IN THE DISTRICT COURT OF THE SEVENTH JUDICIAL DISTRICT

OF THE STATE OF IDAHO, IN AND FOR THE COUNTY OF BINGHAM

JERRY D. BINGHAM and VALERIE H. BINGHAM, Petitioners, vs. IDAHO DEPARTMENT OF WATER RESOURCES, Respondent.	Case No. CV06-26-1801

AGENCY TRANSCRIPT ON APPEAL

Judicial Review from the Idaho Department of Water Resources
Mathew Weaver, Director

RAÚL R. LABRADOR
ATTORNEY GENERAL

JOY M. VEGA
Chief of Energy and Natural Resources Division

GARRICK L. BAXTER, ISB No. 6301
GARRETT F. HENSLEY, ISB No. 12922
Deputy Attorneys General
Idaho Department of Water Resources
PO Box 83720
Boise, Idaho 83720-0098
Telephone: (208) 287-4800
Facsimile: (208) 287-6700
garrick.baxter@idwr.idaho.gov
garrett.hensley@idwr.idaho.gov

Attorneys for Respondent

Reed W. Larsen
COOPER & LARSEN CHARTERED
151 N. 3rd Ave., Suite 200
Pocatello, Idaho 83201
reed@cooper-larsen.com

Bradley R. Cahoon
DENTONS DURHAM JONES PINEGAR P.C.
111 S. Main St., Suite 2400
Salt Lake City, Utah 84111
brad.cahoon@dentons.com

Damien M. Schiff
PACIFIC LEGAL FOUNDATION
555 Capitol Mall, Suite 1290
Sacramento, California 95814
dschiff@pacificlegal.org

Attorneys for Petitioners

Travis L. Thompson
Abby R. Bitzenburg
PARSONS BEHLE & LATIMER
PO Box 63
Twin Falls, Idaho 83303-0063
tthompson@parsonsbehle.com
abitzenburg@parsonsbehle.com

Attorneys for Pending Intervenors A&B Irrigation District, Burley Irrigation District, Milner Irrigation District, North Side Canal Company, and Twin Falls Canal Company

Norman M. Semanko
Garrett M. Kitamura
PARSONS BEHLE & LATIMER
800 W. Main St. Suite 1300
Boise, Idaho 83702
nsemanko@parsonsbehle.com
gkitamura@parsonsbehle.com

Attorneys for Pending Intervenors American Falls Reservoir District #2 and Minidoka Irrigation District

Thomas J. Budge
RACINE OLSON, PLLP
PO Box 1391
Pocatello, Idaho 83204
tj@racineolson.com

Attorney for Pending Intervenor Idaho Ground Water Appropriators, Inc. (IGWA)

Sarah A. Klahn
Maximilian C. Bricker
SOMACH SIMMONS & DUNN, P.C.
1155 Canyon Blvd., Suite 110
Boulder, CO 80302
sklahn@somachlaw.com
mbricker@somachlaw.com

Attorneys for Pending Intervenor City of Pocatello

BEFORE THE DEPARTMENT OF WATER RESOURCES

OF THE STATE OF IDAHO

IN THE MATTER OF DISTRIBUTION OF	)
WATER TO VARIOUS WATER RIGHTS	)
HELD BY OR FOR THE BENEFIT OF A&B	) **DOCKET NO.**
IRRIGATION DISTRICT, AMERICAN	) **CM-DC-2010-001**
FALLS RESERVOIR DISTRICT #2,	)
BURLEY IRRIGATION DISTRICT,	)
MILNER IRRIGATION DISTRICT,	)
MINIDOKA IRRIGATION DISTRICT,	)
NORTH SIDE CANAL COMPANY, AND	)
TWIN FALLS CANAL COMPANY	)
_____	)

BEFORE

HEARING OFFICER: GARY SPACKMAN

VOLUME I

Date: **June 6, 2023 - 9:03 a.m.**

Location: **Idaho Department of Water Resources**
322 East Front Street
Boise, Idaho

REPORTED BY:

COLLEEN P. DOHERTY, CSR 345

Notary Public

APPEARANCES:

For the City of Pocatello:

SOMACH SIMMONS & DUNN, P.C.
BY MS. SARAH A. KLAHN
MR. MAXIMILIAN BRICKER
1155 Canyon Street, Suite 110
Boulder, Colorado 80302
sklahn@somachlaw.com
mbricker@somachlaw.com

For the Cities of Bliss, Burley, Carey, Declo, Dietrich, Gooding, Hazelton, Heyburn, Jerome, Paul, Richfield, Rupert, Shoshone, and Wendell:

McHUGH BROMLEY, PLLC
BY MS. CANDICE M. McHUGH (Present Remotely)
BY MR. CHRIS M. BROMLEY
380 South 4th Street, Suite 103
Boise, Idaho 83702
cmchugh@mchughbromley.com
cbromley@mchughbromley.com

Attorney for City of Idaho Falls and City of Ammon:

HOLDEN, KIDWELL, HAHN & CRAPO, PLLC
BY MR. ROBERT L. HARRIS
1000 Riverwalk Drive, Suite 200
Idaho Falls, Idaho 83405-0130
rharris@holdenlegal.com

APPEARANCES (Continued):

For Idaho Ground Water Appropriators, Inc.:

RACINE OLSON, PLLP
MR. THOMAS J. BUDGE
BY MS. ELISHEVA M. PATTERSON
201 E. Center Street
Pocatello, Idaho 83204
tj@racineolson.com
elisheva@racineolson.com

For Ground Water Districts:

RIGBY ANDRUS & RIGBY LAW, PLLC
BY MR. JERRY R. RIGBY
25 North Second East
Rexburg, Idaho 83440-0250
jrigby@rex-law.com

For Bonneville-Jefferson Ground Water District:

OLSEN TAGGART PLLC
SKYLER C. JOHNS
1449 E 17th Street
Idaho Falls, Idaho 83403
sjohns@olsentaggart.com

APPEARANCES (Continued):

For Bingham Ground Water District:

DYLAN ANDERSON LAW
BY MR. DYLAN ANDERSON
P.O. Box 35
Rexburg, Idaho 83440
dylan@dylanandersonlaw.com

For the Surface Water Coalition, Twin Falls Canal Company, North Side Canal Company, and Milner Irrigation District, A & B, Burley Irrigation District:

MARTEN LAW
BY MR. JOHN K. SIMPSON
BY MR. TRAVIS L. THOMPSON
101 S. Capitol Boulevard, Suite 305
Boise, Idaho 83701-2139
jsimpson@martenlaw.com
tthompson@martenlaw.com

For the Minidoka Irrigation District, AFRD#2:

FLETCHER LAW OFFICE
BY MR. W. KENT FLETCHER
1200 Overland Avenue
Burley, Idaho 83318-0248
wkf@pmt.org

APPEARANCES (Continued)

For the Department of Water Resources:

OFFICE OF ATTORNEY GENERAL

IDAHO DEPARTMENT OF WATER RESOURCES

BY MR. GARRICK BAXTER (Present Remotely)

BY MR. PETER WOOD

322 E. Front Street

Boise, Idaho 83720-0098

garrick.baxter@idwr.idaho.gov

I N D E X

W I T N E S S E S

TESTIMONY OF JENNIFER SUKOW	PAGE
Direct Examination by Mr. Wood	37
Cross-Examination by Ms. McHugh	39
Cross-Examination by Ms. Klahn	60
Cross-Examination by Mr. Budge	63
Cross-Examination by Mr. Harris	88
Cross-Examination by Mr. Anderson	95
Cross-Examination by Mr. Simpson	96
Redirect Examination by Mr. Wood	103
TESTIMONY OF DAVID COLVIN	
Direct Examination by Mr. Thompson	106
Cross-Examination by Mr. Bricker	110
Cross-Examination by Mr. Budge	116
TESTIMONY OF MATTHEW "MATT" ANDERS	
Direct Examination by Wood	119
Cross-Examination by Ms. Klahn	124
Cross-Examination by Mr. Anderson	150
Cross-Examination by Mr. Harris	161
Cross-Examination by Mr. Budge	166
Cross-Examination by Mr. Bromley	213

I N D E X (Continued)

TESTIMONY OF MATTHEW "MATT" ANDERS	PAGE
Cross-Examination by Ms. McHugh	216
Cross-Examination by Mr. Thompson	219
Redirect Examination by Mr. Wood	222
Recross-Examination by Mr. Budge	224

E X H I B I T S

EXHIBIT NO. AND DESCRIPTION	MARKED	RECEIVED
Exh 300 - 4/21/2023 Fifth Amended Final Order	40	59
Exh 301 - 4/21/2023 Final Order Regarding April 2023 Forecast Supply	42	59
Exh 318 - 11/28/2022 IDWR, SWC Methodology	48	51
Exh 305 - 4/20/2022 Final Order Regarding April 2022 Forecast Supply	57	59
Exh 914 - 20221223 IDWR Preliminary Recommendations	65	
Exh 197 - Attachment 1 - IGWA Proportionate Share Modeling	76	

I N D E X (Continued)

E X H I B I T S

EXHIBIT NO. AND DESCRIPTION	MARKED	RECEIVED
Exh 929 - Depo Exhibit 18, CM Rules	80	
Exh 126 - Depo Exhibit 8, 20230503 Baxter Email Re: GWD Mitigation Obligations	84	
Exh 3 - Ground Water Expert Report - 2023 Methodology	107	109
Exh 306 (Exh 135) - 4/19/2016 Fourth Amended Final Order	116	135- 135 306- 149
Exh 324 - 2/19/2015 Proposed Modification to Method for Determining Reasonable In-Season Demand (Anders Dep Exhibit 13)	133	148
Exh 325 - 12/1/2022 Proposed Modification to Method for Determining Reasonable In-Season Demand (Anders Dep Exhibit 14)	137	148
Exh 362 - Copy of Contract Between State Board of Land Commissioners and Twin Falls Land & Water Company, 1/2/1903	145	

I N D E X (Continued)

E X H I B I T S

EXHIBIT NO. AND DESCRIPTION	MARKED	RECEIVED
Exh 914 - 20221212 IDWR Prelim Recommendation	157	
Exh 915 - 20230116 Cities Comments on SWC Methodology Recommendation	179	180
Exh 916 - 20230116 Lynker Memo Re: IDWR Staff Recommendations	179	180
Exh 103 - 2015 Technical Memo from Liz Cresto and Anders to the Director	182	186
Exh 901 - 20221117 Forecast Supply SWC TWG	184	
Exh 928 - Depo Ex 17, 20221201 NRT Metric SWC TWG 12/1/22 with Supplemental Slides	202	
Exh 929 - Depo Exhibit 18, CM Rules	207	
Exh 118 - 20230116 SWC Comments to IDWR Re: Methodology Update	219	230

THE HEARING OFFICER: Welcome everyone, old acquaintances. I have to characterize most of you in that category. We're set up a little differently than we normally set up. And I'm not sure I like it. Many of you seem to be in distant view from this location. So it seemed to me, we needed at least in the past have been a little more intimate in another set up. We arranged the furniture this way, because we have some people participating electronically online in remote locations, and we want to make sure that everybody can see the screens, including the Hearing Officer and reporter. So that's the reason for the change.

This is the time and place scheduled for a hearing regarding the issuance of a Fifth Methodology Order in the Surface Water Coalition delivery call case. And probably the first matter of business is to introduce everyone here and call roll.

So let's start, and we have a court reporter here, that is familiar to many. Colleen, if you would introduce yourself. And then we'll go across the front and go row by row.

THE REPORTER: Colleen Doherty, with M&M Court Reporting.

THE HEARING OFFICER: I might just add that Colleen has been participating in enough of these

hearings that she probably is developed some expertise in the vernacular of water. And so we appreciate M&M Court Reporting and their help.

I'm Gary Spackman, the Director of the Idaho Department of Water Resources.

MR. WOOD: Pete Wood, attorney for the Department.

THE HEARING OFFICER: Let's start with you, Travis, and then wind through.

MR. THOMPSON: Travis Thompson with Marten Law, attorney for A & B Irrigation District, et al.

MR. FLETCHER: Kent Fletcher, attorney for Minidoka Irrigation District, and American Falls Reservoir District No. 2.

MR. BRICKER: Max Bricker with Somach Simmons & Dunn, on behalf of the City of Pocatello.

MS. KLAHN: Sarah Klahn with the Somach Simmons & Dunn, also for the City of Pocatello.

MR. BROMLEY: Chris Bromley with McHugh Bromley for the Coalition of the Cities, the Cities, et al.

MR. HARRIS: Rob Harris with Holden, Kidwell, Hahn & Crapo, on behalf of the City of Idaho Falls.

MR. CONTOR: Bryce Contor at Rocky Mountain Environmental with the Idaho Ground Water District.

MR. SULLIVAN: And I'm Greg Sullivan with Spronk Water Engineers on behalf of the ESPA Cities, and the City of Pocatello.

MR. JOHNS: I'm Skyler Johns with Olsen Taggart, and I represent Bonneville-Jefferson Ground Water District.

MR. ANDERSON: Dylan Anderson, Bingham Ground Water District.

MR. BUDGE: TJ Budge with Racine Olson, Idaho Ground Water Appropriators.

MS. PATTERSON: Elisheva Patterson, Racine Olson, also with the Idaho Ground Water Appropriators.

MR. SIMPSON: Good morning. John Simpson with Marten Law, with A & B Irrigation District, et al.

MR. COLVIN: Dave Colvin with LRE Water representing IGWA.

MR. RIGBY: Jerry Rigby, Ribgy Andrus & Rigby, representing three of ground water districts in IGWA.

THE HEARING OFFICER: Then in the back if you'll speak up loudly.

MS. SUKOW: Jennifer Sukow, Idaho Department of Water Resources.

MS. FERGUSON: Kara Ferguson, Idaho Department of Water Resources.

MR. ANDERS: Matt Anders, IDWR.

MR. JACKSON: Al Jackson with the Bingham Ground Water District.

THE HEARING OFFICER: Thank you, Al.

Okay. Now, we need to call roll for those who are participating remotely. So let's start. And I'll just look at the screen. Sarah, are you there?

MS. McHUGH: Thank you. You mean, Candice.

THE HEARING OFFICER: Candice, did you speak?

MS. McHUGH: Yeah. I wasn't sure if you meant Sarah or Candice. Because we have Candice and Sophia, I think who are remote.

THE HEARING OFFICER: And we have some others who are listening in. I don't think I'll call the roll for all of those folks. Are there other attorneys who are participating? And we have at least one expert witness participating.

MS. SIGSTEDT: Sophia Sigstedt with Lynker on behalf of IGWA.

THE HEARING OFFICER: Thank you, Sophia.

Okay. I don't know unless there is a need for me to call for others who may be listening in. So the instructions that we sent out regarding electronic participation would be that Candice McHugh and Sophia will be participating in the hearing and either will examine or offer testimony remotely. Everyone else is

just listening in, and those folks are not participants in the hearing. And you will be muted for the entirety of the hearing. So that's the instruction. And it's a management requirement for me. Otherwise we would have too many people speaking, and those who are not at least officially parties to this matter.

Okay. Let me just check and see if we have everyone. I know there are attorneys --

MS. McHUGH: Director, this is Candice. Can I ask --

THE HEARING OFFICER: Yes, Candice.

MS. McHUGH: I don't know when everyone is speaking if they make objections or something like that. Travis and Kent were fairly, I could hear them fairly well, but Max, Chris, I couldn't hear them, or Jerry Rigby very well. So just kind of wanted to make sure people were by the mics.

THE HEARING OFFICER: Okay. Well, Candice, since you raised this issue. So we have a room microphone that's set up, I think overhead for the attorneys. But when an attorney is examining a witness, we would like you to come forward. There is a table in front. And you can deposit your exhibits or other materials on the table. You have a choice of either examining from the lectern or the table, itself. There

is a microphone set up in each of those. And the witness will be here to my right.

So hopefully the physical arrangement will promote a verbal dialogue that everybody can hear. But if there are objections from the attorneys, we'll ask that you speak up very loudly, so that the microphone will pick up your voice. And so those participating remotely can hear, and the court reporter can record the objection and any of the exchange. So we'll have to be mindful of the need to be outspoken in these discussions today.

All right. Let me just look at this list again. The Bureau of Reclamation is not represented, but they've been observers more than anything. Okay. I think we have all of the parties represented today.

All right. There are some preliminary matters that we need to talk about. And some either requests or petitions that are pending in front of the Hearing Officer right now. So there is a request for issuance of a subpoena to Mat Weaver and Tony Olenichak to testify as witnesses -- hello -- maybe just a vocal glitch.

And so there is a request that the Hearing Officer or the Director issue subpoenas for Mat Weaver and Tony Olenichak. And because of the timing of those

requests, and because of the nature of the testimony at least is as anticipated. I have prepared or am preparing an order denying that request to issue subpoenas to those two folks. And I'll issue that shortly and will distribute it by hand.

I also have a motion to limit testimony that's pending. And the ground water users, I don't think have had a response or an opportunity to respond. That motion I think came in within the last couple of days. Is there some desire on the part of the petitioners and the ground -- the other -- well, I shouldn't say the ground water users, although I think that's who might oppose the motion.

Petitioners, do you wish to orally present any information at this stage?

MR. THOMPSON: This is Travis Thompson, Director. Just briefly. We filed this yesterday after looking at the list of the witnesses, proposed testimony, and exhibits. And I guess similar to prior hearings in this matter where parties have requested a hearing on the Director's order, in this case the Fifth Order and the As-Applied Order, we think that the scope of that hearing should be limited to those issues identified there.

It looks like to me that we're attempting to

go back and redo an administrative hearing we had in 2008. That was then subject to a final order and then judicial review. We attached a copy of Judge Wildman's decision to Exhibit A to our motion that comprehensively addresses the methodology.

So that was the basis for our motion. I don't have real specifics right now. But I guess as we go through this hearing, we would like a standing objection that if we go beyond the scope of those two orders and issues that are pertinent before the Department, that we would limit that. Thank you.

THE HEARING OFFICER: Responses? Mr. Budge.

MR. BUDGE: Thank you, Director. TJ Budge on behalf of the IGWA, Idaho Ground Water Appropriators. I guess to begin, the parties did file their statements of issues in this case a month ago. So it's a bit peculiar that we got this served on us the day before the hearing as we're traveling to Boise. We have not had a lot of time to prepare for it. But I do want to share just a few thoughts.

If we're going to follow the Coalitions line of reasoning, then the transition from a transient steady state to a transient state model is res judicata. A transient state model was at issue in the earlier hearing in the context of carryover storage. And so

it's certainly something the parties were aware of. It was an issue that could have been litigated in that proceeding. And if that is barred by res judicata, then that component of the Fifth Methodology Order must, you know, be reversed.

Also, acreage was litigated in that prior proceeding, and the Department accepted the acreage evidence presented by the junior ground water users. We were successful in that. And that would also be res judicata.

So if we're going to go that way, we really have to identify what issues are on the table, because it's not a one-way street. You don't get to change just the components that you like, and then claim it's res judicata, so the components you don't like. That's probably not the right approach. And the reason is is that the methodology order is required by law to be based on the best science available. And science changes, facts change, circumstances change. It's not a traditional court order that is locked in place forever. It's more of a living document.

And so if we're going to look at more recent data, if we're going to consider changes in science, then we have the ability to look at all components of the methodology and see, is there a compelling reason to

change any of the components based on experience, science, and recent data.

So for those reasons, we'd ask that the court deny the motion, or the Director deny the motion.

THE HEARING OFFICER: Other responses? Mr. Harris.

MR. HARRIS: Thank you, Director. Ralph Harris on behalf of the City of Idaho Falls. Just to add to what TJ said, we haven't had the chance to research the matter in depth.

But I would draw the Director's attention to the Idaho Supreme Court case of Erickson versus Amoth, which provides the following. Generally the doctrine of res judicata extends only to facts and conditions as they existed at the time the judgment was rendered. And ordinarily res judicata does not apply where there were changed conditions and new facts, which did not exist at the time of prior judgment.

The general view is that where after the rendition of a judgment, subsequent events occur creating a new legal situation, or altering the legal rights relations of the litigants, the judgment may thereby be precluded from operating as an estoppel.

As Mr. Thompson mentioned, the original order was issued in 2008. There have been change

circumstances. In fact, I believe you indicated that was one of the primary reasons you were looking at updating the Fifth Methodology Order. And so for that reason, we think all issues are on the table here today. Thank you.

THE HEARING OFFICER: Other statements?

MR. ANDERSON: Yes.

THE HEARING OFFICER: Dylan, Mr. Anderson.

MR. ANDERSON: Just briefly, Director. One of the things that was called out specifically was something that we intend to introduce as part of Bingham Ground Water refers to, you know, the economic impacts. And the Clear Springs Food, Inc. case was cited in that. And I just wanted to just go on into that case. It introduced, or the Springs Food case quoted the AFRD case.

And it just said somewhere between the absolute right to use a decreed water right and an obligation not to waste it, and to protect the public's interest in this valuable commodity lies an area for the exercise of discretion by the Director. In that sense, the court recognized some discretion by the Director to look at the reasonableness of diversions, look at the reasonableness of what's required by the senior water right holder. I think that the changes contemplated in

the Fifth Methodology certainly would change the reasonableness required by the Department in a sense if you are potentially curtailing ten-fold acreage. The economic impact is increased ten-fold, or actually even exponentially more than ten-fold as it compounds. And so I think that is certainly relevant data for the Department to have, and to understand, and consider in their reasonableness calculations.

The sections that were quoted are not necessarily pertaining to limiting any economic information before the Department. And certainly the Supreme Court didn't deem it inadmissible or completely irrelevant. They just simply didn't use that information for that particular argument.

So we'd join in the rest of the arguments already stated. Thank you, Director.

THE HEARING OFFICER: Other statements?

Okay. As I understood what you presented, Mr. Thompson, you were asking for a standing objection. As I look through the list of witnesses and also the issues, it seems to me that many of the witnesses may be called to testify about the economic impacts of curtailment. And as I read -- well, first of all, as I look at the methodology order and component facts that contribute to the development and to the writing of the

Fifth Methodology Order, economics was not a part of the underlying facts that were considered. And, in fact, the decisions as I read them that have been issued, stated that economic impact and a comparative analysis of economics is not part of prior appropriation administration.

And so I guess what I'm trying to say is, the testimony that I receive in this particular hearing will be limited to the factual components that were a part of the development and writing of the Fifth Methodology Order. And economics were not a part of those facts.

And, in fact, as I read the court decisions, the court has said that the economic comparison would actually frustrate and thwart the administration of water under the prior appropriation doctrine. And so I will cut short in the examination, presentation on the respective economic benefits or the economic impacts of possible curtailment under the Fifth Methodology Order.

Now, there may be other areas that exploration that are outside of the methodology order, itself, and those areas if there is examination regarding those areas, I will allow objections. And will rule on those objections depending on the relevance to the Fifth Methodology Order.

So I'm trying to at least set some boundaries

as to the scope of examination. And there may be other areas beyond economics. But it seemed to me that at least the focus on economic issues in looking at the list of witnesses and the issues is not appropriate in this particular hearing. Okay?

All right. I don't know that I have any other issues that are pending right now. There may be some additional motions that the parties want to offer, and bring before the Hearing Officer at this point. Are there motions, and pre-hearing motions that the parties wish to offer up?

Wow. You're an agreeable crowd.

All right. Let's talk about exhibit numbering. There is a little confusion about it. There were specific ranges of numbers that each of the parties were assigned. And I think there has been some adjustment in that numbering.

Mr. Budge, you may have gone over your range that was my understanding. But I think the parties had recognized that renumbering. But I think just recently there has been an attempt to try to consolidate exhibits.

And I just want to know how the parties want to address that attempted consolidation.

Elesheva.

MS. PATTERSON: Good morning, Director. Yes, as you can see behind you, there is a lot of paper. And so IGWA filed its initial disclosures. We exceeded our allotted range. And so we also used the 800 numbers. Later after all of the initial disclosures were made, our staff went through and tried to identify common exhibits and numbered those as 900, which were unique, in an attempt to save paper and try to simplify things. And so we have disclosed that to all the parties. I have not received any objection to the amended pre-trial disclosures. But will respond to them if there is any objections.

THE HEARING OFFICER: What do the parties want to do?

Mr. Fletcher?

MR. FLETCHER: Director, it might be helpful to just recite, if you remember, I don't know if you remember the ranges that go to each classification. So that the Director is aware of that.

MS. PATTERSON: IGWA was assigned the 100 to 199 numbers. And so we do have documents that range from Exhibit No. 100 to 199. Some of those have been removed. And now are labeled as common exhibits. And then we also have exhibits labeled 800 to 837. And again, some of those in the amended pre-trial disclosure

were removed. And so this will not be a continuous list, but all documents are uniquely identified for the record. And common hearing exhibits --

MS. McHUGH: Elesheva, this is Candice. Did you send us that? In my examination, I just have four exhibits that I refer to in the 300 series. I'm guessing that they have now been renumbered to the 900 series. But I think I'm just going to keep them with the 300 series, because I'm at a little bit of disadvantage not having paper to be able to look through, or I could just tell you what they are, and someone could tell me if they are the 900 series, and I can change the exhibit numbers, but...

MS. PATTERSON: So that is one issue --

MS. McHUGH: I think that might be confusing.

MS. PATTERSON: That is one issue with the common exhibits. So IGWA did send out an amended exhibit list where we had removed from our exhibits those that became common. But I don't know that the Cities and other parties were able to do so. But I think as long as we're all identifying, you know, our submitted document, we can keep the record straight.

And, Candice, you can use the common exhibits if you would like. And I can try to send you an updated numbering for those to keep things simple.

THE HEARING OFFICER: Let me just add that Sarah Tschohl, a paralegal in our office, she has compiled a list of exhibits for me. And she has identified those exhibits that were also designated as common exhibits.

And for the benefit of Candice McHugh, I don't show any of the McCain Foods exhibits as being common exhibits at least in my summary.

MS. PATTERSON: I think that's correct. We had some exhibits that were common with Bonneville-Jefferson and with the Cities exhibits. But I don't think we had any in common with the McCain Foods or the Coalition.

THE HEARING OFFICER: So, Candice, in answer to your question, at least in my summary, your exhibits are numbered 600 through 604. And none of them are common exhibits.

MS. McHUGH: Thank you, Mr. Director. First of all, well, I think the Amalgamated's were 600 through 604, or I mean McCain's. And Amalgamated's were 700 to 703. But I will be examining Jennifer using Coalition exhibits 300, 301, 305, and 318. And I think those are probably Coalition of Cities or -- yeah, the Cities Exhibits 300, 301, 305, and 318. And those are the four exhibits I was specifically talking about.

THE HEARING OFFICER: Well, some of those are common.

MS. McHUGH: Right.

MS. PATTERSON: Candice, if you want to refer to -- Candice, if you want --

MS. McHUGH: Tell me what number to refer to, and I'm good with it.

MS. PATTERSON: I think since we'll be moving into Jennifer Sukow's --

(Interruption had in the proceeding.)

THE HEARING OFFICER: Sarah Tschohl, are you there? Somebody wasn't muted.

MR. HARRIS: I think it's Katie, whoever Katie is.

THE HEARING OFFICER: I don't know who Katie is.

MS. PATTERSON: Yeah, Katie, please mute your mic.

THE HEARING OFFICER: Sarah, can you impose your draconian hand and mute Katie?

MS. PATTERSON: I think she addressed the issue.

THE HEARING OFFICER: Okay.

MS. PATTERSON: Candice, what I was going to suggest since we're starting out with Ms. Sukow first,

and your exhibits that you referenced for the Cities are responsive to that portion of the testimony. Please use those. And we'll just, if we have follow up, we'll refer to the Cities exhibits as IGWA reserve the right to use any exhibits produced by any party.

THE HEARING OFFICER: Okay. So without any objection, we'll introduce, if we can, the numbered exhibits that have been identified as common with the numbering identified by IGWA in the 900 series. Is that acceptable to everyone? And I could supply this cross-reference list if people want this list. If it would be beneficial, we could copy it?

MR. BROMLEY: That would be.

MS. KLAHN: Yes.

THE HEARING OFFICER: So at the first break, I'll ask to have this copied and distributed to all of the parties. And we'll be able to refer to a common list of exhibits if that's okay, Elesheva?

MS. PATTERSON: Yes. Thank you, Director.

THE HEARING OFFICER: Mr. Thompson.

MR. THOMPSON: Just to clarify. We're stipulating to the numbering, and not the actual exhibits themselves; is that correct?

THE HEARING OFFICER: That's correct.

MR. THOMPSON: Okay.

THE HEARING OFFICER: My next question was, have the parties stipulated to the admission of any of the exhibits that have been identified? And if they haven't, maybe there is an opportunity as we go through to stipulate to the admission of some of those. It would speed up the hearing significantly if for every exhibit, we didn't have to move for admission.

MR. THOMPSON: I think that would be our intent to try and do that. We haven't gone through the entire list of the other parties yet. But the ones we'll admit to, we'll stipulate to.

THE HEARING OFFICER: Okay. All right. I have in front of me -- I'll change subjects and not talk about exhibits, unless there is more discussion regarding the exhibits, numbering, and possible stipulation.

All right. I want to move to a proposed witness schedule that has been offered to the parties. And at least my understanding is there has been some discussion about the witnesses, and the order in which they'll be called. And I want to refer back to a discussion about the days that were scheduled for hearing.

It was my intent that we would attempt to finish this hearing in four days, on Friday. And then

Saturday was reserved for any spillover. And I have on this list six witnesses for Saturday, the 10th of June. And I want everybody to know, that I intend to try and finish on Friday. Because I don't want to have an incomplete hearing come Saturday.

And so I will compress this list of witnesses and the days that the witnesses will appear and testify. And if I find that we're getting behind, I will hold you over. And we will start early. Because I want to ensure that we finish, and at least attempt to finish by Friday.

And if you can keep me apprised of some of these witnesses who may or may not testify as we proceed through the hearing, I would appreciate it. I don't want to hold you over, and then finish on Thursday at noon. It would be great, I guess. But I want everybody to know that I want to finish. And my goal is to finish on Friday.

MS. KLAHN: Mr. Director.

THE HEARING OFFICER: Yes.

MS. KLAHN: Sarah Klahn for the City of Pocatello. On the list that you have, Sophia Sigstedt and Greg Sullivan, the order there is flipped. So Mr. Sullivan will go before Sophia, and after Mr. Barlogi, just an FYI.

THE HEARING OFFICER: That would be great. And I appreciate the parties honestly coordinating and figuring out who will be available on which days, so that we can accommodate people as best we can. So I appreciate everybody's efforts. And there may need to be some adjustment because of availability or unavailability.

We had to get Jennifer Sukow excused from jury duty by the way, and issue her a subpoena. So that she could then go present it to the folks at the county, so that she could be here.

Candice, were you wanting to say something?

MS. McHUGH: Yes. I'm sorry. I think there is just a slight delay. And you kind of addressed it. I just wanted to note for the record that McCain's witness, Scott King, and Amalgamated's is Dean Delorey, they are available Friday. So they need to go on Friday. Mr. King might have a little more flexibility, but he's checking his schedule. But Mr. Delorey does not. So regardless, I would ask that they be set for Friday. I expect their testimony to be less than ten minutes. So it would be really quick.

THE HEARING OFFICER: Okay. I also notice on the screen that Katie continues to appear. And I'm assuming that means that she is not muted.

Candice is now there. But Katie was on the screen earlier. So I would ask whoever Katie is, will you please mute your microphone.

And, Sarah Tschohl, if you can control with the Draconian hand, I would appreciate it as well.

Mr. Fletcher, you had a comment.

MR. FLETCHER: I just wanted to clarify the switch in witness order. Is Greg Sullivan going before Delorey?

MS. KLAHN: No. No. Sophia and Greg are switching. That's all.

MR. FLETCHER: Okay. Thank you.

THE HEARING OFFICER: Okay.

MR. THOMPSON: Mr. Director, one point on that list. We do have Justin Temple at some point, probably Friday, not very long, ten minutes. But that will be added.

THE HEARING OFFICER: I expect to have some flexibility in this witness schedule. Particularly if I'm trying to compress. So if the parties will just keep me apprised of what's happening, and keep everybody else apprised, then we'll be able to keep to a semi-rigid schedule. Again, I appreciate everybody's efforts.

Okay. Are there other matters we need to take

up this morning?

Let's talk about the order of questioning. So because this is a hearing that a Hearing Officer and the Director initiated, and because at least the Department's witnesses do not have documents that they prepared, and specifically for the hearing, itself. Often the Hearing Officer will ask for a staff memo.

We will have then the Department witnesses testify at least as in timing as closely as possible to the beginning of the hearing. Then what I'll do is I'll ask the Surface Water Coalition to question the Department witness shortly after to the extent that there are questions. And then allow the other parties to question the Department witness. And then we'll circle back and allow what I would characterize as redirect based on the questions that are asked.

Now, if that's not an order that the parties want to follow, I want to hear about it today. Particularly from the Surface Water Coalition, if you think it compromises your ability to question the witnesses.

MR. FLETCHER: Just a comment. Mr. Director, most of the questions are going to be raised by the ground water users. And until they ask their questions, we can try to cover the areas we think they're concerned

about it. But it might be more efficient to let them question the witness, and then let us address those issues.

THE HEARING OFFICER: And I don't oppose your proposal.

MR. FLETCHER: I think that would be more efficient. I mean, obviously, we're not the ones contesting most of the issues in the matter.

THE HEARING OFFICER: Any other thoughts?

All right. Well, based on your suggestion, Mr. Fletcher, we'll have the Department witness introduced. And some preliminary information brought into the record or offered by the deputy attorney general here today, Pete Wood. And then we'll ask the ground water users and the other parties aligned with them to question the Department witness. And then there will be an opportunity for questioning.

And then I don't know how to characterize this, whether it's redirect or recross. It's really not either, I suppose in the examination of the Department witnesses. But the ground water users will have two opportunities. And the Surface Water Coalition will have two opportunities. And then we'll be done.

MR. FLETCHER: Thank you.

THE HEARING OFFICER: Fair enough?

MR. FLETCHER: Yes.

THE HEARING OFFICER: And then I would expect with the other witnesses, that we follow a more traditional method of examination. Where the witness testifies, and then there is an opportunity for cross-examination, and redirect, and recross. So it's only with the Department witnesses that I think there is an anomalous presentation of testimony.

Okay. Other matters we need to talk about?

Pete, any matters?

MR. WOOD: Not that I can think of.

THE HEARING OFFICER: Okay. I'm ready for the first witness. Again, let me remind everybody, as you examine, I want you to come forward. Assume either a seat at the table or standing at the lectern, and then you can examine from either place. The witness will be here, seated to my right.

TJ?

MR. BUDGE: Yes. Director, there is one more pretrial matter I forgot about. I think counsel did as well. But counsel for the parties did stipulate that the expert witnesses would be qualified as such without needing to go through, you know, their background, and demonstrate their capabilities to testify as experts.

THE HEARING OFFICER: Yes. Thanks for raising

and identifying the stipulation. So I will accept the stipulation. I'm well acquainted I think with most of the experts, if not all of the experts, who will testify today. And I appreciate the pre-hearing stipulation that will encourage efficiency.

MR. FLETCHER: Yes.

THE HEARING OFFICER: Mr. Fletcher.

MR. FLETCHER: On that issue, Mr. Director, we stipulated to a designated list of expert witnesses. We did not stipulate to a Mr. Olson. And I'm not sure we stipulated to Jaxon for everything as an expert on everything he put in his report, Jaxon Higgs. But the rest of the experts I can think of, I believe we can stipulate to their admission as experts. And the ground water users clarified that to be to the matters contained in their reports.

THE HEARING OFFICER: Okay. Clarification accepted, TJ.

MR. BUDGE: Yes.

THE HEARING OFFICER: All right. Anything else?

Jennifer Sukow, if you'll come forward, please.

JENNIFER SUKOW,

first duly sworn to tell the truth relating to said

cause, testified as follows:

THE HEARING OFFICER: Thank you. Please be seated.

Mr. Wood, you may examine Ms. Sukow.

DIRECT EXAMINATION

QUESTIONS BY MR. WOOD:

Q. Hello, Ms. Sukow. Can you please state and spell your name for the record.

A. Jennifer Sukow, J-e-n-n-i-f-e-r, S-u-k-o-w.

Q. And what is your educational background?

A. I have a bachelor's degree in environmental geology and technology from the University of North Dakota, and a master's of science in civil engineering from Utah State University.

Q. And you are a licensed professional engineer and geologist in Idaho; is that correct?

A. Yes.

Q. And you were currently employed at the Idaho Department of Water Resources?

A. Yes.

Q. And how long have you worked for the Department?

A. About 15 years.

Q. And you are currently a technical engineer for the hydrology section?

A. Yes.
Q. And how long have you been in that position?
A. About 13 years.
Q. I would like to turn to the Fifth Methodology Order. Are you familiar with that document?
A. Yes.
Q. And some of the data in the Fifth Methodology Order you know a lot about; is that right?
A. Some of it, yes.
Q. And you played a role in developing some of that information?
A. Some of the findings of fact, yes.
Q. And that is why the Department has selected you to be a witness today; is that correct?
A. That's my understanding.
Q. And you were aware that on May 5th, 2023, the Director issued a notice advising the parties of two topic areas that you might testify today about?
A. Yes.
Q. And those two topic areas are the following: The first is steady state modeling versus transient state modeling, simulations for the ESPA. And the second is calculations of curtailment priority dates for the Surface Water Coalition's delivery call. Does that sound correct?

A. Yes.
Q. And do you have any concerns that you're unqualified to discuss those topics here today?
A. No.
MR. WOOD: The Department has no further questions at this time.
THE HEARING OFFICER: Thank you, Mr. Wood.
All right. Ground water users, is there an order of examination that you prefer?
MS. McHUGH: Mr. Director, this is Candice. I think I'm slated to go first.
THE HEARING OFFICER: Okay. Ms. McHugh.
MS. McHUGH: Just for some efficiency, could I have the witness handed the Coalition of Cities' exhibits No. 300, the binder for that?
MR. WOOD: Was it 300 through 313?
MS. McHUGH: 300 and then through 318.
THE HEARING OFFICER: The witness has the documents in front of her.
MS. McHUGH: Okay. Thank you.

CROSS-EXAMINATION

QUESTIONS BY MS. McHUGH:
Q. Good morning, Jennifer. Candice McHugh on behalf of the Coalition of Cities and McCain Foods. If you could look at the binder, and grab Exhibit 300.

(Exhibit 300 marked.)

Q. (BY MS. McHUGH) If you could identify Exhibit 300?

MR. THOMPSON: Director, this is the --

THE HEARING OFFICER: Just a moment, Candice.

MS. McHUGH: Okay.

MR. THOMPSON: This is our first overlap. I think this is IGWA's common 918. And if you just want to use that once, or admit it twice in the record. I'm confused on what we're going to do?

THE HEARING OFFICER: So should we refer to this as 918?

MS. McHUGH: Okay. We can --

THE HEARING OFFICER: And one of the concerns I have is that the exhibits, themselves, and the documents, themselves, don't bear those numbers; do they? It's only --

MS. PATTERSON: Not the 900s.

MR. THOMPSON: The 900s do. They are all Bates stamped.

MS. KLAHN: We could substitute.

MS. McHUGH: The other option, not to belabor the record, but if you give her Exhibit NO. 918, 919, and 920. And if someone could tell me what 900 series the April 2022 forecast supply order is, I could also

use that 900 number. But I just don't -- from the descriptions, from IGWA's descriptions, I can't tell what 900 number that is.

MR. BUDGE: So Candice 918 is the Fifth Methodology Order.

MS. McHUGH: Uh-huh.

MR. BUDGE: And 919 is the As-Applied Order.

MS. McHUGH: Right. I'm looking for -- I know that. I need the April 2022 As-Applied Order number in the 900 series.

THE HEARING OFFICER: All right. Let's go off the record.

(Off the record.)

THE HEARING OFFICER: Are we ready to go back on? We're recording again. Thank you, Colleen.

All right. Candice, if you will refer to the exhibits you want the witness to review. And we're expecting exhibits in the 300 series.

MS. McHUGH: Great. Thank you.

Q. (BY MS. McHUGH) Good morning, Jennifer. We'll start again. In front of you, you should have Exhibit No. 300. Can you identify that document?

A. It's the "Fifth Amended Final Order Regarding Methodology for Determining Material Injury to Reasonable In-Season Demand and Reasonable Carryover."

(Exhibit 301 marked.)

Q. (BY MS. McHUGH) Okay. And if you could just flip in that binder to Exhibit 301, and identify that exhibit?

A. It's the "Final Order Regarding April 2023 Forecast Supply."

Q. And can you just provide a brief explanation as to what your role was in creating Exhibits 300 and Exhibit 301?

A. In Exhibit 300, I assisted with writing findings of fact relating to the ESPA ground water flow model and calculation of a curtailment priority date for the delivery call. And in Exhibit 301, I did the calculations of the curtailment priority date and the proportionate shares for A & B and IGWA. And I inserted that information in the draft of the order.

Q. Okay. And so if I understand you correctly, once the Director determined that there was shortage to Twin Falls Canal Company, you determined that December 31st, 1953 would be the appropriate curtailment date; is that correct?

A. That's correct.

Q. And the expectation was if water users junior to the December 31st, 1953 were curtailed, you would expect approximately 75,000 acre-feet of water would

accrue to Twin Falls Canal Company; is that correct?

A. We would predict with the model that approximately 75,000 acre-feet would accrue to the near Blackfoot to Minidoka reach between May 1 and September 30th of this irrigation season.

Q. Okay. And Twin Falls Canal Company's water supply is supplied by that reach of the river; is that true?

A. Yes, they have a natural flow that is diverted from that reach of the river.

Q. Okay. And in determining the curtailment date, and the amount of water that would accrue to the Twin Falls Canal Company, you used the model in a transient mode; is that true?

A. Yes, I did a transient simulation as described in the Fifth Methodology Order.

Q. Okay. And if you could look at Exhibit 300 on page 2. And do you see the paragraph there that says that the Department has had additional, and many years to understand the impact of applying steady state modeling? Do you see that paragraph there?

A. Yes.

Q. And you didn't write this paragraph; did you?

A. No, I didn't write it. I think I was asked to look at it, and I edited a couple words in one of the

sentences just to make it technically correct.

Q. Okay. When you first started with the Department roughly 13 years ago, you knew the difference in impacts when you started with the Department between the output from a steady state model and a transient state model; is that correct?

A. Yes.

Q. And your predecessor Allan Wylie also knew the difference in model output between a steady state output and a transient model output; correct?

A. Yes.

Q. And changing from a steady state model to a transient model to predict curtailment date, wasn't a decision in the Fifth Methodology Order, Exhibit 300, based on technical information; was it?

A. Well, I was asked to prepare technical information about the change from steady state to transient, and I did present that technical information to the technical working group and the Director.

Q. I guess my question is, the change from going from a steady state model that had happened for the prior at least 13 years since you've been with the Department, to this year to the move to a transient model, the impetus for that was not a technical decision; correct?

A. It was the Director's decision. I do not know what the impetus was.

Q. Do you believe that it was a technical decision?

A. I don't know.

Q. Do you recall the deposition that I took of you a couple of weeks ago, Jennifer?

A. Yes.

Q. And in that deposition I asked what the impetus was for changing from a steady state model to a transient model in 2023. Do you recall that?

A. Not specifically.

Q. Okay. Well, we'll come back to that in a minute. Were you told why the administrative decision to change from a steady state model to a transient model was implemented in 2023?

A. My understanding is that it is because of direction that the -- direction from the court that the water needs to be provided during the irrigation season at the time and place that it's needed.

Q. And who told you that it was the court that directed that change?

A. I believe Gary Spackman said that.

Q. When we first were at the Department, you understood that the ESPAM model was a transient model;

is that true?

A. The ESPAM model can run simulations in steady state or in transient.

Q. Okay. And the ESPAM model has always been able to run a transient output; correct?

A. Yes, previous versions of ESPAM could also run a transient simulation.

Q. And the current version of the ESPAM model, do you recall when it was implemented or created?

A. I'm sorry. Can you repeat the question?

Q. Yep. The current version of the ESPAM model it's -- maybe I'll do it this way, is 2.2; is that true?

A. Yes.

Q. And ESPAM2.2 when did it first exist?

A. It was finalized in May of 2021.

Q. The current version of ESPAM2 is finalized in May of 2021. And the prior version was ESPAM2.1; correct?

A. Yes.

Q. And when was ESPAM2.1 finalized?

A. It was either the end of 2012 or early in 2013.

Q. Okay. So roughly in 2013 when ESPAM2.1 was updated from the prior version, it was calibrated using monthly stress periods in half-month time steps; is that

true?
A. Yes.
Q. And the current version of ESPAM2.2 also uses monthly stress periods in half-month time steps; correct?
A. Yes.
Q. So prior to 2023, the model was capable of predicting an in-season amount of water that could be expected in the near Blackfoot to Minidoka reach; is that true?
A. Yes.
Q. Because the current version has been able to do that since roughly 2013; correct?
A. Well, I wouldn't say the current version, but the previous version, 2.1 could, yes.
Q. Okay. But there is nothing that changed between 2.1 and the 2.2 version that makes the monthly stress period and the half-month time step different from a transient model standpoint?
A. The time discretization did not change between ESPAM Version 2.1 and ESPAM Version 2.2.
Q. So effectively ESPAM2.2 has always been a transient model?
A. I'm sorry. Repeat that?
Q. So ESPAM 2 and 2.1 -- we'll just say it this

way. So ESPAM2.1 and ESPAM2.2 has always been a transient model; correct?

A. They were both calibrated as transient models, yes.

Q. Okay. In 2023, you understood the difference between the model output for transient versus steady state output; correct?

A. Yes.

Q. And you also understood in 2013, ten years prior, the difference between the model output for transient versus steady state output; correct?

A. Yes.

Q. And since 2013, there were curtailment orders in the surface water delivery call; correct?

A. Yes.

Q. Yet they all used the steady state output; isn't that true?

A. Yes, a steady state simulation was used.

Q. Okay. Even though ESPAM2.1 starting in 2013 through 2021 had the monthly stress periods and half-month time steps capable of being ran in the transient mode?

A. Yes.

(Exhibit 318 marked.)

Q. (BY MS. McHUGH) Could I have you look at

Exhibit 318. Jennifer, can you identify this exhibit?

A. It's a presentation titled "Surface Water Coalition Methodology - calculation of priority dates for curtailment of ground water users."

Q. Is it a PowerPoint presentation that you prepared?

A. Yes.

Q. And the date being November 28, 2022?

A. Yes.

Q. And did you provide this PowerPoint presentation to the Surface Water Coalition technical working group?

A. Yes.

Q. Jennifer, is the exhibit in front of you, does it have page numbers on it or slide numbers?

A. No.

Q. Okay. And so for ease of examination, I'm going to have you like have to thumb through, and I will say like Slide 6, which would essentially be the sixth page of that exhibit. Does that make sense?

A. Yes.

Q. Okay. And if you would just look at that Exhibit 318, is it complete? Is it completely your PowerPoint presentation, are all the slides in that?

A. I don't know. I don't have every page

memorized, so I wouldn't be able to just be able to look at it and know what was missing.

Q. Fair enough. Okay. Can you tell me how many pages it is, just so I'm making sure we have the same exhibit?

A. I have 22 pages.

Q. Okay. And mine has 22 pages, so we're good. Okay. Before we get into the actual pages there, just a little bit of background. Are you aware that there has been a moratorium on new wells without mitigation, so new wells on the Eastern Snake Plain Aquifer since the early 1990s?

A. Yes.

Q. So almost all the wells that withdraw water from the Eastern Snake Plain Aquifer have been pumping for at least 30 years, and some much longer than that; correct?

A. I believe that's correct, yes.

Q. Okay. And if you could look at Slide No. 6 of your Exhibit 318. And Slide No. 6 is a graph that talks about, that shows the steady state conditions. Is that what you see there?

A. It's the time to reach the steady state response.

Q. Okay. And isn't it true that between 90

percent and 99 percent of the impacts of all ESPA pumping on the Snake River flows have been realized?

A. Yes.

Q. And that's what this Slide No. 6 of Exhibit 318 shows that; correct?

A. Yes, it states that in the bullet.

MS. McHUGH: Okay. At this point, I guess I would offer Exhibit 318 as an exhibit, or an offer into the record.

THE HEARING OFFICER: Any objections?

Hearing none, the document marked as Exhibit 318 is received into evidence.

(Exhibit 318 received into evidence.)

Q. (BY MS. McHUGH) Jennifer, continuing on with Exhibit 318, if you could look at Slide No. 13.

THE HEARING OFFICER: Ms. McHugh, it might be helpful rather than just giving us numbers, if somehow we cam identify a title on the page, since the pages are not numbered.

MS. McHUGH: Yes, fair enough.

Q. (BY MS. McHUGH) So on Slide 13, can you read the title of that page?

A. "Comparison of priority dates calculated for April demand shortfall forecasts for May 1 curtailment."

Q. And if you recall, and if you need to look

back at Exhibit 301, which is the 2023 As-Applied Order. Do you recall the amount of water that was forecasted to be short in the 2022 season?

A. Yes.

Q. And that number is roughly 75,000 acre-feet; is that right?

A. Yeah, 75,200 acre-feet.

Q. Okay. And if you look at page No. 13, it says, "Comparison of priority dates calculated." If you look at that graph, based on this slide, curtailment of wells junior to sometime in the mid-1980s would produce roughly 75,200 acre-feet to the near Blackfoot to Minidoka reach of the Snake River in steady state; is that right?

A. Can you --

Q. If you look at the yellow line?

A. So, yeah, if you are looking at the yellow line, a steady state curtailment, which would be a continuous curtailment to the same date every year with a priority date in the mid-1980s would produce approximately 75,000 acre-feet.

Q. So in other words, would you agree that if wells junior to the mid-1980s had never started pumping, there would be an additional 75,200 acre-feet in the river in 2023?

A. Assuming all other aquifer and recharge and discharge occurred the same over those years, then, yes, there should be approximately that additional volume in the reach, in the river reach.

Q. And as a result, without the pumping of those wells junior to the mid-1980s, there would be no forecast shortage for the Surface Water Coalition members in 2023; correct?

A. Yes.

Q. Okay. I'm just going to switch gears for a brief moment. In roughly August of 2022, the Director notified the parties that he was convening a technical working group regarding the Surface Water Coalition delivery call; is that your understanding?

A. Yes.

Q. And how were you notified or told that there was going to be this technical working group?

A. I was told by Matt Anders.

Q. Okay. And did you know which people were told or asked to, or invited to be part of the technical working group?

A. No.

Q. Who made the decision on who would be invited to participate in the technical working group?

A. I don't know.

Q. And when did you first become aware of who was invited to participate in the technical working group?

A. I don't know that I was ever aware of who was invited. My only knowledge is of who was in attendance when I gave the presentation. And I doubt that I even recall who all was in attendance. But I am aware of some of the attendees.

Q. Okay. And when you gave your presentation, which I think you are referring to Exhibit 318, the PowerPoint. Did you do that via Zoom, or some other remote meeting format?

A. I gave the presentation from our conference rooms. But there were some attendees in person and some that were participating remotely.

Q. Okay. And then did you provide the PowerPoint presentation to the technical working group via the Department's website; is that how people got the information?

A. I presented it in the meeting, and I believe -- and I gave a PDF version to Matt Anders, that I believe he sent out to the technical working group. But I did not personally send it out.

Q. Okay. Coming back to Slide 13 in Exhibit 318. This year the Director predicted that approximately 75,200 acre-feet of shortfall was going to Twin Falls

Canal Company. If you look at your graph there on Slide 13 of Exhibit 318, it shows the difference in the number of acres that would be curtailed using a transient model versus a steady state model; correct?

A. Yes, you can determine that information by comparing the different points on this graph.

Q. Okay. And then I think in your presentation you also -- well, let's just stick with this slide first. If you look at the graph there, it shows that in order to get 75,000 acre-feet to Twin Falls Canal Company using a steady state model, the number of acres that would be curtailed is approximately 75,000 acres. Do you see that, or would you agree with that?

A. If you curtailed to the mid-1980s, the acres curtailed would be somewhere in that ballpark, yes.

Q. Okay. And that would show roughly 75,000 acre-feet to the near Blackfoot to Minidoka reach; correct?

A. Well, it would show that that would get there -- that that would be the long-term annual average if that curtailment occurred continuously every year.

Q. Okay. And if you also look at that graph, in order to get 75,000 acre-feet of water to Twin Falls Canal Company during this season in a transient state model, it would require the curtailment of approximately

700,000 acres; is that correct?
A. That's correct.
Q. So nearly ten times as many acres; correct?
A. Roughly, yes.
Q. Okay. Were there any discussions on whether that was a reasonable outcome?
A. I think that was discussed, yes.
Q. And was it discussed with you?
A. To some extent, yes.
Q. And the conclusion was what?
A. The conclusion I think is evident in the Director's order was that the conclusion was that the requirement is to get the water to the reach during this irrigation season and that that was the deciding factor.
Q. Okay. So you agree that in order to get 75,000 acre-feet of water to Twin Falls Canal Company during this irrigation season needing to curtail 700,000 acres is a reasonable outcome?
THE HEARING OFFICER: Okay. Ms. McHugh, I will insert and just state that this line of questioning is not one that Ms. Sukow is qualified to answer.
And I'll instruct the witness not to answer the question. That was not her assignment in developing the data and producing the report that she produced.
MS. McHUGH: Okay.

(Exhibit 305 marked.)

Q. (BY MS. McHUGH) Ms. Sukow, could I have you look at Exhibit 305. And can you identify Exhibit 305 for the record?

A. "Final Order Regarding April 2022 Forecast Supply."

Q. And did you assist the Director in preparing any portion of the April '22 forecast supply?

A. I calculated a curtailment priority date using the ESPA ground water flow model, and I calculated, I believe in this one, yes, a proportionate share for A & B Irrigation District.

Q. Okay. And if I'm correct, the Director predicted that Twin Falls Canal Company would be short approximately 162,000 acre-feet in that order; is that correct?

A. It says 162,600 acre-feet.

Q. Okay. And if you look at Exhibit 318, back to Slide No. 13. How many acres would be curtailed in a steady state model run to supply 162,000 acre-feet of shortage?

A. It's somewhere around 150,000 to 170,000 acres perhaps.

Q. Okay. And if you were to run that same number with transient model output, how many acres would be

curtailed, approximately?

A. Approximately 940,000 acres.

Q. Okay. And if you could turn to Slide No. 15. If I'm looking at Slide No. 15 -- do you have that there?

A. Yes.

Q. And could you give me the title of that slide?

A. "Predicted response to May 1 curtailment of water rights junior to October 11, 1900."

Q. And this slide shows that if you curtailed back to a 1900 priority date, the April to September accrual to the reach that supplies Twin Falls Canal Company would be approximately 97,700 acre-feet; is that correct?

A. Yes.

Q. Isn't it true that if you curtail all the ground water users starting May 1st of any given year, that the maximum amount of water that accrued that season would be 97,700 acre-feet to that reach?

A. That is the predicted volume to accrue from curtailing all of the ground water users junior to October 11th, 1900 within the area of common ground water supply.

MS. McHUGH: Okay. I don't have any further questions. Thank you, Jennifer.

THE HEARING OFFICER: Okay. Thank you, Ms. McHugh.

MS. McHUGH: I would just ask that Exhibits 300, 301, and 305 be admitted. I realize they are the Director's orders in this case, and then the order from last year. But I think for ease of examining it is helpful to have them in as exhibits.

THE HEARING OFFICER: Any objection to the admission of the documents marked as Exhibit 301, 302, and 305?

MR. FLETCHER: No objections.

THE HEARING OFFICER: Hearing no objections, documents numbered 301, 302, 305 are received into evidence.

MR. BRICKER: I just want to clarify.

THE HEARING OFFICER: Yes.

MR. BRICKER: Was it 300 to 301, or 301 and 302?

THE HEARING OFFICER: I'm sorry. I'm assuming that it's 300, 301 --

MS. McHUGH: 300, 301, and 305.

THE HEARING OFFICER: And 305. And I misstated. Thank you.

(Exhibits 300, 301, 305 received into evidence.)

THE HEARING OFFICER: Okay. Anything further, Ms. McHugh?

MS. McHUGH: Nothing further. Thank you.

THE HEARING OFFICER: Okay. Thank you.

It's 10:30. We've been engaged for an hour-and-a-half. Do you the parties want a break, should we continue with another set of questions? Anybody?

Let's forge ahead. Who's next.

MS. KLAHN: I have a couple of questions. I was trying to send then to Candice, but it didn't work.

THE HEARING OFFICER: Ms. Klahn.

CROSS-EXAMINATION

QUESTIONS BY MS. KLAHN:

Q. Good morning, Jennifer. My name is Sarah Klahn. I represent the City of Pocatello. I wanted to ask you about some things related to the modeling questions that Candice was asking you. And I want to back up a step and ask you a little bit about model calibration. Is that something you are involved with?

A. Yes.

Q. Okay. In the framework of model calibration, is one of the inputs you use to compile the return flows associated with Twin Falls Canal Company?

A. Indirectly they are used to calculate. Their

return flows are used in the calculation of the Kimberly to King Hill reach gain, which is used in the calibration.

Q. Okay. And is that because the calibration involves understanding reach gains that come from ESPA discharges versus reach gains that accrue from return flows from the south side, where Twin Falls is located?

A. Yes.

Q. Okay. So when you are compiling these, you would subtract them from the reach gains coming from the north side in order to get the correct relationship; is that true?

A. No, that's not correct.

Q. Okay. Can you tell me what is correct?

A. So the reach gain from the north side the target for that is calculated by taking the inflow gage at Kimberly, the outflow -- and so the river flow at Kimberly, the river flow at King Hill going out of that reach. And then adding or deducting adjustments for all of the other surface flows that occur in between there, and the inflow from the south side.

Q. Okay.

A. So it's not an adjustment to the ESPA discharge. The ESPA discharge is the reach gain. It's just used to calculate how much of what's in the river

in that reach, you know, there is other components in the river flows at that reach. So we have to adjust to them, adjust those out to know what our target is for the ESPA discharge.

Q. Okay. Thank you for that explanation. Can you confirm that the total amount of return flows associated with Twin Falls Canal Company that you're using in that manipulation you just described, is between about 300,000 and 400,000 during the irrigation season?

A. I don't recall. I would have to look at my spreadsheet to -- I don't have that number, that volume memorized.

Q. Have you evaluated any long-term trends in Twin Falls return flows as part of your calibration efforts for the model?

A. Oh, we don't need to do that for the model, because we're looking at the past. So we just look at the measured data that occurred and subtract that off when we're calculating the reach gain.

Q. But in the spreadsheet you are describing, it would include sources of water from the Twin Falls system that are contributing the return flows?

A. Well, it includes the measurements made at the locations where those returns occur.

Q. Is seasonality any part of the evaluation that you do when you are doing that?

A. Well, we use monthly data, so the seasonality is inherent in those monthly averages.

MS. KLAHN: Okay. Thank you. That's all I have.

THE HEARING OFFICER: Okay. Further questions? I thought I saw a hand up.

Mr. Budge.

CROSS-EXAMINATION

QUESTIONS BY MR. BUDGE:

Q. Thank you, Ms. Sukow. I'm TJ Budge, on behalf of the Idaho Ground Water Appropriators. I will try not to duplicate the questions you got from Ms. McHugh.

Jennifer, you are the lead ground water modeler with the Department?

A. That's not officially my title, but...

Q. Did you provide all of the modeling work that was utilized in the Fifth Methodology Order?

A. I provided the modeling work that was presented to the technical working group and the Director that was used I think as a basis for that, yes.

Q. Was there other modeling work that was created in the Department that you did not provide to the technical working group?

A. No.
Q. Okay. And if the Director wanted to know any modeling issues related to the Fifth Methodology Order, you're the one who would have produced that information?
A. To my knowledge, yes.
Q. Okay. In terms of the initiation of the review of the Fourth Methodology Order, that decision came from the Director; correct?
A. I'm sorry. Repeat the question.
Q. The decision to review the Fourth Methodology Order, that came from the Director?
A. That's my understanding.
Q. You didn't tell the Director that there had been some change in the modeling data that necessitated a change to the methodology order?
A. No.
Q. And the modeling work that you did on the Fourth Methodology Order, that came at the direction of the Director or Matt Anders?
A. I was directed by Matt Anders to do that, yes.
Q. Okay. So if Matt told you to do some type of modeling, then you performed that at his direction?
A. Yes, and he was the one who communicated to me what the Director wanted me to model.
Q. Understood. And if Matt told you not to do

some type of modeling, then you would not have done that?

A. He told me what modeling -- or told me what questions they wanted to address, and I did the modeling. I wasn't directed not to do any modeling.

Q. Got you. You did not go outside the scope of the instructions that Matt had given you?

A. No.

(Exhibit 914 marked.)

Q. (BY MR. BUDGE) Okay. If you could turn to Exhibit 914.

THE HEARING OFFICER: We should have two common exhibit binders. 914, Mr. Budge?

MR. BUDGE: Yes.

Q. (BY MR. BUDGE) Jennifer, do you recognize that document?

A. Yes.

Q. Could you read the title for the record?

A. "Comments on behalf" -- oh, I might be on -- what did you say?

Q. 914.

A. Okay. Never mind. "Comments on Behalf of the Coalition of Cities and the City of Pocatello on the Idaho Department of Resources Summary of Recommended Technical Revisions to the Fourth Amended Final Order

Regarding Methodology for Determining Material Injury to Reasonable In-Season Demand and Reasonable Carryover for the Surface Water Coalition," by Kara Ferguson and Matt Anders, on December 23, 2022.

MR. BUDGE: Okay. Director, could we go off the record for a moment?

THE HEARING OFFICER: Yes.

(Off the record.)

MR. BUDGE: Back on the record.

Q. (BY MR. BUDGE) Jennifer, before we went off the record, you had read the title of what I think is Exhibit 915; is that correct?

A. That's correct.

Q. Why don't you go ahead and read the title of 914?

A. "Summary of Recommended Technical Revisions to the Fourth Amended Final Order Regarding Methodology for Determining Material Injury to Reasonable In-Season Demand and Reasonable Carryover for the Surface Water Coalition."

Q. Do you recognize that document?

A. Yes.

Q. Is this a document the Department staff prepared in connection with its work on the Fifth Methodology Order?

A. It was prepared by Kara Ferguson and Matt Anders.
Q. And you did not participate in drafting that document?
A. I did not draft or edit the document.
Q. Okay. If you could turn to Exhibit 318? Jennifer, this is the presentation that you gave to the technical working group; is that right?
A. That's correct.
Q. And my understanding is that this presentation, along with the underlying data that was posted to the Department's website, that consists of all of the modeling work you did related to development of the Fifth Methodology Order?
A. Yes.
Q. Okay. You didn't do any modeling work after that presentation was given, but prior to the issuance of the Fifth Methodology Order?
A. Not for this issue, no.
Q. What issues did you do modeling work?
A. Well, I'm doing modeling work all the time. That was a pretty vague question.
Q. Not related to the Fifth Methodology Order?
A. Not related to the Fifth Methodology Order.
Q. Thank you, I appreciate that. I'm going to

shift gears just briefly.

During your deposition we discussed an irrigated lands dataset that's used in the ESPA model; correct?

A. Yes, I believe we did.

Q. And can you explain what that dataset consists of?

A. The irrigated lands datasets that we're currently using in model calibration are developed by IDWR's GIS staff. And they delineate what -- they delineate lands as being either irrigated, or semi-irrigated or non-irrigated by using a variety of data sources.

Q. What are the data sources they utilize to make those designations?

A. Some of the data sources are the CDL common land unit polygons. They use Landsat photography. They use aerial photography. They use, I should say, Landsat images. I believe they sometimes refer to the metric ET images. I don't do that work myself. So there may be other data sources that I'm not aware of that they look at.

Q. Okay. And that dataset identifies for each irrigated field, whether it's ground water irrigated or whether it's irrigated or non-irrigated?

A. Yes, they have three classifications; irrigated, non-irrigated, or semi-irrigated, which means part of it might be irrigated and part of it not. There are areas where typically there are developed areas. You might have a subdivision with houses and lawns and roads. And it's too time consuming an effort to delineate each of those little polygons. So they lump them altogether.

Q. How is this dataset used in the aquifer model?

A. It is used to calculate aquifer recharge and discharge in conjunction with ET data and precipitation data. So it's used to calculate the irrigation demand.

Q. Could that dataset be used within a particular geographic area just to identify the total number of irrigated acres?

A. Yes.

Q. And is that the best dataset available for use in the model for the purpose for which it's used?

A. That is the best dataset we have for model calibration, yes.

Q. Okay. Let me ask you about another component of the model that we discussed during your deposition, which you referred to as the ground water fraction. Could you describe what that term means?

A. So the ground water source fraction is so

some -- you know, some of the irrigated lands have only surface water supply. Some have only ground water supply. But some have both, and we call that mixed source. And within that mixed source, we need to estimate what fraction of that is supplied by surface water, and what fraction is supplied by ground water.

Q. And how is that dataset created?

A. The original dataset and the -- I guess I should clarify that dataset also includes zeros and ones for things that are entirely supplied by surface water ask ground water. That dataset was initially produced by IWRRI for a previous version of ESPAM. So I don't have direct knowledge of how they produced it.

Q. Okay. And how is that dataset used in ESPAM?

A. It is used to -- the irrigation demand that we calculate from the irrigated lands ET and precipitation, it is used to assign that to either surface water diversions or ground water pumping. So it's used to estimate, you know, which source of supply provides that.

Q. Okay. And is that the best dataset available to you for use in the model for distinguishing between land that's irrigated with surface water, ground water, or a combination?

A. It is the best dataset we have, yeah.

Q. Okay. I want to just ask a few follow-up questions about the change from a steady state to transient state application of the model in this case just to make sure I understand.

The model was capable of being used in a transient state at the time the Fourth Methodology Order was issued?

A. Yes.

Q. Could the model also be run at a transient state when the Third Methodology Order was issued?

A. Yes.

Q. How about the Second Methodology Order?

A. I think you may be getting beyond what -- I don't know the dates of those orders. If there was a version of ESPAM available at those dates, then it was capable of running the transient simulation.

Q. Okay. So if ESPAM was utilized, then it was capable of being run in a transient state?

A. Yes.

Q. Okay. So the Director's decision to change from a steady state to transient state was not based on a change in model capabilities; correct?

A. The model capabilities with respect to being able to run a transient simulation did not change.

Q. Okay. So it would have been a policy decision

of the Director?

A. Yes.

Q. Let me just ask a few questions about the presentation you gave to the technical working group. I believe you have that in front of you. It's Exhibit 318. If you'll please turn to page 20 of that exhibit. And this slide is labeled "Comparison of priority dates calculated using transient and steady state analyses." Do you have the that in front of you, Jennifer?

A. Yes.

Q. As I understand this slide, it provides a comparison of the number of acres that would be curtailed under a steady state application of the model versus a transient state application of the model under different curtailment scenarios?

A. Yes.

Q. And this data was prepared to show those who participated in the technical working group, that a transient state application results in exponentially more acres being curtailed in response to a predicted demand shortfall than under a steady state; is that correct?

A. It is approximately one order of magnitude, yes.

Q. Okay. Let me have you go back to page 15 of

that exhibit. This slide is titled "Predicted response to May 1 curtailment of water rights junior to October 11, 1900." Yes?

A. Okay. Just to clarify, because there is two in a row that have that title. Is it the bar chart or the line graph?

Q. The line graph.

A. Okay.

Q. And thank you for that clarification. I appreciate that.

Ms. McHugh may have asked you this, so I don't mean to be repetitious. But can you explain why the date October 11th, 1900 is selected?

A. I asked Matt Anders what the, you know, controlling priority date was. And my understanding from him is that Twin Falls Canal Company and North Side Canal Company have natural flow rights to the Snake River with that priority date. So any ground -- you know, there is some small amount of ground water use that is senior to that. And, obviously, they weren't included in the curtailment scenarios, because they are senior to the delivery call water right.

Q. The number of ground water rights senior to that 1900 date is very, very small; is that right?

A. It's pretty small.

Q. Generally speaking, a 1900 curtailment date will result in curtailment of every ground water right from the Eastern Snake Plain Aquifer?

A. Well, again, like I said, there are some that are senior, and there are some that are outside the area of common ground water supply, which would not be subject to administration and so -- but it would be -- it would be a very large percentage of -- yes.

Q. And you've got a slide. I don't have the number in front of me. But a slide that shows that with an October 11th, 1900 curtailment date, there would be 941,400 curtailed acres; is that right?

A. That sounds right. What I recall is it's approximately 941,000. Yeah, 941,400.

Q. Okay. So just to connect the dots. Your transient modeling shows that anytime there is a predicted demand shortfall of 97,700 acre-feet or more, in the absence of mitigation, you would have curtailment of 941,400 acres?

A. Approximately, yes.

Q. Okay. Let me have you flip forward again to page 20. We reviewed this a moment ago. But on the right side of the table, it compares the number of acres that would be curtailed under the transient state application of the model versus a steady state. These

are aquifer wide figures, or maybe to be more precise, this is the area within -- this is within the area of common ground water supply?

A. Yes.

Q. Did you analyze what the transient state reach gains would be from curtailment ground water district by ground water district before the Fifth Methodology Order was issued?

A. Not for this, not in connection with the Fifth Methodology Order.

Q. Had you done that in connection with other modeling work?

A. And I can't recall exactly what I did. But I was asked to do some modeling in support of the settlement discussions between the parties. And I recall I was asked to do something by ground water district. And I don't recall exactly what I did, or how it would or would not fit in with what you just asked in your question. But it was not for this proceeding.

Q. Okay. Were you aware prior to when the Fifth Methodology Order was issued, were you aware of the different transient state impacts by ground water district on the near Blackfoot to Minidoka reach?

A. I mean, yes, I'm aware of different impacts from different locations in the aquifer, certainly.

(Exhibit 197 marked.)

Q. (BY MR. BUDGE) Let me have you turn to Exhibit 197. Jennifer, do you recognize this document? It's labeled "Attachment 1, IGWA Proportionate Share Modeling, May 2023 Curtailment"?

A. I believe I did see this in one of the expert reports that was submitted.

Q. This was a document prepared by Jaxon Higgs. And I just want to ask if you are familiar with any of the data that's in here. And maybe what I'll do is I'll just note in the column labeled "IDWR Portion of April 2023 Predicted Demand Shortfall," there is actually two columns there. There is an acre-foot column and a percentage column. And if you go to the bottom of the acre-foot column, you'll see the figure 63,645 acre-feet. Do you see that figure?

A. Yes.

Q. You understand that that represents IGWA's proportionate share of the total predicted demand shortfall of 75,200 acre-feet?

A. Yes.

Q. And then if you go to the next block of columns on the right, kind of in the middle of the spreadsheet. There is a column that says, "Transient May to September Impact." And that's showing the May to

September reach gains from near Blackfoot to Minidoka reach from curtailment in each of those districts. Do you see that column?

A. I see that column.

Q. Are you familiar with the data that's shown in that column that shows the reach gains attributable to curtailment within each ground water district?

A. I did not develop that, those columns. That analysis I believe was done by Jaxon.

Q. Is this an analysis that you've done independently for other purposes, or it's just part of your general modeling work for the Department?

A. I have not done that analysis for -- I did not do that analysis for this priority date, no.

Q. Okay. Have you done that for other curtailment dates?

A. I don't think I did it for any curtailment dates, no.

Q. Have you done that analysis in any other context?

A. Again, I did some sort of analysis by ground water district for the discussions in the settlement talks. And I don't recall exactly what I did. I did not review that in preparation for this hearing.

Q. Okay. So I understand this is Jaxon's

analysis. But if you look at that column, maybe we'll go to the bottom line for North Snake Ground Water District. It shows that curtailment of every water right junior to 1900 in North Snake Ground Water District would curtail 217,000 acre-feet. And the transient benefit to near Blackfoot to Minidoka reach from May to September would be 0.06 acre-feet.

Were you generally familiar, or did you understand prior to when the Fifth Methodology Order was issued, that curtailment of water rights in North Snake Ground Water District would provide essentially no reach gains to the Coalition?

A. During this irrigation season, I didn't do the analysis. But, yes, you would expect that.

Q. Okay. So Jaxon's figures are consistent with your general understanding of the transient impacts by ground water district?

A. Yes, they are consistent with my general understanding. Yes.

Q. Thank you. During your work related to development of the Fifth Methodology Order, did you ever inform Matt Anders or the Director that curtailment in places like North Snake, Henry's Fork, Madison are likely or at least predicted to provide little if any benefit to the Coalition?

A. Well, they will provide benefits in future years in years of -- so they do provide long-term benefits. And they do have long-term impacts on the water in the river reach. So if you don't include them, then you are putting the -- you are basically shifting the responsibility for the shortfall to those users that are closest to the reach, and have the most immediate impact, even though the impacts have been caused by decades of pumping of people that are also further away. So we did have some discussion about that at some point.

Q. Okay. And as part of that discussion, did you explain that there wouldn't be any benefit in terms of mitigating the predicted demand shortfall for 2023?

A. I don't recall whether or not we specifically discussed that.

Q. Okay. So to your knowledge was information provided to the Director before he issued the Fifth Methodology Order that would have made him aware that curtailment in North Snake Ground Water District, Carey Valley Ground Water District, Henry's Fork Ground Water District, and Madison Ground Water District would provide no reach gain benefits to the Coalition in 2023?

A. I was not asked to provide any analysis by ground water districts for the Fifth Methodology Order. So, no, he would not have had that specific information

by ground water district.

Q. Okay. Aside from that information being specific to a ground water district, did you advise the Director that just generally speaking curtailment in these further away locations would not provide any benefit to the Coalition in 2023?

A. I don't recall.

Q. To your knowledge the Director did not have the benefit of this type of information before him when he issued the Fifth Methodology Order?

A. I don't know.

(Exhibit 929 marked.)

Q. (BY MR. BUDGE) Okay. Let me have you turn next to the Exhibit 929. Jennifer, this is a copy of IDAPA 37.03.11, the Rules for Conjunctive Management of Surface and Ground Water Resources. Do you have that in front of you?

A. Yes.

Q. We refer to these generally as the Conjunctive Management Rules. Are you familiar with these rules?

A. To some extent.

Q. I'm just going to draw your attention to page 4 -- excuse me -- page 5. Do you see Rule 20.03?

A. Yes.

Q. If you can just take a moment to read Rules

20.03 and 20.04. And let me know if you are familiar with these rules?

A. (Witness complying.) I'm familiar with them to the extent that I'm aware they exist.

Q. Okay. I'll draw your attention to the last sentence in Rule 20.03, and I'll read that. It says, "An appropriator is not entitled to command the entirety of large volumes of water in a surface or ground water source to support his appropriation contrary to the public policy of reasonable use of water as described in this rule."

Were you asked to do any ground water modeling related to the disparity and -- let me strike that question.

Did this rule ever come up in your discussions with Matt Anders or other Department staff relative to the development of the Fifth Methodology Order?

A. I did not discuss those types of legal aspects with them, no.

Q. Okay. And Rule 20.04 refers to the futile call doctrine. Did that ever come up in your discussions with Matt Anders or other Department staff relative to the development of the Fifth Methodology Order?

A. Not that I recall, no.

Q. So you performed no analysis of the magnitude of curtailment compared to the predicted benefit to the Surface Water Coalition?

A. Well, I did present the magnitude of curtailment compared to the benefit of curtailment. That data are in Exhibit 318.

Q. Okay. Aside from page 20 of Exhibit 318, you didn't do any other analysis that compares the magnitude of curtailment to the predicted benefit to the Coalition?

A. No.

Q. Are you familiar with the concept of a trimline that has been used in delivery calls?

A. Yes.

Q. Can you explain what you understand that term to mean?

A. My understanding is it's an area designation that identifies -- it identifies an area beyond which the impacts of pumping are de minimis to the reach of interest.

Q. Okay. Did the concept of a trimline ever come up in your work related to the Fifth Methodology Order?

A. Again, I don't recall discussing a trimline with respect to this proceeding.

Q. So you didn't ask Matt Anders or the Director

if that's something you should look into?
A. Not that I recall.
Q. And neither of them instructed you not to evaluate trimlines?
A. No, I don't recall receiving any instruction about trimlines.
Q. Okay. Let me next have you turn to Exhibit 301. This is what we called an As-Applied Order of the April 2023 As-Applied Order. I believe Ms. McHugh asked you some questions about this document. This is something you are familiar with, Ms. Sukow?
A. Yes.
Q. If you'll flip to page 5. At the bottom of page 5 there is a footnote, Footnote 5. And it identifies the proportionate mitigation obligation of IGWA as 63,645 acre-feet. Is that a calculation that you made using the model?
A. Yes.
Q. As you know IGWA is made up of several ground water districts. Before the Fourth Methodology Order was issued, had you calculated each individual ground water districts proportionate share of that 63,645 acre-foot figure?
A. I don't refer to it as a proportionate share, because they did not -- they didn't have mitigation

plans. But our attorney, Garrick Baxter, asked me to calculate the percentage of IGWA's proportionate share that could be assigned to each ground water district, I believe, in a response to a request that was made by yourself or one of the other attorneys.

Q. Yes. Thank you.

(Exhibit 126 marked.)

Q. (BY MR. BUDGE) If you could turn to Exhibit 126.

A. I don't have that one.

MR. FLETCHER: 126?

MR. BUDGE: Yes, 126.

Q. (BY MR. BUDGE) Jennifer, what I have in front of me is Exhibit 126 is an email from Garrick Baxter to myself and others. And the subject line says, "Request to delineate proportionate shares of mitigation obligation." Do you see that?

A. Sorry. Say that again.

Q. The Exhibit 126 that I have up is an email from Garrick Baxter to myself and others --

A. Yes.

Q. -- is that what you see?

A. Yes. Yes.

Q. Okay. In that email there is a table that shows the ground water districts, and their

proportionate percentages in acre-feet with respect to the 63,645 acre-foot mitigation obligation of IGWA. Do you see that table?

A. Yes.

Q. Did you generate the data that's shown in this table?

A. Yes.

Q. Okay. And you mentioned a moment ago that you were asked by Mr. Baxter to apportion out IGWA's mitigation obligation, the 63,000 acre-feet figure among the ground water districts. Does this reflect your analysis in that regard?

A. Yes.

Q. That middle column that has acre-feet figures totaling 63,645 acre-feet. I want to ask you some questions about that. And we can continue to use North Snake Ground Water District as an example. But on that bottom row for North Snake, it shows that its portion of the 63,645 acre-feet is 3,262 acre-feet. Does this table indicate that curtailment of every water right within North Snake junior to December 30th, 1953, that would produce a transient state reach gain to the Surface Water Coalition of 3,262 acre-feet?

A. No, it does not.

Q. What does this column represent then?

A. So this is not -- this column is not looking at the benefit of curtailment. This column is looking at what their share of the demand shortfall is if they are going to mitigate by providing storage water. And the shortfall is the result -- this year's shortfall is the result of decades of pumping. So if they are going to mitigate by providing storage water, then their share of the demand shortfall is based on their long-term impact.

Q. Okay.

A. Not what will happen as a result of curtailing starting this May.

Q. Okay. And the demand shortfall predicted in the As-Applied Order that's a predicted demand shortfall for the 2023 irrigation season; correct?

A. Yes.

Q. And under this approach to allocating that predicted demand shortfall. Some ground water districts such as North Snake would have to provide more water as mitigation than the Coalition would receive from curtailment. And other ground water districts would have to provide less water as mitigation than the Coalition would receive from curtailment?

A. I don't think that's true as far as the Department's concerned. IGWA's proportionate share is

63,645 acre-feet. And the Department, I don't think, has a say in how you decide to split that up. You asked us to provide a breakdown, and I did it by this method. And Garrick sent it to you as a courtesy. But we are not telling you that that's how you have to split up the proportionate share.

Q. Yeah. And I appreciate that. And I don't actually even mean to be critical of the method. It's just one method; right? It's not the only method. And I just wanted to highlight that under this method in the proportionate mitigation obligations don't match up with the transient modeled reach gains?

A. No, they do not.

MR. BUDGE: Okay. Thank you, Jennifer. I don't have any further questions.

THE HEARING OFFICER: Okay. Thank you, Mr. Budge.

Do we want to take a break?

MR. FLETCHER: Yes.

THE WITNESS: I could use a restroom break, if I'm allowed to ask.

THE HEARING OFFICER: Yes. Let's break for ten minutes. We'll be back at 11:30.

(Recess.)

THE HEARING OFFICER: Back on the record,

Colleen. All right. We are recording again.

More questions of Ms. Sukow. Mr. Harris.

CROSS-EXAMINATION

QUESTIONS BY MR. HARRIS:

Q. Ms. Sukow, I'm Rob Harris, attorney for the City of Idaho Falls. I have just some follow-up questions to some of your prior testimony.

Mr. Budge talked to you about the IDWR irrigated lands datasets. Could you just explain to me what those are again?

A. They are delineation of -- a land use delineation done by IDWR GIS staff that delineates land units --

MR. BAXTER: Sorry, Director. We're not able to hear Ms. Sukow online.

THE WITNESS: Sorry. I had my microphone off.

THE HEARING OFFICER: Okay. Are we okay? Let's try.

THE WITNESS: The irrigated lands datasets are delineations of land use by IDWR's GIS staff, where they delineate land unit boundaries, and then classify them as either irrigated, non-irrigated, or semi-irrigated.

Q. (BY MR. HARRIS) And so those are hand digitized maps of irrigated acres; correct?

A. Correct, yes.

Q. And those irrigated lands datasets are used to calibrate the ESPAM model; correct?
A. They are used in calculation of the water budget input data that's used in the calibration, yes.
Q. So the answer is, yes, they are used in your model calibration?
A. They are used in the model calibration, yes.
Q. To the best of your knowledge, is there anything else that they are used for within IDWR?
A. There probably is, but I'm not specifically aware.
Q. When you say "probably," what makes you say that?
A. I have the general impression that I am not the only one that uses them.
Q. Okay. You testified about calibrating the ground water model and minusing out return flows from the Twin Falls Canal Company return flows; is that correct?
A. I said that they are used in the calculation of the Kimberly to King Hill reach gain target.
Q. Okay. And so you used river gaging information to help with that calibration; correct? Or I should ask, do you use river gage information for that calibration of --

A. We use river gage information in the calculation of reach gains. So that's to calculate an observation, a physical observation of how much of the river flow is coming from the aquifer.

Q. And do you also do that in the near Blackfoot to Minidoka reach?

A. Yes.

Q. So could you just generally explain how you calibrate model runs to what's actually seen or measured in the Snake River from near Blackfoot to Minidoka?

A. So we have -- during the model calibration we have model input data that we use that, you know, we put aquifer recharge and discharge in. And then we try to match observations. And in model calibration, there are adjustable parameters, like aquifer transmissivity, specific yield, and some other components that are adjusted to best match observed data. So some of that observed data is aquifer head, some of it is aquifer interaction with the river. So places where the aquifer either discharges to the river or receives recharge from the river. And those observations of reach gain are used as calibration targets.

Q. So let me just to make sure I understand, let me use a hypothetical. Let's say that there is 5,000 cfs measured in the river. How do you determine how

much of that is from snow melt versus reach gains from ground water in that reach?

A. You take all of the known surface components and account for them. So you have your measured inflow on the upstream end of your reach. Your measured outflow on the downstream end of your reach. You have diversions from the reach that you account for. You have surface return flows that you account for. And also you might have tributary surface streams that you have a measurement that you account for. So you just account for all those surface inflows and outflows. And then you have a residual. And the residual is your best estimate of the contribution of ground water to that reach.

Q. I see. And in terms of the measurements that you use in that calibration, do you obtain that information from Water District 1 and its watermaster, Tony Olenichak?

A. Some of it.

Q. When you say "some of it," is there anything specifically that you recall that you would obtain from him?

A. The diversion data are obtained from the Water District 01 records.

Q. You had mentioned too, though, that you will

look at water supply from other tributary basins in your calibration. Did I understand your testimony correctly?

A. In a few cases there is a tributary stream, for example, you know, the Malad River, for example, above the springs. There is flow in that river, and we have to account for that when we calculate the reach gains. Lower Salmon Falls Creek is another example of that.

Q. But I want to focus more on the near Blackfoot to Minidoka. Do you or did you in your calculations, do you look at flows out of either Willow Creek, the Blackfoot Basin, or the Portneuf Basins in that calibration?

A. Yes, I know the Portneuf is in that calibration or that calculation. The reach gains above Minidoka are actually calculated for me by another staff member. I do have a list of all the inflows and outflows that are accounted for, but I don't have them memorized.

Q. Who is that other staff member who calculates those reach gains?

A. Ethan Geisler, Guys-ler. I'm not sure how to pronounce his last name.

Q. And he works for the Department?

A. Yes.

Q. Is he a modeler as well?
A. No.
Q. Okay. You were asked before about the model runs that were presented in your PowerPoint presentation. I don't need you to refer to it. But just a follow-up question. In any of the model runs that you did for curtailment, were any ground water rights removed from those runs?
A. I'm sorry. Could you say that question again?
Q. Yeah. In the model runs that you performed, you didn't take out like, for example, A & B Irrigation District's ground water rights in those simulations? They were all just ground water rights on the Eastern Snake Plain Aquifer within the area of common ground water supply; is that right?
A. For the simulations that were presented for the various curtailment dates?
Q. Correct.
A. Yes. So anything within the area of common ground water supply junior to those curtailment dates, yeah.
Q. Yeah. And I just want to make sure that it included all ground water rights in there for any specific reason that there were any that were left out. None were left out on these curtailment runs?

A. Yeah, I -- well, so we have -- yeah. Anything that's in our irrigation POD file, and anything that's in the municipal files.

Q. Just a couple follow-up questions. In the methodology order there is an April forecast supply methodology. And I just want to ask, did you provide any technical information on the forecasted supply that only looks at the unregulated flow at Heise?

A. I'm sorry. Say that again.

Q. Well, in the methodology order, there is a part that forecast the water supply. Are you familiar with that part of the order where it looks at the unregulated flow at the Heise gage on the Snake River.

A. No, I didn't participate in that.

Q. And that's really my question. Is you weren't asked to provide any technical information on that part of the order; were you?

A. No.

Q. But as far as the technical aspects that you were asked to participate in, did you have any discussions on those technical aspects with Mat Weaver or other Department staff?

A. I probably did. I don't have a specific recollection.

Q. Okay. When you say "you probably did," what

makes you say that?

A. I'm sure we just -- I mean, we discussed what I was going to present to the technical working group.

MR. HARRIS: Okay. I have no further questions. Thank you.

THE HEARING OFFICER: Further questions by the ground water users of Ms. Sukow?

Okay. Let's shift.

MR. ANDERSON: Director, very, very quick.

Mr. Anderson.

CROSS-EXAMINATION

QUESTIONS BY MR. ANDERSON:

Q. Jennifer, when did you first learn that the Fifth Methodology Order was going to move from steady state to transient?

A. I don't know when Gary made a final decision on it. I know when I was asked to provide information on it. And that was -- that was for the technical working group.

Q. So after the technical working group, the next time you knew that it was actually going to change to transient, was when it came out in April, or did you know before the issuance of the order that it was going to?

A. I knew when I was asked to assist with

preparing the draft order.

Q. And when was that?

A. I don't recall exactly. Not that long before it came out.

Q. A few weeks, a month?

A. I don't recall.

Q. You don't recall. But when you were asked to prepare the draft order to assist in the preparation, you knew then that it was going to move from steady state to transient?

A. Yes.

MR. ANDERSON: Okay. I don't have any further questions.

THE HEARING OFFICER: All right. Thank you.

With no further questions from the ground water users, we'll shift to the Surface Water Coalition. Mr. Simpson, you stood up. Are you the examiner?

MR. SIMPSON: An examiner, Mr. Director. So I thank you for that acknowledgment.

CROSS-EXAMINATION

QUESTIONS BY MR. SIMPSON:

Q. Good morning, Ms. Sukow. My name is John Simpson. I represent A & B Irrigation District, et al., with Mr. Thompson. I just have a couple follow-up questions for you.

If you could turn to Exhibit 318 from which you testified to before. And I believe that's your slide presentation from November. And, Jennifer, if you could just look at pages 21 and 22. I believe those are your conclusions; is that correct?

A. That's correct.

Q. Those are your conclusions from the modeling you produced as a part of that presentation in November; correct?

A. Correct.

Q. As you sit here today, are those still your conclusions that you would represent to the Hearing Officer and to the parties in terms of the modeling exercise you completed in the comparison between steady state and transient?

A. Yes.

Q. Okay. And then if you would look at page 6 of that presentation. And that's the graph that you testified to earlier regarding examination by Ms. McHugh. Do you see the paragraphs in the middle of the graph regarding the "Less than 15 percent of the steady state impacts of a single-season curtailment are realized." Do you see that language in that graph, that insert?

A. Yes.

Q. Okay. And that's your conclusion; correct?
A. Yes, that's --
Q. Yes.
A. -- data from the analyses.
Q. Right. So that would support your conclusions on page 21 and 22, that the basis for why steady state analysis is not appropriate for short-term river reach gains; is that correct?
A. Well, I think beyond that, because the steady state simulations do not simulate the short-term curtailments that are prescribed in the Surface Water Coalition methodology.
Q. Okay.
A. But the difference in volume is just the result of doing something that does simulate the short-term curtailment.
Q. Right. So if you utilize the steady state model run, you are just not going to realize the amount of water into the reach to mitigate for the identified injury in the Fifth Methodology As-Applied Order; correct?
A. Not within this irrigation season.
Q. And so then the second item is in response to questions by Ms. Klahn regarding the south side returns and the consideration of those south side flow returns.

Do you recall that testimony?

A. Yes.

Q. Okay. And those numbers identified by Ms. Klahn that you testified to, were those estimates of the ground water recharge contribution from irrigation on the North Side Canal Company system?

A. I believe she was asking me about inflows from the south side.

Q. From the south side. With respect to those south side return flows, and the numbers you've testified to, or were asked about. Were those in response to the estimations, calculations regarding the estimated ground water return flows from irrigation on the Twin Falls system; do you recall?

A. Oh, I think you said north side, and I was confused.

Q. If I did, I apologize.

A. No, they are measured flows in the return channels, which are on the south side deeply incised. And in a previous version of ESPAM, we were estimating those based on a water budget method, which is I think what you are asking about. But I determined that our measurements were giving us the same volume. And then having the actual measurements is much better for calculating the reach gain, because it accounts for the

seasonality.

Before we had been averaging it. But with the measurements, we're actually able to account for the monthly seasonality, which gave us -- allowed us to remove a fair amount of noise from our reach gain calibration target.

Q. So those south side return flows that you are discussing, were those only the Twin Falls return flows, or did those include some other tributaries to the Snake River on the south side of the river?

A. Well, there is Lower Salmon Falls Creek, which, you know, we deduct out the total flow in Lower Salmon Falls Creek. Some of that is from return flows, but we don't really care whether it's from return flows or other surface flows. We just deduct off the entire creek flow.

Q. Okay.

A. And then there is also return flows from surface return flows from the north side that we deduct off?

Q. Correct.

A. Yeah.

Q. And then Mr. Budge was asking you about a calculation that you did with respect to dividing up the IGWA's proportionate share under the Footnote 5, I

believe, of the As-Applied Order. Do you recall that testimony?

A. Yes.

Q. I'm not sure if I fully appreciated the calculation you made. But my understanding is that your method that you utilized, and this was your proposed method, acknowledged the long-term impacts of each ground water district on the Blackfoot to Minidoka reach. And then once that percentage was calculated, then it was utilized in the calculation of the responsibility of each ground water district of the total for IGWA; is that correct?

A. Well, and again, that was provided as a courtesy, and the Department is not telling them, IGWA what each ground water districts responsibility is. But it is just an apportioning of it based on their long-term impacts.

Q. Right. And with respect to your work under Exhibit 318, you weren't asked whether or not to consider, when you looked at the curtailment scenarios and transient curtailment, and the number of acres to be curtailed as you've testified here today, whether or not any of those acres were the subject of ongoing mitigation plans or stipulated agreements; were you?

A. I'm sorry. Say that again.

Q. Well, simply your work that you did for Exhibit 318, the modeling you produced in November. Didn't consider whether or not any of the ground water acres that you identified that would be subject to curtailment, were part of an existing or an approved mitigation plan?

A. No.

MR. SIMPSON: Okay. That's all the questions I have. Thank you.

THE HEARING OFFICER: Any other questions from the Surface Water Coalition?

Mr. Fletcher, you represent clients independent of Mr. Simpson.

MR. FLETCHER: Yeah, I don't have any additional questions. Thank you.

THE HEARING OFFICER: Okay. Thank you.

All right. So let's now characterize the next examination as a redirect. So let's just go in the same order as previously followed.

Ms. McHugh, questions?

MS. McHUGH: I have no redirect. Thank you.

THE HEARING OFFICER: Ms. Klahn?

MS. KLAHN: No, Your Honor.

THE HEARING OFFICER: Any of the others who questioned, further questions of Ms. Sukow?

MR. WOOD: I've got a question, Director.

THE HEARING OFFICER: Okay. Mr. Wood.

REDIRECT EXAMINATION

QUESTIONS BY MR. WOOD:

Q. Jennifer, do you recall Mr. Budge asking you a couple questions about trimline?

A. Yes.

Q. And in your professional opinion would a trimline be appropriate in this delivery call?

MR. BUDGE: Objection; foundation.

THE HEARING OFFICER: Sustained.

Mr. Wood, would you just lay a foundation with her.

Q. (BY MR. WOOD) Jennifer, do you recall Mr. Budge asking you a few questions about a trimline?

A. Yes.

Q. And what is a trimline?

A. I believe I answered that for Mr. Budge. But it's a delineation of an area where pumping has a larger than de minimis impact on the reach of interest.

Q. And so in this context, was your understanding of Mr. Budge's question whether or not you were asked to employ a trimline in this situation?

A. I think that's probably a fair characterization, yes.

Q. And in your opinion --

MR. BUDGE: Objection. It misstates the testimony.

THE HEARING OFFICER: Well, I'll allow an opportunity to clarify, if you want.

Answer the question, please. If you remember the question.

Q. (BY MR. WOOD) I'll put it this way. Ms. Sukow, what was your understanding of why Mr. Budge was asking you about a trimline?

A. I don't know why he was asking me about a trimline.

Q. Would a trimline in your professional opinion be appropriate for this delivery call?

MR. BUDGE: Objection. Mr. Director, may I comment.

THE HEARING OFFICER: What's the basis of the objection, Mr. Budge?

MR. BUDGE: In violation of the Director's order limiting the scope of testimony. So what I asked Ms. Sukow is if she had done any analysis or provided any information to the Director. I understood we can't ask her opinions on legal and policy issues based on the Director's order, and so I did not ask those questions. I just asked what analyses information she had provided

to the Director. So I don't think we can be in a position where we can't ask questions about the thinking and the group process. But then the Department can't ask those questions.

THE HEARING OFFICER: Okay. Mr. Budge, Mr. Wood, I will sustain the objection at least at this point in time. But anticipating that there will be further development and testimony regarding a trimline, and Ms. Sukow may be recalled and the question may be posed to her at that time.

Thank you, Mr. Wood.

MR. WOOD: Thank you.

THE HEARING OFFICER: Okay. Further questions of Ms. Sukow anybody?

All right. Well, the timing is perfect I guess. It's the lunch hour. So thank you, Ms. Sukow. And thank you, Colleen. So let's recess for lunch. And come back at what time; 1:00? We'll be back, convene at 1:00. Thank you.

(Lunch recess.)

THE HEARING OFFICER: We're back on the record, Colleen. One suggestion before we start. Some participating remotely have observed that it's difficult to hear objections. You are farther away from the microphone system. If you could speak up, and it might

help if you stand up. There is a microphone in the ceiling somewhere there.

Okay. Is it my understanding that Mr. Colvin is the next witness?

Mr. Colvin, if you would come forward, please.

DAVID COLVIN,

first duly sworn to tell the truth relating to said cause, testified as follows:

THE HEARING OFFICER: Mr. Thompson, you may examine Mr. Colvin.

MR. THOMPSON: Director, there should be a Surface Water Coalition binder exhibits. Probably the smallest skinniest ones back there. If you wouldn't mind getting those out.

DIRECT EXAMINATION

QUESTIONS BY MR. THOMPSON:

Q. Dave, could you state and spell your name for the record, please?

A. My name is Dave Colvin, spelled D-a-v-e, or David, David, Colvin, C-o-l-v-i-n.

Q. And where do you presently work?

A. I work at LRE Water in Denver, Colorado.

Q. And what is your occupation?

A. I'm the ground water team leader, principal hydrogeologist with the firm.

(Exhibit 3 marked.)
Q. (BY MR. THOMPSON) And in that binder we have in front of you, we have what's marked as Exhibit 3. Could you describe that, please?
A. That's Exhibit 3 is my expert report for the Fifth Methodology Order and this hearing.
Q. And is your CV attached to that exhibit?
A. It is.
Q. And does that CV generally describe your education and work history?
A. Yes, it does.
Q. Have you been qualified as an expert witness before IDWR in prior cases?
A. I have.
Q. Are you a member of the Eastern Hydrologic Modeling Committee?
A. Yes, I am.
Q. And did you participate in the technical working group last fall?
A. I did, yes.
Q. And can you generally describe what you were asked to do with that report identified as Exhibit 3?
A. I was asked to review the Fifth Methodology Order and this year's As-Applied Order for steps 1 through 3, and look at the ground water modeling issues

in particular, and evaluate the procedures that were implemented, and formulate my opinions.

Q. And do you want to describe your general conclusions or just refer to those in the report?

A. Yeah. So in my report on page 2, I have a summary of opinions. And so maybe I'll just run through those opinions. And then the rest of my report goes into greater detail. But in summary, I started with Opinion No. 1, stating that ESPAM, specifically Version 2.2 is the widely accepted as the best available scientific tool for evaluating regional ESPA hydrology, particularly reach gain impacts due to curtailing ground water pumping.

Opinion No. 2 was that the steady state use of ESPAM for curtailment analysis in particular is inappropriate due to the methodology's requirement for in-season benefits from curtailment. And so the in-season timing component renders a steady state model ineffective and inappropriate for modeling curtailment benefits. No. 3 is that the transient superposition model for ESPAM2.2 is the appropriate model for calculating the reach gain benefits from curtailing junior ground water pumping.

No. 4 is that regardless of prior approaches from other methodology orders, that transient is the

proper approach for the Fifth Methodology Order. No. 5 is that transient modeling of ESPA has been happening for over ten years for various other applications of ground water modeling.

And then No. 6 is that specific to the steady state modeling that Ms. Sukow described for proportionate share analysis of the demand shortfalls. That that steady state modeling is appropriate for that use, but only when it is applied to mitigation requirements that might be covered by direct delivery of surface water. And that that steady state modeling has no bearing on the ground water curtailment approach to mitigation.

Q. Thank you.

MR. THOMPSON: We would move to admit Exhibit 3 into the record.

THE HEARING OFFICER: Any objection to the admission of this document?

Hearing no objection the document marked as Exhibit 3 is received into evidence.

(Exhibit 3 received into evidence.)

MR. THOMPSON: And we would tender Mr. Colvin as an expert on the subjects addressed in that report for cross-examination. Thank you.

THE HEARING OFFICER: Thank you, Mr. Thompson.

Cross-examination? I want to call you, Max. What's your last name.

MR. BRICKER: Bricker.

THE HEARING OFFICER: Mr. Bricker, you may examine the witness.

MR. BRICKER: Thank you.

CROSS-EXAMINATION

QUESTIONS BY MR. BRICKER:

Q. Good afternoon, Mr. Colvin. How are you doing?

A. Great.

Q. Good. Okay. Would you agree that the Department uses ESPAM to determine which ground water users must be curtailed or must supply mitigation water to offset the predicted shortfall to the Surface Water Coalition?

A. Yes.

Q. Okay. Now, in your report, Exhibit 3, it's your opinion that transient modeling is the most appropriate mechanism to determine the actual increase in Snake River flow in the near Blackfoot to Minidoka reach that would occur in the first year of curtailment; right?

A. Yes.

Q. And you've also stated that the results from

the steady state run overestimated the curtailment benefits by more than an order of magnitude; right?

A. For in-season benefits, yes.

Q. Okay. And you've also stated that the steady state model curtailment results have been clearly demonstrated to be a grievous error; right?

A. Yes.

Q. But Department staff has been aware of the technical differences between the steady state and the transient modeling runs for many years now; right?

A. I can't speak for their awareness, but I would presume so.

Q. Okay. And the Department could have been using transient model runs before 2023; correct?

A. Yes.

Q. So is it fair to say that the use of the steady state runs in modeling was not in error, but was made as a policy decision?

A. I wouldn't be able to speculate on policy decisions.

Q. Okay. And you are aware as was asked of Ms. Sukow, that there has been a moratorium on new wells without mitigation since the early '90s; right?

A. Yes.

Q. So almost all wells have been pumping for at

least some 30 years now; correct?
A. Approximately.
Q. And looking at Exhibit 318, which was the presentation by Ms. Sukow from last November.
A. Yes. Okay. I've got it.
Q. All right.
A. Do you have a page number you are referencing?
Q. I'm looking for it myself. You know what, perhaps it isn't in this. It might be elsewhere. But would you agree that over 90 to 99 percent of the impact of pumping on the ESPA has been realized?
A. You must -- I think you might be referring to page 6.
Q. Let's see. Yes, in fact, there it is.
A. Okay. Can you restate your question?
Q. Would you agree that 90 to 99 percent of pumping impacts on the ESPA have been realized at that particular river reach?
A. Approximately, yes.
Q. So wouldn't you agree that given that, a steady state curtailment run is a reasonable estimate of the current impact on Snake River flows in that reach resulting from the current and prior pumping of those curtailed wells?
MR. THOMPSON: Objection; a compound question.

Q. (BY MR. BRICKER) Would you agree that a steady state curtailment run is a reasonable estimate of the current impact on Snake River flows resulting from current and prior pumping of curtailed runs -- or wells? Excuse me.

A. No.

Q. Okay. All right. Would you agree that the predicted shortfall in 2023 is 75,200 acre-feet?

A. That's what was in the Fifth Methodology Order -- or the As-Applied Order, yes.

Q. Okay. So looking back at that Exhibit 318, looking at page 13, the "Comparison priority dates calculated for DS forecasts," the first of those two pages. Curtailment of wells junior to sometime in the mid-1980s would produce 75,200 acre-feet in the near Blackfoot to Minidoka reach based on steady state modeling; right?

A. It's hard to see in this graph here, but it seems about right.

Q. Sometime in the mid to late '80s?

A. Sure.

Q. So in other words, the current and prior pumping of wells junior to the mid-1980s is currently depleting the near Blackfoot to Minidoka reach by about 75,200 acre-feet given that slide; right?

A. That would be the impact on the reach gains there, so, yes.

Q. Okay. So if the wells junior to the mid-1980s had not started pumping, there would be an additional 75,200 acre-feet in the river at that reach in 2023; right?

A. If they had never started pumping, that would be about the increase in reach gains, yes.

Q. Okay. So as a result, if the pumping of the wells junior to the mid-1980s did not happen, there would be no forecast shortage to the Surface Water Coalition members; right, in 2023?

A. That's possible. And a very different analysis than curtailment.

Q. Okay. Would you agree that it may be unduly burdensome to curtail wells senior to the mid-1980s if it were that those wells senior did not cause the 75,200 acre-foot shortage in 2023?

A. I haven't evaluated the burden of curtailment, but the impacts to reach gains are due to the cumulative pumping across the ESPA for many decades. And so you can apportion it how you want, which is essentially what IDWR did with their proportionate share analysis but -- I guess can you restate your question?

Q. Sure. It was does it seem unduly burdensome

to force wells senior to the mid-1980s to be curtailed if they were not the cause of the 75,200 acre-foot shortage in 2023?

A. Well, again, I haven't evaluated the burden of curtailment compared to being involved in an agreement or mitigating by some other measure. So I guess I don't know.

Q. How about instead of to force curtailment, but to require mitigation water from?

A. Again, I haven't reviewed the burden of what forced mitigation would require. So I don't really know how to answer that question.

Q. How about if you change burden to, is it fair to require mitigation or curtailment of those rights?

A. I guess I don't know what you mean by "fair." But according to prior appropriation, if you mean is it a priority date; is that fair? And I think under prior appropriation administration, a priority date that returns the demand shortfall to the Surface Water Coalition is fair.

MR. BRICKER: Thank you. I have no further questions.

THE HEARING OFFICER: Further cross-examination?

Mr. Budge.

CROSS-EXAMINATION

QUESTIONS BY MR. BUDGE:

Q. Good afternoon, Mr. Colvin. Do you mind if I call you "David"?

A. That's fine.

Q. I have just a few questions.

(Exhibit 306 marked.)

Q. (BY MR. BUDGE) First, if I could have you turn to Exhibit 306.

A. Okay.

Q. What's that document title that you are looking at?

A. This is the Fourth Amended Final Order Regarding Methodology for Determining Material Injury to Reasonable In-Season Demand and Reasonable Carryover."

Q. Thank you. That's the right one. I refer to that as the Fourth Methodology Order. Were you working for the Surface Water Coalition back when that was issued?

A. No, I was not.

Q. When did you begin working for the Coalition?

A. I believe it was 2019 --

Q. Okay.

A. -- maybe 2018.

Q. And what type of work have you done for the

Coalition since then?

A. Evaluation of Eastern Snake Plain Aquifer hydrology related to transfers or the agreement with IGWA, monitoring the Eastern Snake Hydrologic Modeling Committee and participating there, being involved in technical work groups related to the sentinel well tracking, and recharge planning, various other activities on the plain.

Q. Is the methodology order that we're discussing here, is that within the purview of the representation you provide for the Coalition?

A. Yes.

Q. And you mentioned that you participate on the Eastern Snake Hydrologic Modeling Committee?

A. Yes.

Q. Did you participate in the 2015 technical working group that the Department held regarding the methodology order?

A. I did not.

Q. Okay. Back to that exhibit you've got in front of you. If you could flip to page 35?

A. Okay.

Q. About halfway down, there is a heading that says "Order." And then it begins walking through the steps of the methodology order. I assume you are

familiar with all of the steps?
A. Yes.
Q. Step 1, which you are familiar with, requires members of the Coalition to report annually their irrigated acreage to the Department. Are you familiar with that step?
A. Yes.
Q. As a consultant for the Coalition, has the Coalition or any member of the Coalition ever asked you to help them evaluate the irrigated acres within their service area?
A. No, that's kind of out of my specialty. I'm more ground water focused.
Q. Got you. Are there people in your firm that have that type of expertise?
A. There are.
Q. But that's not something the Coalition has ever asked for your help with?
A. No.
Q. Have they ever shared with you the reports that they submit to the Department, where they report their irrigated acreage?
A. Not shared with me directly. I've seen them posted, though.
Q. Okay. But that's not a component of the

methodology that they've consulted your advice in relation to?

A. No.

MR. BUDGE: Okay. I don't have any further questions.

THE HEARING OFFICER: Further examination of Mr. Colvin?

Okay. Any redirect, Mr. Thompson?

MR. THOMPSON: I don't have any.

THE HEARING OFFICER: Mr. Colvin, you are off easy.

THE WITNESS: Okay.

(Witness excused.)

THE HEARING OFFICER: Now, I understand the next witness in the list is Matt Anders, an employee of the Department.

If you'd come forward, Matt.

MATTHEW "MATT" ANDERS,

first duly sworn to tell the truth relating to said cause, testified as follows:

THE HEARING OFFICER: Mr. Wood, you may examine.

DIRECT EXAMINATION

QUESTIONS BY MR. WOOD:

Q. Hello, Mr. Anders.

A. Hello.
Q. Can you please state and spell your name for the record.
A. My name is Matthew Anders. I go by Matt, M-a-t-t, A-n-d-e-r-s.
Q. And what is your educational background?
A. I have a bachelor's in geology from Gustavus Adolphus College, and a master's in geology from Utah State University.
Q. And you're a licensed professional geologist in Idaho; is that correct?
A. I am.
Q. And you are currently employed at the Idaho Department of Water Resources?
A. I am.
Q. And how long have you worked for the Department?
A. Worked a total of 18 years. I was a contractor for about the first three. And then I worked for the Department directly for about 15.
Q. And you are the technical services bureau chief; is that correct?
A. I am.
Q. And how long have you been in that position?
A. About four months.

Q. And what are your duties as the technical services bureau chief?
A. I either oversee directly or indirectly staff from the hydrology section and the GIS section.
Q. I would like to turn your attention to the Fifth Methodology Order.
A. Okay.
Q. Are you familiar with that document?
A. Yes.
Q. And some of that document you know quite a bit about?
A. Yep, I do.
Q. And that you even played a role in developing some of that data?
A. Yes, I did.
Q. And this is why you've been called as a witness here today?
A. I believe so, yes.
Q. And you are aware that the Department has identified nine topics for you to testify; is that correct?
A. Yes.
Q. And I'm going list those line, and let me know if this is correct. Okay?
A. Okay.

Q. Baseline year, forecast supply, surface water irrigated acres, crop water needs. I am going to try hard not to screw this one up -- near real-time mapping evapotranspiration of high resolution with internalized calibration?

A. It's evaporation, but, yes.

Q. See, I knew I wouldn't do it right. All right.

Project efficiency?

A. Yes.

Q. Reasonable carryover?

A. Yes.

Q. Twin Falls Canal Company's increase in diversions?

A. Yes.

Q. And that 2023 technical working group meetings?

A. Yes.

Q. Do you have any concerns that you were unqualified to discuss those topics here today?

A. No, I do not.

Q. One additional issue, Mr. Anders. You brought to our attention some shapefiles that were not included in the original, I guess we'll call it, a data dump on May 5th; is that correct?

A. Correct.
Q. And as I understand it, we provided to the parties the 2022 shapefiles for Minidoka and Milner. And what we meant to provide was the 2023 shapefiles; is that correct?
A. Correct.
Q. And the 2023 shapefiles are what is used in the Fifth Methodology Order?
A. Yes.
Q. And those numbers are correct?
A. The methodology order, the acres that we used, they are correct, yes.
Q. And you provided a zip file that had those two files in them; is that correct?
A. Yes, I did.
Q. And we provided those to the parties this morning. Did you have you an opportunity to look at those files and ensure their accuracy?
A. Before I gave them to you, I inspected them, yes.
Q. Okay. And do you think they are a reasonable representation of what those shapefiles are, the accuracy of the shapefiles?
A. Yes, I do.
MR. WOOD: And with that, Director, we would

move to admit the Minidoka and Milner 2023 shapefiles.

THE HEARING OFFICER: I assume that what you are asking me to do is take official notice of them?

MR. WOOD: Or take official notice of them, sure.

THE HEARING OFFICER: Any objection from the parties?

Okay. I will take official notice of the 2023 shapefiles from Milner and Minidoka as represented.

Thank you, Mr. Wood.

MR. WOOD: The Department has no further questions for Mr. Anders.

THE HEARING OFFICER: Okay. Examination of Mr. Anders by the ground water users?

Ms. Klahn, I see you turning in your seat.

MS. KLAHN: That's right.

THE HEARING OFFICER: Welcome to the podium.

CROSS-EXAMINATION

QUESTIONS BY MS. KLAHN:

Q. Good afternoon, Mr. Anders. I'm Sarah Klahn, representing the City of Pocatello. And it's nice to see you in person after seeing you on Zoom for two days.

I wanted to start by asking you some questions about the Fifth Methodology Order. You should have a notebook up there with a 300 series of exhibits in it.

And you would be looking at Exhibit 300?

A. Binder one of Exhibit 300. And you said tab 300?

Q. Yes.

A. Yes, I have it.

Q. Okay. And let's turn, if you would, in Exhibit 300 to page 12. Starting at paragraph 29, there is a section of the order related to project efficiency. And that's one of the topics you were disclosed for; right?

A. Yes, it's at the bottom of the page.

Q. I wanted to ask you about the statement at the bottom of the page there. The statement in paragraph 29 says, "Project efficiency is the ratio of total volumetric crop water needs within a Surface Water Coalition entity's boundary and the total volume of water diverted by that entity to satisfy its crop needs." The second sentence says, "It is the same concept as efficiency, which was presented at the hearing."

What's your understanding of what was presented at the hearing? Or let's start with, which hearing are we talking about; do you know?

A. I don't know.

Q. Okay. So this wasn't a sentence that you have

any knowledge of?

A. No, I didn't add that sentence.

Q. Okay. Well, let's flip over then to page 13. And there is an equation at the top of the page. And above that equation is some narrative about the relationships that are contained in project efficiency. And I want to ask you about those. So the first component listed there is "seepage loss." Do you see that?

A. I do.

Q. What is seepage loss in your understanding?

A. As water is -- after it's been diverted and is being sent or conveyed to get to the place of use for the water, there are losses out of the canals. Maybe they are unlined. There is some small amount of evaporation. If there happens to be vegetation, they may be pulling. So it is kind of any losses in route to where the water is going to be applied.

Q. Okay. The second item listed there is on-farm application losses. And the first example is deep percolation. Do you have an understanding of what that means?

A. To me, deep percolation is when the soil becomes saturated, because you are applying water. And you get infiltration down below the root zone, so the

plants can no longer access it. And it may stay there, or it may go farther all the way to the aquifer, depending how much water is available.

Q. Okay. The second is "field runoff" listed there in that parenthetical at the top of page 13. How would you characterize "field runoff"?

A. To me, that's over land flow. So it's on the surface of the land. Either the water is applied too quickly, and it can't infiltrate, or the soil is saturated. But in any either case, the water is running off to someplace outside of the field.

Q. Okay. And then the third item there listed is "system operational losses," and the parenthetical is "(return flows)." How is that different in your understanding from the other seepage and the on-farm application losses?

A. I think of return flows as at the end of the system, there is water that's needed to get to deliver water to the end of the system. And there is always excess water there. That water, I think where return flow, the term comes from, either returns to the original source or a different source of water.

Q. Okay. Now, the sentence up there at the top of the page of page 13, goes on to say, "system operational losses for which data is not obtainable by

the Department." Do you see that?
A. I do.
Q. But the Department has data associated with Twin Falls Canal Company return flows; isn't that right?
A. We have some of the return flows monitored through our Eastern Snake Plain's spring and return flow monitoring program. But we don't have everything monitored.
Q. Were you in the room this morning when Ms. Sukow testified?
A. I was.
Q. And you heard her testify about the incorporation of Twin Falls Canal Company return flow data to calibrate the model?
A. Yeah, I heard her say that.
Q. Okay. And so your understanding is that the Department has some Twin Falls return flow data, but there is more that you don't have?
A. I think there are some return flows that are small enough that were not -- we have decided not to monitor.
Q. And are you aware that the return flows associated with Twin Falls Canal Company operations are in the neighborhood of 300,000 to 400,000 acre-feet a year?

MR. THOMPSON: I'm going to object to that question; characterization, foundation.

MS. KLAHN: I asked him if he was aware.

THE HEARING OFFICER: Overruled.

THE WITNESS: I'm not sure I knew that it was that exact number. I've seen numbers, presentations where they've talked about it, but I don't remember that number specifically.

Q. (BY MS. KLAHN) All right. Let's talk for a minute about that equation at the top of page 13. Could you sort of just walk us through how the calculation works, what each of the variables are?

A. Sure. The Ep is the project efficiency. And that is equal to the crop water need, divided by the demand or the diversion, the Q, the discharge of the diversion. Crop water need is composed of, we use ET, we use precipitation, we use acres to calculate that. The diversions are, those are directly measured that we take from water right accounting.

Q. Okay.

A. From Water District 1.

Q. From Water District 1?

A. Yeah.

Q. Okay. So tell me if this is correct from a mathematical perspective. As the irrigation diversions

go up, the project efficiency will go down. As the denominator gets larger, the project efficiency gets smaller; is that true?

A. If the crop water need stays the same, yes.

Q. Okay. In your work with the Department on the methodology order, have you done any evaluation of whether the project deficiencies that you are measuring using this calculation are reasonable?

A. When we're doing our calculations, we are always doing, you know, quality control, quality assurance to see if the numbers make sense. And that's on a technical level. You know, did it compare to previous years, or compared to the previous month, is it a reasonable number? So all of our calculations go through that. We make our calculations. And Kara Ferguson and I switch and review each other's data. So just on the reasonableness of the calculations, yes, on a numbers basis we're looking at.

Q. You were the lead of the technical work group in November and December of 2022; is that right?

A. Yeah, correct.

Q. And there was some discussion there of project efficiency and the methods that the Department uses to calculate those. Do you recall that?

A. Yeah, I gave a presentation on project

efficiency.

Q. And Greg Sullivan, one of the consultants for the Cities in this proceeding, provided some input on alternative ways of looking at project efficiency using the same kind of calculation that the Department was using, but made some suggestions about other ways to look at it. Do you recall that?

A. My recollection of, at the technical working group, he presented us some graphs looking at the relationship between crop water need and project efficiency. I don't remember at that time that he made a proposal about different ways to calculate it. But he did in his expert report at a later date. He may have stated that at the technical working group. I don't remember it. But I do remember it from his technical, his expert report.

Q. During the technical work group process was there any conversation internally in the Department about taking another look at how to do project efficiencies, keeping in mind that you want to use this kind of equation, but to try and I mean get a more meaningful project efficiency measure?

A. We, on a technical level, we have discussed, you know, the accuracy of the project efficiency, and where errors may come in that calculation. But we

haven't gone down the road of like proposing, or even working out possible ways to calculate it differently.

Q. Thank you. Could we turn now to page 10 of Exhibit 300, please? And you'll recall during our deposition, I had quite a log of questions for you on acreage?

A. Yes.

Q. So based on the table that's shown in Exhibit 300, paragraph 22, the Department used the Twin Falls Canal Company 2013 shapefile for purposes of Twin Falls Canal Company acreage in this Fifth Methodology Order; correct?

A. Yes.

Q. And I think you've testified during your deposition, that this Twin Falls Canal Company acreage shown in the table does contain hardened acres. Do you recall that?

A. Yes.

Q. In other words, hardened acres would mean they can't be irrigated?

A. Yeah, correct.

Q. And we also talked during your deposition about the Department's previous reliance in earlier methodology orders on lower numbers for Twin Falls Canal Company acres. Do you recall that?

A. Yes, I believe it was about 183,000, and I think they came from SPF.

Q. I think that's right.

(Exhibit 324 marked.)

Q. (BY MS. KLAHN) So let's take a look at some of those values. I would like you to find in that same notebook, I think in that same notebook, it should be Exhibit 324.

A. No, this one only goes to 313.

Q. I guess it's in, we'll guess, Volume 2.

MR. WOOD: It should be in that.

THE WITNESS: Could you repeat the number I'm looking for?

Q. (BY MS. KLAHN) Sure. It should be a 2015 PowerPoint that you prepared.

A. Yep, I'm to Exhibit 324.

Q. Okay. Could you identify that, please, for the record?

A. The title -- well, it looks like it is a printout of a PowerPoint presentation titled "Proposed Modification to Method Determining Reasonable In-Season Demand for the Surface Water Coalition: Irrigated Acres for SWC Members, Presented to the SWC Methodology Technical Working Group by Matt Anders, February 19, 2015."

Q. Okay. Let's turn, the pages are not numbered. I believe it's page 3. There is a table.

A. "Summary of irrigated acres" is the bullet?

Q. Correct. And I want to draw your attention to the bottom row of the table there, which shows the SPF acres you referenced a minute ago, 183,589. So in 2013, if we go all the way over to the right, "2013 RISD," what does that column represent?

A. That is acres that we used for the 2013 order for the reasonable in-season demand calculation.

Q. Okay. So that number was used in 2013. The same number was used in 2015; wasn't it?

A. Reviewing what we call the calculator, it looked like that number was use from 2010 to 2014.

Q. 2014?

A. Yeah.

Q. You didn't use it in 2015?

A. When I looked at the calculator, we changed it in 2015.

Q. Okay.

A. But that's based on what I see in the calculator.

Q. Okay. Can I hand you -- or I'm not going to hand you, because hopefully you have it in front of you. We're looking at the IGWA notebook, Exhibit 135.

(Exhibit 135/306 marked.)
MS. KLAHN: TJ, any idea if that is Volume 1, 2, or 10?
MR. BUDGE: The numbers are on the binder.
THE WITNESS: They are in the common exhibits.
MS. KLAHN: No, it's in IGWA 135.
MR. SIMPSON: It's the same as 306.
MS. KLAHN: Yes.
THE WITNESS: I'm at Exhibit 135.
Q. (BY MS. KLAHN) Thank you. Would you identify Exhibit 135 for the record, please?
A. It says it's the "Fourth Amended Final Order Regarding Methodology for Determining Material Injury to Reasonable In-Season Demand and Reasonable Carryover."
Q. And then let's turn to the last page. Actually, let's turn to page 39.
MR. FLETCHER: Sarah, for the record, it's already been admitted under a different number.
MS. KLAHN: Oh, it has. I apologize. I missed that.
MR. FLETCHER: Well, we don't want any confusion.
MS. KLAHN: Well, let's keep using 135, but I won't admit it. How is that? I will start talking about it as 306.

MR. FLETCHER: I just thought we should have it on the record, it has been marked as 306.

Q. (BY MS. KLAHN) Okay. Let's not switch the exhibit notebooks.

A. Okay.

Q. But I'm going to refer to this as Exhibit 306?

A. Okay.

MS. KLAHN: Thank you, Kent.

THE WITNESS: I forgot the page number.

Q. (BY MS. KLAHN) 39.

A. All right. I am there.

Q. And that this Fourth Methodology Order is the final order signed by the Director; correct?

A. Yes, it appears to be.

Q. Okay. Now, I would like you to look through the Fourth Methodology Order, Exhibit 306, and find the paragraph where the Twin Falls Canal Company acres used in the Fourth Methodology Order are identified. And I'm not meaning to belabor the suspense. I can't find a spot in there, which it is identified, which is why I wanted you to look at it, and see if that's accurate?

A. I believe that that's accurate.

Q. Okay.

A. And that we started that table which was new in the Fifth Amended Methodology Order of adding the

acres.

Q. Okay.

A. Generally, I think we add the acres, I can't remember, it's either for each year in the April or the July in the as-applieds. They weren't in the fourth amended, I believe.

Q. Okay. That's fair. All right. And so this Fourth Methodology Order was signed by Director Spackman in 2016. So by 2016, you were still using the 2013 shapefile number of 194,000 acres or so for Twin Falls Canal Company; correct?

A. I believe, yeah, we were.

(Exhibit 325 marked.)

Q. (BY MS. KLAHN) Now, let's switch over and take a look at Exhibit 325.

A. Yes I've got it.

Q. And could you identify Exhibit 325 for the record, please?

A. It looks like a printout of a PowerPoint titled "Proposed Modification to Method for Determining Reasonable In-Season Demand for the Surface Water Coalition: Use of the Near Real-Time Metric," Presented by Ethan Geisler, Kara Ferguson, and Matt Anders, on December 1st, 2022.

Q. And I apologize, these pages are not numbered,

but I believe it's page 19. There is a table that's titled "Surface Water Coalition Irrigated Acres." Could you find that, please?

A. I think I'm on that. The first table or the first column is "SWC Member," and the last one is "Methodology Acres"?

Q. Correct. Thank you.

A. Okay.

Q. So let's talk about each column for a minute. So the first column is "SWC Member," as you said. The second column is titled "Created by SWC for IDWR PPU." What does that stand for?

A. It's the source of the shapefile. Whether it was created by a Surface Water Coalition member or sent to us, or it was created by us during the Snake River Basin Adjudication. "PPU" stands for permissible place of use.

Q. Then the next column, "Date of Shapefile," what does that tell us?

A. If it was submitted by the Surface Water Coalition, it was the year that we received it. If it was a permissible place of use, they all have a 2010. That was my understanding of when they were created.

Q. Okay.

A. Or maybe last updated. Maybe not created, but

the last version.

Q. The next column is the "Shapefile Acres." That's self-explanatory; would you agree?

A. Agreed.

Q. The next column is "If Remove Nonirrigated Acres With 2011 Irrigated Lands Dataset." What does that column represent?

A. I'm on a different table. I'm on "CDL Processing Acres." Am I on the wrong one?

Q. Yeah, you are on the wrong one. And that's probably my fault.

A. Well, wait. Three pages later, there is another table.

Q. Let's do that one.

A. Okay. The same, and it says, "If Removed Nonirrigated Acres with 2011 Irrigated Lands Dataset."

Q. Right. And so for purposes of the record, we should be on page 22 of that exhibit, I think?

MR. FLETCHER: It was page 19.

MS. KLAHN: Is it page 19. It was correct. Okay.

THE WITNESS: Okay.

Q. (BY MS. KLAHN) Sorry.

A. I was just -- I didn't count. I just went to it.

Q. That's okay. That's all right. So let's stick with that column. What does it stand for?

A. Those are the acres, if we did a GIS analysis using the 2011 IDWR irrigated lands dataset, if we removed all the polygons in the 2011 dataset. All that area under the non-irrigated from the shapefiles that they list here, either PPU or from the Surface Water Coalition.

Q. Okay. And focusing on Twin Falls Canal Company, if we look at the bottom row, the difference in acres, the Surface Water Coalition's shapefile is 194,727. If you remove the non-irrigated acres with the 2011 irrigated lands dataset, it goes to 179,486; is that right?

A. Correct.

Q. And then the next column over is titled, "If Remove Non-Irrigated Acres with 2017 Irrigated Lands Dataset." What does that tell us?

A. The same thing as we did with the -- or the same process with the 2011 irrigated lands dataset. We did it with the 2017 irrigated lands dataset.

Q. Okay. And then the final column is the column that has been of acres that has been used in the methodology order since the Fourth Methodology Order?

A. Yes, I think it's since the third. The third

came out in 2015.

Q. Okay.

A. I think that's what we've used those acres since then, or Twin Falls specifically since then.

Q. Okay. And before we go on, let's just stop for the record. What is the IDWR irrigated lands dataset?

A. Jennifer was asked this same question. I thought she gave a good answer. It is a -- hopefully, I can give the same answer. It is a dataset that we prepare here at IDWR. We use -- we prepare it by hand. We use several different types of data to create polygons on the Eastern Snake Plain, and then classify them as irrigated, non-irrigated, or semi-irrigated.

Q. Okay. The Twin Falls Canal Company row that we've been looking at shows two acreage numbers that are derived from using the 2011 and 2017 irrigated lands dataset that are roughly 13,000 acres smaller than what's used in the methodology order; correct?

A. Yeah, roughly.

Q. And Ms. Sukow testified this morning that the IDWR irrigated lands dataset is used to calibrate the model. Were you aware of that?

A. I was aware of that, yes.

Q. And yet, during your deposition you testified

that you didn't think the irrigated lands dataset was sufficient to satisfy the clear and convincing standard. Do you recall that?

A. I do recall that.

Q. And in 2017, soon after, you issued the Fourth Methodology Order, you had a brand-new irrigated lands dataset. So why not incorporate that into the methodology and use that instead of the larger shapefile number?

A. So until -- so since about 2015, I haven't been using the irrigated lands dataset at all. So it wasn't a consideration when, in 2017, that I would use that. I wasn't using one to remove the non-irrigated acres. Which was an oversight on my part, because at the same time I was doing that, I was working on the near real-time metric and removing the irrigated acres -- or the non-irrigated acres with the irrigated lands dataset. So it was an inconsistency between processes I had going.

Q. Would you agree the Department's hand digitized maps that are created using the irrigated lands dataset process are highly accurate?

A. I think they are highly accurate for the year that they are created for.

Q. So in an ideal world, there would be a new

irrigated lands dataset every year, and that's what you would use in the methodology order?

A. To use your term "ideal world," yes.

Q. And in the meantime, the dataset you are using is at least ten years old. And you would acknowledge that there is hardened acres incorporated in it; right?

A. Correct.

Q. So right now, the difference between the 2017 irrigated lands dataset and the methodology acres is roughly, what; eight, nine percent difference?

A. Okay. Rough math, sure.

Q. Yes. At some point as the technical lead on the methodology analyses, is there a threshold at which you say, we simply can't use this 2013 dataset anymore from Twin Falls, because it's simply too inaccurate based on what our hand digitizing is showing?

A. Until we get something that passes, or that I feel passes the, or achieves the clear and convincing, I think we're going to use that. The clear and convincing by Judge Wildman of, if you are going to reduce the acres, you have to be clear and convincing.

Q. So the standard isn't really clear and convincing, it's whether or not Judge Wildman has blessed it; is that fair?

A. I don't know the answer to that.

Q. So for purposes of the Fifth Methodology Order, have you done any investigations into Twin Falls Canal Company return flows?

A. Not as part of the order.

Q. You had a conversation with Mr. Barlogi, who's the manager of Twin Falls Canal Company, about their return flows at some point, though; didn't you?

A. I don't think I've ever talked to him, that I remember.

Q. About return flows and their impact on the Murphy gage flows?

A. I stand corrected. As part of the Swan Falls technical working group and work we were doing there, I think -- I can't remember exactly. I may have sat in on a call with Collin Macheel with Mr. Barlogi. I'm not sure on that. I've talked to Collin several times about return flows at Twin Falls. I can't remember if I sat in on a call or not.

Q. Well, Mr. Barlogi testified he was on a call with you in January of this year about Twin Falls Canal Company return flows. And the timing to me was interesting, because it was when the methodology order was being, I guess, being drafted. So that's the source of my question.

In your experience, have you evaluated whether

Twin Falls Canal Company return flows contribute to Swan Falls gage flows -- or sorry -- Murphy gage flows?

A. Yes. And I think that's what that call was about. As we were preparing data to present to the Swan Falls Technical Working Group, that was going on at the same time. We have calculated the contribution at the Murphy gage for what they call the adjusted average daily flow at Swan Falls.

Q. Let me ask you another question related to the Twin Falls Canal Company.

MS. KLAHN: Let's mark this as Exhibit 362.

(Exhibit 362 marked.)

Q. (BY MS. KLAHN) So, Mr. Anders, you've been handed Exhibit 362, which is a contract between the Idaho State Board of Land Commissioners and Twin Falls: Land & Water Company, dated January 2nd, 1903. And I'll represent to you that this is the basis for one of Twin Falls Canal Company's water rights. I would like you to take a look in here at the section --

Well, first of all, have you ever seen this?

A. No.

Q. And so are you familiar with the fact that this describes five-eighths of an inch delivery as the basis for deliveries of water under the Twin Falls Canal Company water right?

A. No.

MR. THOMPSON: Director, I'll object to this exhibit. I guess we need inquiry that it represents the water rights of the canal company. Those rights have been decreed. And I think they are in the Department's files.

THE HEARING OFFICER: Well, these questions are foundational. I'll overrule the objection at least for the moment, Ms. Klahn.

Q. (BY MS. KLAHN) So if you haven't seen this contract before, you are not familiar with the fact that there is a term in here that requires rotation of deliveries at the Twin Falls Canal Company?

A. I'm not familiar with that.

Q. And so when you're doing your evaluations for baseline year for the Twin Falls Canal Company, you don't consider any of this kind of information; isn't that right?

A. No.

MS. KLAHN: Okay. That's all I have.

I would like to move for admission of Exhibit 362, 325, and 324.

THE HEARING OFFICER: Any objection?

MR. THOMPSON: Yeah, I'll object to this exhibit, again. Ms. Klahn, is characterizing it as

conditions of the water right, and how it should be delivered. This is not the partial decree in the SRBA. It doesn't have any sort of general provisions for administration relating to this contract.

So what she's offering it for is a mischaracterization of the water right that's been decreed, in descriptive by the state laws.

MS. KLAHN: Mr. Director, if I may be heard?

THE HEARING OFFICER: Sure.

MS. KLAHN: We can before tomorrow morning, produce the SRBA related documents relating to these kinds of elements of the water right. Originally in 2012, I think it was, the City of Pocatello filed a protest against the Twin Falls Canal Company claims in the SRBA asserting the delivery be related to five-eighths instead of three-quarters, some stuff happened. We entered into a stipulation with Twin Falls about the fact that this would not be decided in the SRBA. That these were elements of administration.

So these are elements that we're asserting should be taken into consideration, because they aren't on the face of the partial decree, and that was by agreement. And if you if you'd like to reserve, and wait for something to be provided, we're happy to do that.

MR. BUDGE: Just one comment.
THE HEARING OFFICER: Mr. Budge.
MR. BUDGE: Director, if you want to look at the SRBA filing that Ms. Klahn is referring to, it's Exhibit 179. And it's an SF5 filed with the SRBA court. So it is the type of document that the Department would typically take judicial notice of.
THE HEARING OFFICER: My reaction is this, Mr. Budge, and, Ms. Klahn. I would take notice of the decrees. I would take notice of the SF5. But do I take notice of a contract document that's been presented to me, that I know nothing about, and Mr. Anders knows nothing about, and receive this into evidence. I mean, it needs to have foundation. And Mr. Anders is not the witness by, or through whom this document should be presented.
So I'll receive into evidence exhibits marked as Exhibits 324 and 325. And I won't allow what's been marked as Exhibit 362 into evidence at this time.
MS. KLAHN: Thank you.
(Exhibits 324 and 325 received into evidence.)
THE HEARING OFFICER: It can be re-offered if there is sufficient foundation, Ms. Klahn.
MS. KLAHN: Okay. Thank you.
MR. FLETCHER: So excuse me. You admitted 324

and what was the other one?

MS. KLAHN: 325.

THE HEARING OFFICER: 325.

MR. FLETCHER: Thank you.

THE HEARING OFFICER: They were presentations by Matt Anders to the Surface Water Coalition technical working group.

Mr. Budge?

MR. BUDGE: One housekeeping item, did Exhibit 306 get admitted into evidence?

THE REPORTER: No, I don't have it.

MS. KLAHN: I misunderstood, Mr. Fletcher. I thought he said it had been used and admitted. So I'll offer Exhibit 306 as well.

THE HEARING OFFICER: So 306 is being offered as 306, not as a combined exhibit?

MS. KLAHN: Yes.

THE HEARING OFFICER: Any objection to the admission of Exhibit 306?

Hearing no objection, the document marked as Exhibit 306 is received into evidence.

(Exhibit 306 received into evidence.)

THE HEARING OFFICER: Further examination of Mr. Anders?

Mr. Anderson.

///

CROSS-EXAMINATION

QUESTIONS BY MR. ANDERSON:

Q. How are you doing, Matt?

A. Good. Thank you.

Q. You should have the methodology order exhibit. Is that still in front of you, 300?

MR. FLETCHER: 301.

Q. (BY MR. ANDERSON) 301.

A. 301.

THE HEARING OFFICER: I think it's 300; isn't it?

MR. ANDERSON: I thought it was 300.

MR. FLETCHER: You mean, the Fifth Methodology?

MR. ANDERSON: I'm sorry. Yes, the Fifth Methodology. The As-Applied is 301.

MR. FLETCHER: Yes.

THE WITNESS: Yes, I have 300.

Q. (BY MR. ANDERSON) Would you go to paragraph 9, and it kind of goes on to page 4 there. I am more curious about the last two sentences there. It says it starts with "an above average diversion year."

A. On page 4. Okay.

Q. Yeah. At the top of page 4.

A. Yes, I see it.
Q. Would you mind just reading that sentence for us?
A. Sure. "An above average diversion year or years selected as the baseline year should also represent a year or years of above average temperatures and reference ET, and below average precipitation to ensure that increased diversions were a function of crop water need and not other factors."
Q. Could you help me understand what those other factors might be?
A. I'm not sure.
Q. Okay. So then is it safe to conclude that an above average diversion year wouldn't matter whether it was above average temperatures, if they divert, they divert? If you cannot identify what other factors it might be, why does it need to be above average temperatures?
A. Well, I don't quite understand the question.
Q. Well, I'm just trying to understand the methodology order as it's stated. It gives the list of factors in choosing the baseline year. And it says "to ensure that the increase in diversions were from a crop water need and not other factors." I don't know either. I'm trying to understand what those other factors are?

But I've asked and answer -- I'm not trying to put you on the spot and make you come up with an answer. If you don't know what those other factors are, that's fine.

A. Okay.

Q. Do you believe there are other factors without naming them?

A. Not that I can think of.

Q. Okay. Let's go to paragraph No. 28.

A. On page 12, correct?

Q. Yes. Okay. There is a quote here at the end of 28. And I'll read it this time. I won't put everything on you. It says, "The concept of a baseline is that it is adjustable as weather conditions or practices change, and that those adjustments will occur in an orderly, understood protocol." Are you with me on the same --

A. I did see that sentence. Yes.

Q. So I have a question. Did weather conditions change in the last seven years to prompt a change in the baseline year?

A. I don't think significantly.

Q. Did practices change?

A. I think the crop mix, crop type, and maybe some harvesting methods may have changed in that time.

Q. Okay. And maybe you can just direct me, which

part of the methodology order looks specifically at that crop mix and --

A. The crop mix is part of the crop water need calculation.

Q. Okay. Do you calculate the change in that crop water need, and evaluate it as a requirement to update the baseline year?

A. Could you restate that question?

Q. Sure. Sure. Maybe I can rephrase it and give a little foundation for it.

The concept of baseline year as it says, it's adjusted as whether conditions change or practices change. So my question is, do you evaluate the crop water need and determine these practices changes?

A. We are evaluating the crop water need. We are also over time watching, especially over the last few years, watching the baseline year to see if it still meets the criteria.

Q. Understand. And could you explain just the orderly and understood protocol for changing a baseline year?

A. The only way a baseline year could be changed is through an order issued by the Director.

Q. The crop water need that you are talking about that you say, the practices changes would show up in the

crop water need; is that correct?

A. They can.

Q. They can?

A. Yeah.

Q. Is there any other way that they could be manifested?

A. I think changes in crop type or crop mix that are being grown can show up in diversion. It can show up in project efficiency. These are all pieces that we're calculating.

Q. But you don't look specifically for changes in practice, those will just show up as a difference in efficiency; correct?

A. Yeah, we're not specifically tracking -- I think I see now. We're not specifically tracking what are their harvesting practices or things like that. We are watching the crop. We do calculate the crop mix. But you are right, that changes in practices, we would only see like the secondary effect of that. It would show up in some kind of number that we're calculating.

Q. I want to talk to you a little bit. I'm kind of confused about the clear and convincing standard that you apply to the crop water acres --

A. Yes.

Q. -- or the irrigated acres? Sorry. Not a

crop water acres.

A. Yes.

Q. What data, I guess, that you would consider needs to meet that clear and convincing standard?

A. I think it has to -- the data have to be timely and accurate. And when I say "timely" --

THE HEARING OFFICER: Go ahead.

THE WITNESS: When I say timely, to use a term used by Ms. Klahn, is it would be really nice to have it in-season, but that's impractical.

Q. (BY MR. ANDERSON) Okay.

A. So as soon as we could get, you know, something recent. That's what I mean by timely.

Q. Not to nitpick you. That's still a different standard than clear and convincing. I'm trying to understand the clear and convincing standard that you apply to the irrigated acres. You said it wasn't clear and convincing. Maybe you could explain what part of the study that the Department did was unclear first?

A. You are talking the 2017 irrigated lands dataset?

Q. Yes, I believe that's what Ms. Klahn was talking about when you gave that answer.

A. Okay. So the part of that to me is that was created in 2017. So while it has the accuracy, I think

the timeliness of that dataset does not meet the standard of clear and convincing. You can open that dataset and see acres that are considered non-irrigated. Overlay it on a recent air photo, maybe a 2021 or something a 2022, and see that it is irrigated.

So to me, that's not convincing that those acres should be removed. They said in the 2017, that dataset indicates that they should be removed. But if we look at recent air photos. It shouldn't be. They are irrigated.

Q. And the Department has done those studies, recent studies of irrigated acres?

A. It was just a preliminary analysis to see what does it look like compared to current conditions, the 2017. So we did not do a full-blown project or analysis of it. It was more of a preliminary.

Q. And with that study, did you find acres that were considered irrigated back then, but are no longer appearing to be irrigated acres?

A. I didn't identify any, but I would say it's likely that there are exactly that.

Q. Is there any other data or evidence that you think needs to meet a clear and convincing standard that you did not consider in this methodology order, because it did not meet that standard?

A. Can you repeat that question?
Q. That was a little bad. I'll take that.
Is there any data or information that you didn't consider as part of this methodology order, because you felt it didn't reach that clear and convincing standard?
A. I think that the supplemental ground water is the same, is in the same category that to adjust the acres downward, it needs to be clear and convincing.
Q. Okay. But all the other data that you used, you felt was clear and convincing?
A. I'm not sure that that standard is applied to everything. When Judge Wildman, at least the piece that I have read, was talking about irrigated acres, not the methodology as a whole.
Q. Okay. I understand. I want to talk a little bit maybe about the recommendations.
(Exhibit 914 marked.)
Q. (BY MR. ANDERSON) This is Exhibit 914. You know, I don't know that we even need to take the time to even get it out. I'm going to reference it. 914, I'll represent was the recommendations in December that the Department made. It was a one-page document. You are familiar with that; correct?
A. For the technical working group?

Q. Yes.
A. Yes, I am familiar with that. Yes.
Q. Yes. And that didn't recommend a move to transient; correct?
A. No, it did not.
Q. And if you need to look at it for reference, you can. But that's all I'm going to touch on it.
A. No, it did not.
Q. When did it first become evident to you, that the new methodology order, the Fifth Methodology Order was going to move to transient?
A. The official time is when the Director signed it.
Q. All right. Now, I understand that there may have been discussions. But when do you, for example, I assume you saw drafts of the order prior to it being signed and released?
A. Yes, correct.
Q. When did you first see a draft of the order that switched to transient?
A. The first draft of the order that I saw was sometime in late January. I can't remember if that draft had proposed language to move to transient. But at that time that the draft was given to technical staff, to Jennifer and Kara and I, so soon after. If it

didn't have it at that point, late January, it would have had it soon after. We were editing it actively at that point.

Q. And did you from your edits from that draft, did you add in the language regarding the move to transient?

A. No, that would have been Jennifer Sukow.

Q. Okay. But in a draft that you returned to the Director, did that have the language showing a move to transient?

A. Yes, there would have been -- I don't know the timing of it exactly, but it -- when we would have given him drafts that had that recommendation in it, or proposed language in it for that.

Q. Were you aware of any settlement negotiations going on between the Surface Water Coalition and ground water users at the time the Fifth Methodology Order was being prepared?

A. I don't remember if there were negotiations going on. I remember that there was some through the summer. And I thought they ended in the fall, but that's what I remember.

MR. FLETCHER: I'm going to object. I don't know the relevancy of that question to this proceeding.

THE HEARING OFFICER: Sustained.

Q. (BY MR. ANDERSON) I'm going to wrap it up here pretty soon. Can we go back to the methodology order, No. 300?

A. Okay. I have it.

Q. We're going to go to paragraph 30.

A. On page 13?

Q. Yes. I kind of want you just to walk me through a process, if you can. On paragraph 30, it references a Q sub D. How do you refer to that internally. Do you just say, "QD"?

A. We just call it diversions. But what it is discharge from diversions. The "Q" is discharge. And the "D" indicates it's from diversions.

Q. Okay. When you look at it, though, I appreciate your reference to calling it diversions. But it's actually a specific type of diversions; correct? You could look right above paragraph 30 if you --

A. It says above it, "QD" is defined as "irrigation entity diversion of water specifically put to beneficial use for the growing crops within the irrigation entity."

Q. So there is a slight difference in QD than just diversions; correct, or does the Department see no difference?

A. I think there is a difference. Here we are

referring to their entire diversions, the seepage loss, everything. What they diverted at their headgates.

Q. Okay. And that's how the Department sees QD is just diversions?

A. In the methodology?

Q. Yes.

A. Elsewhere? I don't know.

MR. ANDERSON: I don't think I have any further questions.

THE WITNESS: Okay.

THE HEARING OFFICER: Thank you, Mr. Anderson.

MR. ANDERSON: Thank you.

THE HEARING OFFICER: Further questions of Mr. Anders?

Mr. Harris.

CROSS-EXAMINATION

QUESTIONS BY MR. HARRIS:

Q. Mr. Anders, my name is Rob Harris. I represent the City of Idaho Falls. I don't think we've met before. But in the list that was read by Mr. Wood earlier. I understand that you are the person that the Department is designated to testify about the forecast supply; is that right?

A. You are correct.

Q. Okay. And you have in front of you Exhibit

300, which is the Fifth Methodology Order?
A. I do.
Q. Could you turn to page 18 for me?
A. What page?
Q. Page 18, paragraph 49?
A. Did you say, paragraph 49?
Q. Yes.
A. Okay. I'm there.
Q. Okay. As I understand the order when the Department or the Director looks at the forecast supply, he is looking at a prediction of the unregulated inflow volume at the Heise gage as of April 1st; is that right?
A. Yes.
Q. Okay. And that forecast is prepared by who?
A. We get that forecast from the Bureau of Reclamation, who does a joint -- what they call the joint forecast, with the Army Corps of Engineers.
Q. Okay. And Heise gage is generally located where on the Snake River; do you know?
A. It's located by Palisades. I don't know the exact mile, how many miles, but between Palisades and Idaho Falls generally speaking.
Q. So it's predicting the inflow in the watershed above that gage; correct?
A. The unregulated flow means if there were no

reservoir operations going on, how much would be there, so, yes.

Q. Are you familiar with some of the other watersheds of the tributary streams or basins in eastern Idaho?

A. A little familiar.

Q. Are you familiar with the Willow Creek drainage?

A. Somewhat.

Q. Okay. It's the drainage where Ririe Reservoir is located. How about the Blackfoot River drainage.

A. Not as familiar with that one.

Q. Okay.

A. But I know roughly where it is.

Q. The Blackfoot River comes below where the Heise gage would be; would you agree with that?

A. I believe it comes in from the east.

Q. The same with Willow Creek?

A. Yes, I believe my geography is right. They both come in from the east below Heise.

Q. Also the Portneuf River drainage; correct?

A. More familiar there. It comes in from the southeast, but also -- yes.

Q. And those are all tributary streams to the Snake River; correct?

A. I believe so, yes.
Q. And what is the source of the water right for the Twin Falls Canal Company; do you know?
A. The Snake River.
Q. The Snake River. And so these tributary basins come in above Twin Falls Canal Company's points of diversion; do you agree?
A. Yes.
Q. Okay. Are you familiar with the snow water equivalency maps that the Department posts routinely during the non-irrigation season?
A. Yes, I am.
Q. Okay. How are you familiar with those?
A. They are prepared by the NRCS. We take their data, and we create maps. And then we post it on our web page.
Q. And were you aware on the snow equivalency map for April 3rd, that the percentage snow pack in the Portneuf basin was 216 percent?
A. I knew it was very high. I didn't know the exact number.
Q. Did you know in the Blackfoot River drainage, it was at 186 percent?
A. Again, I knew it was high, not the exact number.

Q. The same for Willow Creek at 178 percent?
A. Again, I knew it was high, but not the exact number.
Q. Was there ever any discussion within the Department to look at these other basins, in addition to the unregulated flow at Heise, forecast as part of the water supply to the Surface Water Coalition?
A. We didn't have any discussions about adding them to our regressions or adding them some way to the joint forecast, no.
Q. But you would agree, it would provide water to the water supply of the Twin Falls Canal Company; correct?
A. Among others. They can supply water to the reservoirs. They can supply water to anybody below there that's in priority. But Twin Falls is among those water users.
Q. And the Portneuf River, for example, flows directly into American Falls Reservoir; correct?
A. Yeah, uh-huh.
Q. But that wasn't considered in the revised methodology order at all looking at anomalous snow pack situations and tributary basins?
A. No, we didn't do any review like that.
Q. In paragraph 49, there is also some discussion

about shifting one, was it one standard deviation in the forecast supply? Did I understand that correctly?

A. We calculate the supply. And then shift it down by one standard deviation, yes.

Q. Is that something that you recommended to be done?

A. That method was developed around 2014 or '15. My best guess is that was recommended by Liz Cresto.

Q. I'm sorry. Who is that?

A. Liz Cresto was formerly a hydrologist with IDWR, and she worked on the methodology. And her portion, or the portion she worked on was the forecast supply.

MR. HARRIS: I have no further questions. Thank you.

THE WITNESS: Thank you.

THE HEARING OFFICER: Thank you, Mr. Harris.

Further questions of Mr. Anders?

Mr. Budge.

CROSS-EXAMINATION

QUESTIONS BY MR. BUDGE:

Q. Thank you. Mr. Anders, I'm TJ Budge. I represent IGWA. Do you mind if I call you Matt today?

A. Sure, that would be great.

Q. All right. Matt, I want to follow up with

just some questions that Mr. Harris asked that piqued my curiosity. And maybe I didn't follow that. But I think I understood that the forecast supply, the joint forecast that goes into the forecast supply does not take into account inflows from the Portneuf or Blackfoot River basin?

A. That forecast is prepared by the Bureau of Reclamation and the Army Corps of Engineers. I'm not familiar with everything that they consider, or how they calculate it. But my understanding it's the flow, unregulated flow at Heise.

Q. Okay. So I want to ask a few follow-up questions. If that forecast doesn't take into account the Portneuf, or, you know, the Blackfoot River basins, is there anything else in the methodology that would account for the inflow from the Portneuf on a year like this?

A. I'm unsure what you mean by "account for."

Q. Are you aware that the Portneuf River basin had record snow pack this winter?

A. I knew it was high, yes.

Q. Yeah. And I'm from Pocatello, so this is, you know, close to home. But are you aware of the flooding that's been going on there for the last month or so?

A. I was not.

Q. Well, I'll just represent that the Portneuf had the highest snow water equivalent in Idaho this year. And it was record for the Portneuf basin. And there has been flooding for the last month in the lower Portneuf basin.

And so my question is, do you know if there is anything in the methodology order that would take into account that excess inflow on a year like this, that's coming in from the Portneuf?

A. We don't do an adjustment, or something on the forecast -- or on the joint forecast.

Q. Okay. And it's a genuine question, because I don't know that either. But I appreciate your answer. If there is no adjustment, then, you know, the record inflow or excess inflow would that become a windfall to the Surface Water Coalition or be accounted for in some other way?

MR. THOMPSON: I'll object to the form of the question.

THE HEARING OFFICER: Overruled.

THE WITNESS: I don't know about a windfall for Twin Falls Canal Company. It would be captured and delivered like any other tributary, or captured in the reservoirs. It would become part of the water supply. Who's going to benefit from that? It depends on which

reservoir is filling, what space is filling, who's in priority.

Q. (BY MR. BUDGE) Fair enough. Let me move back to the questions I had planned on asking you. But I appreciate that explanation. That's helpful. I will try not to duplicate questions that others have asked.

I understand that you have worked on prior versions of the methodology order?

A. I worked on the Third and the Fourth, yes.

Q. Okay. And then in respect to reviewing the Fourth and preparing the Fifth, you are the lead Department staff member overseeing the technical aspect of that review?

A. Yes.

Q. My understanding is that you took directions from the Director in terms of which analyses to perform. And then you would make those assignments to Jennifer Sukow and other staff members to perform those analyses?

A. Definitely took direction from the Director about what he wanted us to look at. When we started the review, I was not either directly or indirectly supervising Jennifer. I was supervising Kara.

Q. Okay. And your review began in the summer of 2021?

A. We started reviewing in 2020.

Q. 2020.

A. Fall of 2020, that check-in review on it, on the methodology.

Q. And that continued through 2021 and then into '22, until the Director's assignment in August of '22 that he was going to proceed with amending the methodology order?

A. Not continuous. We worked for a few months reviewing it, and presenting our results to the Director between maybe October and February -- October 2020 and February 2021. And then we, Kara and I may have been working a little bit on our own, individually.

But there was no formal kind of check-in review going on, until fall of 2022, or I should say, late summer, when we started talking about it again. We had been talking about it on and off in there, but that's when in August, that's when the Director issued we needed to convene the technical working group.

Q. What components of the methodology did you work on in the fall of 2020, and then into the winter of 2021?

A. Originally we were looking at baseline year, we were looking at forecast supply, and we were looking at near real-time metric.

Q. And I understand that a main impetus for

reviewing the Fourth Methodology Order was just the passage of time, and additional data that had been developed since 2016?

A. That was part of it. We were also -- one of the variables that we used for forecast supply is Box Canyon at after -- we issued the Third Methodology Order in 2015. And then the USGS did a shift on that gage that spring. And we were unsure about what that did to our regression that we were using for forecast. So we have been -- we had been watching that on and off for years.

In 2020, we became concerned again about is Box Canyon performing the way we want it to? And then the passage of time on the baseline year, was that still meeting all the criteria?

Q. And Box Canyon is part of the regression equation used to predict forecast supplying?

A. It is. Not for all the companies, but specifically it is for Twin Falls Canal Company, which is the one that has the first shortfall. So we watch that closely.

Q. Okay. And the deterioration in that regression equation in the R-squared value was one of the impetuses for reviewing the Fourth Methodology Order then?

A. Yes, that's an indicator of, is the regression performing the way we want it to be?

Q. Okay. So there wasn't some type of emergency circumstance that forced the Department to review the Fourth Methodology Order?

A. Not that I remember.

Q. Okay. You participated in the August 5th, 2022 status conference, where the Director announced publicly that the Department was going to review the Fourth Methodology Order?

A. Yes, I was present.

Q. And do you recall from that, that I raised a concern about how this proceeding would comply with due process?

A. I remember you talking. I don't remember what you said.

Q. It must not have been that memorable.

A. Sorry.

Q. Are you aware that there was subsequent correspondence between myself and Garrick Baxter about holding a hearing, and complying with due process in the Administrative Procedures Act?

A. No, I'm not aware.

Q. Was there any discussion among technical staff as to whether the Department would hold a hearing before

or after issuing the Fifth Methodology Order?

A. Say that again. Please repeat that question?

Q. Yeah. Was there any discussion among the Department staff, about whether the Department would hold a hearing before or after issuing the Fifth Methodology Order?

A. I hate to do this again. When you say "hearing," were you talking about on the Fifth Methodology Order, or were you still talking about the August 5th? I'm confused which one you are talking about. A hearing for each one?

Q. I apologize for not asking clear questions. So the hearing we're holding today on the Fifth Methodology Order. Was there ever any discussion as to whether an evidentiary hearing would be held before, versus after the Fifth Methodology Order was issued?

A. Not with me.

Q. Okay. Let me ask you to turn to Exhibit 914. In fact, you don't need to turn to it. This is the preliminary recommendation document that you and Kara Ferguson authored?

A. Yes.

Q. You are very familiar with that.

A. Yes.

Q. That document is titled a recommendation

concerning the Fifth Methodology Order. Ultimately, was that a recommendation to the Director?

A. Yeah, I believe that is. It's from Kara and I to the Director.

Q. Okay. And did the Director contribute to reviewing and editing that recommendation before it was published?

A. Yes.

Q. That's dated, I think, was it December 23rd? What's the date on that?

A. That sounds familiar. It was right before Christmas. Yeah.

Q. And that followed the technical working group presentations that were made in November and December; correct?

A. Yeah. I think the last technical working group meeting was about a week before that.

Q. Okay. So as of the time of that recommendation, all of the technical presentations to outside consultants had been completed?

A. Yes.

Q. And we heard Jennifer this morning testify that she didn't really do any modeling related to the Fifth Methodology Order, you know, after our technical presentation was made; is that correct?

A. I don't know.
Q. Okay. Had the technical review of the Fourth Methodology Order essentially been complete by the time you issued the December 23rd recommendation document?
A. I would call the preliminary was complete. That's what I would call that. There was additional review. And as we were drafting the order, talking about different aspects of it, and things changed. So I would say that's more of kind of like the preliminary portion was done.
Q. Was the subsequent review a discussion of the technical work that was presented in November or December, or did the Department continue to perform additional analyses that, you know, had not been presented in November, December?
A. I don't think there were -- there were additional analyses that we worked on after the technical working group.
Q. What did those consist of?
A. The ones that I remember the most, were centered around reasonable carryover. When we presented that to the technical working group, we actually realized about halfway through the technical working group, that we hadn't planned on modifying reasonable carryover. But then we realized, or I realized that the

baseline year is part of that calculation. So that we were going to have to take a look at reasonable carryover.

And we -- that was during the technical working group. So the way that I presented it there was, if we just inserted the 2018 baseline year in the reasonable carryover calculation. Here's what you -- here's the results. And here would be the impact on how often we would have a reasonable carryover shortfall.

After we got the comments, and after we were into the drafting, we started doing additional analyses looking at the reasonable carryover.

Q. Okay. Was there an updated PowerPoint presentation or some other type of report that reflected the additional carryover review that you conducted?

A. No, we did not send anything out.

Q. Okay. Was there something generated internally within the Department, or was it more just verbal discussions?

A. There were several meetings. There were proposed drafts, or proposed language in the order, conversations about it. And then ultimately, what our final decision is in the order.

Q. Understood. Any other components of the

methodology that you continued to conduct additional analyses on after December 23rd?

A. I can't remember the date on the email. Kara sent -- Kara Ferguson sent out some additional analysis about kind of follow up for additional variables on the forecast supply. I want to say that came out late December, after that summary.

Q. Okay.

A. But that was to the technical working group, mailed out to everybody.

Q. So that email went to the folks that were invited to those November, December technical working group --

A. Correct. Everybody that was on our list that we sent everything to, that would have gone out to all of those.

Q. Okay.

A. I can't remember the date on it, but I think it was after the 23rd, when that went out.

Q. Okay. So other than the email that you just mentioned that Kara sent out, and the additional carryover analysis. All the other technical work had essentially been completed by the end of 2022?

A. I think on irrigated acres, based on input from the technical working group, I calculated -- I

think I did some additional work on the irrigated acres to calculate what they would be, with the new shapefiles, and like the 2023 shapefiles. So I had to do some additional work there. I also worked on Milner, which is why we released that one.

Q. Got you. When you say the 2023 acres, is that based on the acreage that the Coalition reported in 2023 under Step 1 of the methodology?

A. Yeah.

Q. Okay.

A. We received a new shapefile. And I -- for Minidoka. And I recalculated the acres for Milner.

Q. Okay. And Twin Falls Canal reported the same acreage in '23 as they have since 2013; correct?

A. They sent us a letter. I don't remember if the acreage is in that letter, or if they just say it hasn't changed five percent from our previous year. I'm not sure of that.

Q. Okay. You didn't go run the methodology based on the other acreage figures for Twin Falls that were discussed earlier today? And what I mean by that, I'll clarify. Is in the technical working group presentation where it shows the irrigated lands, dataset acres, and the metric acres that were around 179,000 or 180,000. You didn't run the methodology based on those acreage

figures?
A. No, I used the 194 number for the methodology.
Q. Okay. Thank you.
(Exhibits 915 and 916 marked.)
Q. (BY MR. BUDGE) Let me have you open the common exhibits binder, and turn to Exhibits 915 and 916.
A. So, yep, I'm on 915.
Q. And is 915, the comments that Sophia Sigstedt with Lynker Technology submitted to the technical working group, I think that was January 16th?
A. Yeah, they are from Heidi Netter and Greg Sullivan, 915.
Q. I've got those backwards. So 915 are the comments from Spronk Water Engineers?
A. That's what I have.
Q. Okay.
A. Yep.
Q. And then 916 are the comments from Sophie Sigstedt with Lynker Technology?
A. Yep, that's true.
Q. Are you familiar with those documents?
A. Yes, I am.
Q. Just describe briefly what those are?
A. So these are the comments provided. 915 is

the comments by Spronk Water Engineers related to the information that we presented in the technical working group and the summary. And the same is true for 916, but this one is from Sophia Sigstedt of Lynker Technology.

Q. Thank you. And these comments were solicited by Department staff as part of the technical working group process?

A. Yeah, they were.

Q. And they were kept by the Department, among its records, considered in connection with developing the Fifth Methodology Order?

A. Yes, we reviewed them in our process.

MR. BUDGE: I would move to admit Exhibits 915 and 916.

THE HEARING OFFICER: Any objection to the admission of these documents?

With no objection -- well, it seems odd to me that they are coming in through Mr. Anders, and not the experts, themselves, who will testify. But they are the documents marked as Exhibits 915 and 916 are received into evidence.

(Exhibits 915 and 916 received into evidence.)

Q. (BY MR. BUDGE) Matt, did you review those documents when they came in?

A. Yes.
Q. And did you communicate those to the Director, and bring to his attention the issues raised in those documents?
A. Yeah, we did.
Q. Let me shift gears back to a discussion we had a moment ago about forecast supply. And we talked about the degradation of the regression equation used for Twin Falls Canal Company.
My understanding is that the forecast supply for Twin Falls Canal was based on a regression analysis comparing natural flow of the Snake River near Heise to the natural flow diverted by each Surface Water Coalition entity; is that accurate?
A. I think there is an additional variable there, predictor. I think it's Box Canyon. I would have to look at the -- for Twin Falls Canal Company, I would have to look at the order to make sure.
Q. Okay. Can you just summarize their regression equation as you understand it, utilized to predict Twin Falls Canal Company's forecast supply?
A. I think it's the unregulated flow at Heise. And I think November through March flow at Box Canyon is the other variable.
Q. Okay. And you mentioned that one of the

reasons that the Department undertook a review of the Fourth Methodology Order is due to concerns with the reliability of that predictive tool?

A. Yes. Is that tool, or is that regression accurate still.

(Exhibit 103 marked.)

Q. (BY MR. BUDGE) Okay. If you'll turn to Exhibit 103. That's in one of the binders of IGWA's exhibits.

A. 103 for me is the 2015 technical memo from Liz Cresto and I, to the Director.

Q. That's correct. Thank you. I'm sure you recognize this document, since you are one of the authors?

A. Yep, I recognize it.

Q. Just explain briefly what this document is?

A. So in two-thousand- -- I think all the meetings were in 2015. We held a series of technical working group meetings with the consultants and representatives of the parties. And we talked about several topics. And based on those, or kind of that -- those meetings, Liz and I wrote this technical memo to the Director.

In addition to this technical memo, I think attached to it, were comments if the consultants of the

different parties wanted to submit comments, that we attached them to this. And I believe they all did. I can't remember.

Q. I believe they may be attached.

A. Yes.

Q. Okay.

A. I see them attached here.

Q. If I look at the introductory paragraph at the bottom of that, it identifies three specific issues that the Director had tasked Department staff with evaluating. And Issue No. 1 is "Revising the natural flow forecast methods for Twin Falls Canal Company."

Can you explain what was going on at that time, and why Department staff had been tasked with analyzing this?

A. I don't remember exactly why we were tasked with that. But in the fall of 2014, we received a court ruling that listed several things that we had to adjust or look at in the methodology. This may have been one of them.

Q. Okay.

A. I don't remember.

Q. So does the simple fact that that action item was being assigned for review and improvement, indicate that there were some concerns with the reliability of

the natural forecast methods that had been used at that time?

A. I'm not sure. But I would expect that there was some concern with the way we were doing it.

Q. But you don't remember whether there was concerns with that at that time or not?

A. I don't at that time.

Q. Okay. Has the Department had concerns with Twin Falls' forecast regression for some time now?

A. We've been concerned about it, I'll speak, since 2015, since we issued the Third Methodology Order. We've been concerned and monitoring that forecast. We're seeing a degradation or a downward decline in the R-squared for that one.

(Exhibit 901 marked.)

Q. (BY MR. BUDGE) Let me have you turn next to Exhibit 901.

A. Okay. I have that, 901.

Q. So I'll read the title "Evaluation of Method for Determining Material Injury to Reasonable In-Season Demand and Reasonable Carryover: April and July Forecast Supply," presented by Kara Ferguson, dated November 17th, 2022. Is that the one you are looking at?

A. I am.

Q. Do you recognize that document?
A. Yep, I do.
Q. Is that a copy of the presentation that Ms. Ferguson gave to the technical working group this last November of 2022?
A. I didn't memorize the presentation, but it does look like the slides that she gave.
Q. Okay. If you'll turn to page 9 of that exhibit?
A. Yep, the page number at the top, Exhibit 901, page 9.
Q. I'm going to bookmark that just for a moment.
MR. BUDGE: Director, I'm going to take a step back and move to admit Exhibit 103, which is the 2015 staff memo we discussed a moment ago.
THE HEARING OFFICER: Any objection?
Hearing no objection, the document marked as Exhibit 901; is that correct, Mr. Budge?
MR. BUDGE: 103.
THE HEARING OFFICER: I'm sorry. 103. Wait a minute.
MR. BUDGE: We're on 901 currently. But I'm stepping to the prior exhibit. I failed to move for its admission while we were discussing it.
THE HEARING OFFICER: Okay. Let me work

through that again. So you've moved for admission of document marked as Exhibit 103. Any objection?

Hearing no objection, the document marked as Exhibit 103 is received into evidence.

(Exhibit 103 received into evidence.)

MR. BUDGE: Okay. Thank you.

Q. (BY MR. BUDGE) And, Matt, thanks for the detour there.

Let's go back to Exhibit 901. If you could flip to page 9 of that exhibit?

A. Yep, I'm there.

Q. Are you familiar with this page of the exhibit?

A. Yes, I am.

Q. And can you explain what that table on page 9 shows?

A. So the top half of that slide talks about how we -- what the multi-linear regression that we're using for AFRD2, BID, Minidoka, North Side, Twin Falls Canal Company, and then it provides the equation.

And then the table at the bottom is by each one of those members, it's showing what the adjusted R-square value was in 2014 when we established it, or 2015. I think the order was signed in 2015. And then it shows the progression of the R-squared for each one

of those, in 2016, 2018, 2020, and 2022.

Q. And can you explain the significance of an R-squared value, what that term refers to?

A. It is a statistic that's calculated with regressions that help users understand how much of the variability that regression equation is accounting for. Generally speaking, the ranges between one and negative one. As you get closer to one or negative one, that's a better value. So in this case the higher values, the higher decimal values that you see here are a better result.

Q. And when you say "better," it means that the regression equation is more accurately predicting supply, the higher the number?

A. Yeah, generally speaking, yes.

Q. And we can see that for the first for SWC members, AFRD2, BID, Minidoka and North Side Canal Company, the R-squared value has remained relatively constant. But for Twin Falls it has declined over time. Do you see that?

A. I do see that.

Q. You testified earlier that the Department has had some concerns about the regression equation for Twin Falls Canal. Is this representative of the Department's concern?

A. Yes, this is it. The reduction in that number from 2014 to 2022 is our concern.

Q. And you testified that the Department started in 2020 to begin looking at certain components of the methodology. Is this one of the components that you started reviewing early on?

A. Yes, this is one of the first ones we were looking at, forecast supply. Specifically Box Canyon was, but we looked at other things. But we were for sure looking at Box Canyon.

Q. Okay. Explain why you were looking at Box Canyon?

A. We, as I said earlier, we developed the regressions -- Liz Cresto developed these regressions in 2014 and 2015. And then we issued the order in April. And then there was a shift on that gage at Box Canyon. And we were unsure what that meant. We had developed the regressions before that. We were unsure what that meant to our regressions now. Are we going to accurately predict. So that was the first. It's been in our minds since then about, did something change? Can we rely on the regressions that we built? So we had that concern since right away, since day one almost after we issued the order.

Q. So Box Canyon may be one of the contributing

factors that's causing the degradation in the R-squared?

A. It could be, yes.

Q. Do you have any other ideas what might be contributing to that?

A. The only other variable is Heise, and it's working for the other companies. Maybe for some reason, it's not working for Twin Falls. But it seems like it's Box Canyon.

Q. Okay. Is it possible that the model, itself, for Twin Falls Canal just needs to be changed?

A. It's possible. And we would consider if we could find another predictor variable that works better that we would change it.

Q. Okay. Has the Department evaluated alternative models for Twin Falls?

A. At this point, our recommendation was that we would keep watching it, and see if it continues to degrade. So we've done -- I think Kara did three, maybe three variables looking at possible alternatives. But nothing extensive at this point.

Q. Okay. Let me have you turn to Exhibit 916, which you might still have in front of you. We reviewed that one earlier today.

A. The Lynker comments?

Q. Yes.

A. From Sophia?
Q. Yes.
A. Okay.
Q. If you turn to page 4 of that exhibit, I think it's --
MR. FLETCHER: Did you say 915.
MR. BUDGE: 916.
MR. FLETCHER: Thank you.
Q. (BY MR. BUDGE) It's that top paragraph, No. 2.
A. Yep, I see it.
Q. Okay. That's not the paragraph, actually. Under the heading "Section 2: Forecasting Natural Flow Supply." You've read this document, Matt?
A. Yes.
Q. You may remember that in the second paragraph underneath that heading, "Section 2," and you can review it, it's in front of you. That Lynker Technology or Sophia Sigstedt had proposed an alternative recommendation in 2015, a different approach to modeling forecast supply for Twin Falls Canal.
Are you familiar with this part of Sophie's report?
A. Yes, I am familiar that that's what she's stated, yes.

Q. Did you recall that Sophia had made an alternative proposal in 2015?
A. I did not remember that proposal.
Q. Okay. Do you know if the Department has done any work to evaluate the proposal that Sophia suggested in 2015?
A. Not to this point that I know of.
Q. Okay. Do you recall advising the Director that Sophia had proposed an alternative mechanism to forecast supply for Twin Falls?
A. I don't think I passed that recommendation along to the Director.
Q. Matt, let me have you turn to Exhibit 300, which is the Fourth Methodology Order?
A. Okay. I'm there.
Q. And then turn to page 9.
A. Okay. I'm on page 9.
Q. If you look down to paragraph 19, it's under a heading "Irrigation Practices." And the sentence in that paragraph states that, "Current condition should be represented by: (a) the net area of the irrigated crops." And then I'm not going to read B and C.
A. Okay.
Q. But in terms of net area of irrigated crops, do you understand that to mean that current conditions

should represent actual irrigated acreage?
A. I think that's what "net" means there, the irrigated acres.
Q. Okay. And you've been asked a number of questions earlier about different irrigated land datasets. The 2011 irrigated lands dataset, the 2017, near real-time metric dataset, and then there was an analysis done by SPF water engineers in 2009. You are familiar with those different acreage representations?
A. Yep.
Q. And for Twin Falls Canal Company each of those analyses showed actual irrigated acres around 180,000 acres total?
A. More or less, somewhere --
Q. More or less?
A. -- between 180, 179, 183, somewhere in that range.
Q. Right in there?
A. Yes.
Q. After the 2017 irrigated lands dataset came out -- well, let me back up. Can you explain how irrigated acreage is utilized in the model to predict reasonable in-season demand?
A. Yes. So --
Q. Let me clarify. I said used in the model. I

meant used in the methodology.

A. Okay. That's what I was going to answer anyway. So when we calculate crop water need, the equation is we take the ET, and we subtract off the effective precipitation. And then we take the ET by crop type, and multiply it by the acres of each crop type that we have calculated with the crop mix.

Q. Okay.

A. And then -- go ahead.

And then with the crop water need, we divide that by project efficiency, and that becomes the reasonable in-season demand on a monthly basis.

Q. So if irrigated acreage goes up, the demand prediction goes up. And if irrigated acres goes down, the demand prediction goes down?

A. If crop water need -- I guess if the ET and everything else is held constant, that is true.

Q. Okay. After the 2017 irrigated lands dataset came out, and that one showed for Twin Falls Canal 180,956 acres. Did the Department approach Twin Falls Canal Company and ask them to justify the higher number that they had been reporting, the 194,000 acre number?

A. Not that I know of.

Q. After the 2021 near real-time metric dataset came out that also showed around 179,000 acres

irrigated, do you know if the Department approached Twin Falls at that point and asked them to justify their higher figure?

A. Not that I know of.

Q. The 194,000 acre-foot figure acre figure the Twin Falls Canal Company reports, that's based on 2013 shapefile, I believe; is that right?

A. Yes, they submitted us a shapefile. We do some GIS analysis on it to remove overlaps or anything outside the service area.

Q. Okay. On that shapefile you said you remove overlaps. Can you explain what that consists of?

A. If there is two polygons in a shapefile that overlap, those acres will be double counted.

Q. Okay. Did the Department take that 2013 shapefile, and also remove hardened acres from that shapefile?

A. No.

Q. Okay. The 2017 irrigated lands dataset, I understood from Jennifer Sukow's testimony, that it does go kind of field by field and removes hardened acres; is that correct?

A. That dataset has three classifications in it. In the irrigated, it takes out any hardened acres. That's usually just fields. But the semi-irrigated will

have, as Jennifer explained, will have farmsteads, or maybe a subdivision, where there are a mixture of hardened acres and irrigated acres in there.

Q. As of 2017, is it your view that that 2017 irrigated lands dataset would have been more accurate than the 2013 shapefile?

A. Can you restate the question?

Q. Yes. Once the 2017 irrigated lands dataset was completed, at that time do you agree that it would have provided a more accurate representation of irrigated acres than the 2013 shapefile?

A. I think so, yes.

Q. And I understand that a metric dataset was completed in 2017; is that correct?

A. I'm not sure what you mean by a metric dataset?

Q. Excuse me. 2021.

A. When I saw that on -- I don't know where I saw that -- on a table that came in or something. I think what that is, is when we were doing the real-time metric, we were removing the irrigated acres -- or the non-irrigated acres, using the 2011 irrigated lands dataset for consistency.

I think that's where that number comes from. It wasn't generated by near real-time metric. It was us

in our processing removing the acres. And what was left may have been reported by as 2021 acres in the technical working group. But it was actually, I'm pretty sure, it was done with the 2011 irrigated lands dataset.

Q. Okay. Let me have you turn to Exhibit 325.

THE HEARING OFFICER: Mr. Budge, how much longer do you have with Mr. Anders? I think I need to call for a break here. We've been at this probably --

MR. BUDGE: I've got probably a half an hour. And I don't mind taking a break.

THE HEARING OFFICER: All right. Let's take a break for 15 minutes. And come back at 3:40.

(Recess.)

THE HEARING OFFICER: Let's start.

MR. BUDGE: Back on the record.

Q. (BY MR. BUDGE) Okay. Matt, let's shift gears. And let me have you turn to Exhibit 300, which is the Fifth Methodology Order. And when you get there, you can turn to page 10.

A. Okay. I'm on page 10.

Q. If you look at paragraph 23, that's a finding of fact in the methodology order that deals with supplemental ground water use. Are you familiar with that paragraph?

A. Yes, I am.

Q. The second sentence, and I'll read that. It says, "Supplemental ground water is a factor the Director can consider in the context of a delivery call." It then cites a district court decision. And then it says, "At this time, the information submitted or available to the Department is insufficient to determine the extent of supplemental irrigation on lands within the service areas of SWC entities."

During the Department's technical review of the Fourth Methodology Order, was any effort made to evaluate supplemental ground water use?

A. No.

Q. The Department does have a database of all surface water and ground water rights; correct?

A. Yes, we do.

Q. And the Department has a WMIS database that keeps track of all ground water diversions and surface water diversions?

A. I don't think that database has all ground water diversions. I believe it just has the ground water diversions that have some kind of measurement order on them that require them to be measured.

Q. Okay. I appreciate the clarification. So there are some, you know, small domestic rights and other comparatively small water rights that aren't being

measured and reported in WMIS?

A. Yes.

Q. But in terms of irrigation rights, any irrigation right larger than five acres essentially is being reported in WMIS; correct?

A. I don't believe all irrigation rights in Idaho, ground water irrigation rights greater than five acres are in that database. I think they have to have a measurement order or something to get them in that database.

Q. The water rights on the -- the ground water rights from the ESPA within the area of common ground water supply, do you understand that they do have a measurement order?

A. Yes.

Q. Okay. So the ground water rights that are affected by this delivery call, their diversions would be in the WMIS database?

A. I believe they are.

Q. Okay. Could the Department utilize place of use shapefiles, water right conditions, and diversion data to analyze supplemental ground water use within the Surface Water Coalition entities?

A. I think that you could start the analysis with those pieces of data, the water rights, and the WMIS I

pumping data. I don't think you can get all the way to clear and convincing with those two pieces of data.

Q. What else would you need?

A. Those -- I think you need to talk to the individual water users or some fraction of them to try to get an idea of how they are using the water. Some of those systems are complicated. They have well water in with surface water shares. You have to understand the system about where the water is being applied, and when it's being applied. And I don't think you can get that without talking to the users, at least on some level.

Q. Yeah. So the Department does have the metric database that's calculating ET?

A. Yes.

Q. And we do have surface and ground water delivery records. So between irrigated acreage, ET, surface water and ground water deliveries, is it not possible to calculate, at least to the extent we're able, the supplemental ground water use?

A. We don't know where the shares are going inside the service areas, you know, for the companies, where they are applying the water. I think, yeah, I don't think you can get the clear and convincing without talking to the users just on a remote sensing type of analysis.

Q. Well, I'm not asking about legal standards --
A. Okay.
Q. -- clear and convincing evidence. So disregard what the legal standard is?
A. Okay.
Q. I'm just saying, technically does the Department have a way to do that? Because we heard Jennifer Sukow say that, yes, they do that in the model?
A. In the model, they have a dataset that they are using.
Q. Okay. Could we use that same dataset in the methodology order?
A. Theoretically, we could.
Q. Okay. If that's all we've got, that's the best we've got, could we use that?
A. When I say "theoretically" we could use that dataset. I don't think that dataset achieves or meets the clear and convincing, again.
Q. Okay. But --
A. You've told me not to do that.
Q. -- setting that aside. I'm just asking technically, is that the best data you've got today?
A. That dataset is -- my understanding of that dataset was, it was originally created before the SRBA, based on water rights. And at that time, IDWR was

tracking surface and ground water on the water rights. That's a very old dataset. We haven't updated it since. So theoretically we could use that dataset. It may be the best dataset we have. It's not the best dataset.

Q. Yeah. I'm going to think of it kind of like the R-squared for Twin Falls. It's not that great. But it might be the best thing we've got. Is that a fair analogy?

A. Those are such vastly different datasets. When you say that for Twin Falls Canal Company for that regression, we have been working on that. We have been updating that. You are talking about a very old dataset here in my mind. Perhaps those might be the best dataset we have.

Q. Okay. Because the methodology does not account for supplemental -- actually, let me strike that question. I'm going to take a step back.

You are aware that many of lands within the surface water entities do have supplemental ground water rights?

A. I do know they do have supplemental ground water rights. How many? I don't know.

Q. But we know there is ground water being used to irrigate some the lands within the surface water entities; right?

A. I think there are likely lands that are ground water only within the Surface Water Coalition service areas. And what we would call a supplemental, where there is surface water and ground water used on the same land. Yeah, I think they are in there.

Q. And so when the methodology order does not take into account supplemental ground water use, the effect of that is an assumption that all of the land within each Surface Water Coalition entity, is irrigated solely with surface water; correct?

A. Yeah, that is the way that we're doing that.

Q. And if in reality there is ground water being used to irrigate some of those lands, then by not taking into account supplemental ground water use, the methodology effectively overstates surface water demand within the Surface Water Coalition entities?

A. I think so. It would over calculate, yes.

(Exhibit 928 marked.)

Q. (BY MR. BUDGE) Okay. Let me turn your attention next to Exhibit 928. Matt, I'm actually going to change numbers on you. Let's go to 907.

A. Okay. I have that presentation.

Q. I apologize for the delay. I'm not pulling up the slide that I expected. I've got a typo in my notes. That was a mistake on my part.

I am going to go back to Exhibit 928. This is a PowerPoint presentation. It is titled "Proposed Modification and Method for Determining Reasonable In-Season Demand for Surface Water Coalition Use of the Real-Time Metric," by Ethan Geisler, Kara Ferguson, and Matt Anders, dated December 1st, 2022.

Is that what you are looking at, Matt?

A. I am.

Q. Do you recognize this as one of the working group presentations given last December?

A. Yes.

Q. Why don't you flip to the last slide, Slide No. 22. It's labeled "SWC Methodology Acres." And it lists what I understand are the number of acres utilized for each Surface Water Coalition member in the methodology order.

A. Yep, I'm on page 22.

Q. And is that what that slide reflects?

A. Yes, for the 2022 irrigation season.

Q. Okay. And under "SWC Member," A & B, there is an asterisk. And then there are some notes down at the bottom it says asterisk "A & B acres include," and there is a "1-14, 14,637 acres." Can you explain what that refers to?

A. That is -- so this bullet is our notes, are my

notes about how we got the irrigated acres for A & B. So the first bullet under "A & B acres include:" 1-14 is the water right. And the 14,637 is the number of acres.

Q. So A & B owns water right number 1-14. And that water right authorizes the irrigation of 14,637 acres?

A. Yes.

Q. And then in the table, it shows that the methodology order is using 15,924 acres. Do your other notes explain the difference there?

A. Yes. So the second bullet, it's "beneficial use claims," and then it lists the series of water rights there. And then the number of acres for those. And then the final bullet is enlargement. It lists two water rights, and then 1175.2 for acres. So A & B if you add those three numbers together, they should -- the 14,637, the 111, and the 1,175, it should total up to 15,924 in the upper table.

Q. Do you know what priority rights are in the beneficial use claims in the enlargement water rights?

A. I do not.

Q. Are you familiar with enlargement water rights generally?

A. Very, very generally.

Q. Okay. I'll just represent that enlargement rights have an effective priority date of 1994, which is junior to probably all of the ground water rights that are at risk of curtailment under the methodology order.

And so my next question is, has there been discussion within the Department staff as to whether the methodology should be run based on the 14,637 acre figure instead of the 15,924 acre figure?

A. No, we haven't had any discussions about that.

Q. Okay. If, as I represented, the enlargement rights are junior to the ground water rights of IGWA and others, do you agree that it would probably be important or appropriate to make that adjustment, and run the methodology based on the 14,637 acre figure?

A. I don't know. I would have to investigate it further.

Q. Okay. Fair enough. Let me ask a few follow-up questions about the Director's move from the steady state to a transient state model. Are you aware of the settlement agreement between IGWA and the Surface Water Coalition related to the Coalition's delivery call?

A. Yes, I'm aware of it.

Q. Are you aware that there is an ongoing dispute between them concerning the breach of that agreement?

A. Also aware of that, yes.
Q. Did that ever come up in your discussions concerning the Fifth Methodology Order?
A. No, not that I remember.
Q. Okay. Are you aware that IGWA and the Coalition were involved in settlement negotiations this last February?
MR. FLETCHER: Director, I'm going to object, again, to the same line of questioning I objected to earlier. I'm not sure whether this is relevant.
THE HEARING OFFICER: Sustained.
Q. (BY MR. BUDGE) Matt, let me ask, I've just got a few more questions. I'm almost done. So I appreciate your patience.
Is it your understanding, Matt, that the change in the baseline year from the Fourth Methodology to the Fifth Methodology would result in much larger and more frequent demand shortfall predictions?
A. In April.
Q. In April?
A. It will increase the shortfall predictions.
Q. Okay.
A. In July, we also use the baseline year. So it will likely increase July, not for certain. But it will likely do that as well.

Q. Okay. And then as the demand shortfall becomes larger and more frequent, that translates into larger and more frequent curtailments of junior ground water rights in the absence of mitigation?

A. In April and July.

Q. In April and July?

A. Yes.

Q. And you understood that when you change from a steady state to transient state curtailment, you end up with exponentially more acres being curtailed under the Fifth Methodology Order than what have occurred under the Fourth?

A. I don't know about exponentially. But it is a larger acreage that's curtailed.

(Exhibit 929 marked.)

Q. (BY MR. BUDGE) Okay. Let me have you turn to the Conjunctive Management Rules, and that's Exhibit 929.

A. Okay. I have the rules.

Q. Are you familiar with the Conjunctive Management Rules?

A. Generally.

Q. If you'll scroll down to, I believe, it's page 4, Rule 20. I'll just give you a moment to read rules 20.03 and Rule 20.04.

A. Did you say page 4?
MR. WOOD: Page 5.
Q. (BY MR. BUDGE) It's page 5. My mistake.
A. Page 5. I'm sorry?
Q. Yes.
A. Okay.
Q. Yes, just take a moment to refresh your memory as to 20.03 and 20.04.
A. Okay.
Q. At the bottom of 20.03, there is a statement, "An appropriator is not entitled to command the entirety of large volumes of water in a surface or ground water source to support his appropriation contrary to the public policy of reasonable use of water as described in this rule."
Are you familiar with that concept?
A. A little bit familiar.
Q. Okay. Looking in 20.04, there is a reference to the futile call doctrine. The second sentence says, "The principle of the futile call applies to the distribution of water under these rules."
Are you familiar with the futile call doctrine?
A. Yes, I am.
Q. Okay. And then next I'm going to have you

scroll down to Rule 40.03. It's on page 9.

A. "Reasonable Exercise of Rights."

Q. Yeah. Go ahead and review that?

A. (Witness complying.) Okay.

Q. And so just to summarize 40.03, just explains that the Director will consider reasonable use of water under Conjunctive Management Rules. And so my question, were the concepts we just reviewed, were these ever brought up in connection with the technical work that you did in connection with the Fifth Methodology Order or the As-Applied Order?

A. Not that I remember.

Q. There wasn't any discussion of how -- let me strike that question.

You weren't given any instructions from the Director to perform technical analyses related to those concepts?

A. No, I was not.

Q. Are you familiar with how the Department applies the futile call doctrine in surface water systems?

A. Yes, I am.

Q. Can you just explain briefly how that's applied?

A. If a water user makes, in my layman's terms,

if a water user makes a water call, if the water cannot be delivered to that user, it's considered futile, and the call is not honored or made.

Q. Okay. Have you been involved just personally, in water distribution where the futile call doctrine is applied in Idaho?

A. I don't know if they apply it. But the closest would be in the Big Lost for the water righted county. They argue every year about, can we get water down below the Darlington Sinks. I don't know if they use the futile call. But they are always talking about it.

Q. Okay. Do you know if there is any like time parameters that are utilized in the Big Lost to evaluate whether a call is futile or not?

A. I don't remember off the top of my head if they use a parameter.

Q. Okay. Who within the Department would be most qualified to testify as to that?

MR. THOMPSON: I guess I'll lodge an objection here, Director. I guess the surface water administration around the state, and how futile call is applied to specific basins, I think is irrelevant to this proceeding.

THE HEARING OFFICER: I'll overrule the

objection.

But, Mr. Budge, I wonder about the relevance of the question. But I'll ask Mr. Anders to answer it.

THE WITNESS: Probably somebody in the water compliance Bureau. They deal with watermasters, and rules, futile calls, things like that.

Q. (BY MR. BUDGE) Okay. And, Director, I only have a couple questions on this topic.

Are you familiar with the application of the futile call doctrine in the Teton River basin?

A. I am not.

Q. Okay. Would Tony Olenichak be most suited to explain how it works in that context?

A. If it's in Water District 1, he would be the person to talk to as the watermaster.

Q. Okay. That's all the questions I have in that regard. Just a few more questions.

Has the Department conducted any analysis of just the long-term effects of the beneficial use of water from the ESPA as a result of the changes made in the Fifth Methodology Order?

A. No.

Q. Has the Department attempted to quantify the additional beneficial use that would occur within members of the Surface Water Coalition as a result of

changes made in the methodology order?

A. Not that I know of.

Q. Are you familiar with the concept of a trimline that's been used in other delivery calls?

A. I've heard of the trimline, yes.

Q. Okay. What's your understanding of the concept?

A. It is a geographic area used in modeling.

Q. Did that term ever come up in connection with your work on the Fifth Methodology Order?

A. No.

Q. So to your knowledge, none of the Department technical staff asked if there should be some evaluation of trimlines?

A. It's related to modeling. I don't remember any conversations, but I am not involved in all of the conversations related to modeling.

MR. BUDGE: Okay. That's all the questions I have. Thank you, Matt.

THE WITNESS: Thank you.

THE HEARING OFFICER: Thank you, Mr. Budge.

Further questions from the ground water group? Mr. Bromley.

MS. McHUGH: Yes. Oh, is Mr. Bromley going to do it?

THE HEARING OFFICER: Mr. Bromley is standing halfway to the podium.

MS. McHUGH: Okay.

THE HEARING OFFICER: I could ask Mr. Bromley if he wants to yield.

MR. BROMLEY: I've got to take a shot, Director.

THE HEARING OFFICER: Okay.

CROSS-EXAMINATION

QUESTIONS BY MR. BROMLEY:

Q. Hi, Chris Bromley on behalf of the Coalition of the Cities. Matt, I just have a couple questions here.

So Exhibit 300, which is the Fifth Methodology Order, if you could turn to that?

A. Yes.

Q. And let's look at page 18.

A. Did you say 18?

Q. Yes, I did.

A. Okay. I'm on page 18.

Q. Great. And we've got paragraphs 49 and 50. And when I look at paragraph 49, it's talking about predicting natural flow to members of the Surface Water Coalition. And when I look at paragraph 50, I see that it's talking about predicting storage allocations for

each member of the Coalition. Would you agree with that?

A. Yes.

Q. Great. So in Footnote 15, I see that there were a series of meetings held in the winter of '22-'23 with parties' technical consultants to discuss potential updates to the methodology order. And you are looking at trying to better predict Surface Water Coalition water supplies in April. That's what I take from that footnote; is that correct?

A. Yeah, that's accurate.

Q. Did you have any discussions with Water District 1 about how to improve the forecasting?

A. Not about how to improve the forecasting.

Q. How about to improve looking at storage water allocations?

A. We normally in the as-applied process, are talking to them about what they think the reservoirs are going to fill to what rights they are going to fill. And we don't ask them for an official opinion. But we do ask them for what they think is going to happen. And then we factor that into our storage allocations.

Q. Okay. In the as-applied?

A. In the as-applied, yes.

Q. Great. And then let's go back to Exhibit 928.

That was one that TJ was talking with you about. It was a technical working group document. And it was the last page in that exhibit, to make it easier to flip through.

A. So I'm at 928.

Q. The last page of 928; correct?

A. Okay. Page 22 for me.

Q. Correct, that's what I have.

A. Okay.

Q. "SWC Methodology Acres" is the title of the slide?

A. Yep.

Q. And at the bottom, Mr. Budge was asking you about these enlargement acres. And I believe I heard you say, you didn't know what enlargement acres were; is that correct?

A. Generally that's correct, yes.

Q. So do you know has the Department backed out any other enlargement acres, or are these the only ones that have been identified?

A. In terms of the methodology acres that we use, these are the only enlargement acres that I remember. There may be enlargement in the other one. I just listed these, because they were confusing to me about how we got to the 15,924.

Q. Okay. And that makes sense. So you don't

know then how many enlargement acres are within these other companies --

A. I do not.

Q. -- within in an irrigated area?

A. Sorry. I do not.

MR. BROMLEY: Okay. Thank you. I have no further questions.

THE HEARING OFFICER: Any further questions?

MS. McHUGH: Yes, Mr. Director, this is Candice. I just have a couple clarification questions.

THE HEARING OFFICER: Okay. Go ahead.

MS. McHUGH: And I had to switch to my headphones. So can everybody hear me okay?

THE HEARING OFFICER: You are audible.

MS. McHUGH: Okay. Great.

CROSS-EXAMINATION

QUESTIONS BY MS. McHUGH:

Q. Matt, my understanding from your testimony is that you've been involved with two different technical working groups, at least one relative to the Surface Water Coalition methodology orders, one in 2015, and one in 2022; is that correct?

A. Yes.

Q. Has there been any others relative to this Surface Water Coalition delivery call that you've been

involved in?

A. No other technical working groups that I can think of.

Q. Okay. And how are those technical working groups compiled, like who gets invited?

A. I don't remember on the 2015 technical working group. But for, we'll call it the 2022 technical working group, I asked the Director for guidance on who should be invited.

Q. And what were you instructed as far as who should be invited?

A. The response from the Director was to ask the parties who they wanted to attend.

Q. And by the "parties," do you mean the parties that had already been part of the Surface Water Coalition delivery call that dated back to 2008, 2009 time frame?

A. Yeah, I think so. The Surface Water Coalition, IGWA, and the Cities are who I talked to.

Q. Okay. And when does that invitation get sent out, and by what method?

A. My best estimate is in September, the Director at the status -- or at a status conference, said we were going to have a technical working group. So probably early September is when, or late August maybe, I emailed

the attorneys or the legal counsel for the different parties, and asked them who they wanted to attend the technical working group.

Q. Okay. And that was in 2022?

A. Yeah.

Q. Okay. And can you tell me what suggestions from the 2022 technical working group, did you recommend that be implemented in the Fifth Methodology Order, from non-Department employees? I should clarify.

A. I can't think of -- I don't think we used any or implemented any of the recommendations from the technical working group.

Q. And what -- any datasets or any kind of technical information, other than methods, did you recommend from the technical working group?

A. I didn't quite understand that question. Could you repeat it?

Q. I understood you to say that you didn't implement any suggestions as to like a method from the technical working group. And I was following up just to clarify. Did you use any improved data, or datasets, or, you know, that kind of information that was provided from the technical working group?

A. I don't think so.

Q. Okay. In the 2015 technical working group,

what suggestions from the 2015 technical working group, did you implement or recommend be used in the methodology?

A. I don't remember the recommendations from the different consultants at that point.

Q. Okay. But you think that you may have taken some from the outside consultants and incorporated into the methodology?

A. I don't know.

MS. McHUGH: I don't have any further questions.

THE HEARING OFFICER: Okay. Further questions from the ground water group? I don't see any hands raised.

So let's shift. And I think now the Surface Water Coalition, if you wish to question Mr. Anders, you may examine.

Mr. Thompson.

CROSS-EXAMINATION

QUESTIONS BY MR. THOMPSON:

Q. Good afternoon, Mr. Anders, Travis Thompson for A & B, et al. Just a couple questions.

(Exhibit 118 marked.)

Q. (BY MR. THOMPSON) So if you could turn to Exhibit 118. Would you please identify that for the

record?
A. Did you say 118?
Q. Correct.
A. I'm there.
Q. Do you recognize that document?
A. Yes.
Q. And were those comments submitted by consultants for the Surface Water Coalition?
A. Yes, they were.
Q. And did the Department consider those comments and others submitted by other consultants?
A. Yes, we did.
Q. I'm going to go back to a few questions on is it the irrigated land dataset that the Department created?
A. Yes.
Q. And you said they did one in 2011 and 2017?
A. Yes.
Q. And are those different staff that created those?
A. I think it was created by the same staff. But I'm not totally sure on that. They would have been IDWR staff.
Q. And that's a snapshot of a single year; is that correct?

A. Yeah. They are designed to just identify the irrigated, non-irrigated, and semi-irrigated for that year.

Q. And do staff ground proof those estimates with individual irrigators?

A. I don't know.

Q. How about individual canal companies or irrigation districts?

A. I also don't know.

Q. I think you testified earlier that you agreed that certain lands that show up irrigated one year, may not be irrigated the next; is that true?

A. That is true.

Q. And vice versa, non-irrigated lands may not be not irrigated one year, but irrigated the next?

A. Also true.

Q. You said those data land sets --

A. Irrigated lands dataset.

Q. Irrigated lands dataset. Sorry. Three categories, we've got an irrigated, non-irrigated, and semi-irrigated?

A. Correct.

Q. And do each of those categories have specific numbers of acres?

A. I don't understand the question.

Q. I think we talked about at least the example for Twin Falls Canal Company, the 2017 dataset had a number of like 179,000. Do you know if that was the irrigated lands dataset for that year?

A. Each -- we can calculate the acres for each one of those categories. The 179 was what was left, the number of acres, irrigated acres left in the shapefile from Twin Falls Canal Company after we removed the non-irrigated using the irrigated lands dataset.

Q. So it would include semi-irrigated?

A. Yes, that would include semi-irrigated.

MR. THOMPSON: That's all the questions I have. Thank you.

THE WITNESS: Thank you.

MR. FLETCHER: No questions.

THE HEARING OFFICER: All right. Let's circle back again.

Mr. Wood, do you have any questions?

MR. WOOD: Just a couple.

REDIRECT EXAMINATION

QUESTIONS BY MR. WOOD:

Q. Hi, Matt. Do you recall testifying earlier about using Twin Falls Canal Company's irrigated acres dataset?

A. I do.

Q. And do you recall attorneys for the ground water users suggesting that the Department should use Twin Falls Canal Company's irrigation acre dataset rather than the decreed acres?

A. I didn't understand the question there.

Q. Do you recall a suggestion that the Department should use Twin Falls Canal Company's irrigated acres, rather than their decreed acres?

A. I think what they were recommending was we use the irrigated acres after we removed the non-irrigated with the irrigated lands dataset.

Q. That's a better way to put it. In your opinion, what would it take from a staffing perspective to implement the dataset as suggested by the ground water users?

A. Those irrigated lands datasets take about one year of staff time to make, to review and to do the edits. So we would have to dedicate quite -- I mean, if we wanted to do it in the current irrigation season, we would have a lot of staff time trying to get it done in time to be used with the methodology. If we did a year like the previous year, we would still have to exert a lot of effort to get it created.

Q. So are staffing issues one of the reasons that the dataset wasn't used?

A. Yeah. It's one of the reasons we don't have, say, a 2022 dataset, or a 2021. A new one every year, yes.

Q. Switching gears a little bit. Do you recall testifying about Twin Falls Canal Company's regression equation?

A. I do.

Q. And based on the R-2, do you think the regression equation still accurately predicts the natural flow for the Twin Falls Canal Company?

A. We think it accurately is still predicting the natural flow for Twin Falls Canal Company. But we're concerned about the downward trend in the R-squared value, indicating that it may be degrading. That the regression may be degrading. But we still have confidence in it at this point. We want to see it in a couple more years and see what happens.

MR. WOOD: Thank you. No further questions.

THE HEARING OFFICER: Further questions from the ground water group?

Mr. Budge.

RECROSS-EXAMINATION

QUESTIONS BY MR. BUDGE:

Q. Just a couple questions, Matt. I'll take them in reverse order.

First, regarding the regression equation for Twin Falls Canal Company, you were asked whether the current regression formula still accurately predicts the forecast supply? Do you recall that question?

A. I do.

Q. Accuracy is a matter of degree; right?

A. Okay.

Q. So you would agree that the prediction is becoming less accurate over time?

A. I think that's what the R-squared is telling us, that statistic, yes.

Q. So your testimony is, in your opinion, it's not become so inaccurate, that you can't use it at all?

A. Not yet.

Q. Okay. But that time could come?

A. It might come. It might -- we have seen them stabilize. It might stabilize where it is. It might go up a little bit. We don't really know.

Q. Okay. Next, just about the staffing required to create an irrigated lands dataset. When you answered that it takes a lot of work. You are talking about creating a new irrigated lands dataset?

A. Yes, I think they often start with the previous one. But to create a new one, it is a lot of staff time to update the lines, and to do all the

analysis. We are experimenting with ways to automate that. We don't have it to the point where we think we have the accuracy that we want to yet. If we could get to an automated method, we might be able to get one for every year. We don't know yet, but we are experimenting with it.

Q. Okay. And once the 2017 dataset was created, it certainly could have been implemented in the methodology in, say, 2018?

A. Well, I don't know when that dataset was finished. For example, they're working on 2021 right now. So it would have been at some point after. And if it takes a year, it probably would have been a couple of years after when it became available. I'm just estimating. I don't know when exactly they started on that one. But there is a lag there by at least a year and maybe more.

Q. I understand. Are you familiar with the near real-time metric dataset?

A. I am.

Q. And that dataset also, if I understood Ms. Sukow, also can tend to delineate irrigated versus non-irrigated acres?

A. Yeah, it's showing ET, or actual ET on the ground. So, yeah, it can indicate whether something is

irrigated or not.

Q. And that dataset I believe is available annually?

A. The metric dataset or the near real-time metric?

Q. Let's start with the near real-time metric.

A. Right now we're in testing mode with the near real-time metric to see if we can do it on schedule. But we need further methodology. So that one, I don't know if we have 2022. But up to that point, we were getting it like July 5th, August, September, so we had that one real-time, yes.

For metric, I don't know if they've done all the years for metric, because they make that decision after the season is over and based on the cloud cover. Clouds are difficult for, to get a good metric dataset if you've got a lot of clouds. So I don't know what years they have done.

They don't always -- for example, we did real-time metric, but they didn't do metric for all those years that we did near real-time.

Q. So it sounds like there are tools available or under development that are going to enable more frequent evaluation of irrigated acres using metric or the data lands, the irrigated lands dataset?

A. I think there is things, yeah, developing.
Q. And in terms of the staffing, it wouldn't be hard to plug a different acreage figure into the methodology order, that could be done, you know, with a push of the button. The staffing you are talking about is creating a new dataset, or an updated dataset?
A. You are correct.
Q. So the Department could today rerun the methodology with the figures from the 2017 irrigated lands dataset, and that would not take a lot of time?
A. No, you are correct, that would be easy.
Q. And they could do the same with the most recent metric or near real-time metric data?
A. Once we have the number, it's easy to plug into the calculator.
MR. BUDGE: Okay. That's all I've got. Thanks, Matt.
THE WITNESS: Thank you.
THE HEARING OFFICER: Further questions from the ground water group?
And one more chance for questions from the Surface Water Coalition. Any further questions?
Apparently not. Okay. We are finished with Matt Anders.
(Witness dismissed.)

THE HEARING OFFICER: It is 4:30. I don't see Jay Barlogi in the gallery. So I'm assuming that Jay is next; is that correct?

MR. THOMPSON: Yes, Director. I've been in communication with him and have him online if that's an option. I guess depending on what the parties want to do?

THE HEARING OFFICER: What's the preference of the parties?

Mr. Bromley?

MR. BROMLEY: Well, I was going to take the primary lead of questioning of Mr. Barlogi. I do have some physical exhibits. And he's not here to look at those.

THE HEARING OFFICER: Are we expecting Mr. Barlogi in person tomorrow?

MR. THOMPSON: Yes.

MR. FLETCHER: He will be here in the morning.

THE HEARING OFFICER: Well, I think we're on schedule, and maybe just a little ahead looking at the list of witnesses, so perhaps --

MR. ANDERSON: Just as a --

THE HEARING OFFICER: Mr. Anderson?

MR. ANDERSON: Just as a way to save time, I have a matter that I could take up just quickly

regarding the order that you made this morning. It's a little off-the-cuff, but just a couple minutes. If it's okay?

THE HEARING OFFICER: Okay. That would be fine. But as Mr. Anderson is coming forward, it appears to me that we're at a logical breaking point. And maybe we ought to adjourn following Mr. Anderson's presentation.

MR. THOMPSON: Could we move to admit Exhibit 118?

THE HEARING OFFICER: Pardon me?

MR. THOMPSON: Could we move to admit Exhibit 118?

MR. FLETCHER: That was the Surface Water Coalition comments on the recommendations to the technical working group.

THE HEARING OFFICER: Prepared by Dave Colvin and Dave Shaw, I think so.

MR. FLETCHER: I think, yeah.

THE HEARING OFFICER: Yes. Any objection to admitting the document marked as Exhibit 118?

Seeing no objection, the document marked as Exhibit 118 is received into evidence.

(Exhibit 118 received into evidence.)

MR. ANDERSON: Thank you, Director. Just as a

way of utilizing our time wisely, and this is a little off-the-cuff given the order that was this morning. I am just doing a brief, ask the Director to reconsider the order regarding economic benefit, just some really small discussion regarding that. And then in the alternative, just offer an informal offer of proof here, if that's okay?

THE HEARING OFFICER: Go ahead.

MR. ANDERSON: In the Fifth Methodology Order, Exhibit 300, I believe, which we've been talking about. There are conclusions, specifically conclusions No. 6. And it talks about the public interest, full economic benefit and optimum development of water resources for the public interest. It talks about full economic development in the result of the optimum development of water resources. The policy of securing the maximum use and benefit and least wasteful use of the state water resources applies to both the surface water and ground water. And I'm kind of paraphrasing a little bit. But these are all quotes from cases in the sixth finding in the methodology order.

The issue I think is the lack of facts cited to support that finding. I think the lack of facts is what the Department relied on earlier in making an order that the methodology didn't address economic issues.

And so it was beyond the scope to address those at this hearing.

I think the lack of facts cited in making this finding of No. 6 is a reason why economic issues should be permitted into this hearing, to bolster the facts, and bolster the evidence in making that finding. Whether or not the Department gives them whatever weight the Department wants, I certainly think it's within the public interest to do so. I would argue that perhaps the decision of the Department to go with steady state in the first place rather than change of methodology order to be con-transient in itself has some inherent economic aspects. So I would just ask the court to reconsider.

In the alternative, rather than do a formal offer of proof, I think that in this case an informal offer of proof would be streamlined and everyone would appreciate it, just given the fact that we have an expert that would be traveling from out of town to do that formal offer of proof. And I think it was Judge Stegner, when he was a judge said that an informal offer of proof is appropriate when the attorney presenting it is not simply conclusory stating the summary of facts that will be presented, and is not hypothetically stating facts that may be presented.

Here we have a simple expert report. And so I would just like to informally submit that as an offer of proof in the alternative that the Department wouldn't reconsider its decision on excluding economic testimony.

THE HEARING OFFICER: Okay. Thank you, Mr. Anderson.

I'm certain the Surface Water Coalition wants to respond. Mr. Thompson, Mr. Fletcher.

MR. FLETCHER: Director, we agree with the Director's ruling on this issue. We were surprised by the issues people wanted to raise in this methodology. A lot of these issues were raised in the earlier methodology. There is multiple cases dealing with this issue. And it's not a matter of wanting economic harm to the various parties in order to determine who should receive the water under the priority doctrine. And so we agree with how the Director ruled on this issue this morning.

MR. ANDERSON: A 30 second rebuttal.

THE HEARING OFFICER: Sure, Mr. Anderson.

MR. ANDERSON: And I agree, it's not necessarily about weighing the harm between the parties. But when you have such an exorbitant curtailment at stake, it's certainly relevant for the Department to take that into consideration in the public interest and

use of the resource. It has nothing to do with the economic benefit or realization of the two parties and comparing them. It's just something that the Department is within its discretion as the courts' have said to consider.

THE HEARING OFFICER: All right. Well, thanks, Mr. Anderson. I'll at least take the motion, and I'll characterize it as a motion, under advisement. And rule on it tomorrow morning when we start.

I will tell you, though, that I have read the motion in limine, or the motion to limit, and have at least reviewed the citations and the quotes. And have some memory of those decisions that were issued by the court related to whether the Department could consider the economic benefits as part of determining whether a junior, or the holders of junior-priority water rights should be curtailed.

And I thought at least one of those quotes was telling, because the court essentially said that the Department should not be reviewing. And the Director should not be reviewing the respective economic benefits of water use. And delving into the actual financial standing and books of the various parties. And the warning I think from the courts was that it would compromise the prior appropriation doctrine. And the

expected administration of water rights under the prior appropriation doctrine.

So I'll take it under advisement with I guess some reluctance. But I'll look at it, and rule on it in the morning.

Okay. Anything else we need to talk about?

MS. McHUGH: Mr. Director, this is Candice. This doesn't have to be on the record. It is just a housekeeping piece.

THE HEARING OFFICER: Well, go ahead. We're on the record.

MS. McHUGH: Okay. Fair enough. I'm traveling by air tomorrow for the most part, and so just as a courtesy to the Director and the parties, I won't be participating the full day remotely. But just kind of wanted you to know that I'm not missing in action. If all of the sudden I'm off, it is because I'm actually traveling tomorrow.

THE HEARING OFFICER: All right. Thanks for the heads up, Candice.

So what time should we start in the morning? Do you want to start at 9:00? Do you want to start at 8:30? What's the preference? Do you want to start at 7:30?

MS. KLAHN: How about 9:00?

THE HEARING OFFICER: 9:00.

MR. FLETCHER: 9:00 is fine.

THE HEARING OFFICER: All right. Let's start at 9:00 a.m. tomorrow morning. Thanks for the help from everyone here. And we'll adjourn for the night. So let's go off the record and then review the exhibits.

(Hearing adjourned at 4:46 p.m.)

REPORTER'S CERTIFICATE

I, COLLEEN P. DOHERTY, CSR No. 345, Certified Shorthand Reporter, certify:

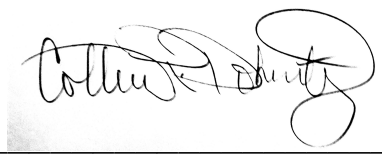
That the foregoing proceedings were taken before me at the time and place therein set forth, at which time the witness was put under oath by me;

That the testimony and all objections made were recorded stenographically by me and transcribed by me or under my direction;

That the foregoing is a true and correct record of all testimony given, to the best of my ability;

I further certify that I am not a relative or employee of any attorney or party, nor am I financially interested in the action.

IN WITNESS WHEREOF, I set my hand and seal this 16th day of June, 2023.



COLLEEN P. DOHERTY, CSR 345
Notary Public
P.O. Box 2636
Boise, Idaho 83701-2636

My commission expires September 7, 2023.

/

/// (1)
150:1

A

ability (2)
18:24;33:20
able (14)
25:10,20;28:17;32:22;
46:5;47:12;50:1,1;71:24;
88:14;100:3;111:19;199:19;
226:4
above (13)
92:5,15;126:5;150:23;
151:4,6,14,15,17;160:17,18;
162:24;164:6
absence (2)
74:18;207:4
absolute (1)
20:18
accept (1)
36:1
acceptable (1)
28:10
accepted (3)
18:7;36:18;108:10
access (1)
127:1
accommodate (1)
31:4
according (1)
115:16
account (15)
91:4,7,8,10,11;92:6;100:3;
167:5,13,16,18;168:8;
201:16;202:7,14
accounted (2)
92:18;168:16
accounting (2)
129:19;187:6
accounts (1)
99:25
accrual (1)
58:12
accrue (5)
43:1,3,12;58:20;61:6
accrued (1)
58:18
accuracy (6)
123:18,23;131:24;155:25;
225:6;226:3
accurate (11)
136:21,22;142:22,23;
155:6;181:14;182:5;195:5,
10;214:11;225:9
accurately (5)
187:13;188:20;224:9,11;
225:3
achieves (2)
143:18;200:17
acknowledge (1)
143:5
acknowledged (1)
101:7
acknowledgment (1)
96:19
acquaintances (1)
10:2
acquainted (1)
36:2
acre (6)
193:22;194:5;205:7,8,14;
223:3
acreage (21)
18:6,7;21:3;118:5,22;
132:6,11,15;141:16;178:7,
14,16,20,25;192:1,9,22;
193:13;199:16;207:14;228:3
acre-feet (36)
42:25;43:3;52:5,7,12,21,
24;54:25;55:10,17,23;56:16;
57:15,17,20;58:13,19;74:17;
76:16,20;78:5,7;83:16;85:1,
10,14,15,19,19,23;87:1;
113:8,15,25;114:5;128:24
acre-foot (7)
76:13,15;83:23;85:2;
114:18;115:2;194:5
acres (122)
55:3,11,12,14;56:1,3,18;
57:19,22,25;58:2;69:15;
72:12,20;74:12,19,23;88:24;
101:21,23;102:4;118:10;
122:2;123:11;129:17;
132:16,19,25;133:22;134:3,
6,9;136:17;137:1,3,10;138:2,
6;139:2,6,9,16;140:3,11,12,
17,23;141:3,18;142:14,17,
17;143:6,9,21;154:23,25;
155:1,17;156:3,7,12,17,19;
157:9,14;177:24;178:1,6,12,
23,24;192:3,12,13;193:6,14,
20,25;194:14,16,21,24;
195:3,3,11,21,22;196:1,2;
198:4,8;203:13,14,22,23;
204:1,2,4,7,10,14,16;207:10;
215:9,13,14,18,20,21;216:1;
221:24;222:5,7,7,23;223:4,7,
8,10;226:23;227:24
across (2)
10:20;114:21
Act (1)
172:22
action (2)
183:23;235:16
actively (1)
159:2
activities (1)
117:8
actual (8)
28:22;50:8;99:24;110:20;
192:1,12;226:24;234:22
actually (16)
21:4;22:14;76:12;87:8;
90:9;92:16;95:21;100:3;
135:16;160:16;175:22;
190:12;196:3;201:16;
202:20;235:17
add (7)
10:24;19:9;26:1;126:2;
137:3;159:5;204:17
added (1)
32:17
adding (4)
61:19;136:25;165:8,9
addition (2)
165:5;182:24
additional (21)
23:8;43:19;52:24;53:3;
102:15;114:4;122:22;171:2;
175:6,14,17;176:12,16;
177:1,4,5,21;178:1,4;181:15;
211:24
address (5)
23:24;34:2;65:4;231:25;
232:1
addressed (3)
27:21;31:14;109:23
addresses (1)
17:5
adjourn (2)
230:7;236:5
adjourned (1)
236:7
Adjudication (1)
138:16
adjust (4)
62:2,3;157:8;183:18
adjustable (2)
90:15;152:13
adjusted (4)
90:17;145:7;153:12;
186:22
adjustment (6)
23:17;31:6;61:23;168:10,
14;205:13
adjustments (2)
61:19;152:14
administration (8)
22:6,14;74:7;115:18;
147:4,19;210:22;235:1
administrative (3)
17:1;45:14;172:22
admission (11)
29:2,5,7;36:14;59:9;
109:18;146:21;149:19;
180:17;185:24;186:1
admit (9)
29:11;40:9;109:15;124:1;
135:24;180:14;185:14;
230:9,12
admitted (5)
59:4;135:18;148:25;
149:10,13
admitting (1)
230:21
Adolphus (1)
120:8
advice (1)
119:1
advise (1)
80:3
advisement (2)
234:8;235:3
advising (2)
38:17;191:8
aerial (1)
68:18
affected (1)
198:17
AFRD (1)
20:15
AFRD2 (2)
186:19;187:17
afternoon (4)
110:9;116:3;124:20;
219:21
again (30)
15:13;24:25;32:23;35:13;
41:15,21;74:4,21;77:21;
82:23;84:18;88:1,10;93:9;
94:9;101:13,25;115:4,10;
146:25;164:24;165:2;
170:15;171:12;173:2,7;
186:1;200:18;206:9;222:17
against (1)
147:14
ago (8)
17:16;44:3;45:7;74:22;
85:8;134:6;181:7;185:15
agree (22)
52:22;55:13;56:15;
110:12;112:10,16,20;113:1,
7;114:15;139:3;142:20;
163:16;164:7;165:11;195:9;
205:12;214:1;225:8;233:9,
17,21
agreeable (1)
23:12
Agreed (2)
139:4;221:10
agreement (5)
115:5;117:3;147:23;
205:20,25
agreements (1)
101:24
ahead (9)
60:9;66:14;155:7;193:9;
209:3;216:11;229:20;231:8;
235:10
air (3)
156:4,9;235:13
al (7)
11:11,21;12:14;13:1,3;
96:23;219:22
aligned (1)
34:15
Allan (1)
44:8

allocating (1)
86:17
allocations (3)
213:25;214:16,22
allotted (1)
24:4
allow (5)
22:22;33:13,15;104:4;
148:18
allowed (2)
87:21;100:4
almost (4)
50:14;111:25;188:23;
206:13
along (2)
67:11;191:12
altering (1)
19:21
alternative (8)
131:4;189:15;190:19;
191:2,9;231:6;232:15;233:3
alternatives (1)
189:19
although (1)
16:12
altogether (1)
69:8
always (7)
46:4;47:22;48:1;127:19;
130:10;210:11;227:19
Amalgamated's (3)
26:19,20;31:16
Amended (11)
7:11;24:10,25;25:17;
41:23;65:25;66:17;116:13;
135:12;136:25;137:6
amending (1)
170:6
American (2)
11:13;165:19
among (6)
85:10;165:14,16;172:24;
173:3;180:10
Amoth (1)
19:12
amount (9)
43:12;47:8;52:2;58:18;
62:6;73:19;98:18;100:5;
126:15
analogy (1)
201:8
analyses (12)
72:8;98:4;104:25;143:13;
169:16,18;175:14,17;
176:12;177:2;192:12;209:16
analysis (31)
22:4;77:9,10,13,14,19,21;
78:1,14;79:23;82:1,8;85:12;
98:7;104:21;108:15;109:7;
114:14,23;140:3;156:13,15;
177:4,22;181:11;192:8;
194:9;198:24;199:25;
211:18;226:1
analyze (2)
75:5;198:22
analyzing (1)
183:15
ANDERS (40)
7:2;12:25,25;53:18;54:20;
64:19,20;66:4;67:2;73:14;
78:22;81:16,22;82:25;
119:15,18,25;120:4;122:22;
124:12,14,20;133:24;
137:23;145:13;148:12,14;
149:6,24;161:14,18;166:18,
22;180:19;196:7;203:6;
211:3;219:16,21;228:24
A-n-d-e-r-s (1)
120:5
ANDERSON (32)
12:7,7;20:7,8,9;95:9,10,
12;96:12;149:25;150:3,9,13,
16,20;155:11;157:19;160:1;
161:8,11,12;229:22,23,24;
230:5,25;231:9;233:6,19,20,
21;234:7
Anderson's (1)
230:7
Andrus (1)
12:17
announced (1)
172:8
annual (1)
55:20
annually (2)
118:4;227:3
anomalous (2)
35:8;165:22
answered (2)
103:18;225:20
anticipated (1)
16:2
anticipating (1)
105:7
anymore (1)
143:14
apologize (5)
99:17;135:19;137:25;
173:12;202:23
Apparently (1)
228:23
appear (2)
30:7;31:24
appearing (1)
156:19
appears (2)
136:14;230:5
application (8)
71:3;72:13,14,19;74:25;
126:20;127:16;211:9
applications (1)
109:3
applied (9)
109:9;126:18;127:8;
157:12;199:9,10;209:24;
210:6,23
applies (3)
208:20;209:20;231:18
apply (4)
19:16;154:23;155:17;
210:7
applying (3)
43:20;126:24;199:22
apportion (2)
85:9;114:22
apportioning (1)
101:16
appreciate (16)
11:2;30:14;31:2,5;32:5,23;
36:4;67:25;73:10;87:7;
160:15;168:13;169:5;
197:23;206:14;232:18
appreciated (1)
101:4
apprised (3)
30:12;32:21,22
approach (6)
18:16;86:17;109:1,12;
190:20;193:20
approached (1)
194:1
approaches (1)
108:24
appropriate (10)
23:4;42:20;98:7;103:9;
104:14;108:21;109:8;
110:20;205:13;232:22
appropriation (8)
22:5,15;81:9;115:16,18;
208:13;234:25;235:2
appropriator (2)
81:7;208:11
Appropriators (4)
12:10,12;17:14;63:13
approved (1)
102:5
approximately (16)
42:25;43:3;52:21;53:3;
54:24;55:12,25;57:15;58:1,
2,13;72:23;74:14,20;112:2,
19
April (23)
7:13,18;40:25;41:9;42:5;
51:24;57:5,8;58:11;76:11;
83:9;94:5;95:22;137:4;
162:12;164:18;184:21;
188:15;206:19,20;207:5,6;
214:9
Aquifer (17)
50:11,15;53:1;69:9,10;
74:3;75:1,25;90:4,13,15,18,
18,19;93:14;117:2;127:2
area (19)
20:20;58:22;69:14;74:5;
75:2,2;82:17,18;93:14,19;
103:19;118:11;140:6;
191:21,24;194:10;198:12;
212:8;216:4
areas (12)
22:19,21,22;23:2;33:25;
38:18,20;69:4,4;197:8;
199:21;202:3
argue (2)
210:9;232:9
argument (1)
21:14
arguments (1)
21:15
Army (2)
162:17;167:8
around (7)
57:22;166:7;175:21;
178:24;192:12;193:25;
210:22
arranged (1)
10:8
arrangement (1)
15:3
As-Applied (16)
16:22;41:7,9;52:1;83:8,9;
86:14;98:20;101:1;107:24;
113:10;150:17;209:11;
214:17,23,24
as-applieds (1)
137:5
Aside (3)
80:2;82:7;200:21
aspect (1)
169:12
aspects (5)
81:18;94:19,21;175:8;
232:13
asserting (2)
147:15,20
assign (1)
70:17
assigned (4)
23:16;24:20;84:3;183:24
assignment (2)
56:23;170:5
assignments (1)
169:17
assist (3)
57:7;95:25;96:8
assisted (1)
42:10
associated (4)
60:24;62:7;128:3,23
Assume (4)
35:14;117:25;124:2;
158:16
assuming (4)
31:25;53:1;59:19;229:2
assumption (1)
202:8
assurance (1)
130:11
asterisk (2)
203:21,22
attached (6)
17:3;107:7;182:25;183:2,
4,7

Attachment (2)
7:22;76:4
attempt (4)
23:21;24:8;29:24;30:10
attempted (2)
23:24;211:23
attempting (1)
16:25
attend (2)
217:13;218:2
attendance (2)
54:4,6
attendees (2)
54:7,13
attention (8)
19:11;80:22;81:5;121:5;
122:23;134:4;181:3;202:20
attorney (8)
11:6,11,12;14:21;34:13;
84:1;88:5;232:22
attorneys (7)
13:14;14:8,21;15:5;84:5;
218:1;223:1
attributable (1)
77:6
audible (1)
216:14
August (7)
53:11;170:5,17;172:7;
173:10;217:25;227:11
authored (1)
173:21
authorizes (1)
204:6
authors (1)
182:14
automate (1)
226:1
automated (1)
226:4
availability (1)
31:6
available (12)
18:18;31:3,17;69:17;
70:21;71:15;108:10;127:3;
197:6;226:14;227:2,22
average (9)
55:20;145:7;150:23;151:4,
6,7,14,15,17
averages (1)
63:4
averaging (1)
100:2
aware (33)
18:1;24:19;38:16;50:9;
54:1,3,6;68:21;75:20,21,24;
79:18;81:4;89:11;111:8,21;
121:19;128:22;129:3;
141:23,24;159:15;164:17;
167:19,23;172:19,23;
201:18;205:19,23,24;206:1,5
awareness (1)
111:11
away (4)
79:9;80:5;105:24;188:23

B

bachelor's (2)
37:11;120:7
back (37)
12:19;17:1;29:21;33:15;
41:14;45:13;52:1;54:23;
57:18;58:11;60:19;66:9;
72:25;87:23,25;105:18,18,
21;106:13;113:11;116:18;
117:20;156:18;160:2;169:3;
181:6;185:14;186:9;192:21;
196:12,15;201:17;203:1;
214:25;217:16;220:13;
222:17
backed (1)
215:17
background (4)
35:23;37:10;50:9;120:6
backwards (1)
179:14
bad (1)
157:2
ballpark (1)
55:15
bar (1)
73:5
Barlogi (7)
30:25;144:5,15,19;229:2,
12,16
barred (1)
18:3
based (27)
18:18;19:1;33:16;34:10;
44:15;52:10;71:21;86:8;
99:21;101:16;104:23;
113:16;132:8;134:21;
143:16;177:24;178:7,19,25;
181:11;182:21;194:6;
200:25;205:7,14;224:8;
227:15
Baseline (17)
122:1;146:16;151:5,22;
152:12,20;153:7,11,17,20,
22;170:22;171:14;176:1,6;
206:16,23
basically (1)
79:5
Basin (8)
92:12;138:16;164:19;
167:6,19;168:3,5;211:10
basins (8)
92:1,12;163:4;164:6;
165:5,23;167:14;210:23
basis (8)
17:6;63:22;98:6;104:17;
130:18;145:17,24;193:12
Bates (1)
40:20
Baxter (6)
84:1,14,20;85:9;88:14;
172:20
bear (1)
40:16
bearing (1)
109:12
became (3)
25:19;171:12;226:14
become (5)
54:1;158:9;168:15,24;
225:13
becomes (3)
126:24;193:11;207:2
becoming (1)
225:9
began (1)
169:23
begin (3)
17:15;116:21;188:4
beginning (1)
33:10
begins (1)
117:24
behalf (11)
11:16,23;12:2;13:18;
17:14;19:8;39:24;63:12;
65:19,22;213:11
behind (2)
24:2;30:8
belabor (2)
40:22;136:19
below (6)
126:25;151:7;163:15,20;
165:15;210:10
beneficial (6)
28:12;160:20;204:12,21;
211:19,24
benefit (15)
26:6;78:6,25;79:12;80:6,9;
82:2,5,9;86:2;168:25;231:4,
13,17;234:2
benefits (11)
22:17;79:1,3,22;108:17,
20,22;111:2,3;234:15,21
best (18)
18:18;31:4;69:17,19;
70:21,25;89:8;90:17;91:12;
108:10;166:8;200:15,22;
201:4,4,7,13;217:22
better (7)
99:24;187:9,10,12;189:12;
214:8;223:12
beyond (6)
17:9;23:2;71:13;82:18;
98:9;232:1
BID (2)
186:19;187:17
Big (2)
210:8,14
binder (8)
39:15,25;42:3;106:12;
107:2;125:2;135:4;179:6
binders (2)
65:13;182:8
Bingham (3)
12:7;13:1;20:11
bit (12)
17:16;25:9;50:9;60:19;
121:10;154:21;157:17;
170:12;208:17;224:4;
225:18;231:19
Blackfoot (20)
43:4;47:9;52:12;55:17;
75:23;77:1;78:6;90:5,10;
92:9,12;101:8;110:21;
113:16,24;163:11,15;
164:22;167:5,14
blessed (1)
143:24
block (1)
76:22
Board (1)
145:15
Boise (1)
17:18
bolster (2)
232:5,6
Bonneville-Jefferson (2)
12:5;26:11
bookmark (1)
185:12
books (1)
234:23
both (4)
48:3;70:3;163:20;231:18
bottom (13)
76:14;78:2;83:13;85:18;
125:11,13;134:5;140:10;
183:9;186:21;203:22;
208:10;215:12
boundaries (2)
22:25;88:21
boundary (1)
125:16
Box (11)
171:5,13,16;181:16,23;
188:8,10,11,16,25;189:8
brand-new (1)
142:6
breach (1)
205:25
break (8)
28:15;60:6;87:18,20,22;
196:8,10,12
breakdown (1)
87:3
breaking (1)
230:6
BRICKER (11)
11:15,15;59:15,17;110:3,
3,4,6,8;113:1;115:21
brief (3)
42:7;53:11;231:3
briefly (6)
16:17;20:9;68:1;179:24;
182:16;209:23

bring (2)
23:9;181:3
BROMLEY (14)
11:19,19,20;28:13;212:23,24;213:1,4,6,10,11;216:6;229:10,11
brought (3)
34:12;122:22;209:9
Bryce (1)
11:24
Budge (84)
7:6;12:9,9;17:12,13,13;23:18;35:19;36:19;41:4,7;63:9,11,12;65:10,13,14,15;66:5,9,10;76:2;80:13;84:8,12,13;87:14,17;88:8;100:23;103:5,10,15,18;104:2,9,15,18,19;105:5;115:25;116:2,8;119:4;135:4;148:1,2,3,9;149:8,9;166:19,21,22;169:3;179:5;180:14,24;182:7;184:16;185:13,18,19,22;186:6,7;190:7,9;196:6,9,15,16;202:19;206:12;207:16;208:3;211:2,7;212:18,21;215:12;224:21,23;228:16
Budge's (1)
103:22
budget (2)
89:4;99:21
built (1)
188:22
bullet (6)
51:6;134:3;203:25;204:2,12,15
burden (4)
114:19;115:4,10,13
burdensome (2)
114:16,25
Bureau (6)
15:13;120:21;121:2;162:15;167:7;211:5
business (1)
10:16
button (1)
228:5

C

calculate (21)
60:25;61:25;69:10,12;70:16;84:2;90:2;92:6;129:17;130:24;131:12;132:2;153:5;154:17;166:3;167:10;178:2;193:3;199:18;202:17;222:5
calculated (14)
51:23;52:9;57:9,10;61:16;72:8;83:21;92:16;101:9;113:13;145:6;177:25;187:4;193:7
calculates (1)
92:20
calculating (6)
62:20;99:25;108:22;154:10,20;199:13
calculation (19)
42:12;49:3;61:1;83:16;89:3,20;90:2;92:15;100:24;101:5,10;129:11;130:8;131:5,25;134:10;153:4;176:1,7
calculations (9)
21:8;38:23;42:14;92:10;99:12;130:9,14,15,17
calculator (4)
134:13,18,22;228:15
calibrate (4)
89:2;90:9;128:14;141:22
calibrated (2)
46:24;48:3
calibrating (1)
89:16
calibration (21)
60:20,22;61:3,4;62:15;68:9;69:20;89:4,6,7,23,25;90:11,14,22;91:16;92:2,13,15;100:6;122:5
call (47)
10:15,17;13:4,13,21;38:24;42:13;48:14;53:14;70:3;73:22;81:21;103:9;104:14;110:1;116:4;122:24;134:13;144:15,18,19;145:3,7;160:11;162:16;166:23;175:5,6;196:8;197:4;198:17;202:3;205:22;208:19,20,22;209:20;210:1,3,5,11,15,22;211:10;216:25;217:7,16
called (5)
20:10;21:22;29:21;83:8;121:16
calling (1)
160:15
calls (3)
82:13;211:6;212:4
cam (1)
51:18
came (14)
16:9;64:8,11,18;95:22;96:4;133:2;141:1;177:6;180:25;192:20;193:19,25;195:19
can (91)
10:10;14:9,23;15:4,8,8;24:2;25:13,22,23,24;27:19;28:7;30:12;31:4,4;32:4;33:25;35:11,16;36:13,13;37:7;40:13;41:22;42:7;46:2,10;49:1;50:3;51:21;52:15;55:5;57:3;61:14;62:5;68:6;73:12;80:25;82:15;85:16;105:1;107:21;112:15;114:22,24;120:2;127:1;134:23;141:10;147:10;148:22;152:7,25;153:9;154:2,3,8,8;156:2;157:1;158:7;160:2,8;165:14,15;181:19;183:13;186:15;187:2,16;188:22;190:17;192:21;194:12;195:7;196:19;197:3;199:1,10,23;203:23;209:23;210:9;216:13;217:2;218:6;222:5;226:22,25;227:8
Canal (70)
42:19;43:1,6,13;55:1,10,24;56:16;57:14;58:12;60:24;62:7;73:16,17;89:18;99:6;122:13;128:4,13,23;132:10,11,15,24;136:17;137:11;140:9;141:15;144:3,6,20;145:1,10,18,24;146:4,13,16;147:14;164:3,6;165:12;168:22;171:19;178:13;181:9,11,17,21;183:12;186:19;187:17,24;189:10;190:21;192:11;193:19,21;194:6;201:10;221:7;222:2,8,23;223:3,7;224:5,10,12;225:2
canals (1)
126:14
Candice (27)
13:7,8,10,10,23;14:9,11,18;25:4,23;26:6,14;27:4,5,24;31:12;32:1;39:10,23;40:5;41:4,16;60:11,18;216:10;235:7,20
Canyon (11)
171:6,13,16;181:16,23;188:8,10,12,16,25;189:8
capabilities (3)
35:24;71:22,23
capable (5)
47:7;48:21;71:5,16,18
captured (2)
168:22,23
care (1)
100:14
Carey (1)
79:19
carryover (16)
17:25;41:25;66:2,19;116:15;122:11;135:14;175:21,25;176:3,7,9,13,16;177:22;184:21
case (13)
10:15;16:21;17:16;19:12;20:13,14,15,16;59:5;71:3;127:10;187:9;232:16
cases (4)
92:3;107:13;231:20;233:13
categories (3)
221:20,23;222:6
category (2)
10:3;157:8
cause (5)
37:1;106:8;114:17;115:2;119:20
caused (1)
79:8
causing (1)
189:1
CDL (2)
68:16;139:8
ceiling (1)
106:2
centered (1)
175:21
certain (4)
188:4;206:24;221:11;233:7
certainly (8)
18:1;21:1,6,11;75:25;226:8;232:8;233:24
cfs (1)
90:25
chance (2)
19:9;228:21
change (35)
10:12;18:13,19,19;19:1,25;21:1;25:13;29:13;44:17,20;45:15,22;47:20;64:14,15;71:2,20,22,24;95:21;115:13;152:14,19,19,22;153:5,12,13;188:21;189:13;202:21;206:16;207:8;232:11
changed (8)
19:17;47:16;134:18;152:24;153:22;175:8;178:17;189:10
changes (10)
18:19,23;20:25;153:14,25;154:7,11,18;211:20;212:1
changing (3)
44:12;45:10;153:20
channels (1)
99:19
characterization (2)
103:25;129:2
characterize (6)
10:2;33:15;34:18;102:17;127:6;234:8
characterizing (1)
146:25
chart (1)
73:5
check (1)
14:7
check-in (2)
170:2,13
checking (1)
31:19
chief (2)
120:22;121:2
choice (1)
14:24
choosing (1)
151:22
Chris (3)

11:19;14:15;213:11
Christmas (1)
174:12
circle (2)
33:15;222:16
circumstance (1)
172:4
circumstances (2)
18:19;20:1
citations (1)
234:12
cited (3)
20:13;231:22;232:3
cites (1)
197:4
Cities (14)
11:20,20;12:2;25:20;
26:11,23,23;28:1,4;39:24;
65:23;131:3;213:12;217:19
Cities' (1)
39:14
City (12)
11:16,18,23;12:3;19:8;
30:21;60:16;65:23;88:6;
124:21;147:13;161:19
civil (1)
37:13
claim (1)
18:14
claims (3)
147:14;204:13,21
Clarification (4)
36:17;73:9;197:23;216:10
clarified (1)
36:15
clarify (10)
28:21;32:7;59:15;70:9;
73:4;104:5;178:22;192:25;
218:9,21
classification (1)
24:18
classifications (2)
69:1;194:23
classify (2)
88:21;141:13
Clear (21)
20:13;142:2;143:18,19,21,
22;154:22;155:4,15,16,17;
156:2,23;157:5,9,11;173:12;
199:2,23;200:3,18
clearly (1)
111:5
clients (1)
102:12
close (1)
167:23
closely (2)
33:9;171:21
closer (1)
187:8
closest (2)
79:7;210:8
cloud (1)
227:15
Clouds (2)
227:16,17
Coalition (77)
10:15;11:20;26:13,21,23;
33:11,19;34:22;39:14,24;
49:3,11;53:7,13;65:23;66:3,
20;78:12,25;79:22;80:6;
82:3,10;85:23;86:20,23;
96:16;98:12;102:11;106:12;
110:16;114:12;115:20;
116:18,21;117:1,11;118:4,8,
9,9,17;125:16;133:22;
137:22;138:2,14,21;140:8;
149:6;159:16;165:7;168:16;
178:7;181:14;198:23;202:2,
9,16;203:4,15;205:21;206:6;
211:25;213:11,24;214:1,8;
216:21,25;217:16,19;
219:16;220:8;228:22;
230:15;233:7
Coalitions (1)
17:21
Coalition's (3)
38:24;140:11;205:21
Colleen (7)
10:19,22,25;41:15;88:1;
105:17,22
College (1)
120:8
Collin (2)
144:15,16
Colorado (1)
106:22
column (26)
76:11,13,14,15,24;77:3,4,
6;78:1;85:14,25;86:1,2;
134:8;138:5,9,10,11,18;
139:2,5,7;140:2,16,22,22
columns (3)
76:13,23;77:8
COLVIN (14)
12:15,15;106:3,5,6,10,19,
20;109:22;110:9;116:3;
119:7,10;230:17
C-o-l-v-i-n (1)
106:20
combination (1)
70:24
combined (1)
149:16
Coming (6)
54:23;61:10;90:4;168:9;
180:19;230:5
command (2)
81:7;208:11
comment (4)
32:6;33:22;104:16;148:1
Comments (15)
65:19,22;176:11;179:9,15,
19,25;180:1,6;182:25;183:1;
189:24;220:7,10;230:15
Commissioners (1)
145:15
Committee (3)
107:16;117:5,14
commodity (1)
20:20
common (25)
24:6,23;25:3,17,19,23;
26:5,7,10,12,17;27:2;28:8,
17;40:8;58:22;65:13;68:16;
74:6;75:3;93:14,19;135:5;
179:6;198:12
communicate (1)
181:2
communicated (1)
64:23
communication (1)
229:5
companies (5)
171:18;189:6;199:21;
216:2;221:7
Company (55)
42:19;43:1,13;55:1,11,24;
56:16;57:14;58:13;60:24;
62:7;73:16,17;89:18;99:6;
128:4,13,23;132:10,11,15,
25;136:17;137:11;140:10;
141:15;144:3,6,21;145:1,10,
16,25;146:4,13,16;147:14;
164:3;165:12;168:22;
171:19;181:9,17;183:12;
186:20;187:18;192:11;
193:21;194:6;201:10;222:2,
8;224:10,12;225:2
Company's (9)
43:6;122:13;145:18;
164:6;181:21;222:23;223:3,
7;224:5
comparative (1)
22:4
comparatively (1)
197:25
compare (1)
130:12
compared (5)
82:2,5;115:5;130:13;
156:14
compares (2)
74:23;82:8
comparing (3)
55:6;181:12;234:3
comparison (7)
22:13;51:23;52:9;72:7,12;
97:14;113:12
compelling (1)
18:25
compile (1)
60:23
compiled (2)
26:3;217:5
compiling (1)
61:9
complete (3)
49:23;175:3,5
completed (5)
97:14;174:20;177:23;
195:9,14
completely (2)
21:12;49:23
compliance (1)
211:5
complicated (1)
199:7
comply (1)
172:13
complying (3)
81:3;172:21;209:4
component (6)
18:4;21:24;69:21;108:18;
118:25;126:8
components (12)
18:14,15,24;19:1;22:9;
62:1;90:16;91:3;170:19;
176:25;188:4,5
composed (1)
129:16
compound (1)
112:25
compounds (1)
21:5
comprehensively (1)
17:4
compress (2)
30:6;32:20
compromise (1)
234:25
compromises (1)
33:20
concept (8)
82:12,21;125:19;152:12;
153:11;208:16;212:3,7
concepts (2)
209:8,17
concern (5)
172:13;184:4;187:25;
188:2,23
concerned (6)
33:25;86:25;171:12;
184:10,12;224:13
concerning (3)
174:1;205:25;206:3
concerns (8)
39:2;40:14;122:19;182:2;
183:25;184:6,8;187:23
conclude (1)
151:13
conclusion (4)
56:10,11,12;98:1
conclusions (7)
97:5,7,12;98:5;108:4;
231:11,11
conclusory (1)
232:23
condition (1)
191:20
conditions (10)
19:14,17;50:21;147:1;

152:13,18;153:12;156:14;
191:25;198:21
conduct (1)
177:1
conducted (2)
176:16;211:18
conference (3)
54:12;172:8;217:23
confidence (1)
224:16
confirm (1)
62:6
confused (4)
40:10;99:16;154:22;
173:10
confusing (2)
25:15;215:23
confusion (2)
23:14;135:22
conjunction (1)
69:11
Conjunctive (5)
80:15,19;207:17,20;209:7
connect (1)
74:15
connection (7)
66:24;75:9,11;180:11;
209:9,10;212:9
consider (15)
18:23;21:7;101:20;102:3;
146:17;155:3;156:24;157:4;
167:9;189:11;197:3;209:6;
220:10;234:5,14
consideration (4)
98:25;142:12;147:21;
233:25
considered (6)
22:2;156:3,18;165:21;
180:11;210:2
consist (1)
175:19
consistency (1)
195:23
consistent (2)
78:15,18
consists (3)
67:12;68:6;194:12
consolidate (1)
23:21
consolidation (1)
23:24
constant (2)
187:19;193:17
consultant (1)
118:8
consultants (9)
131:2;174:20;182:19,25;
214:6;219:5,7;220:8,11
consulted (1)
119:1
consuming (1)
69:6
contain (1)
132:16
contained (2)
36:16;126:6
contemplated (1)
20:25
contesting (1)
34:8
context (5)
17:25;77:20;103:21;
197:3;211:13
continue (3)
60:7;85:16;175:13
Continued (3)
7:1;170:4;177:1
continues (2)
31:24;189:17
continuing (1)
51:14
continuous (3)
25:1;52:19;170:8
continuously (1)
55:21
CONTOR (2)
11:24,24
contract (4)
145:14;146:11;147:4;
148:11
contractor (1)
120:19
con-transient (1)
232:12
contrary (2)
81:9;208:13
contribute (3)
21:25;145:1;174:5
contributing (3)
62:23;188:25;189:4
contribution (3)
91:13;99:5;145:6
control (2)
32:4;130:10
controlling (1)
73:15
convene (2)
105:18;170:18
convening (1)
53:12
conversation (2)
131:18;144:5
conversations (3)
176:23;212:16,17
conveyed (1)
126:13
convincing (20)
142:2;143:18,19,21,23;
154:22;155:4,15,16,18;
156:2,6,23;157:6,9,11;199:2,
23;200:3,18
coordinating (1)
31:2
copied (1)
28:16
copy (4)
17:3;28:12;80:14;185:3
Corps (2)
162:17;167:8
corrected (1)
144:12
correctly (3)
42:17;92:2;166:2
correspondence (1)
172:20
counsel (3)
35:20,21;218:1
count (1)
139:24
counted (1)
194:14
county (2)
31:10;210:9
couple (16)
16:9;43:25;45:7;60:10;
94:4;96:24;103:6;211:8;
213:12;216:10;219:22;
222:19;224:17,24;226:13;
230:2
court (19)
10:18,22;11:3;15:8;18:20;
19:3,12;20:22;21:12;22:12,
13;45:18,21;148:5;183:17;
197:4;232:13;234:14,19
courtesy (3)
87:4;101:14;235:14
courts (1)
234:24
courts' (1)
234:4
cover (2)
33:25;227:15
covered (1)
109:10
Crapo (1)
11:23
create (4)
141:12;164:15;225:20,24
created (17)
46:9;63:23;70:7;138:11,
14,15,23,25;142:21,24;
155:25;200:24;220:15,19,
21;223:23;226:7
creating (4)
19:21;42:8;225:22;228:6
Creek (8)
92:7,11;100:11,13,16;
163:7,18;165:1
Cresto (4)
166:8,10;182:11;188:14
criteria (2)
153:18;171:15
critical (1)
87:8
crop (31)
122:2;125:15,17;129:14,
16;130:4;131:10;151:8,23;
152:23,23;153:2,3,3,6,13,15,
24;154:1,7,7,17,17,23;155:1;
193:3,6,6,7,10,16
crops (3)
160:20;191:22,24
Cross-Examination (21)
7:3,4;35:6;39:21;60:13;
63:10;88:3;95:11;96:20;
109:24;110:1,7;115:24;
116:1;124:18;150:2;161:16;
166:20;213:9;216:16;219:19
cross-reference (1)
28:11
crowd (1)
23:12
cumulative (1)
114:20
curiosity (1)
167:2
curious (1)
150:22
current (16)
46:8,11,16;47:3,12,14;
112:22,23;113:3,4,22;
156:14;191:20,25;223:19;
225:3
currently (6)
37:18,24;68:9;113:23;
120:13;185:22
curtail (4)
56:17;58:16;78:5;114:16
curtailed (20)
42:24;55:3,12,14,15;
57:19;58:1,10;72:13,20;
74:12,24;101:22;110:14;
112:24;113:4;115:1;207:10,
14;234:17
curtailing (5)
21:3;58:21;86:11;108:12,
22
curtailment (71)
21:23;22:18;38:23;42:12,
14,20;43:11;44:13;48:13;
49:4;51:24;52:10,18,19;
55:21,25;57:9;58:8;72:15;
73:2,21;74:1,2,11,18;75:6;
76:5;77:2,7,16,17;78:3,10,
22;79:19;80:4;82:2,5,5,9;
85:20;86:2,21,23;93:7,17,20,
25;97:22;98:16;101:20,21;
102:5;108:15,17,19;109:12;
110:22;111:1,5;112:21;
113:2,14;114:14,19;115:5,8,
14;205:4;207:9;233:23
curtailments (2)
98:11;207:3
cut (1)
22:16
CV (2)
107:7,9

D

daily (1)
145:8

Dakota (1)
37:13
Darlington (1)
210:10
data (51)
18:23;19:2;21:6;38:7;
56:24;62:19;63:3;64:14;
67:11;68:13,14,16,21;69:11,
12;72:17;76:10;77:5;82:6;
85:5;89:4;90:12,17,18;
91:23;98:4;121:14;122:24;
127:25;128:3,14,17;130:16;
141:12;145:4;155:3,5;
156:22;157:3,10;164:15;
171:2;198:22,25;199:1,2;
200:22;218:21;221:17;
227:24;228:13
database (7)
197:13,16,19;198:8,10,18;
199:13
dataset (90)
68:3,6,23;69:9,13,17,19;
70:7,8,9,11,14,21,25;139:6,
16;140:4,5,13,18,20,21;
141:7,10,18,22;142:1,7,11,
18,22;143:1,4,9,14;155:21;
156:1,3,8;178:23;192:6,7,20;
193:18,24;194:19,23;195:5,
8,13,16,23;196:4;200:9,11,
17,17,23,24;201:2,3,4,4,12,
14;220:14;221:18,19;222:2,
4,9,24;223:3,11,14,25;224:2;
225:20,22;226:7,10,19,21;
227:2,4,16,25;228:6,6,10
datasets (9)
68:8;88:9,19;89:1;192:6;
201:9;218:13,21;223:16
date (25)
42:12,14,20;43:12;44:13;
49:8;52:19,20;57:9;58:11;
73:13,15,18,24;74:1,11;
77:14;115:17,18;131:13;
138:18;174:10;177:3,18;
205:2
dated (5)
145:16;174:9;184:22;
203:6;217:16
dates (12)
38:23;49:3;51:23;52:9;
71:14,15;72:7;77:16,18;
93:17,20;113:12
Dave (5)
12:15;106:17,19;230:17,
18
D-a-v-e (1)
106:19
DAVID (4)
106:6,20,20;116:4
day (3)
17:17;188:23;235:15
days (6)
16:9;29:22,25;30:7;31:3;
124:22
de (2)
82:19;103:20
deal (1)
211:5
dealing (1)
233:13
deals (1)
196:22
Dean (1)
31:16
decades (3)
79:9;86:6;114:21
December (17)
42:19,24;66:4;85:21;
130:20;137:24;157:22;
174:9,14;175:4,13,15;177:2,
7,12;203:6,10
decide (1)
87:2
decided (2)
128:20;147:18
deciding (1)
56:14
decimal (1)
187:10
decision (18)
17:4;44:14,25;45:1,4,14;
53:23;64:7,10;71:20,25;
95:16;111:18;176:24;197:4;
227:14;232:10;233:4
decisions (4)
22:3,12;111:20;234:13
decline (1)
184:13
declined (1)
187:19
decree (2)
147:2,22
decreed (5)
20:18;146:5;147:7;223:4,8
decrees (1)
148:10
dedicate (1)
223:18
deduct (3)
100:12,15,19
deducting (1)
61:19
deem (1)
21:12
deep (2)
126:20,23
deeply (1)
99:19
deficiencies (1)
130:7
defined (1)
160:18
Definitely (1)
169:19
degradation (3)
181:8;184:13;189:1
degrade (1)
189:18
degrading (2)
224:14,15
degree (2)
37:11;225:6
delay (2)
31:14;202:23
delineate (6)
68:10,11;69:7;84:16;
88:21;226:22
delineates (1)
88:12
delineation (3)
88:11,12;103:19
delineations (1)
88:20
deliver (1)
127:18
delivered (3)
147:2;168:23;210:2
deliveries (3)
145:24;146:13;199:17
delivery (19)
10:15;38:24;42:13;48:14;
53:14;73:22;82:13;103:9;
104:14;109:10;145:23;
147:15;197:3;198:17;
199:16;205:21;212:4;
216:25;217:16
Delorey (3)
31:16,19;32:9
delving (1)
234:22
Demand (33)
41:25;51:24;66:2,19;
69:12;70:15;72:21;74:17;
76:12,19;79:13;86:3,8,13,14,
18;109:7;115:19;116:15;
129:15;133:22;134:10;
135:14;137:21;184:21;
192:23;193:12,13,15;
202:15;203:4;206:18;207:1
demonstrate (1)
35:24
demonstrated (1)
111:6
denominator (1)
130:2
Denver (1)
106:22
deny (2)
19:4,4
denying (1)
16:3
Department (115)
11:5,7;12:21,23;17:10;
18:7;21:2,7,11;33:8,12,14;
34:11,16,20;35:7;37:19,22;
38:13;39:5;43:19;44:3,4,23;
45:24;63:16,24;65:24;66:23;
77:12;81:16,22;87:1;92:24;
94:22;101:14;105:3;110:13;
111:8,13;117:17;118:5,21;
119:16;120:14,17,20;
121:19;124:11;128:1,3,17;
130:5,23;131:5,18;132:9;
148:6;155:19;156:11;
157:23;160:23;161:3,22;
162:10;164:10;165:5;
169:12;172:4,9,25;173:4,4;
175:13;176:19;180:7,10;
182:1;183:10,14;184:8;
187:22;188:3;189:14;191:4;
193:20;194:1,15;197:6,13,
16;198:20;199:12;200:7;
205:6;209:19;210:18;
211:18,23;212:12;215:17;
220:10,14;223:2,6;228:8;
231:24;232:7,8,10;233:3,24;
234:3,14,20
Department's (9)
33:5;54:17;67:12;86:25;
132:23;142:20;146:5;
187:24;197:9
depending (3)
22:23;127:3;229:6
depends (1)
168:25
depleting (1)
113:24
deposit (1)
14:23
deposition (8)
45:6,9;68:2;69:22;132:5,
15,22;141:25
depth (1)
19:10
deputy (1)
34:13
derived (1)
141:17
describe (6)
69:24;107:4,9,21;108:3;
179:24
described (5)
43:15;62:8;81:10;109:6;
208:14
describes (1)
145:23
describing (1)
62:21
DESCRIPTION (1)
7:9
descriptions (2)
41:2,2
descriptive (1)
147:7
designated (3)
26:4;36:9;161:22
designation (1)
82:17
designations (1)
68:15
designed (1)
221:1
desire (1)

16:10
detail (1)
108:8
deterioration (1)
171:22
determine (7)
55:5;90:25;110:13,20;
153:14;197:7;233:15
determined (3)
42:18,19;99:22
Determining (11)
41:24;43:11;66:1,18;
116:14;133:21;135:13;
137:20;184:20;203:3;234:15
detour (1)
186:8
develop (1)
77:8
developed (8)
11:1;68:9;69:4;166:7;
171:3;188:13,14,17
developing (5)
38:10;56:23;121:13;
180:11;228:1
development (11)
21:25;22:10;67:13;78:21;
81:17,23;105:8;227:23;
231:13,15,15
deviation (2)
166:1,4
dialogue (1)
15:4
difference (14)
44:3,9;48:5,10;55:2;98:14;
140:10;143:8,10;154:12;
160:22,24,25;204:11
differences (1)
111:9
different (25)
47:18;55:6;72:15;75:22,
24,25;114:13;127:14,22;
131:12;135:18;139:8;
141:12;155:14;175:8;183:1;
190:20;192:5,9;201:9;
216:19;218:1;219:5;220:19;
228:3
differently (2)
10:3;132:2
difficult (2)
105:23;227:16
digitized (2)
88:24;142:21
digitizing (1)
143:16
DIRECT (6)
37:5;70:13;106:15;
109:10;119:23;152:25
directed (3)
45:22;64:20;65:5
direction (5)
45:18,18;64:18,22;169:19
directions (1)
169:15
directly (6)
118:23;120:20;121:3;
129:18;165:19;169:21
Director (97)
11:4;14:9;15:24;16:17;
17:13;19:4,7;20:9,21,22;
21:16;24:1,16,19;26:18;
28:19;30:19;32:14;33:4,22;
35:19;36:8;38:17;39:10;
40:4;42:18;44:19;53:11;
54:24;57:7,13;63:22;64:2,8,
11,13,19,24;66:5;72:1;
78:22;79:17;80:4,8;82:25;
88:14;95:9;96:18;103:1;
104:15,22;105:1;106:11;
123:25;136:13;137:8;146:2;
147:8;148:3;153:23;158:12;
159:9;162:10;169:16,19;
170:9,17;172:8;174:2,4,5;
181:2;182:11,23;183:10;
185:13;191:8,12;197:3;
206:8;209:6,16;210:21;
211:7;213:7;216:9;217:8,12,
22;229:4;230:25;231:3;
233:9,17;234:20;235:7,14
Director's (11)
16:21;19:11;45:1;56:12;
59:5;71:20;104:19,24;170:5;
205:18;233:10
disadvantage (1)
25:10
discharge (9)
53:2;61:24,24;62:4;69:11;
90:13;129:15;160:12,12
discharges (2)
61:6;90:20
disclosed (2)
24:9;125:9
disclosure (1)
24:25
disclosures (3)
24:3,5,11
discretion (3)
20:21,22;234:4
discretization (1)
47:20
discuss (4)
39:3;81:18;122:20;214:6
discussed (9)
56:7,8;68:2;69:22;79:15;
95:2;131:23;178:21;185:15
discussing (4)
82:23;100:8;117:9;185:24
discussion (16)
29:14,20,22;79:10,11;
130:22;165:4,25;172:24;
173:3,14;175:11;181:6;
205:6;209:13;231:5
discussions (13)
15:10;56:5;75:15;77:22;
81:15,22;94:21;158:15;
165:8;176:20;205:9;206:2;
214:12
dismissed (1)
228:25
disparity (1)
81:13
dispute (1)
205:24
disregard (1)
200:4
distant (1)
10:5
distinguishing (1)
70:22
distribute (1)
16:5
distributed (1)
28:16
distribution (2)
208:21;210:5
District (37)
11:11,13,14,25;12:6,8,14;
13:2;57:12;75:6,7,17,23;
77:7,22;78:3,5,11,17;79:19,
20,21,21;80:1,3;84:3;85:17;
91:17,24;96:23;101:8,11;
129:21,22;197:4;211:14;
214:13
districts (11)
12:18;77:2;79:24;83:20,
22;84:25;85:11;86:18,21;
101:15;221:8
District's (1)
93:12
diversion (10)
91:23;129:15,16;150:23;
151:4,14;154:8;160:19;
164:7;198:21
diversions (21)
20:23;70:18;91:7;122:14;
129:18,25;151:8,23;160:11,
12,13,15,16,23;161:1,4;
197:17,18,20,21;198:17
divert (2)
151:15,16
diverted (5)
43:9;125:17;126:12;
161:2;181:13
divide (1)
193:10
divided (1)
129:14
dividing (1)
100:24
doctrine (11)
19:13;22:15;81:21;208:19,
23;209:20;210:5;211:10;
233:16;234:25;235:2
document (37)
18:21;25:22;38:5;41:22;
51:11;65:16;66:21,23;67:4,
5;76:3,8;83:10;109:18,19;
116:11;121:8,10;148:6,11,
15;149:20;157:23;173:20,
25;175:4;182:13,16;185:1,
17;186:2,3;190:14;215:2;
220:5;230:21,22
documents (13)
24:21;25:2;33:5;39:19;
40:16;59:9,13;147:11;
179:22;180:17,21,25;181:4
Doherty (1)
10:22
domestic (1)
197:24
done (25)
34:23;65:1;75:11;77:9,10,
13,15,19;88:12;104:21;
116:25;130:6;144:2;156:11;
166:6;175:10;189:18;191:4;
192:8;196:4;206:13;223:20;
227:13,18;228:4
dots (1)
74:15
double (1)
194:14
doubt (1)
54:5
down (12)
117:23;126:25;130:1;
132:1;166:4;191:18;193:14,
15;203:21;207:23;209:1;
210:10
downstream (1)
91:6
downward (3)
157:9;184:13;224:13
draconian (2)
27:20;32:5
draft (10)
42:16;67:5;96:1,8;158:19,
21,23,24;159:4,8
drafted (1)
144:23
drafting (3)
67:3;175:7;176:12
drafts (3)
158:16;159:13;176:22
drainage (5)
163:8,10,11,21;164:22
draw (4)
19:11;80:22;81:5;134:4
DS (1)
113:13
due (6)
108:12,16;114:20;172:13,
21;182:2
duly (3)
36:25;106:7;119:19
dump (1)
122:24
Dunn (2)
11:16,18
duplicate (2)
63:14;169:6
during (19)
45:19;55:24;56:13,17;
62:9;68:2;69:22;78:13,20;

90:11;131:17;132:4,14,22;
138:15;141:25;164:11;
176:4;197:9
duties (1)
121:1
duty (1)
31:9
Dylan (2)
12:7;20:8

E

earlier (15)
17:24;32:2;97:19;132:23;
161:21;178:21;187:22;
188:13;189:23;192:5;
206:10;221:10;222:22;
231:24;233:12
early (6)
30:9;46:21;50:12;111:23;
188:6;217:25
ease (2)
49:17;59:6
easier (1)
215:3
east (2)
163:17,20
Eastern (11)
50:11,15;74:3;93:13;
107:15;117:2,4,14;128:6;
141:13;163:4
easy (3)
119:11;228:11,14
economic (20)
20:12;21:4,10,22;22:4,13,
17,17;23:3;231:4,12,14,25;
232:4,13;233:4,14;234:2,15,
21
economics (4)
22:1,5,11;23:2
edit (1)
67:5
edited (1)
43:25
editing (2)
159:2;174:6
edits (2)
159:4;223:18
education (1)
107:10
educational (2)
37:10;120:6
effect (2)
154:19;202:8
effective (2)
193:5;205:2
effectively (2)
47:22;202:15
effects (1)
211:19
efficiencies (1)
131:20
efficiency (19)
36:5;39:13;122:9;125:8,
14,19;126:6;129:13;130:1,2,
23;131:1,4,11,22,24;154:9,
13;193:11
efficient (2)
34:1,7
effort (3)
69:6;197:10;223:23
efforts (3)
31:5;32:24;62:16
eight (1)
143:10
either (21)
13:24;14:24;15:17;34:20;
35:14,16;46:21;68:11;70:17;
88:22;90:20;92:11;121:3;
127:8,10,21;137:4;140:7;
151:24;168:13;169:21
electronic (1)
13:22
electronically (1)
10:9
elements (3)
147:12,19,20
Elesheva (3)
23:25;25:4;28:18
Elisheva (1)
12:11
else (8)
13:25;32:22;36:21;89:9;
167:15;193:17;199:3;235:6
elsewhere (2)
112:9;161:7
email (6)
84:14,19,24;177:3,11,20
emailed (1)
217:25
emergency (1)
172:3
employ (1)
103:23
employed (2)
37:18;120:13
employee (1)
119:15
employees (1)
218:9
enable (1)
227:23
encourage (1)
36:5
end (8)
46:21;91:5,6;127:17,19;
152:10;177:23;207:9
ended (1)
159:21
engaged (1)
60:5
engineer (2)
37:15,24
engineering (1)
37:13
Engineers (6)
12:2;162:17;167:8;
179:15;180:1;192:8
enlargement (11)
204:15,21,23;205:1,10;
215:13,14,18,21,22;216:1
enough (8)
10:25;34:25;50:3;51:20;
128:20;169:3;205:17;235:12
ensure (4)
30:10;123:18;151:8,23
entered (1)
147:17
entire (3)
29:10;100:15;161:1
entirely (1)
70:10
entirety (3)
14:2;81:7;208:11
entities (5)
197:8;198:23;201:19,25;
202:16
entitled (2)
81:7;208:11
entity (5)
125:17;160:19,21;181:14;
202:9
entity's (1)
125:16
Environmental (2)
11:25;37:11
Ep (1)
129:13
equal (1)
129:14
equation (16)
126:4,5;129:10;131:21;
171:17,23;181:8,20;186:20;
187:6,13,23;193:4;224:6,9;
225:1
equivalency (2)
164:10,17
equivalent (1)
168:2
Erickson (1)
19:12
error (2)
111:6,17
errors (1)
131:25
ESPA (17)
12:2;38:22;42:11;51:1;
57:10;61:5,23,24;62:4;68:3;
108:11;109:2;112:11,17;
114:21;198:12;211:20
ESPAM (18)
45:25;46:2,4,6,8,11;47:21,
21,25;70:12,14;71:15,17;
89:2;99:20;108:9,15;110:13
ESPAM2 (1)
46:16
ESPAM2.1 (5)
46:17,20,23;48:1,19
ESPAM2.2 (5)
46:14;47:3,22;48:1;108:21
especially (1)
153:16
essentially (7)
49:19;78:11;114:22;
175:3;177:23;198:4;234:19
established (1)
186:23
estimate (6)
70:5,19;91:13;112:21;
113:2;217:22
estimated (1)
99:13
estimates (2)
99:4;221:4
estimating (2)
99:20;226:15
estimations (1)
99:12
estoppel (1)
19:23
et (17)
11:11,20;12:14;68:19;
69:11;70:16;96:23;129:16;
151:7;193:4,5,16;199:13,16;
219:22;226:24,24
Ethan (3)
92:22;137:23;203:5
evaluate (8)
83:4;108:1;118:10;153:6,
13;191:5;197:11;210:14
evaluated (5)
62:14;114:19;115:4;
144:25;189:14
evaluating (3)
108:11;153:15;183:11
evaluation (6)
63:1;117:2;130:6;184:19;
212:13;227:24
evaluations (1)
146:15
evaporation (2)
122:6;126:16
evapotranspiration (1)
122:4
even (9)
21:4;48:19;54:5;79:8;
87:8;121:13;132:1;157:20,
21
events (1)
19:20
everybody (9)
10:10;15:4;30:3,16;32:21;
35:13;177:10,14;216:13
everybody's (2)
31:5;32:23
everyone (8)
10:1,17;13:25;14:8,12;
28:10;232:17;236:5
evidence (23)
18:8;51:12,13;59:14,25;
109:20,21;148:13,17,19,21;
149:10,21,22;156:22;180:22,

23;186:4,5;200:3;230:23,24;
232:6
evident (2)
56:11;158:9
evidentiary (1)
173:15
exact (5)
129:6;162:21;164:21,24;
165:2
exactly (9)
75:13,17;77:23;96:3;
144:14;156:21;159:12;
183:16;226:15
Examination (19)
7:5;22:16,21;23:1;25:5;
34:20;35:4;37:5;39:9;49:17;
97:19;102:18;103:3;106:15;
119:6,23;124:13;149:23;
222:20
examine (8)
13:25;35:14,16;37:4;
106:10;110:5;119:22;219:17
examiner (2)
96:17,18
examining (4)
14:21,25;26:21;59:6
example (11)
85:17;92:4,4,7;93:11;
126:20;158:15;165:18;
222:1;226:11;227:19
exceeded (1)
24:3
excess (3)
127:20;168:8,15
exchange (1)
15:9
excluding (1)
233:4
excuse (4)
80:23;113:5;148:25;
195:17
excused (2)
31:8;119:13
exercise (3)
20:21;97:14;209:2
exert (1)
223:22
Exh (6)
7:10,12,15,17,20,22
EXHIBIT (153)
7:9;17:4;23:13;24:22;
25:13,18;29:7;39:25;40:1,2,
23;41:22;42:1,3,4,9,10,13;
43:17;44:14;48:24;49:1,1,
14,20,23;50:5,20;51:4,8,8,
11,13,15;52:1;54:9,23;55:2;
57:1,3,3,18;59:9;65:9,11,13;
66:12;67:6;72:5,6;73:1;76:1,
3;80:12,14;82:6,7;83:7;84:7,
8,14,19;97:1;101:19;102:2;
107:1,3,5,7,22;109:15,20,21;
110:18;112:3;113:11;116:7,
9;117:20;125:1,2,7;132:4,8;
133:4,8,16;134:25;135:1,9,
11;136:4,6,16;137:13,15,17;
139:18;145:11,12,14;146:3,
21,25;148:5,19;149:9,14,16,
19,21,22;150:6;157:18,19;
161:25;173:18;182:6,8;
184:15,17;185:9,10,14,18,
23;186:2,4,5,9,10,13;189:21;
190:4;191:13;196:5,17;
202:18,20;203:1;207:15,17;
213:14;214:25;215:3;
219:23,25;230:9,12,21,23,
24;231:10
exhibits (55)
14:23;16:19;23:22;24:7,
23,24;25:3,6,17,18,23;26:3,
4,5,7,8,10,11,15,17,22,24,25;
28:1,4,5,8,18,23;29:3,14,15;
39:15;40:15;41:17,18;42:8;
59:3,7,24;106:12;124:25;
135:5;148:17,18,21;179:4,6,
6;180:14,21,23;182:9;
229:13;236:6
exist (3)
19:17;46:14;81:4
existed (1)
19:15
existing (1)
102:5
exorbitant (1)
233:23
expect (6)
31:21;32:18;35:2;42:25;
78:14;184:3
expectation (1)
42:23
expected (3)
47:9;202:24;235:1
expecting (2)
41:18;229:15
experience (2)
19:1;144:25
experimenting (2)
226:1,5
expert (12)
13:15;35:22;36:9,11;76:6;
107:5,12;109:23;131:13,16;
232:19;233:1
expertise (2)
11:1;118:15
experts (6)
35:24;36:3,3,13,14;180:20
explain (19)
68:6;73:12;79:12;82:15;
88:9;90:8;153:19;155:18;
182:16;183:13;186:15;
187:2;188:11;192:21;
194:12;203:23;204:11;
209:23;211:13
explained (1)
195:1
explains (1)
209:5
explanation (3)
42:7;62:5;169:5
exploration (1)
22:19
exponentially (4)
21:5;72:19;207:10,13
extends (1)
19:14
extensive (1)
189:20
extent (6)
33:12;56:9;80:21;81:4;
197:7;199:18

F

face (1)
147:22
fact (13)
20:1;22:2,12;38:12;42:11;
112:14;145:22;146:11;
147:18;173:19;183:23;
196:22;232:18
factor (3)
56:14;197:2;214:22
factors (9)
151:9,11,16,22,24,25;
152:3,5;189:1
facts (12)
18:19;19:14,17;21:24;
22:2,11;231:22,23;232:3,5,
23,25
factual (1)
22:9
failed (1)
185:23
Fair (16)
34:25;50:3;51:20;100:5;
103:24;111:16;115:13,15,17,
20;137:7;143:24;169:3;
201:7;205:17;235:12
fairly (2)
14:14,14
fall (6)
107:19;159:21;170:2,14,
20;183:17
Falls (98)
11:13,23;19:8;42:19;43:1,
6,13;54:25;55:10,23;56:16;
57:14;58:12;60:24;61:7;
62:7,15,22;73:16;88:6;
89:18;92:7;99:14;100:8,11,
13;122:13;128:4,13,17,23;
132:9,10,15,24;136:17;
137:10;140:9;141:4,15;
143:15;144:2,6,12,17,20;
145:1,2,5,8,10,15,18,24;
146:13,16;147:14,17;
161:19;162:22;164:3,6;
165:12,16,19;168:22;
171:19;178:13,20;181:9,11,
17,21;183:12;186:19;
187:19,24;189:7,10,15;
190:21;191:10;192:11;
193:19,20;194:2,6;201:6,10;
222:2,8,23;223:3,7;224:5,10,
12;225:2
Falls' (1)
184:9
familiar (45)
10:19;38:5;76:9;77:5;
78:8;80:20;81:1,3;82:12;
83:11;94:11;118:1,3,5;
121:8;145:22;146:11,14;
157:24;158:2;163:3,6,7,12,
22;164:9,13;167:9;173:23;
174:11;179:22;186:12;
190:22,24;192:9;196:23;
204:23;207:20;208:16,17,
22;209:19;211:9;212:3;
226:18
far (3)
86:24;94:19;217:10
farmsteads (1)
195:1
farther (2)
105:24;127:2
fault (1)
139:11
February (4)
133:24;170:10,11;206:7
feel (1)
143:18
felt (2)
157:5,11
FERGUSON (11)
12:23,23;66:3;67:1;
130:16;137:23;173:21;
177:4;184:22;185:4;203:5
few (14)
17:20;71:1;72:3;92:3;
96:5;103:15;116:6;153:16;
167:12;170:8;205:17;
206:13;211:17;220:13
field (6)
68:24;127:4,6,11;194:21,
21
fields (1)
194:25
Fifth (70)
7:10;10:14;16:21;18:4;
20:3;21:1;22:1,10,18,23;
38:4,7;41:4,23;43:16;44:14;
63:19;64:3;66:24;67:14,18,
23,24;75:7,9,20;78:9,21;
79:17,24;80:10;81:17,23;
82:22;95:14;98:20;107:6,23;
109:1;113:9;121:6;123:8;
124:24;132:11;136:25;
144:1;150:14,16;158:10;
159:17;162:1;169:11;173:1,
5,8,13,16;174:1,24;180:12;
196:18;206:3,17;207:11;
209:10;211:21;212:10;
213:14;218:8;231:9
figure (11)

76:15,16;83:23;85:10;
194:3,5,5;205:8,8,14;228:3
figures (6)
75:1;78:15;85:14;178:20;
179:1;228:9
figuring (1)
31:3
file (3)
17:15;94:2;123:13
filed (4)
16:17;24:3;147:13;148:5
files (4)
94:3;123:14,18;146:6
filing (1)
148:4
fill (2)
214:19,19
filling (2)
169:1,1
Final (16)
7:11,12,17;17:2;41:23;
42:5;57:5;65:25;66:17;
95:16;116:13;135:12;
136:13;140:22;176:24;
204:15
finalized (3)
46:15,16,20
financial (1)
234:22
find (7)
30:8;133:6;136:16,19;
138:3;156:17;189:12
finding (5)
196:21;231:20,23;232:4,6
findings (2)
38:12;42:11
fine (4)
116:5;152:3;230:5;236:2
finish (7)
29:25;30:4,10,10,15,17,17
finished (2)
226:11;228:23
firm (2)
106:25;118:14
first (39)
10:16;21:23;26:18;27:25;
28:15;35:13;36:25;38:21;
39:11;40:7;44:2;45:24;
46:14;54:1;55:9;95:13;
106:7;110:22;113:13;116:8;
119:19;120:19;126:7,20;
138:4,5,10;145:20;155:19;
158:9,19,21;171:20;187:16;
188:7,20;204:2;225:1;
232:11
fit (1)
75:18
five (3)
178:17;198:4,7
five-eighths (2)
145:23;147:16
Fletcher (41)
11:12,12;24:15,16;32:6,7,
12;33:22;34:6,11,24;35:1;
36:6,7,8;59:11;84:11;87:19;
102:12,14;135:17,21;136:1;
139:19;148:25;149:4,12;
150:8,14,18;159:23;190:6,8;
206:8;222:15;229:18;
230:14,19;233:8,9;236:2
flexibility (2)
31:18;32:19
flip (8)
42:3;74:21;83:13;117:21;
126:3;186:10;203:12;215:3
flipped (1)
30:23
flooding (2)
167:23;168:4
flow (33)
42:11;43:9;57:10;61:17,
18;73:17;90:4;92:5;94:8,13;
98:25;100:12,16;110:21;
127:7,21;128:6,13,17;145:8;
162:25;165:6;167:10,11;
181:12,13,22,23;183:12;
190:13;213:23;224:10,12
flows (41)
51:2;60:23;61:1,7,20;62:2,
6,15,23;89:17,18;91:8;
92:11;99:10,13,18;100:7,8,
13,14,15,18,19;112:22;
113:3;127:14,17;128:4,5,19,
22;144:3,7,10,11,17,21;
145:1,2,2;165:18
focus (2)
23:3;92:9
focused (1)
118:13
focusing (1)
140:9
folks (5)
13:14;14:1;16:4;31:10;
177:11
follow (7)
17:21;28:3;33:18;35:3;
166:25;167:2;177:5
followed (2)
102:19;174:13
following (4)
19:13;38:20;218:20;230:7
follows (3)
37:1;106:8;119:20
follow-up (7)
71:1;88:6;93:6;94:4;
96:24;167:12;205:18
Food (2)
20:13,15
Foods (3)
26:7,12;39:24
footnote (5)
83:14,14;100:25;214:4,10
force (2)
115:1,8
forced (2)
115:11;172:4
Forecast (44)
7:13,18;40:25;42:6;53:7;
57:5,8;94:5,11;114:11;
122:1;161:22;162:10,14,15,
17;165:6,10;166:2,12;167:3,
4,4,7,13;168:11,11;170:23;
171:5,9,17;177:6;181:7,10,
21;183:12;184:1,9,12,22;
188:8;190:21;191:10;225:4
forecasted (2)
52:2;94:7
Forecasting (3)
190:13;214:13,14
forecasts (2)
51:24;113:13
forever (1)
18:20
forge (1)
60:9
forgot (2)
35:20;136:9
Fork (2)
78:23;79:20
form (1)
168:18
formal (3)
170:13;232:15,20
format (1)
54:11
formerly (1)
166:10
formula (1)
225:3
formulate (1)
108:2
forward (7)
14:22;35:14;36:22;74:21;
106:5;119:17;230:5
foundation (6)
103:10,12;129:2;148:14,
23;153:10
foundational (1)
146:8
four (4)
25:5;26:24;29:25;120:25
Fourth (29)
64:7,10,18;65:25;66:17;
71:6;83:20;116:13,17;
135:12;136:12,16,18;137:5,
8;140:24;142:5;169:9,11;
171:1,24;172:5,10;175:2;
182:2;191:14;197:10;
206:16;207:12
fraction (5)
69:23,25;70:5,6;199:5
frame (1)
217:17
framework (1)
60:22
frequent (4)
206:18;207:2,3;227:23
Friday (8)
29:25;30:4,11,18;31:17,
18,21;32:16
front (19)
10:20;14:23;15:18;29:13;
39:19;41:21;49:14;72:5,9;
74:10;80:17;84:13;107:3;
117:21;134:24;150:7;
161:25;189:22;190:18
frustrate (1)
22:14
full (3)
231:12,14;235:15
full-blown (1)
156:15
fully (1)
101:4
function (1)
151:8
furniture (1)
10:8
further (36)
39:5;58:24;60:1,3;63:7;
79:9;80:5;87:15;95:4,6;
96:12,15;102:25;105:8,13;
115:21,23;119:4,6;124:11;
149:23;161:9,13;166:14,18;
205:16;212:22;216:7,8;
219:10,12;224:18,19;227:9;
228:19,22
futile (12)
81:20;208:19,20,22;
209:20;210:2,5,11,15,22;
211:6,10
future (1)
79:1
FYI (1)
30:25

G

gage (14)
61:16;89:24;90:1;94:13;
144:11;145:2,2,7;162:12,18,
24;163:16;171:7;188:16
gaging (1)
89:22
gain (12)
61:2,15,24;62:20;79:22;
85:22;89:21;90:21;99:25;
100:5;108:12,22
gains (17)
61:5,6,10;75:6;77:1,6;
78:12;87:12;90:2;91:1;92:7,
15,21;98:8;114:1,8,20
gallery (1)
229:2
Garrick (5)
84:1,14,20;87:4;172:20
Gary (3)
11:4;45:23;95:16
gave (13)
54:5,8,12,20;67:7;72:4;
100:4;123:19;130:25;141:9;
155:23;185:4,7

gears (5)
53:10;68:1;181:6;196:17;
224:4
Geisler (3)
92:22;137:23;203:5
general (8)
19:19;34:14;77:12;78:16,
18;89:14;108:3;147:3
Generally (17)
19:13;74:1;78:8;80:4,19;
90:8;107:9,21;137:3;162:18,
22;187:7,15;204:24,25;
207:22;215:16
generate (1)
85:5
generated (2)
176:18;195:25
genuine (1)
168:12
geographic (2)
69:14;212:8
geography (1)
163:19
geologist (2)
37:16;120:10
geology (3)
37:12;120:7,8
gets (3)
130:2,2;217:5
GIS (6)
68:10;88:12,20;121:4;
140:3;194:9
given (11)
58:17;65:7;67:17;112:20;
113:25;158:24;159:12;
203:10;209:15;231:2;232:18
gives (2)
151:21;232:7
giving (2)
51:17;99:23
glitch (1)
15:22
goal (1)
30:17
goes (10)
108:7;127:24;133:9;
140:13;150:21;167:4;
193:13,14,14,15
Good (16)
12:13;24:1;27:7;39:23;
41:20;50:7;60:15;96:22;
110:9,12;116:3;124:20;
141:9;150:5;219:21;227:16
grab (1)
39:25
graph (12)
50:20;52:10;55:1,6,9,22;
73:6,7;97:18,21,23;113:18
graphs (1)
131:9
great (10)
30:16;31:1;41:19;110:11;
166:24;201:6;213:21;214:4,
25;216:15
greater (2)
108:8;198:7
Greg (6)
12:1;30:23;32:8,10;131:2;
179:12
grievous (1)
111:6
Ground (133)
11:25;12:5,7,10,12,18;
13:2;16:7,11,12;17:14;18:8;
20:12;33:24;34:15,21;36:14;
39:8;42:11;49:4;57:10;
58:17,21,22;63:13,15;68:24;
69:23,25;70:2,6,11,18,23;
73:18,19,23;74:2,6;75:3,6,7,
16,22;77:7,21;78:2,4,11,17;
79:19,20,20,21,24;80:1,3,16;
81:8,12;83:19,21;84:3,25;
85:11,17;86:18,21;89:17;
91:2,13;93:7,12,13,14,20,23;
95:7;96:15;99:5,13;101:8,
11,15;102:3;106:24;107:25;
108:12,23;109:4,12;110:13;
118:13;124:14;157:7;
159:16;196:23;197:2,11,14,
17,19,20;198:7,11,12,16,22;
199:15,17,19;201:1,19,21,
23;202:1,4,7,12,14;205:3,11;
207:3;208:12;212:22;
219:13;221:4;223:1,14;
224:20;226:25;228:20;
231:18
group (65)
44:19;49:12;53:13,17,21,
24;54:2,16,21;63:21,25;
67:8;72:4,18;95:3,19,20;
105:3;107:19;117:17;
122:16;130:19;131:9,14,17;
133:24;144:13;145:5;149:7;
157:25;170:18;174:13,17;
175:18,22,24;176:5;177:9,
13,25;178:22;179:11;180:3,
8;182:19;185:4;196:3;
203:10;212:22;215:2;217:7,
8,24;218:3,7,12,15,20,23,25;
219:1,13;224:20;228:20;
230:16
groups (4)
117:6;216:20;217:2,5
growing (1)
160:20
grown (1)
154:8
guess (24)
16:19;17:7,15;22:7;30:16;
44:20;51:7;70:8;105:16;
114:24;115:6,15;122:24;
133:10,10;144:23;146:3;
155:3;166:8;193:16;210:20,
21;229:6;235:3
guessing (1)
25:7
guidance (1)
217:8
Gustavus (1)
120:7
Guys-ler (1)
92:22

H

Hahn (1)
11:23
half (2)
186:17;196:9
half-month (4)
46:25;47:4,18;48:21
halfway (3)
117:23;175:23;213:2
hand (10)
16:5;27:20;32:5;63:8;
88:23;134:23,24;141:11;
142:20;143:16
handed (2)
39:14;145:14
hands (1)
219:13
happen (3)
86:11;114:10;214:21
happened (2)
44:21;147:17
happening (2)
32:21;109:2
happens (2)
126:16;224:17
happy (1)
147:24
hard (3)
113:18;122:3;228:3
hardened (7)
132:16,19;143:6;194:16,
21,24;195:3
harm (2)
233:14,22
Harris (17)
11:22,22;19:6,7,8;27:13;
88:2,4,5,23;95:4;161:15,17,
18;166:14,17;167:1
harvesting (2)
152:24;154:16
hate (1)
173:7
head (2)
90:18;210:16
headgates (1)
161:2
heading (4)
117:23;190:13,17;191:19
headphones (1)
216:13
heads (1)
235:20
hear (8)
14:14,15;15:4,8;33:18;
88:15;105:24;216:13
heard (7)
128:12,15;147:8;174:22;
200:7;212:5;215:13
HEARING (202)
10:1,11,14,24;11:8;12:19;
13:3,8,12,19,24;14:2,3,11,
18;15:18,23;16:21,23;17:1,8,
12,17,25;19:5;20:6,8;21:17;
22:8;23:5,9;24:13;25:3;26:1,
14;27:1,11,15,19,23;28:6,15,
20,24;29:1,6,12,23,25;30:5,
14,20;31:1,23;32:13,18;33:3,
3,6,7,10;34:4,9,25;35:2,12,
25;36:7,17,20;37:2;39:7,12,
18;40:5,11,14;41:11,14;
51:10,11,16;56:19;59:1,8,12,
12,16,19,22;60:1,4,12;63:7;
65:12;66:7;77:24;87:16,22,
25;88:17;95:6;96:14;97:12;
102:10,16,22,24;103:2,11;
104:4,17;105:5,13,21;106:9;
107:6;109:17,19,25;110:4;
115:23;119:6,10,14,21;
124:2,6,13,17;125:20,22,23;
129:4;146:7,23;147:9;148:2,
8,22;149:3,5,15,18,20,23;
150:11;155:7;159:25;
161:11,13;166:17;168:20;
172:21,25;173:5,8,11,13,15;
180:16;185:16,17,20,25;
186:3;196:6,11,14;206:11;
210:25;212:21;213:1,4,8;
216:8,11,14;219:12;222:16;
224:19;228:19;229:1,8,15,
19,23;230:4,11,17,20;231:8;
232:2,5;233:5,20;234:6;
235:10,19;236:1,3,7
hearings (2)
11:1;16:20
Heidi (1)
179:12
Heise (11)
94:8,13;162:12,18;163:16,
20;165:6;167:11;181:12,22;
189:5
held (5)
117:17;173:15;182:18;
193:17;214:5
hello (4)
15:21;37:7;119:25;120:1
help (8)
11:3;89:23;106:1;118:10,
18;151:10;187:5;236:4
helpful (4)
24:16;51:17;59:7;169:5
Henry's (2)
78:23;79:20
Here's (2)
176:7,8
Hi (2)
213:11;222:22
Higgs (2)
36:12;76:8

high (5)
122:4;164:20,24;165:2;
167:21
higher (5)
187:9,10,14;193:21;194:3
highest (1)
168:2
highlight (1)
87:10
highly (2)
142:22,23
Hill (3)
61:2,18;89:21
history (1)
107:10
hold (4)
30:8,15;172:25;173:5
Holden (1)
11:22
holder (1)
20:25
holders (1)
234:16
holding (2)
172:21;173:13
home (1)
167:23
honestly (1)
31:2
Honor (1)
102:23
honored (1)
210:3
hopefully (3)
15:3;134:24;141:9
hour (2)
105:16;196:9
hour-and-a-half (1)
60:6
housekeeping (2)
149:9;235:9
houses (1)
69:5
hydrogeologist (1)
106:25
Hydrologic (3)
107:15;117:4,14
hydrologist (1)
166:10
hydrology (4)
37:25;108:11;117:3;121:4
hypothetical (1)
90:24
hypothetically (1)
232:24

I

Idaho (24)
11:4,23,25;12:9,12,21,23;
17:14;19:8,12;37:16,18;
63:13;65:24;88:6;120:11,13;
145:15;161:19;162:22;
163:5;168:2;198:7;210:6
IDAPA (1)
80:15
idea (2)
135:2;199:6
ideal (2)
142:25;143:3
ideas (1)
189:3
identified (14)
16:24;25:2;26:4;28:8,9;
29:3;98:19;99:3;102:4;
107:22;121:20;136:18,20;
215:19
identifies (5)
68:23;82:18,18;83:15;
183:9
identify (16)
18:12;24:6;40:2;41:22;
42:3;49:1;51:18;57:3;69:14;
133:17;135:10;137:17;
151:16;156:20;219:25;221:1
identifying (2)
25:21;36:1
IDWR (17)
7:15,20;12:25;76:11;88:8,
12;89:9;107:13;114:23;
138:11;140:4;141:6,11,22;
166:11;200:25;220:22
IDWR's (2)
68:10;88:20
IGWA (25)
7:22;12:16,18;13:18;
17:14;24:3,20;25:17;28:4,9;
42:15;76:4;83:16,19;85:2;
101:12,14;117:4;134:25;
135:6;166:23;205:11,20;
206:5;217:19
IGWA's (8)
40:8;41:2;76:18;84:2;
85:9;86:25;100:25;182:8
images (2)
68:19,20
immediate (1)
79:7
impact (13)
21:4;22:4;43:20;76:25;
79:8;86:9;103:20;112:10,22;
113:3;114:1;144:10;176:8
impacts (17)
20:12;21:22;22:17;44:4;
51:1;75:22,24;78:16;79:3,8;
82:19;97:22;101:7,17;
108:12;112:17;114:20
impetus (4)
44:24;45:2,10;170:25
impetuses (1)
171:24
implement (3)
218:19;219:2;223:14
implemented (6)
45:16;46:9;108:2;218:8,
11;226:8
important (1)
205:12
impose (1)
27:19
impractical (1)
155:10
impression (1)
89:14
improve (3)
214:13,14,15
improved (1)
218:21
improvement (1)
183:24
inaccurate (2)
143:15;225:13
inadmissible (1)
21:12
inappropriate (2)
108:16,19
Inc (1)
20:13
inch (1)
145:23
incised (1)
99:19
include (7)
62:22;79:4;100:9;203:22;
204:2;222:10,11
included (3)
73:21;93:23;122:23
includes (2)
62:24;70:9
including (1)
10:11
incomplete (1)
30:5
inconsistency (1)
142:18
incorporate (1)
142:7
incorporated (2)
143:6;219:7
incorporation (1)
128:13
increase (6)
110:20;114:8;122:13;
151:23;206:21,24
increased (2)
21:4;151:8
independent (1)
102:13
independently (1)
77:11
indicate (3)
85:20;183:24;226:25
indicated (1)
20:1
indicates (2)
156:8;160:13
indicating (1)
224:14
indicator (1)
172:1
Indirectly (3)
60:25;121:3;169:21
individual (4)
83:21;199:5;221:5,7
individually (1)
170:12
ineffective (1)
108:19
infiltrate (1)
127:9
infiltration (1)
126:25
inflow (9)
61:16,21;91:4;162:11,23;
167:16;168:8,15,15
inflows (4)
91:11;92:17;99:7;167:5
inform (1)
78:22
informal (3)
231:6;232:16,21
informally (1)
233:2
information (31)
16:15;21:11,14;34:12;
38:11;42:16;44:15,17,18;
54:18;55:5;64:4;79:16,25;
80:2,9;89:23,24;90:1;91:17;
94:7,16;95:17;104:22,25;
146:17;157:3;180:2;197:5;
218:14,22
inherent (2)
63:4;232:12
initial (2)
24:3,5
initially (1)
70:11
initiated (1)
33:4
initiation (1)
64:6
Injury (7)
41:24;66:1,18;98:20;
116:14;135:13;184:20
input (4)
89:4;90:12;131:3;177:24
inputs (1)
60:23
inquiry (1)
146:3
In-Season (17)
41:25;47:8;66:2,18;
108:17,18;111:3;116:15;
133:21;134:10;135:14;
137:21;155:10;184:20;
192:23;193:12;203:4
insert (2)
56:20;97:24
inserted (2)
42:15;176:6
inside (1)
199:21

inspected (1)
123:19
instead (4)
115:8;142:8;147:16;205:8
instruct (1)
56:22
instructed (2)
83:3;217:10
instruction (2)
14:3;83:5
instructions (3)
13:22;65:7;209:15
insufficient (1)
197:6
intend (2)
20:11;30:3
intent (2)
29:9,24
interaction (1)
90:19
interest (7)
20:20;82:20;103:20;
231:12,14;232:9;233:25
interesting (1)
144:22
internalized (1)
122:4
internally (3)
131:18;160:10;176:19
Interruption (1)
27:10
intimate (1)
10:7
into (50)
20:14;27:9;34:13;50:8;
51:8,12,13;59:13,24;83:1;
98:19;108:8;109:16,20,21;
142:7;144:2;147:17,21;
148:13,17,19,21;149:10,21,
22;165:19;167:4,5,13;168:7;
170:4,20;176:12;180:22,23;
186:4,5;202:7,14;207:2;
214:22;219:7;228:3,15;
230:23,24;232:5;233:25;
234:22
introduce (4)
10:17,20;20:11;28:7
introduced (2)
20:15;34:12
introductory (1)
183:8
investigate (1)
205:15
investigations (1)
144:2
invitation (1)
217:20
invited (8)
53:20,23;54:2,4;177:12;
217:5,9,11
involved (8)
60:20;115:5;117:5;206:6;
210:4;212:16;216:19;217:1
involves (1)
61:5
irrelevant (2)
21:13;210:23
irrigate (2)
201:24;202:13
irrigated (106)
68:3,8,11,24,24,25;69:2,3,
15;70:1,16,23;88:9,19,22,24;
89:1;118:5,10,22;122:2;
132:20;133:22;134:3;138:2;
139:6,16;140:4,13,17,20,21;
141:6,14,17,22;142:1,6,11,
16,17,21;143:1,9;154:25;
155:17,20;156:5,10,12,18,
19;157:14;177:24;178:1,23;
191:21,24;192:1,3,5,6,12,20,
22;193:13,14,18;194:1,19,
24;195:3,5,8,11,21,22;196:4;
199:16;202:9;204:1;216:4;
220:14;221:2,11,12,15,15,
18,19,20;222:4,7,9,23;223:7,
10,11,16;225:20,22;226:22;
227:1,24,25;228:9
Irrigation (33)
11:11,13;12:14;43:5;
45:19;56:14,17;57:12;62:9;
69:12;70:15;78:13;86:15;
93:11;94:2;96:23;98:22;
99:5,13;129:25;160:19,21;
191:19;197:7;198:3,4,6,7;
203:19;204:6;221:8;223:3,
19
irrigators (1)
221:5
issuance (4)
10:14;15:19;67:17;95:23
issue (18)
14:19;15:24;16:3,4;17:24;
18:2;25:14,16;27:22;31:9;
36:8;67:19;122:22;183:11;
231:22;233:10,14,17
issued (22)
19:25;22:3;38:17;71:7,10;
75:8,21;78:10;79:17;80:10;
83:21;116:19;142:5;153:23;
170:17;171:6;173:16;175:4;
184:11;188:15,24;234:13
issues (22)
16:23;17:10,16;18:12;
20:4;21:21;23:3,4,7;34:3,8;
64:3;67:20;104:23;107:25;
181:3;183:9;223:24;231:25;
232:4;233:11,12
issuing (2)
173:1,5
item (5)
98:23;126:19;127:12;
149:9;183:23
IWRRI (1)
70:12

J

JACKSON (2)
13:1,1
January (5)
144:20;145:16;158:22;
159:1;179:11
Jaxon (4)
36:11,12;76:8;77:9
Jaxon's (2)
77:25;78:15
Jay (2)
229:2,2
Jennifer (37)
12:21;26:21;27:9;31:8;
36:22,24;37:9;39:23;41:20;
45:7;49:1,14;51:14;58:25;
60:15;63:15;65:15;66:10;
67:7;72:9;76:3;80:14;84:13;
87:14;95:13;97:3;103:5,14;
141:8;158:25;159:7;169:17,
22;174:22;194:20;195:1;
200:8
J-e-n-n-i-f-e-r (1)
37:9
Jerry (2)
12:17;14:15
John (2)
12:13;96:22
JOHNS (2)
12:4,4
join (1)
21:15
joint (5)
162:16,17;165:10;167:3;
168:11
Judge (6)
17:3;143:20,23;157:13;
232:20,21
judgment (4)
19:15,18,20,22
judicata (6)
17:23;18:3,10,15;19:14,16
judicial (2)
17:3;148:7
July (7)
137:5;184:21;206:23,24;
207:5,6;227:11
June (1)
30:2
junior (20)
18:8;42:23;52:11,23;53:6;
58:9,21;73:2;78:4;85:21;
93:20;108:23;113:14,23;
114:3,10;205:3,11;207:3;
234:16
junior-priority (1)
234:16
jury (1)
31:8
justify (2)
193:21;194:2
Justin (1)
32:15

K

Kara (16)
12:23;66:3;67:1;130:15;
137:23;158:25;169:22;
170:11;173:20;174:3;177:3,
4,21;184:22;189:18;203:5
Katie (8)
27:13,13,15,17,20;31:24;
32:1,2
keep (9)
25:8,22,25;30:12;32:21,
21,22;135:23;189:17
keeping (1)
131:20
keeps (1)
197:17
Kent (3)
11:12;14:14;136:8
kept (1)
180:10
Kidwell (1)
11:22
Kimberly (4)
61:1,17,18;89:21
kind (23)
14:16;31:14;76:23;
118:12;126:17;131:5,21;
146:17;150:21;154:20,21;
160:7;170:13;175:9;177:5;
182:21;194:21;197:21;
201:5;218:13,22;231:19;
235:15
kinds (1)
147:12
King (5)
31:16,18;61:2,18;89:21
Klahn (56)
11:17,17;28:14;30:19,21,
21;32:10;40:21;60:10,12,14,
16;63:5;98:24;99:4;102:22,
23;124:15,16,19,20;129:3,9;
133:5,14;135:2,6,8,10,19,23;
136:3,8,10;137:14;139:20,
23;145:11,13;146:9,10,20,
25;147:8,10;148:4,9,20,23,
24;149:2,12,17;155:9,22;
235:25
knew (11)
44:3,8;95:21,25;96:9;
122:7;129:5;164:20,24;
165:2;167:21
knowledge (8)
54:4;64:5;70:13;79:16;
80:8;89:8;126:1;212:12
known (1)
91:3
knows (1)
148:12

L

labeled (6)
24:23,24;72:7;76:4,11;
203:13
lack (3)
231:22,23;232:3
lag (1)
226:16
land (15)
68:17;70:23;88:11,12,20,
21;127:7,8;145:15,16;192:5;
202:5,8;220:14;221:17
lands (53)
68:3,8,11;70:1,16;88:9,19;
89:1;139:6,16;140:4,13,17,
20,21;141:6,17,22;142:1,6,
11,18,22;143:1,9;155:20;
178:23;192:6,20;193:18;
194:19;195:5,8,22;196:4;
197:7;201:18,24;202:1,13;
221:11,14,18,19;222:4,9;
223:11,16;225:20,22;227:25,
25;228:10
Landsat (2)
68:17,18
language (6)
97:23;158:23;159:5,9,14;
176:22
large (3)
74:8;81:8;208:12
larger (8)
103:19;130:2;142:8;
198:4;206:17;207:2,3,14
last (23)
16:9;59:6;81:5;92:23;
107:19;110:2;112:4;135:15;
138:5,25;139:1;150:22;
152:19;153:16;167:24;
168:4;174:16;185:5;203:10,
12;206:7;215:2,5
late (6)
113:20;158:22;159:1;
170:15;177:6;217:25
Later (3)
24:5;131:13;139:12
Law (3)
11:11;12:14;18:17
lawns (1)
69:5
laws (1)
147:7
lay (1)
103:12
layman's (1)
209:25
lead (5)
63:15;130:19;143:12;
169:11;229:12
leader (1)
106:24
learn (1)
95:13
least (29)
10:6;13:15;14:5;16:2;
22:25;23:3;26:8,15;29:19;
30:10;33:4,9;44:22;50:16;
78:24;105:6;112:1;143:5;
146:8;157:13;199:11,18;
216:20;222:1;226:16;
231:17;234:7,12,18
lectern (2)
14:25;35:15
left (5)
93:24,25;196:1;222:6,7
legal (7)
19:21,21;81:18;104:23;
200:1,4;218:1
less (6)
31:21;86:22;97:21;192:14,
15;225:9
letter (2)
178:15,16
level (3)
130:12;131:23;199:11
licensed (2)
37:15;120:10
lies (1)
20:20
likely (5)
78:24;156:21;202:1;
206:24,25
limine (1)
234:11
limit (3)
16:6;17:11;234:11
limited (2)
16:23;22:9
limiting (2)
21:10;104:20
line (10)
17:21;52:16,18;56:20;
73:6,7;78:2;84:15;121:23;
206:9
lines (1)
225:25
list (24)
15:12;16:18;21:20;23:4;
25:2,18;26:3;28:11,11,18;
29:10;30:2,6,22;32:15;36:9;
92:17;119:15;121:23;140:7;
151:21;161:20;177:14;
229:21
listed (6)
126:8,19;127:4,12;183:18;
215:23
listening (3)
13:13,21;14:1
lists (3)
203:14;204:13,15
litigants (1)
19:22
litigated (2)
18:2,6
little (22)
10:3,7;23:14;25:9;31:18;
50:9;60:19;69:7;78:24;
153:10;154:21;157:2,16;
163:6;170:12;208:17;224:4;
225:18;229:20;230:2;231:1,
19
living (1)
18:21
Liz (5)
166:8,10;182:10,22;
188:14
located (4)
61:7;162:18,20;163:11
location (1)
10:5
locations (4)
10:10;62:25;75:25;80:5
locked (1)
18:20
lodge (1)
210:20
log (1)
132:5
logical (1)
230:6
long (7)
25:21;32:16;37:21;38:2;
96:3;120:16,24
longer (4)
50:16;127:1;156:18;196:7
long-term (8)
55:20;62:14;79:2,3;86:8;
101:7,17;211:19
look (67)
13:6;15:12;18:22,24;
20:23,23;21:20,24;25:10;
39:25;43:17,25;48:25;49:22;
50:1,19;51:15,25;52:8,10,16;
55:1,9,22;57:3,18;62:11,18;
68:21;78:1;83:1;92:1,11;
97:4,17;107:25;123:17;
131:7,19;133:5;136:15,21;
137:15;140:10;145:19;
148:3;154:11;156:9,14;
158:6;160:14,17;165:5;
169:20;176:2;181:17,18;
183:8,19;185:7;191:18;
196:21;213:17,22,24;
229:13;235:4
looked (4)
101:20;134:14,18;188:9
looking (38)
16:18;20:2;23:3;41:8;
52:17;58:4;62:18;86:1,2;
112:3,8;113:11,12;116:12;
125:1;130:18;131:4,9;
133:13;134:25;141:16;
162:11;165:22;170:22,23,
23;176:13;184:23;188:4,8,
10,11;189:19;203:7;208:18;
214:7,15;229:20
looks (7)
16:25;94:8,12;133:19;
137:19;153:1;162:10
loss (3)
126:8,11;161:1
losses (6)
126:14,17,20;127:13,16,25
Lost (2)
210:8,14
lot (10)
17:18;24:2;38:8;223:20,
23;225:21,24;227:17;
228:10;233:12
loudly (2)
12:20;15:6
Lower (5)
92:7;100:11,12;132:24;
168:4
LRE (2)
12:15;106:22
lump (1)
69:7
lunch (3)
105:16,17,20
Lynker (6)
13:17;179:10,20;180:4;
189:24;190:18

M

M&M (2)
10:22;11:2
Macheel (1)
144:15
Madison (2)
78:23;79:21
magnitude (5)
72:23;82:1,4,8;111:2
mailed (1)
177:10
main (1)
170:25
makes (6)
47:17;89:12;95:1;209:25;
210:1;215:25
making (4)
50:4;231:24;232:3,6
Malad (1)
92:4
management (6)
14:4;80:15,20;207:17,21;
209:7
manager (1)
144:6
manifested (1)
154:6
manipulation (1)
62:8
Many (15)
10:4,19;14:5;21:21;43:19;
50:3;56:3;57:19,25;111:10;
114:21;162:21;201:18,22;
216:1
map (1)
164:17

mapping (1)
122:3
maps (4)
88:24;142:21;164:10,15
March (1)
181:23
mark (1)
145:11
MARKED (36)
7:9;40:1;42:1;48:24;
51:11;57:1;59:9;65:9;76:1;
80:12;84:7;107:1,3;109:19;
116:7;133:4;135:1;136:2;
137:13;145:12;148:17,19;
149:20;157:18;179:4;
180:21;182:6;184:15;
185:17;186:2,3;202:18;
207:15;219:23;230:21,22
Marten (2)
11:10;12:14
master's (2)
37:13;120:8
Mat (3)
15:20,24;94:21
match (3)
87:11;90:14,17
Material (6)
41:24;66:1,18;116:14;
135:13;184:20
materials (1)
14:24
math (1)
143:11
mathematical (1)
129:25
MATT (43)
7:2;12:25;53:18;54:20;
64:19,20,21,25;65:7;66:3;
67:1;73:14;78:22;81:16,22;
82:25;119:15,17,18;120:4;
133:24;137:23;149:6;150:4;
166:23,25;180:24;186:7;
190:14;191:13;196:16;
202:20;203:6,7;206:12,15;
212:19;213:12;216:18;
222:22;224:24;228:17,24
M-a-t-t (1)
120:5
matter (10)
10:16;14:6;16:20;19:10;
34:8;35:20;151:14;225:6;
229:25;233:14
matters (5)
15:16;32:25;35:9,10;36:15
MATTHEW (3)
7:2;119:18;120:4
Max (3)
11:15;14:15;110:1
maximum (2)
58:18;231:16
may (59)
13:21;19:22;21:21;22:19;
23:1,7,18;30:13,13;31:5;
37:4;38:16;43:4;46:15,17;
51:24;58:8,17;68:20;71:13;
73:2,11;76:5,25,25;78:7;
86:12;104:15;105:9,9;106:9;
110:4;114:15;119:21;
122:25;126:17;127:1,2;
131:13,25;144:14;147:8;
152:24;158:14;170:11;
183:4,19;188:25;190:16;
196:2;201:3;215:22;219:6,
17;221:11,14;224:14,15;
232:25
maybe (26)
15:21;29:4;46:12;75:1;
76:10;78:1;108:6;116:24;
126:14;138:25,25;152:23,
25;153:9;155:18;156:4;
157:17;167:2;170:10;189:6,
18;195:2;217:25;226:17;
229:20;230:6
McCain (3)
26:7,12;39:24
McCain's (2)
26:20;31:15
McHugh (60)
7:3;11:19;13:7,9,23;14:9,
12;25:4,15;26:6,18;27:3,6;
31:13;39:10,12,13,17,20,22,
23;40:2,6,13,22;41:6,8,19,
20;42:2;48:25;51:7,14,16,20,
21;56:19,25;57:2;58:24;
59:2,3,21;60:2,3;63:14;
73:11;83:9;97:20;102:20,21;
212:24;213:3;216:9,12,15,
17;219:10;235:7,12
mean (21)
13:7;26:20;34:7;73:12;
75:24;82:16;87:8;95:2;
115:15,16;131:21;132:19;
148:13;150:14;155:13;
167:18;178:21;191:25;
195:15;217:14;223:18
meaning (1)
136:19
meaningful (1)
131:22
means (7)
31:25;69:2,24;126:22;
162:25;187:12;192:2
meant (5)
13:9;123:4;188:17,19;
193:1
meantime (1)
143:4
measure (2)
115:6;131:22
measured (9)
62:19;90:9,25;91:4,5;
99:18;129:18;197:22;198:1
measurement (4)
91:10;197:21;198:9,14
measurements (5)
62:24;91:15;99:23,24;
100:3
measuring (1)
130:7
mechanism (2)
110:20;191:9
meet (4)
155:4;156:1,23,25
meeting (4)
54:11,19;171:15;174:17
meetings (6)
122:17;176:21;182:18,19,
22;214:5
meets (2)
153:18;200:17
melt (1)
91:1
member (11)
92:17,20;107:15;118:9;
138:5,10,14;169:12;203:15,
20;214:1
members (9)
53:8;114:12;118:4;
133:23;169:18;186:22;
187:17;211:25;213:23
memo (5)
33:7;182:10,23,24;185:15
memorable (1)
172:17
memorize (1)
185:6
memorized (3)
50:1;62:13;92:19
memory (2)
208:7;234:13
mentioned (6)
19:24;85:8;91:25;117:13;
177:21;181:25
met (1)
161:20
method (17)
35:4;87:3,8,9,9,10;99:21;
101:6,7;133:21;137:20;
166:7;184:19;203:3;217:21;
218:19;226:4
Methodology (178)
7:16;10:14;17:5;18:4,17,
25;20:3;21:1,24;22:1,10,18,
20,24;38:4,7;41:5,24;43:16;
44:14;49:3;63:19;64:3,7,10,
15,18;66:1,17,25;67:14,18,
23,24;71:6,10,12;75:7,10,21;
78:9,21;79:18,24;80:10;
81:17,23;82:22;83:20;94:5,
6,10;95:14;98:12,20;107:6,
23;108:25;109:1;113:9;
116:14,17;117:9,18,25;
119:1;121:6;123:8,11;
124:24;130:6;132:11,24;
133:23;135:13;136:12,16,18,
25;137:8;138:6;140:24,24;
141:19;142:6,8;143:2,9,13;
144:1,22;150:6,15,17;
151:21;153:1;156:24;157:4,
15;158:10,10;159:17;160:2;
161:5;162:1;165:22;166:11;
167:15;168:7;169:8;170:3,7,
19;171:1,6,24;172:5,10;
173:1,6,9,14,16;174:1,24;
175:3;177:1;178:8,19,25;
179:2;180:12;182:2;183:19;
184:11;188:5;191:14;193:1;
196:18,22;197:10;200:12;
201:15;202:6,15;203:13,16;
204:10;205:4,7,14;206:3,16,
17;207:11;209:10;211:21;
212:1,10;213:14;214:7;
215:9,20;216:21;218:8;
219:3,8;223:21;226:9;227:9;
228:4,9;231:9,21,25;232:11;
233:11,13
methodology's (1)
108:16
methods (5)
130:23;152:24;183:12;
184:1;218:14
metric (26)
68:19;137:22;142:16;
170:24;178:24;192:7;
193:24;195:13,15,21,25;
199:12;203:5;226:19;227:4,
5,6,8,13,14,16,20,20,24;
228:13,13
mic (1)
27:18
microphone (7)
14:20;15:1,6;32:3;88:16;
105:25;106:1
mics (1)
14:17
mid (1)
113:20
mid-1980s (11)
52:11,20,23;53:6;55:14;
113:15,23;114:3,10,16;115:1
middle (3)
76:23;85:14;97:20
might (27)
10:24;16:12;24:16;25:15;
31:18;34:1;38:18;51:16;
65:19;69:3,5;91:9;105:25;
109:10;112:9,12;151:11,17;
189:3,22;201:7,13;225:16,
16,17,17;226:4
mile (1)
162:21
miles (1)
162:21
Milner (5)
123:3;124:1,9;178:4,12
mind (8)
65:22;106:14;116:3;
131:20;151:2;166:23;
196:10;201:13
mindful (1)
15:10
minds (1)

188:21
mine (1)
50:7
Minidoka (22)
11:13;43:4;47:9;52:13;
55:17;75:23;77:1;78:6;90:6,
10;92:10,16;101:8;110:21;
113:16,24;123:3;124:1,9;
178:12;186:19;187:17
minimis (2)
82:19;103:20
minusing (1)
89:17
minute (5)
45:14;129:10;134:6;
138:9;185:21
minutes (5)
31:22;32:16;87:23;
196:12;230:2
mischaracterization (1)
147:6
missed (1)
135:20
missing (2)
50:2;235:16
misstated (1)
59:23
misstates (1)
104:2
mistake (2)
202:25;208:3
misunderstood (1)
149:12
mitigate (3)
86:4,7;98:19
mitigating (2)
79:13;115:6
mitigation (20)
50:10;74:18;83:15,25;
84:16;85:2,10;86:20,22;
87:11;101:24;102:6;109:9,
13;110:14;111:23;115:9,11,
14;207:4
mix (6)
152:23;153:2,3;154:7,17;
193:7
mixed (2)
70:3,4
mixture (1)
195:2
mode (3)
43:14;48:22;227:7
model (82)
17:23,24;42:12;43:2,13;
44:5,6,9,10,12,13,21,24;
45:10,11,15,15,25,25;46:2,4,
8,11;47:7,19,23;48:2,6,10;
55:3,4,11,25;57:10,20,25;
60:19,22;62:16,17;64:24;
68:3,9;69:9,18,19,22;70:22;
71:3,5,9,22,23;72:13,14;
74:25;83:17;89:2,6,7,17;
90:9,11,12,14;93:3,6,10;
98:18;108:18,21,21;111:5,
14;128:14;141:23;189:9;
192:22,25;200:8,9;205:19
modeled (1)
87:12
modeler (2)
63:16;93:1
Modeling (48)
7:23;38:21,22;43:21;
60:17;63:18,20,23;64:3,14,
17,22;65:1,3,5,5;67:13,16,
20,21;74:16;75:12,14;76:5;
77:12;81:12;97:7,13;102:2;
107:16,25;108:19;109:2,4,6,
8,11;110:19;111:10,17;
113:17;117:4,14;174:23;
190:20;212:8,15,17
models (2)
48:3;189:15
Modification (3)
133:21;137:20;203:3
modifying (1)
175:24
moment (12)
40:5;53:11;66:6;74:22;
80:25;85:8;146:9;181:7;
185:12,15;207:24;208:7
monitor (1)
128:21
monitored (2)
128:5,8
monitoring (3)
117:4;128:7;184:12
month (5)
17:16;96:5;130:13;
167:24;168:4
monthly (8)
46:25;47:4,17;48:20;63:3,
4;100:4;193:12
months (2)
120:25;170:8
moratorium (2)
50:10;111:22
more (41)
10:7;15:14;18:21,22;21:5;
29:14;31:18;34:1,6;35:3,19;
72:20;74:17;75:1;86:19;
88:2;92:9;111:2;118:13;
128:18;131:21;150:21;
156:16;163:22;175:9;
176:19;187:13;192:14,15;
195:5,10;206:13,18;207:2,3,
10;211:17;224:17;226:17;
227:23;228:21
morning (20)
12:13;24:1;33:1;39:23;
41:20;60:15;96:22;123:17;
128:9;141:21;147:10;
174:22;229:18;230:1;231:2;
233:18;234:9;235:5,21;
236:4
most (11)
10:2;33:23;34:8;36:2;
79:7;110:19;175:20;210:18;
211:12;228:12;235:13
motion (11)
16:6,9,13;17:4,6;19:4,4;
234:7,8,11,11
motions (3)
23:8,10,10
Mountain (1)
11:24
move (20)
29:7,17;44:23;95:14;96:9;
109:15;124:1;146:21;158:3,
11,23;159:5,9;169:3;180:14;
185:14,23;205:18;230:9,12
moved (1)
186:1
moving (1)
27:8
much (10)
50:16;61:25;90:3;91:1;
99:24;127:3;163:1;187:5;
196:6;206:17
multi-linear (1)
186:18
multiple (1)
233:13
multiply (1)
193:6
municipal (1)
94:3
Murphy (3)
144:11;145:2,7
must (5)
18:4;110:14,14;112:12;
172:17
mute (3)
27:17,20;32:3
muted (3)
14:2;27:12;31:25
myself (5)
68:20;84:15,20;112:8;
172:20

N

name (10)
37:8;60:15;92:23;96:22;
106:17,19;110:2;120:2,4;
161:18
naming (1)
152:6
narrative (1)
126:5
natural (10)
43:9;73:17;181:12,13;
183:11;184:1;190:13;
213:23;224:10,12
nature (1)
16:1
near (27)
43:3;47:9;52:12;55:17;
75:23;77:1;78:6;90:5,10;
92:9;110:21;113:15,24;
122:3;137:22;142:16;
170:24;181:12;192:7;
193:24;195:25;226:18;
227:4,6,7,21;228:13
nearly (1)
56:3
necessarily (2)
21:10;233:22
necessitated (1)
64:14
need (38)
13:4,20;15:10,17;31:5,17;
32:25;35:9;41:9;51:25;
62:17;70:4;93:5;129:14,16;
130:4;131:10;146:3;151:9,
17,24;153:3,6,14,15,24;
154:1;157:20;158:6;173:19;
193:3,10,16;196:7;199:3,4;
227:9;235:6
needed (4)
10:6;45:20;127:18;170:18
needing (2)
35:23;56:17
needs (9)
45:19;122:2;125:15,18;
148:14;155:4;156:23;157:9;
189:10
negative (2)
187:7,8
negotiations (3)
159:15,19;206:6
neighborhood (1)
128:24
neither (1)
83:3
net (3)
191:21,24;192:2
Netter (1)
179:12
new (14)
19:17,21;50:10,11;111:22;
136:24;142:25;158:10;
178:2,11;224:2;225:22,24;
228:6
next (21)
29:1;60:9;76:22;80:14;
83:7;95:20;102:17;106:4;
119:15;138:18;139:2,5;
140:16;184:16;202:20;
205:5;208:25;221:12,15;
225:19;229:3
nice (2)
124:21;155:9
night (1)
236:5
nine (2)
121:20;143:10
nitpick (1)
155:14
noise (1)
100:5
non-Department (1)
218:9

none (4)
26:16;51:11;93:25;212:12
Nonirrigated (2)
139:5,16
non-irrigated (18)
68:12,25;69:2;88:22;
140:6,12,17;141:14;142:13,
17;156:3;195:22;221:2,14,
20;222:9;223:10;226:23
non-irrigation (1)
164:11
noon (1)
30:16
normally (2)
10:4;214:17
North (18)
37:12;61:11,15;73:16;
78:2,4,10,23;79:19;85:16,18,
21;86:19;99:6,15;100:19;
186:19;187:17
note (2)
31:15;76:11
notebook (4)
124:25;133:7,7;134:25
notebooks (1)
136:4
notes (5)
202:24;203:21,25;204:1,
11
notice (9)
31:23;38:17;124:3,4,8;
148:7,9,10,11
notified (2)
53:12,16
November (13)
49:8;97:3,8;102:2;112:4;
130:20;174:14;175:12,15;
177:12;181:23;184:23;185:5
NRCS (1)
164:14
number (46)
27:6;41:1,3,9;52:5;55:2,
11;57:24;62:12;69:14;72:12;
73:23;74:10,23;101:21;
112:7;129:6,8;130:14;
133:12;134:11,12,14;
135:18;136:9;137:10;142:9;
154:20;164:21,25;165:3;
179:2;185:10;187:14;188:1;
192:4;193:21,22;195:24;
203:14;204:3,5,14;222:3,7;
228:14
numbered (7)
24:7;26:16;28:7;51:19;
59:13;134:1;137:25
numbering (6)
23:14,17;25:25;28:9,22;
29:15
numbers (20)
23:15;24:4,21;25:13;
40:16;49:15,15;51:17;99:3,
10;123:10;129:6;130:11,18;
132:24;135:4;141:16;
202:21;204:17;221:24

O

object (6)
129:1;146:2,24;159:23;
168:18;206:8
objected (1)
206:9
objection (29)
15:9;17:8;21:19;24:10;
28:7;59:8;103:10;104:2,15,
18;105:6;109:17,19;112:25;
124:6;146:8,23;149:18,20;
180:16,18;185:16,17;186:2,
3;210:20;211:1;230:20,22
objections (9)
14:13;15:5;22:22,23;
24:12;51:10;59:11,12;
105:24
obligation (5)
20:19;83:15;84:17;85:2,10
obligations (1)
87:11
observation (2)
90:3,3
observations (2)
90:14,21
observed (3)
90:17,18;105:23
observers (1)
15:14
obtain (2)
91:16,21
obtainable (1)
127:25
obtained (1)
91:23
obviously (2)
34:7;73:20
occupation (1)
106:23
occur (6)
19:20;61:20;62:25;
110:22;152:14;211:24
occurred (4)
53:2;55:21;62:19;207:11
October (7)
58:9,22;73:2,13;74:11;
170:10,10
odd (1)
180:18
off (17)
41:11,13;62:19;66:5,8,10;
88:16;100:15,20;119:10;
127:11;170:16;171:10;
193:4;210:16;235:17;236:6
offer (13)
13:25;23:8,11;51:8,8;
149:14;231:6,6;232:16,17,
20,21;233:2
offered (3)
29:18;34:13;149:15
offering (1)
147:5
office (1)
26:2
OFFICER (160)
10:1,11,24;11:8;12:19;
13:3,8,12,19;14:11,18;15:19,
24;17:12;19:5;20:6,8;21:17;
23:9;24:13;26:1,14;27:1,11,
15,19,23;28:6,15,20,24;29:1,
12;30:20;31:1,23;32:13,18;
33:3,7;34:4,9,25;35:2,12,25;
36:7,17,20;37:2;39:7,12,18;
40:5,11,14;41:11,14;51:10,
16;56:19;59:1,8,12,16,19,22;
60:1,4,12;63:7;65:12;66:7;
87:16,22,25;88:17;95:6;
96:14;97:13;102:10,16,22,
24;103:2,11;104:4,17;105:5,
13,21;106:9;109:17,25;
110:4;115:23;119:6,10,14,
21;124:2,6,13,17;129:4;
146:7,23;147:9;148:2,8,22;
149:3,5,15,18,23;150:11;
155:7;159:25;161:11,13;
166:17;168:20;180:16;
185:16,20,25;196:6,11,14;
206:11;210:25;212:21;
213:1,4,8;216:8,11,14;
219:12;222:16;224:19;
228:19;229:1,8,15,19,23;
230:4,11,17,20;231:8;233:5,
20;234:6;235:10,19;236:1,3
official (5)
124:3,4,8;158:12;214:20
officially (2)
14:6;63:17
offset (1)
110:15
off-the-cuff (2)
230:2;231:2
Often (3)
33:7;176:9;225:23
old (4)
10:1;143:5;201:2,12
Olenichak (4)
15:20,25;91:18;211:12
Olsen (1)
12:4
Olson (3)
12:9,12;36:10
once (6)
40:9;42:18;101:9;195:8;
226:7;228:14
one (88)
13:15;20:2,9;25:14,16;
32:14;35:19;40:14;43:25;
56:21;57:11;60:23;64:4,23;
72:23;76:6;84:5,10;87:9;
89:15;105:22;116:16;122:3,
22;125:2,9;131:2;133:9;
138:5;139:9,10,14;142:13;
145:17;148:1;149:1,9;
163:12;166:1,1,4;171:4,20,
23;173:10,11;178:5;180:4;
181:25;182:8,13;183:19;
184:14,23;186:22,25;187:7,
8,8,8;188:5,7,23,25;189:23;
193:19;203:9;215:1,22;
216:20,21,21;220:17;221:11,
15;222:6;223:16,24;224:1,2;
225:24,24;226:4,16;227:9,
12;228:21;234:18
one-page (1)
157:23
ones (7)
29:10;34:7;70:9;106:13;
175:20;188:7;215:18
one-way (1)
18:13
on-farm (2)
126:19;127:15
ongoing (2)
101:23;205:24
online (3)
10:9;88:15;229:5
only (19)
19:14;35:7;40:17;54:4;
70:1,2;87:9;89:15;94:8;
100:8;109:9;133:9;153:22;
154:19;189:5;202:2;211:7;
215:18,21
open (2)
156:2;179:5
operating (1)
19:23
operational (2)
127:13,25
operations (2)
128:23;163:1
opinion (9)
103:8;104:1,13;108:9,14;
110:19;214:20;223:13;
225:12
opinions (4)
104:23;108:2,6,7
opportunities (2)
34:22,23
opportunity (6)
16:8;29:4;34:17;35:5;
104:5;123:17
oppose (2)
16:13;34:4
optimum (2)
231:13,15
option (2)
40:22;229:6
orally (1)
16:14
Order (201)
7:11,12,17;10:15;16:3,21,
22,22;17:2;18:4,17,20;
19:24;20:3;21:24;22:1,11,
18,20,24;29:20;30:23;32:8;
33:2,17;38:5,8;39:9;40:25;
41:5,7,9,23;42:5,16;43:16;

44:14;52:1;55:10,23;56:12,15;57:5,15;59:5;61:11;63:19;64:3,7,11,15,18;65:25;66:17,25;67:14,18,23,24;71:6,10,12;72:23;75:7,10,21;78:9,21;79:18,24;80:10;81:17,24;82:22;83:8,9,20;86:14;94:5,10,12,17;95:14,23;96:1,8;98:20;101:1;102:19;104:20,24;107:6,24,24;109:1;111:2;113:10,10;116:13,17;117:9,18,24,25;121:6;123:8,11;124:24;125:8;130:6;132:11;134:9;135:12;136:12,13,16,18,25;137:8;140:24,24;141:19;142:6;143:2;144:2,4,22;150:6;151:21;153:1,23;156:24;157:4;158:10,10,16,19,21;159:17;160:3;162:1,9;165:22;168:7;169:8;170:7;171:1,6,24;172:5,10;173:1,6,9,14,16;174:1,24;175:3,7;176:22,24;180:12;181:18;182:2;184:11;186:24;188:15,24;191:14;196:18,22;197:10,22;198:9,14;200:12;202:6;203:16;204:10;205:4;206:3;207:11;209:10,11;211:21;212:1,10;213:15;214:7;218:8;224:25;228:4;230:1;231:2,4,9,21,24;232:12;233:15

orderly (2)
152:15;153:20

orders (7)
17:9;48:13;59:5;71:14;108:25;132:24;216:21

ordinarily (1)
19:16

original (4)
19:24;70:8;122:24;127:22

Originally (3)
147:12;170:22;200:24

others (10)
13:12,21;84:15,20;102:24;165:14;169:6;205:12;216:24;220:11

other's (1)
130:16

Otherwise (1)
14:4

ought (1)
230:7

out (38)
13:22;20:10;25:17;27:25;31:3;54:21,22;61:18;62:3;85:9;89:17;92:11;93:11,24,25;95:22;96:4;100:12;106:14;118:12;126:14;132:2;141:1;157:21;176:17;177:4,6,10,15,19,21;192:21;193:19,25;194:24;215:17;217:21;232:19

outcome (2)
56:6,18

outflow (2)
61:17;91:6

outflows (2)
91:11;92:18

output (11)
44:5,9,9,10;46:5;48:6,7,10,11,16;57:25

outside (7)
22:20;65:6;74:5;127:11;174:20;194:10;219:7

outspoken (1)
15:10

over (17)
23:18;30:9,15;53:2;109:3;112:10;126:3;127:7;134:7;137:14;140:16;153:16,16;187:19;202:17;225:9;227:15

overestimated (1)
111:1

overhead (1)
14:20

overlap (2)
40:7;194:14

overlaps (2)
194:9,12

Overlay (1)
156:4

overrule (2)
146:8;210:25

Overruled (2)
129:4;168:20

oversee (1)
121:3

overseeing (1)
169:12

oversight (1)
142:14

overstates (1)
202:15

own (1)
170:12

owns (1)
204:5

P

pack (3)
164:18;165:22;167:20

PAGE (73)
7:2;43:18;49:15,20,25;51:18,22;52:8;72:6,25;74:22;80:22,23;82:7;83:13,14;97:17;98:6;108:5;112:7,13;113:12;117:21;125:7,11,13;126:3,4;127:5,24,24;129:10;132:3;134:2;135:15,16;136:9;138:1;139:18,19,20;150:21,24,25;152:9;160:6;162:3,4,5;164:16;185:8,10,11;186:10,12,15;190:4;191:16,17;196:19,20;203:17;207:23;208:1,2,3,4;209:1;213:17,20;215:3,5,6

pages (10)
50:4,6,7,8;51:18;97:4;113:14;134:1;137:25;139:12

Palisades (2)
162:20,21

paper (3)
24:2,8;25:10

paragraph (25)
43:18,21,23;125:7,13;132:9;136:17;150:20;152:8;160:5,8,17;162:5,6;165:25;183:8;190:9,12,16;191:18,20;196:21,24;213:22,24

paragraphs (2)
97:20;213:21

paralegal (1)
26:2

parameter (1)
210:17

parameters (2)
90:15;210:14

paraphrasing (1)
231:19

Pardon (1)
230:11

parenthetical (2)
127:5,13

part (37)
16:10;20:11;22:1,5,9,11;53:20;62:15;63:1;69:3,3;77:11;79:11;94:11,12,16;97:8;102:5;142:14;144:4,12;153:1,3;155:18,24;157:4;165:6;168:24;171:4,16;176:1;180:7;190:22;202:25;217:15;234:15;235:13

partial (2)
147:2,22

participants (1)
14:1

participate (8)
53:24;54:2;67:3;94:14,20;107:18;117:13,16

participated (2)
72:18;172:7

participating (11)
10:9,25;13:5,15,16,24;15:7;54:14;105:23;117:5;235:15

participation (1)
13:23

particular (7)
21:14;22:8;23:5;69:13;108:1,15;112:18

Particularly (3)
32:19;33:19;108:12

parties (44)
14:6;15:15;16:20;17:15;18:1;23:8,10,15,19,23;24:9,13;25:20;28:17;29:2,10,18;31:2;32:20;33:13,17;34:15;35:21;38:17;53:12;60:6;75:15;97:13;123:3,16;124:7;182:20;183:1;217:13,14,14;218:2;229:6,9;233:15,22;234:2,23;235:14

parties' (1)
214:6

party (1)
28:5

passage (2)
171:2,14

passed (1)
191:11

passes (2)
143:17,18

past (2)
10:6;62:18

patience (1)
206:14

PATTERSON (14)
12:11,11;24:1,20;25:14,16;26:9;27:4,8,17,21,24;28:19;40:18

PDF (1)
54:20

peculiar (1)
17:16

pending (3)
15:18;16:7;23:7

people (10)
10:9;14:5,17;28:11;31:4;53:19;54:17;79:9;118:14;233:11

percent (10)
51:1,1;97:21;112:10,16;143:10;164:19,23;165:1;178:17

percentage (5)
74:8;76:14;84:2;101:9;164:18

percentages (1)
85:1

percolation (2)
126:21,23

perfect (1)
105:15

perform (4)
169:16,18;175:13;209:16

performed (3)
64:22;82:1;93:10

performing (2)
171:13;172:2

perhaps (5)
57:23;112:9;201:13;229:21;232:9

period (1)
47:18

periods (3)
46:25;47:4;48:20

permissible (2)
138:16,22

permitted (1)

232:5
person (5)
54:13;124:22;161:21;
211:15;229:16
personally (2)
54:22;210:4
perspective (2)
129:25;223:13
pertaining (1)
21:10
pertinent (1)
17:10
Pete (3)
11:6;34:14;35:10
petitioners (2)
16:10,14
petitions (1)
15:18
photo (1)
156:4
photography (2)
68:17,18
photos (1)
156:9
physical (3)
15:3;90:3;229:13
pick (1)
15:7
piece (2)
157:13;235:9
pieces (3)
154:9;198:25;199:2
piqued (1)
167:1
place (9)
10:13;18:20;35:16;45:20;
126:13;138:16,22;198:20;
232:11
places (2)
78:23;90:19
Plain (7)
50:11,15;74:3;93:14;
117:2,8;141:13
Plain's (1)
128:6
plan (1)
102:6
planned (2)
169:4;175:24
planning (1)
117:7
plans (2)
84:1;101:24
plants (1)
127:1
played (2)
38:10;121:13
please (19)
27:17;28:2;32:3;36:23;
37:2,7;72:6;104:6;106:5,18;
107:4;120:2;132:4;133:17;
135:11;137:18;138:3;173:2;
219:25
plug (2)
228:3,14
pm (1)
236:7
Pocatello (9)
11:16,18;12:3;30:22;
60:16;65:23;124:21;147:13;
167:22
POD (1)
94:2
podium (2)
124:17;213:2
point (20)
23:9;32:14,15;51:7;79:10;
105:7;143:12;144:7;159:1,3;
189:16,20;191:7;194:2;
219:5;224:16;226:2,12;
227:10;230:6
points (2)
55:6;164:6
policy (7)
71:25;81:10;104:23;
111:18,19;208:14;231:16
polygons (5)
68:17;69:7;140:5;141:13;
194:13
portion (7)
28:2;57:8;76:11;85:18;
166:12,12;175:10
Portneuf (13)
92:12,14;163:21;164:19;
165:18;167:5,14,16,19;
168:1,3,5,9
posed (1)
105:10
position (3)
38:2;105:2;120:24
possible (9)
22:18;29:15;33:9;114:13;
132:2;189:9,11,19;199:18
post (1)
164:15
posted (2)
67:12;118:24
posts (1)
164:10
potential (1)
214:6
potentially (1)
21:3
PowerPoint (11)
49:5,10,24;54:10,15;93:4;
133:15,20;137:19;176:14;
203:2
PPU (3)
138:11,16;140:7
practice (1)
154:12
practices (8)
152:14,22;153:12,14,25;
154:16,18;191:19
precipitation (5)
69:11;70:16;129:17;
151:7;193:5
precise (1)
75:1
precluded (1)
19:23
predecessor (1)
44:8
predict (7)
43:2;44:13;171:17;
181:20;188:20;192:22;214:8
predicted (18)
54:24;57:14;58:8,20;
72:20;73:1;74:17;76:12,19;
78:24;79:13;82:2,9;86:13,
14,18;110:15;113:8
predicting (6)
47:8;162:23;187:13;
213:23,25;224:11
prediction (4)
162:11;193:14,15;225:8
predictions (2)
206:18,21
predictive (1)
182:3
predictor (2)
181:16;189:12
predicts (2)
224:9;225:3
prefer (1)
39:9
preference (2)
229:8;235:23
pre-hearing (2)
23:10;36:4
Preliminary (8)
7:21;15:16;34:12;156:13,
16;173:20;175:5,9
preparation (2)
77:24;96:8
prepare (5)
17:19;44:16;96:8;141:11,
11
prepared (13)
16:2;33:6;49:6;66:24;
67:1;72:17;76:8;133:15;
159:18;162:14;164:14;
167:7;230:17
preparing (5)
16:3;57:7;96:1;145:4;
169:11
prescribed (1)
98:11
present (7)
16:14;31:10;44:18;82:4;
95:3;145:4;172:11
presentation (30)
22:16;35:8;49:2,5,11,24;
54:5,8,12,16;55:7;67:7,11,
17;72:4;93:5;97:3,8,18;
112:4;130:25;133:20;
174:25;176:15;178:22;
185:3,6;202:22;203:2;230:8
presentations (5)
129:6;149:5;174:14,19;
203:10
presented (21)
18:8;21:18;54:19;63:21;
93:4,16;125:19,22;131:9;
133:23;137:22;148:11,16;
175:12,15,21;176:5;180:2;
184:22;232:24,25
presenting (2)
170:9;232:22
presently (1)
106:21
presume (1)
111:12
pretrial (1)
35:20
pre-trial (2)
24:10,25
pretty (4)
67:22;73:25;160:2;196:3
previous (10)
46:6;47:15;70:12;99:20;
130:13,13;132:23;178:17;
223:22;225:24
previously (1)
102:19
primary (2)
20:2;229:12
principal (1)
106:24
principle (1)
208:20
printout (2)
133:20;137:19
prior (26)
16:19;18:6;19:18;22:5,15;
44:22;46:17,24;47:7;48:10;
67:17;75:20;78:9;88:7;
107:13;108:24;112:23;
113:4,22;115:16,17;158:16;
169:7;185:23;234:25;235:1
priority (21)
38:23;42:12,14;49:3;
51:23;52:9,20;57:9;58:11;
72:7;73:15,18;77:14;113:12;
115:17,18;165:16;169:2;
204:20;205:2;233:16
probably (19)
10:16;11:1;18:16;26:23;
32:15;89:10,12;94:23,25;
103:24;106:12;139:11;
196:8,9;205:3,12;211:4;
217:24;226:13
procedures (2)
108:1;172:22
proceed (2)
30:13;170:6
proceeding (9)
18:3,7;27:10;75:19;82:24;
131:3;159:24;172:13;210:24
process (10)
105:3;131:17;140:20;
142:22;160:8;172:14,21;

180:8,13;214:17
processes (1)
142:19
Processing (2)
139:9;196:1
produce (5)
52:11,20;85:22;113:15;
147:11
produced (7)
28:5;56:24;64:4;70:11,13;
97:8;102:2
producing (1)
56:24
professional (4)
37:15;103:8;104:13;
120:10
program (1)
128:7
progression (1)
186:25
Project (18)
122:9;125:8,14;126:6;
129:13;130:1,2,7,22,25;
131:4,10,19,22,24;154:9;
156:15;193:11
promote (1)
15:4
prompt (1)
152:19
pronounce (1)
92:23
proof (7)
221:4;231:6;232:16,17,20,
22;233:3
proper (1)
109:1
Proportionate (17)
7:23;42:15;57:11;76:4,19;
83:15,22,24;84:2,16;85:1;
86:25;87:6,11;100:25;109:7;
114:23
proposal (5)
34:5;131:12;191:2,3,5
proposed (12)
16:18;29:17;101:6;
133:20;137:20;158:23;
159:14;176:22,22;190:19;
191:9;203:2
proposing (1)
132:1
protect (1)
20:19
protest (1)
147:14
protocol (2)
152:15;153:20
provide (21)
42:7;49:10;54:15;63:18,
24;78:11,24;79:1,2,22,23;
80:5;86:19,22;87:3;94:6,16;
95:17;117:11;123:4;165:11
provided (14)
45:19;63:20;79:17;
101:13;104:21,25;123:2,13,
16;131:3;147:24;179:25;
195:10;218:22
provides (4)
19:13;70:19;72:11;186:20
providing (2)
86:4,7
provisions (1)
147:3
public (6)
81:10;208:14;231:12,14;
232:9;233:25
publicly (1)
172:9
public's (1)
20:19
published (1)
174:7
pulling (2)
126:17;202:23
pumping (22)
50:15;51:2;52:23;53:5;
70:18;79:9;82:19;86:6;
103:19;108:13,23;111:25;
112:11,17,23;113:4,23;
114:4,7,9,21;199:1
purpose (1)
69:18
purposes (4)
77:11;132:10;139:17;
144:1
purview (1)
117:10
push (1)
228:5
put (7)
36:12;90:12;104:8;152:1,
11;160:19;223:12
putting (1)
79:5

Q

QD (4)
160:10,18,22;161:3
qualified (4)
35:22;56:21;107:12;
210:19
quality (2)
130:10,10
quantify (1)
211:23
quick (2)
31:22;95:9
quickly (2)
127:9;229:25
quite (5)
121:10;132:5;151:19;
218:16;223:18
quote (1)
152:10
quoted (2)
20:15;21:9
quotes (3)
231:20;234:12,18

R

R-2 (1)
224:8
Racine (2)
12:9,11
raise (1)
233:11
raised (6)
14:19;33:23;172:12;
181:3;219:14;233:12
raising (1)
35:25
Ralph (1)
19:7
ran (1)
48:21
range (4)
23:18;24:4,21;192:17
ranges (3)
23:15;24:18;187:7
rather (5)
51:17;223:4,8;232:11,15
ratio (1)
125:14
reach (66)
43:4,7,10;47:9;50:23;
52:13;53:4,4;55:17;56:13;
58:12,19;61:2,5,6,10,15,19,
24;62:1,2,20;75:5,23;77:1,2,
6;78:6,11;79:4,7,22;82:19;
85:22;87:12;89:21;90:2,6,
21;91:1,2,5,6,7,14;92:6,15,
21;98:7,19;99:25;100:5;
101:9;103:20;108:12,22;
110:22;112:18,22;113:16,
24;114:1,5,8,20;157:5
reaction (1)
148:8
read (18)
21:23;22:3,12;51:21;
65:18;66:11,14;80:25;81:6;
152:11;157:14;161:20;
184:19;190:14;191:22;
197:1;207:24;234:10
reading (1)
151:2
ready (2)
35:12;41:14
real (1)
17:7
reality (1)
202:12
realization (1)
234:2
realize (2)
59:4;98:18
realized (7)
51:2;97:23;112:11,17;
175:23,25,25
really (11)
18:11;31:22;34:19;94:15;
100:14;115:11;143:22;
155:9;174:23;225:18;231:4
real-time (17)
122:3;137:22;142:16;
170:24;192:7;193:24;
195:20,25;203:5;226:19;
227:4,6,8,12,20,21;228:13
reason (7)
10:12;18:16,25;20:4;
93:24;189:6;232:4
Reasonable (36)
41:25,25;56:6,18;66:2,2,
18,19;81:10;112:21;113:2;
116:15,15;122:11;123:21;
130:8,14;133:21;134:10;
135:14,14;137:21;175:21,
24;176:2,7,9,13;184:20,21;
192:23;193:12;203:3;
208:14;209:2,6
reasonableness (5)
20:23,24;21:2,8;130:17
reasoning (1)
17:22
reasons (5)
19:3;20:2;182:1;223:24;
224:1
rebuttal (1)
233:19
recalculated (1)
178:12
recall (42)
45:6,11;46:9;51:25;52:2;
54:6;62:11;74:13;75:13,16,
17;77:23;79:14;80:7;81:25;
82:23;83:2,5;91:21;96:3,6,7;
99:1,14;101:1;103:5,14;
130:24;131:7;132:4,17,25;
142:3,4;172:12;191:1,8;
222:22;223:1,6;224:4;225:4
recalled (1)
105:9
receive (6)
22:8;86:20,23;148:13,17;
233:16
RECEIVED (20)
7:9;24:10;51:12,13;59:13,
24;109:20,21;138:21;
148:21;149:21,22;178:11;
180:21,23;183:17;186:4,5;
230:23,24
receives (1)
90:20
receiving (1)
83:5
recent (7)
18:22;19:2;155:13;156:4,
9,12;228:13
recently (1)
23:20
Recess (4)
87:24;105:17,20;196:13

recharge (6)
53:1;69:10;90:13,20;99:5;
117:7
recite (1)
24:17
Reclamation (3)
15:13;162:16;167:8
recognize (8)
65:15;66:21;76:3;182:13,
15;185:1;203:9;220:5
recognized (2)
20:22;23:20
recollection (2)
94:24;131:8
recommend (4)
158:3;218:7,15;219:2
recommendation (10)
159:13;173:20,25;174:2,6,
19;175:4;189:16;190:20;
191:11
Recommendations (6)
7:21;157:17,22;218:11;
219:4;230:15
Recommended (4)
65:24;66:16;166:5,8
recommending (1)
223:9
reconsider (3)
231:3;232:14;233:4
record (37)
15:8;25:3,22;31:15;34:13;
37:8;40:9,23;41:12,13;51:9;
57:4;65:18;66:6,8,9,11;
87:25;105:22;106:18;
109:16;120:3;133:18;
135:11,17;136:2;137:18;
139:17;141:6;167:20;168:3,
14;196:15;220:1;235:8,11;
236:6
recording (2)
41:15;88:1
records (3)
91:24;180:11;199:16
recross (2)
34:19;35:6
Recross-Examination (2)
7:6;224:22
Redirect (9)
7:5;33:16;34:19;35:6;
102:18,21;103:3;119:8;
222:20
redo (1)
17:1
reduce (1)
143:20
reduction (1)
188:1
refer (16)
25:6;27:4,6;28:4,17;29:21;
40:11;41:16;68:19;80:19;
83:24;93:5;108:4;116:16;
136:6;160:9
reference (5)
151:7;157:21;158:6;
160:15;208:18
referenced (2)
28:1;134:6
references (1)
160:9
referencing (1)
112:7
referred (1)
69:23
referring (4)
54:9;112:12;148:4;161:1
refers (4)
20:12;81:20;187:3;203:24
reflect (1)
85:11
reflected (1)
176:15
reflects (1)
203:18
refresh (1)
208:7
regard (2)
85:12;211:17
Regarding (25)
7:13,18;10:14;13:22;
22:21;29:15;41:23;42:5;
53:13;57:5;66:1,17;97:19,
21;98:24;99:12;105:8;
116:14;117:17;135:13;
159:5;225:1;230:1;231:4,5
regardless (2)
31:20;108:24
regional (1)
108:11
regression (19)
171:9,16,23;172:1;181:8,
11,19;182:4;184:9;186:18;
187:6,13,23;201:11;224:5,9,
15;225:1,3
regressions (7)
165:9;187:5;188:14,14,18,
19,22
related (21)
60:17;64:3;67:13,23,24;
78:20;81:13;82:22;117:3,6;
125:8;145:9;147:11,15;
174:23;180:1;205:21;
209:16;212:15,17;234:14
relating (6)
36:25;42:11;106:7;
119:19;147:4,11
relation (1)
119:2
relations (1)
19:22
relationship (2)
61:11;131:10
relationships (1)
126:6
relative (4)
81:16,23;216:20,24
relatively (1)
187:18
released (2)
158:17;178:5
relevance (2)
22:23;211:2
relevancy (1)
159:24
relevant (3)
21:6;206:10;233:24
reliability (2)
182:3;183:25
reliance (1)
132:23
relied (1)
231:24
reluctance (1)
235:4
rely (1)
188:22
remained (1)
187:18
remember (35)
24:17,18;104:6;129:7;
131:11,15,15;137:4;144:9,
14,17;158:22;159:19,20,22;
172:6,15,15;175:20;177:3,
18;178:15;183:3,16,22;
184:5;190:16;191:3;206:4;
209:12;210:16;212:15;
215:21;217:6;219:4
remind (1)
35:13
remote (4)
10:9;13:11;54:11;199:24
remotely (6)
13:5,25;15:8;54:14;
105:23;235:15
remove (8)
100:5;139:5;140:12,17;
142:13;194:9,11,16
removed (10)
24:23;25:1,18;93:8;
139:15;140:5;156:7,8;222:8;
223:10
removes (1)
194:21
removing (3)
142:16;195:21;196:1
rendered (1)
19:15
renders (1)
108:18
rendition (1)
19:20
renumbered (1)
25:7
renumbering (1)
23:20
re-offered (1)
148:22
repeat (7)
46:10;47:24;64:9;133:12;
157:1;173:2;218:17
repetitious (1)
73:12
rephrase (1)
153:9
report (16)
36:12;56:24;107:5,22;
108:4,5,7;109:23;110:18;
118:4,21;131:13,16;176:15;
190:23;233:1
reported (5)
178:7,13;196:2;198:1,5
reporter (5)
10:12,18,22;15:8;149:11
Reporting (3)
10:23;11:3;193:22
reports (4)
36:16;76:7;118:20;194:6
represent (16)
12:5;60:16;85:25;96:23;
97:12;102:12;134:8;139:7;
145:17;151:6;157:22;
161:19;166:23;168:1;192:1;
205:1
representation (3)
117:10;123:22;195:10
representations (1)
192:9
representative (1)
187:24
representatives (1)
182:20
represented (5)
15:13,15;124:9;191:21;
205:10
representing (3)
12:16,18;124:21
represents (2)
76:18;146:3
request (5)
15:19,23;16:3;84:4,15
requested (1)
16:20
requests (2)
15:17;16:1
require (5)
55:25;115:9,11,14;197:22
required (4)
18:17;20:24;21:2;225:19
requirement (4)
14:4;56:13;108:16;153:6
requirements (1)
109:10
requires (2)
118:3;146:12
rerun (1)
228:8
res (6)
17:23;18:3,10,15;19:14,16
research (1)
19:10
reserve (2)
28:4;147:23
reserved (1)

30:1
Reservoir (5)
11:14;163:1,10;165:19;
169:1
reservoirs (3)
165:15;168:24;214:18
residual (2)
91:12,12
resolution (1)
122:4
resource (1)
234:1
Resources (10)
11:5;12:22,24;37:19;
65:24;80:16;120:14;231:13,
16,18
respect (7)
71:23;82:24;85:1;99:9;
100:24;101:18;169:10
respective (2)
22:17;234:21
respond (3)
16:8;24:11;233:8
response (9)
16:8;50:24;58:8;72:20;
73:1;84:4;98:23;99:12;
217:12
Responses (2)
17:12;19:5
responsibility (3)
79:6;101:11,15
responsive (1)
28:2
rest (3)
21:15;36:13;108:7
restate (4)
112:15;114:24;153:8;
195:7
restroom (1)
87:20
result (12)
53:5;74:2;86:5,6,11;98:15;
114:9;187:11;206:17;
211:20,25;231:15
resulting (2)
112:23;113:3
results (5)
72:19;110:25;111:5;
170:9;176:8
return (34)
60:23;61:1,6;62:6,15,23;
89:17,18;91:8;99:10,13,18;
100:7,8,13,14,18,19;127:14,
17,20;128:4,5,6,13,17,19,22;
144:3,7,10,17,21;145:1
returned (1)
159:8
returns (5)
62:25;98:24,25;115:19;
127:21
reverse (1)
224:25
reversed (1)
18:5
review (27)
17:3;41:17;64:7,10;77:24;
107:23;130:16;165:24;
169:13,21,23;170:2,14;
172:4,9;175:2,7,11;176:16;
180:24;182:1;183:24;
190:17;197:9;209:3;223:17;
236:6
reviewed (6)
74:22;115:10;180:13;
189:22;209:8;234:12
Reviewing (10)
134:13;169:10,25;170:9;
171:1,24;174:6;188:6;
234:20,21
revised (1)
165:21
Revising (1)
183:11
Revisions (2)
65:25;66:16
Ribgy (1)
12:17
RIGBY (4)
12:17,17,17;14:16
right (106)
15:2,12,16,19;17:7;18:16;
20:18,18,25;23:6,7,13;27:3;
28:4;29:12,17;34:10;35:17;
36:20;38:8;39:8;41:8,11,16;
52:6,14;67:8;73:22,24;74:2,
12,13,23;76:23;78:4;85:20;
87:9;88:1;93:15;96:14;98:5,
17;101:18;102:17;105:15;
110:23;111:2,6,10,23;112:6;
113:7,17,19,25;114:6,12;
116:16;122:7,8;124:16;
125:10;128:4;129:9,19;
130:20;133:3;134:7;136:11;
137:7;139:17;140:1,14;
143:6,8;145:25;146:18;
147:1,6,12;154:18;158:14;
160:17;161:23;162:12;
163:19;164:2;166:25;
174:11;188:23;192:18;
194:7;196:11;198:4,21;
201:25;204:3,5,6;222:16;
225:6;226:11;227:7;234:6;
235:19;236:3
righted (1)
210:8
rights (42)
19:22;58:9;73:2,17,23;
78:10;93:8,12,13,23;115:14;
145:18;146:4,4;197:14,24,
25;198:3,6,7,11,12,16,25;
200:25;201:1,20,22;204:14,
16,20,21,23;205:2,3,11,11;
207:4;209:2;214:19;234:16;
235:1
Ririe (1)
163:10
RISD (1)
134:7
risk (1)
205:4
river (47)
43:7,10;51:2;52:13,25;
53:4;61:17,18,25;62:2;
73:18;79:4;89:22,24;90:1,4,
10,19,20,21,25;92:4,5;94:13;
98:7;100:10,10;110:21;
112:18,22;113:3;114:5;
138:15;162:19;163:11,15,21,
25;164:4,5,22;165:18;167:6,
14,19;181:12;211:10
road (1)
132:1
roads (1)
69:6
Rob (3)
11:22;88:5;161:18
Rocky (1)
11:24
role (3)
38:10;42:8;121:13
roll (3)
10:17;13:4,13
room (2)
14:19;128:9
rooms (1)
54:13
root (1)
126:25
rotation (1)
146:12
Rough (1)
143:11
roughly (12)
44:3;46:23;47:13;52:5,12;
53:11;55:16;56:4;141:18,20;
143:10;163:14
route (1)
126:17
routinely (1)
164:10
row (7)
10:21,21;73:5;85:18;
134:5;140:10;141:15
R-square (1)
186:23
R-squared (9)
171:23;184:14;186:25;
187:3,18;189:1;201:6;
224:13;225:10
rule (12)
22:22;80:23;81:6,11,15,
20;207:24,25;208:15;209:1;
234:9;235:4
ruled (1)
233:17
Rules (12)
80:15,20,20,25;81:2;
207:17,19,21,24;208:21;
209:7;211:6
ruling (2)
183:18;233:10
run (17)
46:2,5,6;57:20,24;71:9,18,
24;98:18;108:6;111:1;
112:21;113:2;178:19,25;
205:7,13
running (2)
71:16;127:10
runoff (2)
127:4,6
runs (10)
90:9;93:4,6,8,10,25;
111:10,14,17;113:4

S

safe (1)
151:13
Salmon (3)
92:7;100:11,13
same (32)
50:4;52:19;53:2;57:24;
99:23;102:18;125:18;130:4;
131:5;133:6,7;134:12;135:7;
139:15;140:19,20;141:8,10;
142:15;145:6;152:16;157:8,
8;163:18;165:1;178:13;
180:3;200:11;202:4;206:9;
220:21;228:12
Sarah (11)
11:17;13:6,10;26:2;27:11,
19;30:21;32:4;60:15;124:20;
135:17
sat (2)
144:14,17
satisfy (2)
125:17;142:2
saturated (2)
126:24;127:10
Saturday (3)
30:1,2,5
save (2)
24:8;229:24
saw (5)
63:8;158:16,21;195:18,18
saying (1)
200:6
scenarios (3)
72:15;73:21;101:20
schedule (6)
29:18;31:19;32:19,23;
227:8;229:20
scheduled (2)
10:13;29:22
science (5)
18:18,18,23;19:2;37:13
scientific (1)
108:11
scope (6)
16:22;17:9;23:1;65:6;
104:20;232:1
Scott (1)

31:16
screen (3)
13:6;31:24;32:2
screens (1)
10:11
screw (1)
122:3
scroll (2)
207:23;209:1
season (15)
43:5;45:19;52:3;55:24;
56:14,17;58:19;62:10;78:13;
86:15;98:22;164:11;203:19;
223:19;227:15
seasonality (4)
63:1,3;100:1,4
seat (2)
35:15;124:15
seated (2)
35:17;37:3
second (12)
38:23;71:12;98:23;
125:18;126:19;127:4;
138:11;190:16;197:1;
204:12;208:19;233:19
secondary (1)
154:19
section (7)
37:25;121:4,4;125:8;
145:19;190:13,17
sections (1)
21:9
securing (1)
231:16
seeing (3)
124:22;184:13;230:22
seem (2)
10:5;114:25
seemed (2)
10:6;23:2
seems (4)
21:21;113:19;180:18;
189:7
seepage (4)
126:8,11;127:15;161:1
sees (1)
161:3
selected (3)
38:13;73:13;151:5
self-explanatory (1)
139:3
semi-irrigated (9)
68:12;69:2;88:22;141:14;
194:25;221:2,21;222:10,11
semi-rigid (1)
32:23
send (6)
25:5,17,24;54:22;60:11;
176:17
senior (8)
20:24;73:20,22,23;74:5;
114:16,17;115:1
sense (5)
20:21;21:2;49:20;130:11;
215:25
sensing (1)
199:24
sent (11)
13:22;54:21;87:4;126:13;
138:14;177:4,4,15,21;
178:15;217:20
sentence (10)
81:6;125:18,25;126:2;
127:23;151:2;152:17;
191:19;197:1;208:19
sentences (2)
44:1;150:22
sentinel (1)
117:6
September (8)
43:4;58:11;76:25;77:1;
78:7;217:22,25;227:11
series (12)
25:6,8,9,12;28:9;40:24;
41:10,18;124:25;182:18;
204:13;214:5
served (1)
17:17
service (5)
118:11;194:10;197:8;
199:21;202:2
services (2)
120:21;121:2
set (8)
10:3,4,7;14:20;15:1;22:25;
31:20;60:7
sets (1)
221:17
setting (1)
200:21
settlement (5)
75:15;77:22;159:15;
205:20;206:6
seven (1)
152:19
several (6)
83:19;141:12;144:16;
176:21;182:21;183:18
SF5 (2)
148:5,10
shapefile (17)
132:10;137:10;138:13,18;
139:2;140:11;142:8;178:11;
194:7,8,11,13,16,17;195:6,
11;222:7
shapefiles (12)
122:23;123:3,4,7,22,23;
124:1,9;140:6;178:3,3;
198:21
Share (15)
7:23;17:19;57:11;76:4,19;
83:22,24;84:2;86:3,7,25;
87:6;100:25;109:7;114:23
shared (2)
118:20,23
shares (4)
42:15;84:16;199:8,20
Shaw (1)
230:18
shift (9)
68:1;95:8;96:16;166:3;
171:7;181:6;188:16;196:16;
219:15
shifting (2)
79:5;166:1
short (3)
22:16;52:3;57:14
shortage (6)
42:18;53:7;57:21;114:11,
18;115:3
shortfall (23)
51:24;54:25;72:21;74:17;
76:12,20;79:6,13;86:3,5,5,8,
13,14,18;110:15;113:8;
115:19;171:20;176:10;
206:18,21;207:1
shortfalls (1)
109:7
shortly (2)
16:5;33:12
short-term (3)
98:7,10,16
shot (1)
213:6
show (10)
26:7;55:16,19;72:17;
153:25;154:8,8,12,20;221:11
showed (3)
192:12;193:19,25
showing (5)
76:25;143:16;159:9;
186:22;226:24
shown (4)
77:5;85:5;132:8,16
shows (17)
50:21;51:5;55:2,9;58:10;
74:10,16;77:6;78:3;84:25;
85:18;134:5;141:16;178:23;
186:16,25;204:9
side (19)
61:7,11,15,21;73:16;
74:23;98:24,25;99:6,8,9,10,
15,19;100:7,10,19;186:19;
187:17
signed (5)
136:13;137:8;158:12,17;
186:24
significance (1)
187:2
significantly (2)
29:6;152:21
SIGSTEDT (7)
13:17,17;30:22;179:9,20;
180:4;190:19
similar (1)
16:19
Simmons (2)
11:15,18
simple (3)
25:25;183:23;233:1
simplify (1)
24:8
simply (5)
21:13;102:1;143:14,15;
232:23
SIMPSON (9)
12:13,13;96:17,18,21,23;
102:8,13;135:7
simulate (2)
98:10,15
simulation (5)
43:15;46:7;48:18;71:16,24
simulations (5)
38:22;46:2;93:12,16;98:10
single (1)
220:24
single-season (1)
97:22
Sinks (1)
210:10
sit (1)
97:11
situation (2)
19:21;103:23
situations (1)
165:23
six (1)
30:2
sixth (2)
49:19;231:20
skinniest (1)
106:13
Skyler (1)
12:4
slated (1)
39:11
slide (29)
49:15,19;50:19,20;51:4,
15,21;52:10;54:23;55:1,8;
57:19;58:3,4,7,10;72:7,11;
73:1;74:9,10;97:3;113:25;
186:17;202:24;203:12,12,
18;215:10
slides (2)
49:24;185:7
slight (2)
31:14;160:22
small (8)
73:19,24,25;126:15;
128:20;197:24,25;231:5
smaller (2)
130:3;141:18
smallest (1)
106:13
Snake (33)
50:11,15;51:2;52:13;
73:17;74:3;78:2,4,10,23;
79:19;85:17,18,21;86:19;
90:10;93:14;94:13;100:9;
110:21;112:22;113:3;117:2,
4,14;128:6;138:15;141:13;
162:19;163:25;164:4,5;

181:12
snapshot (1)
220:24
snow (7)
91:1;164:9,17,18;165:22;
167:20;168:2
soil (2)
126:23;127:9
solely (1)
202:10
solicited (1)
180:6
Somach (2)
11:15,17
Somebody (2)
27:12;211:4
somehow (1)
51:17
someone (2)
25:12;40:24
someplace (1)
127:11
sometime (4)
52:11;113:14,20;158:22
sometimes (1)
68:19
Somewhat (1)
163:9
somewhere (6)
20:17;55:15;57:22;106:2;
192:14,16
soon (5)
142:5;155:12;158:25;
159:2;160:2
Sophia (14)
13:10,17,19,23;30:22,24;
32:10;179:9;180:4;190:1,19;
191:1,5,9
Sophie (1)
179:19
Sophie's (1)
190:22
sorry (21)
31:13;46:10;47:24;59:19;
64:9;84:18;88:14,16;93:9;
94:9;101:25;139:23;145:2;
150:16;154:25;166:9;
172:18;185:20;208:4;216:5;
221:19
sort (3)
77:21;129:11;147:3
sound (1)
38:25
sounds (3)
74:13;174:11;227:22
source (11)
69:25;70:4,4,19;81:9;
127:22,22;138:13;144:23;
164:2;208:13
sources (5)
62:22;68:13,14,16,21
south (10)
61:7,21;98:24,25;99:8,9,
10,19;100:7,10
southeast (1)
163:23
space (1)
169:1
Spackman (3)
11:4;45:23;137:8
speak (6)
12:20;13:8;15:6;105:25;
111:11;184:10
speaking (7)
14:5,13;74:1;80:4;162:22;
187:7,15
specialty (1)
118:12
specific (11)
23:15;79:25;80:3;90:16;
93:24;94:23;109:5;160:16;
183:9;210:23;221:23
specifically (18)
20:10;26:25;33:6;45:12;
79:14;89:10;91:21;108:9;
129:8;141:4;153:1;154:11,
14,15;160:19;171:19;188:8;
231:11
specifics (1)
17:7
speculate (1)
111:19
speed (1)
29:6
spell (3)
37:8;106:17;120:2
spelled (1)
106:19
SPF (3)
133:2;134:5;192:8
spillover (1)
30:1
split (2)
87:2,5
spot (2)
136:20;152:2
spreadsheet (3)
62:12,21;76:24
spring (2)
128:6;171:8
Springs (3)
20:13,15;92:5
Spronk (3)
12:2;179:15;180:1
SRBA (7)
147:2,11,15,19;148:4,5;
200:24
stabilize (2)
225:17,17
staff (31)
24:6;33:7;66:23;68:10;
81:16,22;88:12,20;92:16,20;
94:22;111:8;121:3;158:25;
169:12,18;172:24;173:4;
180:7;183:10,14;185:15;
205:6;212:13;220:19,21,23;
221:4;223:17,20;225:25
staffing (5)
223:13,24;225:19;228:2,5
stage (1)
16:15
stake (1)
233:24
stamped (1)
40:20
stand (4)
106:1;138:12;140:2;
144:12
standard (14)
142:2;143:22;154:22;
155:4,15,16;156:2,23,25;
157:6,12;166:1,4;200:4
standards (1)
200:1
standing (5)
17:8;21:19;35:15;213:1;
234:23
standpoint (1)
47:19
stands (1)
138:16
start (19)
10:18;11:8;13:5;30:9;
41:21;105:22;124:23;
125:22;135:24;196:14;
198:24;225:23;227:6;234:9;
235:21,22,22,23;236:3
started (14)
44:2,4;52:23;108:8;114:4,
7;136:24;169:20,25;170:15;
176:12;188:3,6;226:15
starting (5)
27:25;48:19;58:17;86:12;
125:7
starts (1)
150:23
state (78)
17:23,23,24;37:7,14;
38:21,22;43:20;44:5,6,9,12,
17,21;45:10,15;46:3;48:7,11,
16,18;50:21,23;52:13,18;
55:4,11,24;56:20;57:20;
71:2,3,6,10,18,21,21;72:8,13,
14,19,21;74:24,25;75:5,22;
85:22;95:15;96:10;97:15,22;
98:6,10,17;106:17;108:14,
18;109:6,8,11;111:1,5,9,17;
112:21;113:2,16;120:2,9;
145:15;147:7;205:19,19;
207:9,9;210:22;231:17;
232:10
stated (7)
21:16;22:4;110:25;111:4;
131:14;151:21;190:25
statement (3)
125:12,13;208:10
statements (3)
17:15;20:6;21:17
states (2)
51:6;191:20
stating (3)
108:9;232:23,25
statistic (2)
187:4;225:11
status (3)
172:8;217:23,23
stay (1)
127:1
stays (1)
130:4
steady (50)
17:23;38:21;43:20;44:5,9,
12,17,21;45:10,15;46:2;48:6,
11,16,18;50:21,23;52:13,18;
55:4,11;57:20;71:2,21;72:8,
13,21;74:25;95:14;96:9;
97:14,22;98:6,9,17;108:14,
18;109:5,8,11;111:1,4,9,17;
112:21;113:2,16;205:19;
207:9;232:10
Stegner (1)
232:21
step (7)
47:18;60:19;118:3,6;
178:8;185:13;201:17
stepping (1)
185:23
steps (6)
46:25;47:4;48:21;107:24;
117:25;118:1
stick (2)
55:8;140:2
still (14)
97:11;137:9;150:7;
153:17;155:14;171:14;
173:9;182:5;189:22;223:22;
224:9,11,15;225:3
stipulate (5)
29:5,11;35:21;36:10,14
stipulated (4)
29:2;36:9,11;101:24
stipulating (1)
28:22
stipulation (5)
29:16;36:1,2,4;147:17
stood (1)
96:17
stop (1)
141:5
storage (6)
17:25;86:4,7;213:25;
214:15,22
straight (1)
25:22
stream (1)
92:3
streamlined (1)
232:17
streams (3)
91:9;163:4,24
street (1)
18:13

stress (4)
46:25;47:4,18;48:20
strike (3)
81:13;201:16;209:14
studies (2)
156:11,12
study (2)
155:19;156:17
stuff (1)
147:16
sub (1)
160:9
subdivision (2)
69:5;195:2
subject (5)
17:2;74:7;84:15;101:23;
102:4
subjects (2)
29:13;109:23
submit (3)
118:21;183:1;233:2
submitted (8)
25:22;76:7;138:20;
179:10;194:8;197:5;220:7,
11
subpoena (2)
15:20;31:9
subpoenas (2)
15:24;16:4
subsequent (3)
19:20;172:19;175:11
substitute (1)
40:21
subtract (3)
61:10;62:19;193:4
successful (1)
18:9
sudden (1)
235:17
sufficient (2)
142:2;148:23
suggest (1)
27:25
suggested (2)
191:5;223:14
suggesting (1)
223:2
suggestion (3)
34:10;105:22;223:6
suggestions (4)
131:6;218:6,19;219:1
suited (1)
211:12
SUKOW (33)
12:21,21;27:25;31:8;
36:22,24;37:4,7,9;56:21;
57:2;63:12;83:11;88:2,5,15;
95:7;96:22;102:25;104:9,21;
105:9,14,16;109:6;111:22;
112:4;128:10;141:21;159:7;
169:18;200:8;226:22
S-u-k-o-w (1)
37:9
Sukow's (2)
27:9;194:20
SULLIVAN (7)
12:1,1;30:23,24;32:8;
131:2;179:13
summarize (2)
181:19;209:5
summary (10)
26:8,15;65:24;66:16;
108:6,8;134:3;177:7;180:3;
232:23
summer (3)
159:21;169:23;170:15
superposition (1)
108:20
supervising (2)
169:22,22
supplemental (13)
157:7;196:23;197:2,7,11;
198:22;199:19;201:16,19,
21;202:3,7,14
supplied (4)
43:7;70:5,6,10
supplies (2)
58:12;214:9
Supply (49)
7:14,19;28:10;40:25;42:6;
43:7;57:6,8,20;58:23;70:2,3,
19;74:6;75:3;92:1;93:15,20;
94:5,7,11;110:14;122:1;
161:23;162:10;165:7,12,14,
15;166:2,3,13;167:3,4;
168:24;170:23;171:5;177:6;
181:7,10,21;184:22;187:14;
188:8;190:14,21;191:10;
198:13;225:4
supplying (1)
171:17
support (5)
75:14;81:9;98:5;208:13;
231:23
suppose (1)
34:20
Supreme (2)
19:12;21:12
sure (37)
10:4,10;13:9;14:16;36:10;
50:4;71:4;90:23;92:22;
93:22;95:2;101:4;113:21;
114:25;124:5;129:5,13;
133:14;143:11;144:16;
147:9;151:4,12;153:9,9;
157:12;166:24;178:18;
181:18;182:12;184:3;
188:10;195:15;196:3;
206:10;220:22;233:20
Surface (86)
10:15;33:11,19;34:22;
38:24;48:14;49:2,11;53:7,
13;61:20;66:3,19;70:2,5,10,
17,23;80:16;81:8;82:3;
85:23;91:3,8,9,11;96:16;
98:11;100:15,19;102:11;
106:12;109:11;110:15;
114:11;115:19;116:18;
122:1;125:15;127:8;133:22;
137:21;138:2,14,20;140:7,
11;149:6;159:16;165:7;
168:16;181:13;197:14,17;
198:23;199:8,15,17;201:1,
19,24;202:2,4,9,10,15,16;
203:4,15;205:20;208:12;
209:20;210:21;211:25;
213:23;214:8;216:20,25;
217:15,18;219:15;220:8;
228:22;230:14;231:18;233:7
surprised (1)
233:10
suspense (1)
136:19
sustain (1)
105:6
Sustained (3)
103:11;159:25;206:11
Swan (4)
144:12;145:1,4,8
SWC (11)
7:15;133:23,23;138:5,10,
11;187:16;197:8;203:13,20;
215:9
switch (6)
32:8;53:10;130:16;136:3;
137:14;216:12
switched (1)
158:20
switching (2)
32:11;224:4
sworn (3)
36:25;106:7;119:19
system (9)
62:23;99:6,14;105:25;
127:13,18,19,24;199:9
systems (2)
199:7;209:21

T

tab (1)
125:2
table (25)
14:22,24,25;18:12;20:4;
35:15;74:23;84:24;85:3,6,
20;132:8,16;134:2,5;136:24;
138:1,4;139:8,13;186:15,21;
195:19;204:9,19
Taggart (1)
12:5
talk (12)
15:17;23:13;29:13;33:2;
35:9;129:9;138:9;154:21;
157:16;199:4;211:15;235:6
talked (9)
88:8;129:7;132:22;144:8,
16;181:7;182:20;217:19;
222:1
talking (25)
26:25;125:23;135:24;
153:24;155:20,23;157:14;
170:15,16;172:15;173:8,9,
10;175:7;199:11,24;201:12;
210:11;213:22,25;214:18;
215:1;225:21;228:5;231:10
talks (5)
50:20;77:23;186:17;
231:12,14
target (4)
61:16;62:3;89:21;100:6
targets (1)
90:22
tasked (3)
183:10,14,16
team (1)
106:24
technical (99)
37:24;44:15,16,18,19,24;
45:3;49:11;53:12,17,20,24;
54:2,16,21;63:21,25;65:25;
66:16;67:8;72:4,18;94:7,16,
19,21;95:3,18,20;107:18;
111:9;117:6,16;120:21;
121:1;122:16;130:12,19;
131:8,14,15,17,23;133:24;
143:12;144:13;145:5;149:6;
157:25;158:24;169:12;
170:18;172:24;174:13,16,19,
24;175:2,12,18,22,23;176:4;
177:9,12,22,25;178:22;
179:10;180:2,7;182:10,18,
22,24;185:4;196:2;197:9;
209:9,16;212:13;214:6;
215:2;216:19;217:2,4,6,7,24;
218:3,7,12,14,15,20,23,25;
219:1;230:16
technically (3)
44:1;200:6,22
technology (5)
37:12;179:10,20;180:5;
190:18
telling (4)
87:5;101:14;225:10;
234:19
temperatures (3)
151:6,15,18
Temple (1)
32:15
ten (7)
31:21;32:16;48:9;56:3;
87:23;109:3;143:5
tend (1)
226:22
tender (1)
109:22
ten-fold (3)
21:3,4,5
term (8)
69:24;82:15;127:21;
143:3;146:12;155:8;187:3;
212:9
terms (10)

64:6;79:12;91:15;97:13;
169:16;191:24;198:3;
209:25;215:20;228:2
testified (17)
37:1;89:16;97:2,19;99:4,
11;101:22;106:8;119:20;
128:10;132:14;141:21,25;
144:19;187:22;188:3;221:10
testifies (1)
35:5
testify (14)
15:21;21:22;30:7,13;33:9;
35:24;36:3;38:18;121:20;
128:12;161:22;174:22;
180:20;210:19
testifying (2)
222:22;224:5
TESTIMONY (20)
7:2;13:25;16:1,6,19;22:8;
28:2;31:21;35:8;88:7;92:2;
99:1;101:2;104:3,20;105:8;
194:20;216:18;225:12;233:4
testing (1)
227:7
Teton (1)
211:10
Thanks (6)
35:25;186:7;228:17;
234:7;235:19;236:4
Theoretically (3)
200:13,16;201:3
thereby (1)
19:23
thinking (1)
105:2
Third (7)
71:10;127:12;140:25,25;
169:9;171:6;184:11
Thompson (41)
7:4;11:10,10;16:16,16;
19:24;21:19;28:20,21,25;
29:8;32:14;40:4,7,19;96:24;
106:9,11,16;107:2;109:15,
22,25;112:25;119:8,9;129:1;
146:2,24;168:18;210:20;
219:18,20,21,24;222:12;
229:4,17;230:9,12;233:8
though (7)
48:19;79:8;91:25;118:24;
144:7;160:14;234:10
thought (7)
63:8;136:1;141:9;149:13;
150:13;159:21;234:18
thoughts (2)
17:20;34:9
three (10)
12:18;69:1;120:19;
139:12;183:9;189:18,19;
194:23;204:17;221:19
three-quarters (1)
147:16
threshold (1)
143:13
thumb (1)
49:18
Thursday (1)
30:15
thwart (1)
22:14
timeliness (1)
156:1
timely (4)
155:6,6,8,13
times (2)
56:3;144:16
timing (6)
15:25;33:9;105:15;
108:18;144:21;159:12
title (12)
51:18,22;58:7;63:17;
65:18;66:11,14;73:5;116:11;
133:19;184:19;215:9
titled (9)
49:2;73:1;133:20;137:20;
138:2,11;140:16;173:25;
203:2
TJ (9)
12:9;17:13;19:9;35:18;
36:18;63:12;135:2;166:22;
215:1
today (19)
15:11,15;20:4;33:18;
34:14;36:4;38:14,18;39:3;
97:11;101:22;121:17;
122:20;166:23;173:13;
178:21;189:23;200:22;228:8
together (1)
204:17
told (10)
45:14,21;53:16,18,19;
64:21,25;65:3,3;200:20
tomorrow (6)
147:10;229:16;234:9;
235:13,18;236:4
Tony (4)
15:20,25;91:18;211:12
took (3)
45:6;169:15,19
tool (3)
108:11;182:3,4
tools (1)
227:22
top (9)
126:4;127:5,23;129:10;
150:25;185:10;186:17;
190:9;210:16
topic (3)
38:18,20;211:8
topics (5)
39:3;121:20;122:20;
125:9;182:21
total (10)
62:6;69:14;76:19;100:12;
101:12;120:18;125:14,16;
192:13;204:18
totaling (1)
85:15
totally (1)
220:22
touch (1)
158:7
town (1)
232:19
track (1)
197:17
tracking (4)
117:7;154:14,15;201:1
traditional (2)
18:20;35:4
transfers (1)
117:3
transient (65)
17:22,23,24;38:21;43:14,
15;44:5,10,13,18,23;45:11,
15,25;46:3,5,7;47:19,23;
48:2,3,6,11,22;55:3,24;
57:25;71:3,6,9,16,18,21,24;
72:8,14,19;74:16,24;75:5,22;
76:24;78:6,16;85:22;87:12;
95:15,22;96:10;97:15;
101:21;108:20,25;109:2;
110:19;111:10,14;158:4,11,
20,23;159:6,10;205:19;
207:9
transition (1)
17:22
translates (1)
207:2
transmissivity (1)
90:15
traveling (4)
17:18;232:19;235:13,18
Travis (5)
11:9,10;14:14;16:16;
219:21
trend (1)
224:13
trends (1)
62:14
tributaries (1)
100:9
tributary (8)
91:9;92:1,3;163:4,24;
164:5;165:23;168:23
tried (1)
24:6
trimline (14)
82:13,21,23;103:6,9,15,17,
23;104:10,12,13;105:8;
212:4,5
trimlines (3)
83:4,6;212:14
true (18)
43:8,14;46:1,12;47:1,10;
48:17;50:25;58:16;61:12;
86:24;130:3;179:21;180:3;
193:17;221:12,13,16
truth (3)
36:25;106:7;119:19
try (13)
23:21;24:8;25:24;29:9;
30:3;33:25;63:13;88:18;
90:13;122:2;131:21;169:6;
199:5
trying (10)
22:7,25;32:20;60:11;
151:20,25;152:1;155:15;
214:8;223:20
Tschohl (3)
26:2;27:11;32:4
turn (35)
38:4;58:3;65:10;67:6;
72:6;76:2;80:13;83:7;84:8;
97:1;116:9;121:5;125:6;
132:3;134:1;135:15,16;
162:3;173:18,19;179:6;
182:7;184:16;185:8;189:21;
190:4;191:13,16;196:5,17,
19;202:19;207:16;213:15;
219:24
turning (1)
124:15
twice (1)
40:9
Twin (85)
42:19;43:1,6,13;54:25;
55:10,23;56:16;57:14;58:12;
60:24;61:7;62:7,15,22;
73:16;89:18;99:14;100:8;
122:13;128:4,13,17,23;
132:9,10,15,24;136:17;
137:10;140:9;141:4,15;
143:15;144:2,6,17,20;145:1,
10,15,17,24;146:13,16;
147:14,17;164:3,6;165:12,
16;168:22;171:19;178:13,
20;181:8,11,17,20;183:12;
184:9;186:19;187:19,23;
189:7,10,15;190:21;191:10;
192:11;193:19,20;194:1,6;
201:6,10;222:2,8,23;223:3,7;
224:5,10,12;225:2
two (19)
16:4;17:9;34:21,23;38:17,
20;65:12;73:4;76:12;113:13;
123:13;124:22;141:16;
150:22;194:13;199:2;
204:15;216:19;234:2
two-thousand- (1)
182:17
type (14)
64:21;65:1;80:9;116:25;
118:15;148:6;152:23;154:7;
160:16;172:3;176:15;193:6,
7;199:24
types (2)
81:18;141:12
typically (2)
69:4;148:7
typo (1)
202:24

U

Ultimately (2)
174:1;176:23
unavailability (1)
31:7
unclear (1)
155:19
under (29)
22:15,18;72:13,14,21;
74:24;86:17;87:10;100:25;
101:18;115:17;135:18;
140:6;145:24;178:8;190:13;
191:18;203:20;204:2;205:4;
207:10,11;208:21;209:7;
227:23;233:16;234:8;235:1,
3
underlying (2)
22:2;67:11
underneath (1)
190:17
understood (14)
21:18;45:25;48:5,9;64:25;
104:22;152:15;153:20;
167:3;176:25;194:20;207:8;
218:18;226:21
undertook (1)
182:1
unduly (2)
114:15,25
unique (1)
24:7
uniquely (1)
25:2
unit (2)
68:17;88:21
units (1)
88:13
University (3)
37:12,14;120:9
unless (2)
13:20;29:14
unlined (1)
126:15
unqualified (2)
39:3;122:20
unregulated (7)
94:8,13;162:11,25;165:6;
167:11;181:22
unsure (4)
167:18;171:8;188:17,18
up (54)
10:3,4,7;12:20;14:20;15:1,
6,7;23:11;28:3;29:6;33:1;
60:19;63:8;81:15,21;82:22;
83:19;84:19;87:2,5,11;
96:17;100:24;105:25;106:1;
122:3;124:25;127:23;130:1;
152:2;153:25;154:8,9,12,20;
160:1;166:25;177:5;192:21;
193:13,14;202:23;204:18;
206:2;207:9;209:9;212:9;
218:20;221:11;225:18;
227:10;229:25;235:20
update (2)
153:7;225:25
updated (6)
25:24;46:24;138:25;
176:14;201:2;228:6
updates (1)
214:7
updating (2)
20:3;201:12
upper (1)
204:19
upstream (1)
91:5
use (79)
20:18;21:13;25:23;28:2,5;
40:9;41:1;60:23;63:3;68:17,
18,18;69:17;70:22;73:19;
81:10;85:16;87:20;88:11,20;
89:24;90:1,12,24;91:16;
108:14;109:9;111:16;
126:13;129:16,17,17;
131:20;134:14,17;137:22;
138:17,22;141:11,12;142:8,
12;143:2,3,14,19;155:8;
160:20;196:23;197:11;
198:21,22;199:19;200:11,15,
16;201:3;202:7,14;203:4;
204:13,21;206:23;208:14;
209:6;210:11,17;211:19,24;
215:20;218:21;223:2,7,9;
225:13;231:16,17;234:1,22
used (60)
24:4;43:13;48:16,18;
60:25;61:1,2,25;63:22;68:3;
69:9,10,12,13,18;70:14,15,
17,18;71:5;82:13;89:1,3,4,5,
7,9,20,22;90:22;123:7,11;
132:9;134:9,11,12;136:17;
140:23;141:3,19,22;149:13;
155:9;157:10;171:5,17;
179:2;181:8;184:1;192:25;
193:1;201:23;202:4,13;
212:4,8;218:10;219:2;
223:21,25
user (3)
209:25;210:1,2
users (25)
16:7,12;18:8;33:24;34:15,
21;36:15;39:8;42:23;49:4;
58:17,21;79:6;95:7;96:16;
110:14;124:14;159:17;
165:17;187:5;199:5,11,24;
223:2,15
uses (4)
47:3;89:15;110:13;130:23
USGS (1)
171:7
using (31)
26:21;46:24;55:3,11;57:9;
62:8;68:9,12;72:8;83:17;
111:14;130:8;131:4,6;
135:23;137:9;140:4;141:17;
142:11,13,21;143:4;171:9;
186:18;195:22;199:6;
200:10;204:10;222:9,23;
227:24
usually (1)
194:25
Utah (2)
37:14;120:8
utilize (3)
68:14;98:17;198:20
utilized (8)
63:19;71:17;101:6,10;
181:20;192:22;203:14;
210:14
utilizing (1)
231:1

V

vague (1)
67:22
Valley (1)
79:20
valuable (1)
20:20
value (6)
171:23;186:23;187:3,9,18;
224:14
values (3)
133:6;187:9,10
variability (1)
187:6
variable (4)
181:15,24;189:5,12
variables (4)
129:12;171:5;177:5;
189:19
variety (1)
68:12
various (5)
93:17;109:3;117:7;
233:15;234:23
vastly (1)
201:9
vegetation (1)
126:16
verbal (2)
15:4;176:20
vernacular (1)
11:2
versa (1)
221:14
version (18)
46:8,11,16,17,24;47:3,12,
14,15,17,21,21;54:20;70:12;
71:15;99:20;108:9;139:1
versions (2)
46:6;169:8
versus (11)
19:12;38:21;48:6,11;55:4;
61:6;72:14;74:25;91:1;
173:16;226:22
via (2)
54:10,16
vice (1)
221:14
view (3)
10:5;19:19;195:4
violation (1)
104:19
vocal (1)
15:21
voice (1)
15:7
volume (9)
53:3;58:20;62:12;98:14;
99:23;125:16;133:10;135:2;
162:12
volumes (2)
81:8;208:12
volumetric (1)
125:15

W

wait (3)
139:12;147:24;185:20
walk (2)
129:11;160:7
walking (1)
117:24
wants (3)
213:5;232:8;233:7
warning (1)
234:24
waste (1)
20:19
wasteful (1)
231:17
watch (1)
171:20
watching (5)
153:16,17;154:17;171:10;
189:17
Water (348)
10:15;11:2,5,25;12:2,6,8,
10,12,15,18,22,24;13:2;16:7,
12;17:14;18:8;20:12,18,24;
22:15;33:11,19,24;34:15,21,
22;36:15;37:19;38:24;39:8;
42:11,23,25;43:6,12;45:19;
47:8;48:14;49:2,4,11;50:14;
52:2;53:7,13;55:23;56:13,
16;57:10;58:9,17,18,21,23;
62:22;63:13,15;66:3,19;
68:24;69:23,25;70:2,2,6,6,
10,11,17,18,23,23;73:2,19,
22,23;74:2,6;75:3,6,7,16,22;
77:7,22;78:2,3,4,10,11,17;
79:4,19,20,20,21,24;80:1,3,
16;81:8,8,10,12;82:3;83:20,
22;84:3,25;85:11,17,20,23;
86:4,7,18,19,21,22;89:3,17;
91:2,13,17,23;92:1;93:7,12,
13,15,20,23;94:11;95:7;

96:16,16;98:11,19;99:5,13,21;101:8,11,15;102:3,11;106:12,22,24;107:25;108:13,23;109:4,11,12;110:13,14,15;114:11;115:9,19;116:18;118:13;120:14;122:1,2;124:14;125:15,15,17;126:12,14,18,24;127:3,8,10,18,19,20,20,22;129:14,16,19,21,22;130:4;131:10;133:22;137:21;138:2,14,20;140:7,11;145:16,18,24,25;146:4;147:1,6,12;149:6;151:9,24;153:3,6,14,15,24;154:1,23;155:1;157:7;159:16,17;160:19;164:2,9;165:7,7,11,12,14,15,17;168:2,16,24;179:15;180:1;181:13;192:8;193:3,10,16;196:23;197:2,11,14,14,17,18,20,21,25;198:7,11,11,13,16,21,22,23,25;199:5,6,7,8,9,15,17,17,19,22;200:25;201:1,1,19,19,22,23,24;202:2,2,4,4,7,9,10,12,14,15,16;203:4,15;204:3,5,6,13,16,21,23;205:3,11,21;207:4;208:12,12,14,21;209:6,20,25;210:1,1,1,5,8,9,21;211:4,14,20,25;212:22;213:23;214:8,9,12,15;216:21,25;217:15,18;219:13,16;220:8;223:2,15;224:20;228:20,22;230:14;231:13,16,17,18,19;233:7,16;234:16,22;235:1

watermaster (2)
91:17;211:15

watermasters (1)
211:5

watershed (1)
162:23

watersheds (1)
163:4

way (22)
10:8;18:11;31:9;46:12;48:1;104:8;127:2;134:7;153:22;154:5;165:9;168:17;171:13;172:2;176:5;184:4;199:1;200:7;202:11;223:12;229:24;231:1

ways (5)
131:4,6,12;132:2;226:1

weather (2)
152:13,18

Weaver (3)
15:20,24;94:21

web (1)
164:16

website (2)
54:17;67:12

week (1)
174:17

weeks (2)
45:7;96:5

weighing (1)
233:22

weight (1)
232:7

Welcome (2)
10:1;124:17

wells (17)
50:10,11,14;52:11,23;53:6;111:22,25;112:24;113:4,14,23;114:3,10,16,17;115:1

weren't (5)
73:20;94:15;101:19;137:5;209:15

what's (15)
20:24;32:21;61:25;90:9;104:17;107:3;110:2;116:11;125:21;141:19;148:18;174:10;212:6;229:8;235:23

whole (1)
157:15

Who's (4)
60:9;144:5;168:25;169:1

wide (1)
75:1

widely (1)
108:10

Wildman (3)
143:20,23;157:13

Wildman's (1)
17:3

Willow (4)
92:11;163:7,18;165:1

wind (1)
11:9

windfall (2)
168:15,21

winter (3)
167:20;170:20;214:5

wisely (1)
231:1

wish (3)
16:14;23:11;219:16

withdraw (1)
50:14

within (33)
16:9;58:22;69:13;70:4;75:2,2;77:7;85:21;89:9;93:14,19;98:22;117:10;118:10;125:15;160:20;165:4;176:19;197:8;198:12,22;201:18,24;202:2,9,16;205:6;210:18;211:24;216:1,4;232:8;234:4

without (8)
28:6;35:22;50:10;53:5;111:23;152:5;199:11,23

witness (49)
13:16;14:21;15:2;29:18;31:16;32:8,19;33:12,14;34:2,11,16;35:4,13,16;38:14;39:14,18;41:17;56:22;81:3;87:20;88:16,19;106:4;107:12;110:5;119:12,13,15;121:17;129:5;133:12;135:5,9;136:9;139:22;148:15;150:19;155:8;161:10;166:16;168:21;209:4;211:4;212:20;222:14;228:18,25

witnesses (19)
15:21;16:18;21:20,21;23:4;29:20;30:2,6,7,13;33:5,8,21;34:21;35:3,7,22;36:9;229:21

WMIS (5)
197:16;198:1,5,18,25

wonder (1)
211:2

Wood (32)
7:5;11:6,6;34:14;35:11;37:4,6;39:5,7,16;103:1,2,4,12,14;104:8;105:6,11,12;119:21,24;123:25;124:4,10,11;133:11;161:20;208:2;222:18,19,21;224:18

words (4)
43:25;52:22;113:22;132:19

work (36)
60:11;63:18,20,23;64:17;66:24;67:13,16,20,21;68:20;75:12;77:12;78:20;82:22;101:18;102:1;106:21,22;107:10;116:25;117:6;130:5,19;131:17;144:13;170:20;175:12;177:22;178:1,4;185:25;191:5;209:9;212:10;225:21

worked (11)
37:21;120:16,18,19;166:11,12;169:7,9;170:8;175:17;178:4

working (70)
44:19;49:12;53:13,17,21,24;54:2,16,21;63:21,25;67:8;72:4,18;95:3,19,20;107:19;116:17,21;117:17;122:16;131:8,14;132:2;133:24;142:15;144:13;145:5;149:7;157:25;170:12,18;174:13,16;175:18,22,23;176:5;177:9,12,25;178:22;179:11;180:2,7;182:19;185:4;189:6,7;196:3;201:11;203:9;215:2;216:20;217:2,4,6,8,24;218:3,7,12,15,20,23,25;219:1;226:11;230:16

works (4)
92:24;129:12;189:12;211:13

world (2)
142:25;143:3

Wow (1)
23:12

wrap (1)
160:1

write (2)
43:23,24

writing (3)
21:25;22:10;42:10

wrong (2)
139:9,10

wrote (1)
182:22

Wylie (1)
44:8

Y

year (50)
44:23;52:19;54:24;55:21;58:17;59:6;110:22;122:1;128:25;137:4;138:21;142:23;143:1;144:20;146:16;150:23;151:4,5,6,14,22;152:20;153:7,11,17,21,22;167:16;168:3,8;170:22;171:14;176:1,6;178:17;206:16,23;210:9;220:24;221:3,11,15;222:4;223:17,21,22;224:2;226:5,13,16

years (26)
37:23;38:3;43:19;44:3,22;48:9;50:16;53:2;79:2,2;109:3;111:10;112:1;120:18;130:13;143:5;151:5,6;152:19;153:17;171:11;224:17;226:14;227:14,18,21

year's (2)
86:5;107:24

yellow (2)
52:16,17

Yep (14)
46:11;121:12;133:16;179:8,18,21;182:15;185:2,10;186:11;190:11;192:10;203:17;215:11

yesterday (1)
16:17

yield (2)
90:16;213:5

Z

zeros (1)
70:9

zip (1)
123:13

zone (1)
126:25

Zoom (2)
54:10;124:22

0

0.06 (1)
78:7

01 (1)

91:24

1

1 (17)
7:22;43:4;51:24;58:8;
73:2;76:4;91:17;107:24;
108:9;118:3;129:21,22;
135:2;178:8;183:11;211:14;
214:13
1,175 (1)
204:18
1:00 (2)
105:18,19
10 (4)
132:3;135:3;196:19,20
10:30 (1)
60:5
100 (2)
24:20,22
103 (9)
182:6,8,10;185:14,19,20;
186:2,4,5
10th (1)
30:2
11 (2)
58:9;73:3
11/28/2022 (1)
7:15
11:30 (1)
87:23
111 (1)
204:18
1-14 (3)
203:23;204:2,5
1175.2 (1)
204:16
118 (8)
219:23,25;220:2;230:10,
13,21,23,24
11th (3)
58:22;73:13;74:11
12 (2)
125:7;152:9
126 (6)
84:7,9,11,12,14,19
13 (15)
38:3;44:3,22;51:15,21;
52:8;54:23;55:2;57:19;
113:12;126:3;127:5,24;
129:10;160:6
13,000 (1)
141:18
135 (5)
134:25;135:6,9,11,23
135/306 (1)
135:1
14,637 (6)
203:23;204:3,6,18;205:7,
14
15 (9)
37:23;58:3,4;72:25;97:21;
120:20;166:7;196:12;214:4
15,924 (4)
204:10,19;205:8;215:24
150,000 (1)
57:22
162,000 (2)
57:15,20
162,600 (1)
57:17
16th (1)
179:11
170,000 (1)
57:22
178 (1)
165:1
179 (3)
148:5;192:16;222:6
179,000 (3)
178:24;193:25;222:3
179,486 (1)
140:13
17th (1)
184:23
18 (6)
120:18;162:3,5;213:17,18,
20
180 (1)
192:16
180,000 (2)
178:24;192:12
180,956 (1)
193:20
183 (1)
192:16
183,000 (1)
133:1
183,589 (1)
134:6
186 (1)
164:23
19 (5)
133:24;138:1;139:19,20;
191:18
1900 (9)
58:9,11,22;73:3,13,24;
74:1,11;78:4
1903 (1)
145:16
194 (1)
179:2
194,000 (3)
137:10;193:22;194:5
194,727 (1)
140:12
1953 (3)
42:20,24;85:21
197 (3)
7:22;76:1,3
199 (2)
24:21,22
1990s (1)
50:12
1994 (1)
205:2
1st (4)
58:17;137:24;162:12;
203:6

2

2 (10)
11:14;43:18;47:25;108:5,
14;133:10;135:3;190:10,13,
17
2.1 (4)
47:15,17,21,25
2.2 (4)
46:12;47:17,21;108:10
20 (4)
72:6;74:22;82:7;207:24
20.03 (6)
80:23;81:1,6;207:25;
208:8,10
20.04 (5)
81:1,20;207:25;208:8,18
2008 (3)
17:2;19:25;217:16
2009 (2)
192:8;217:16
2010 (2)
134:14;138:22
2011 (11)
139:6,16;140:4,5,13,20;
141:17;192:6;195:22;196:4;
220:17
2012 (2)
46:21;147:13
2013 (18)
46:22,23;47:13;48:9,13,
19;132:10;134:6,7,9,11;
137:9;143:14;178:14;194:6,
15;195:6,11
2014 (7)
134:14,15;166:7;183:17;
186:23;188:2,15
2015 (23)
117:16;133:14,25;134:12,
17,19;141:1;142:10;171:7;
182:10,18;184:11;185:14;
186:24,24;188:15;190:20;
191:2,6;216:21;217:6;
218:25;219:1
2016 (4)
137:9,9;171:3;187:1
2017 (22)
140:17,21;141:17;142:5,
12;143:8;155:20,25;156:7,
15;192:6,20;193:18;194:19;
195:4,4,8,14;220:17;222:2;
226:7;228:9
2018 (4)
116:24;176:6;187:1;226:9
2019 (1)
116:22
2020 (8)
169:25;170:1,2,10,20;
171:12;187:1;188:4
2021 (13)
46:15,17;48:20;156:4;
169:24;170:4,11,21;193:24;
195:17;196:2;224:2;226:11
2022 (27)
7:18;40:25;41:9;49:8;
52:3;53:11;57:5;66:4;123:3;
130:20;137:24;156:5;
170:14;172:8;177:23;
184:23;185:5;187:1;188:2;
203:6,19;216:22;217:7;
218:4,7;224:2;227:10
20221223 (1)
7:20
2023 (31)
7:13;38:16;42:5;45:11,16;
47:7;48:5;52:1,25;53:8;76:5,
12;79:13,22;80:6;83:9;
86:15;111:14;113:8;114:5,
12,18;115:3;122:16;123:4,7;
124:1,8;178:3,6,7
21 (2)
97:4;98:6
216 (2)
7:3;164:19
217,000 (1)
78:5
219 (1)
7:4
22 (12)
50:6,7;57:8;97:4;98:6;
132:9;139:18;170:5,5;
203:13,17;215:6
222 (1)
7:5
22-'23 (1)
214:5
224 (1)
7:6
23 (3)
66:4;178:14;196:21
23rd (4)
174:9;175:4;177:2,19
28 (3)
49:8;152:8,11
29 (2)
125:7,13
2nd (1)
145:16

3

3 (11)
107:1,3,5,22,25;108:20;
109:16,20,21;110:18;134:2
3,262 (2)
85:19,23
3:40 (1)
196:12
30 (6)
50:16;112:1;160:5,8,17;
233:19
300 (39)

7:10;25:6,9;26:22,24;
39:15,16,17,25;40:1,3;41:18,
22;42:8,10;43:17;44:14;
59:4,17,20,21,24;124:25;
125:1,2,3,7;132:4,9;150:7,
11,13,19;160:3;162:1;
191:13;196:17;213:14;
231:10
300,000 (2)
62:9;128:24
301 (21)
7:12;26:22,24;42:1,3,9,13;
52:1;59:4,9,13,17,17,20,21,
24;83:8;150:8,9,10,17
302 (3)
59:9,13,18
305 (12)
7:17;26:22,24;57:1,3,3;
59:4,10,13,21,22,24
306 (14)
116:7,9;135:7,25;136:2,6,
16;149:10,14,15,16,19,21,22
30th (2)
43:5;85:21
313 (2)
39:16;133:9
318 (26)
7:15;26:22,24;39:17;
48:24;49:1,23;50:20;51:5,8,
12,13,15;54:9,23;55:2;
57:18;67:6;72:6;82:6,7;97:1;
101:19;102:2;112:3;113:11
31st (2)
42:20,24
324 (7)
133:4,8,16;146:22;148:18,
21,25
325 (9)
137:13,15,17;146:22;
148:18,21;149:2,3;196:5
35 (1)
117:21
362 (5)
145:11,12,14;146:22;
148:19
37.03.11 (1)
80:15
39 (2)
135:16;136:10
3rd (1)
164:18

4

4 (8)
80:23;108:24;150:21,24,
25;190:4;207:24;208:1
4/20/2022 (1)
7:17
4/21/2023 (2)
7:10,12
4:30 (1)
229:1
4:46 (1)
236:7
40 (1)
7:10
40.03 (2)
209:1,5
400,000 (2)
62:9;128:24
42 (1)
7:12
48 (1)
7:15
49 (5)
162:5,6;165:25;213:21,22

5

5 (9)
80:23;83:13,14,14;100:25;
109:1;208:2,3,4
5,000 (1)
90:24
50 (2)
213:21,24
51 (1)
7:15
57 (1)
7:17
59 (3)
7:10,12,17
5th (5)
38:16;122:25;172:7;
173:10;227:11

6

6 (9)
49:19;50:19,20;51:4;
97:17;109:5;112:13;231:11;
232:4
600 (2)
26:16,19
604 (2)
26:16,20
63,000 (1)
85:10
63,645 (7)
76:15;83:16,22;85:2,15,
19;87:1
65 (1)
7:20

7

7:30 (1)
235:24
700 (1)
26:20
700,000 (2)
56:1,17
703 (1)
26:21
75,000 (9)
42:25;43:3;52:5,21;55:10,
12,16,23;56:16
75,200 (11)
52:7,12,24;54:25;76:20;
113:8,15,25;114:5,17;115:2
76 (1)
7:22

8

8:30 (1)
235:23
800 (2)
24:4,24
80s (1)
113:20
837 (1)
24:24

9

9 (8)
150:21;185:8,11;186:10,
15;191:16,17;209:1
9:00 (5)
235:22,25;236:1,2,4
90 (3)
50:25;112:10,16
900 (8)
24:7;25:7,12;28:9;40:24;
41:1,3,10
900s (2)
40:18,19
901 (7)
184:15,17,18;185:10,18,
22;186:9
907 (1)
202:21
90s (1)
111:23
914 (10)
7:20;65:9,11,13,21;66:15;
157:18,19,21;173:18
915 (12)
66:12;179:4,6,8,9,13,14,
25;180:14,21,23;190:6
916 (9)
179:4,7,19;180:3,15,21,23;
189:21;190:7
918 (4)
40:8,12,23;41:4
919 (2)
40:23;41:7
920 (1)
40:24
928 (6)
202:18,20;203:1;214:25;
215:4,5
929 (4)
80:12,14;207:15,18
940,000 (1)
58:2
941,000 (1)
74:14
941,400 (3)
74:12,14,19
97,700 (3)
58:13,19;74:17
99 (3)
51:1;112:10,16

BEFORE THE DEPARTMENT OF WATER RESOURCES

OF THE STATE OF IDAHO

IN THE MATTER OF DISTRIBUTION OF	**) DOCKET NO.**
WATER TO VARIOUS WATER RIGHTS	**) CM-DC-2010-001**
HELD BY OR FOR THE BENEFIT OF A&B	**)**
IRRIGATION DISTRICT, AMERICAN	**)**
FALLS RESERVOIR DISTRICT #2,	**)**
BURLEY IRRIGATION DISTRICT,	**)**
MILNER IRRIGATION DISTRICT,	**)**
MINIDOKA IRRIGATION DISTRICT,	**)**
NORTH SIDE CANAL COMPANY, AND	**)**
TWIN FALLS CANAL COMPANY	**)**
_____	**)**

BEFORE

HEARING OFFICER: GARY SPACKMAN

VOLUME II

Date: June 7, 2023, 9:02 a.m.

Location: Idaho Department of Water Resources
322 East Front Street, 6th Floor

REPORTED BY:

ANDREA L. CHECK, CSR No. 748, RPR, CRR

Notary Public

A P P E A R A N C E S

For the Idaho Department of Water Resources:
Office of the Attorney General
Idaho Department of Water Resources
BY MR. PETER A. WOOD, ESQ.
322 East Front Street, Suite 648
Boise, Idaho 83720-0098
pete.wood@idwr.idaho.gov

For the City of Pocatello:
Somach Simmons & Dunn, P.C.
BY MS. SARAH A. KLAHN, ESQ.
& MR. MAXIMILIAN C. BRICKER, ESQ.
1155 Canyon Boulevard, Suite 110
Boulder, Colorado 80302
mbricker@somachlaw.com

For the Cities of Bliss, Burley, Carey, Declo, Dietrich, Gooding, Hazelton, Heyburn, Jerome, Paul, Richfield, Rupert, Shoshone, and Wendell:
McHugh Bromley, PLLC
BY MR. CHRIS M. BROMLEY, ESQ.
& MS. CANDICE M. McHUGH, ESQ. (Remotely)
380 South 4th Street, Suite 103
Boise, Idaho 83702
cmchugh@mchughbromley.com

A P P E A R A N C E S (Continued)

For the Surface Water Coalition, Twin Falls Canal Company, North Side Canal Company, and Milner Irrigation District, A&B, Burley Irrigation District:

Marten Law
BY MR. JOHN K. SIMPSON, ESQ.
& MR. TRAVIS L. THOMPSON, ESQ.
101 South Capitol Boulevard, Suite 305
Boise, Idaho 83702
jsimpson@martenlaw.com
tthompson@martenlaw.com

For the Minidoka Irrigation District, AFRD#2:

Fletcher Law Office
BY MR. W. KENT FLETCHER, ESQ.
1200 Overland Avenue
Burley, Idaho 83318-0248
wkf@pmt.org

For the City of Idaho Falls:

Holden, Kidwell, Hahn & Crapo
BY MR. ROBERT L. HARRIS, ESQ.
1000 Riverwalk Drive, Suite 200
P.O. Box 50130
Idaho Falls, ID 83405
rharris@holdenlegal.com

A P P E A R A N C E S (Continued)

For Idaho Ground Water Appropriators, Inc.:
Racine Olson, PLLP
BY MR. THOMAS J. BUDGE, ESQ.
& MS. ELISHEVA M. PATTERSON, ESQ.
201 East Center Street
Pocatello, Idaho 83201
tj@racineolson.com
elisheva@racineolson.com

For Madison Ground Water District, Henry's Fork Ground Water District, Jefferson Clark Ground Water District:
Rigby, Andrus & Rigby Law, PLLC
BY MR. JERRY R. RIGBY, ESQ.
25 North 2nd East
Rexburg, Idaho 83440
jrigby@rex-law.com

For Bonneville-Jefferson Ground Water District:
Olsen Taggart, PLLC
BY MR. SKYLER C. JOHNS, ESQ.
P.O. Box 3005
Idaho Falls, Idaho 83403
sjohns@olsentaggart.com

A P P E A R A N C E S (Continued)

For Bingham Ground Water District:

Dylan Anderson Law
BY MR. DYLAN K. ANDERSON, ESQ.
P.O. Box 35
Rexburg, Idaho 83440
dylan@dylanandersonlaw.com

I N D E X

W I T N E S S E S

TESTIMONY OF JAY BARLOGI	PAGE
Direct Examination by Mr. Thompson	13
Cross-Examination by Mr. Bromley	24
Cross-Examination by Mr. Bricker	70
Cross-Examination by Mr. Budge	78
Cross-Examination by Mr. Anderson	99
Redirect Examination by Mr. Thompson	100
Recross-Examination by Mr. Budge	105
TESTIMONY OF GREGORY K. SULLIVAN	
Direct Examination by Ms. Klahn	111
Cross-Examination by Mr. Mr. Fletcher	198
Cross-Examination by Mr. Thompson	230
Cross-Examination by Mr. Budge	247
Redirect Examination by Ms. Klahn	253

I N D E X

E X H I B I T S

NO.		MARKED	RECEIVED
SWC			
1	-	***	23
1A	-	15	23
IDAHO FALLS, POCATELLO, AND COALITION OF CITIES			
332	-	***	48
334	-	***	49
337	-	***	69
338	-	***	48
347A	-	118	125
363	-	60	69
364	-	65	69
365	-	194	194
BINGHAM GROUND WATER DISTRICT			
400	- (Offer of Proof Only)	***	10

P R O C E E D I N G S

HEARING OFFICER: So we're recording. We have a new court reporter this morning.

Will you introduce yourself, please.

COURT REPORTER: My name is Andrea Check. Good morning.

HEARING OFFICER: I'm sorry, Andrea. I cut you off. Go ahead.

COURT REPORTER: I'm Andrea Check. Good morning.

HEARING OFFICER: All right. Thanks everybody. Let's see. We need to turn microphones on, and maybe I'll turn this one on. I think we just leave these on so that we don't have to worry.

And we have a number of participants who are listening in remotely. I -- because -- well, it shows Candice McHugh is on, at least for a time.

MS. McHUGH: Yes. I'll be here this morning.

HEARING OFFICER: Okay. Thank you, Candice.

All right. And as I scan the room, it looks like everyone else is here. We have at least one preliminary matter to address this morning, and that's an informal offer of proof that was presented or offered late yesterday.

And the offer of proof, Mr. Anderson, I understand, is that you want to have at least what's been marked as Exhibit 400 lodged in the record as an offer.

And this, at least, purports to be a report by Darryll Olsen regarding economic impacts surrounding water right, water supply restrictions.

And so I guess before I rule on this offer of proof, Surface Water Coalition, do you have any objection to this document being lodged but not being part of the record?

MR. FLETCHER: Well, it's my understanding it's being lodged for the purposes of the -- I think the term you used was "informal offer of proof"?

HEARING OFFICER: Yeah.

MR. FLETCHER: And for that purpose, I don't think we really have grounds for objection, but we would object to it being introduced as an exhibit.

HEARING OFFICER: So based on my review and the request for this document to be lodged as an offer of proof, I'll allow it to come in, not as an exhibit, but just as an offer of proof so that at least the document is there. And if there's -- the reviewing courts determine in some subsequent appeal that it should have been considered, then it won't have to come

back.

(Exhibit 400 received for offer of proof purposes only.)

HEARING OFFICER: Now, as part of this ruling, I guess, I think it's important to go back and just excerpt some of the prior decisions by the --

COURT REPORTER: Can you hang on for one second?

HEARING OFFICER: Sure.

COURT REPORTER: My machine just stopped.

HEARING OFFICER: I thought you were struggling with my inarticulate delivery.

COURT REPORTER: No. But I might need -- can we go off the record for one minute?

HEARING OFFICER: Sure. That would be fine.

(Break taken.)

HEARING OFFICER: Back on the record.

Thank you, Andrea.

Okay. Well, the court reporter has said that at least some of what was said she didn't capture, so let me see if I can rehabilitate.

So it's my understanding that there were actually two matters in front of me: One was a motion to reconsider my ruling that I would not accept evidence regarding the economic impacts of possible curtailment

resulting from the -- a delivery call and associated methodology order amendment and also an informal offer of proof.

And probably in the proper order of discussing in this matter, I ought to at least address the motion for reconsideration. And I'd just excerpted a couple of passages from the Clear Springs decision, Clear Springs Foods versus Spackman, issued in 2011 by the Idaho Supreme Court where the Court said that: "A delivery call cannot be denied on the grounds that curtailment of junior appropriators would result in substantial economic harm."

And then, further: "'Full economic development'" -- which was argued yesterday and referenced in the constitutional provisions -- "'Full economic development of underground water resources' does not mean that the groundwater appropriator who is producing the greater economic benefit or would suffer the greater economic loss is entitled to use of the groundwater when there is insufficient water for both the senior and junior appropriators. If that were the basis for allocating water in times of shortage, then water would be allocated among farmers based upon market prices and their respective crops and their expected yields."

And so from my perspective, this particular issue has been addressed by the courts previously. And, furthermore, it's not an issue that is part of the Methodology Order and the underlying facts that were considered in amending the Methodology Order.

So as a result, I'll again verbally deny the motion to reconsider, but I will allow the document to be -- the document marked as Exhibit 400 to be lodged in the -- or at least be lodged with the record but not part of the record if some reviewing tribunal wants to take this up and reverses my ruling on the presentation of evidence regarding economic harm and respective economic comparisons.

Okay.

MR. BAXTER: Director?

HEARING OFFICER: Yes?

MR. BAXTER: Could you turn your microphone on, please.

HEARING OFFICER: Oh, I'm sorry. Thank you. We've been on and off and on and off. Thank you.

Okay. Are there other matters we need to talk about this morning?

All right. We have a witness slated to be called. I think the next witness is Jay Barlogi.

Mr. Barlogi --

Is that correct, Mr. Thompson?

MR. THOMPSON: Yes.

HEARING OFFICER: Mr. Barlogi, if you'll come forward, please. If you'll raise your right hand.

JAY BARLOGI,

called as a witness by the Surface Water Coalition, having been first duly sworn to tell the truth relating to said cause, testified as follows:

HEARING OFFICER: Thank you. You may assume the seat of discomfort.

Mr. Thompson?

MR. THOMPSON: Thank you. Travis Thompson for A&B Irrigation District, et al.

DIRECT EXAMINATION

QUESTIONS BY MR. THOMPSON:

Q. Mr. Barlogi, can you please state and spell your name for the record.

A. Yeah, my name is Jay Barlogi. It's J-a-y, and the last name is B-a-r-l-o-g-i.

Q. And when did you start working for the Twin Falls Canal Company?

A. I started working in 1993.

Q. And what positions have you held since that time?

A. I started out as a ditch rider. I moved up to the East End watermaster, moved from there into the field supervisor position, and then moved from there into the general manager position.

Q. And if you could look behind you, I think there should be a binder of Surface Water Coalition exhibits.

A. Thank you.

Q. If I could have you look at Exhibit 1, please.

Can you generally describe that document for the record?

A. Yes. This is a document that I put together that is titled, "Direct Testimony of Jay Barlogi." It just kind of explains, more or less, how we operate at the Twin Falls Canal Company.

Q. And that's based upon your personal experience and work history with the company; is that correct?

A. Yes, sir.

Q. If you could turn to page 27 on that exhibit, please.

A. Okay. I'm there.

Q. And is there a graph that depicts Twin Falls Canal Company diversions 1988 through 2002?

A. Yes, sir.
Q. 2022. I'm sorry.
A. Yes, sir.
Q. And did you prepare that graph?
A. Yes, sir.
Q. What was the source of the data for that graph?
A. That source was Water District 1 accounting data.
Q. Director, if I might approach. I've got --
HEARING OFFICER: Yes.
MR. THOMPSON: -- a better copy marked as Exhibit 1A.
(Exhibit 1A marked.)
Q. (BY MR. THOMPSON) Jay, can you describe what's been marked as Exhibit 1A for the record, please.
A. Yes. This is a bar graph that I put together. This -- each bar represents an individual year from 1998 -- or from 1988, rather, through 2022. And these are our annual diversions from April 1st through October 31st of each of those years since 1988.
Q. And is that just a larger version of that graph contained in your pretrial testimony at page 27?
A. Yes, sir.
Q. Jay, since 2010, can you just generally

describe how the company delivers water to its shareholders?

A. Certainly. We do it pretty much the same way we always have. We divert water out of Milner Dam. We divert it through our Shoestring Canal down to Murtaugh Lake, which is a recharge -- or not a recharge, but a re-regulating reservoir within the system. It flows out of there into our Main Line Canal around the Hansen Butte, where it hits forks where it bifurcates into the High Line and the Low Line Canal that run all the way to the west end of our system and both expire at Deep Creek.

Off of all of those canals, the Shoestring, the Main Line, the High Line, and the Low Line, there are over 1,000 miles of smaller canals that come off of those larger waterways where we divert water to our shareholders out of over 4,000 different headgates that we measure. As those individuals call in-season and ask for their water to be turned on, our ditch riders take those calls every morning between 7:00 and 7:30, and then they go out and start delivering that water. They go to one meter at a time, measure the appropriate amount out of the gate, lock it up, and go on to the next gate.

Q. And how about your maintenance activities, can

you just generally describe what the company does to maintain its system?

A. Sure. Maintenance activities have really kind of got, I guess, two seasons. Certainly during the irrigation season our maintenance activities are different than they are during the nonirrigation season.

During the irrigation season we have crews out right now with several different mowing tractors mowing weeds along the edges of the canals. As you can imagine, this time of year the weeds are beginning to grow, the grass is beginning to grow. It's important that we maintain that weed and grass growth, as it occludes the channels, forces us to push harder to get the water through to the end.

We also have multiple excavators that spend much of their time this time of year cleaning canals and cleaning sediment out of the bottoms of canals. As we start irrigating -- preirrigating bean ground this time of year, the sediment ponds at the ends of the fields and many of our water quality projects are beginning to fill up or starting to fill up. So those excavators are out right now cleaning canals, making sure the water flows freely through those canals.

As you can imagine, this time of year, it's early in the season, as we bring the water level in the

canals up, there's a leak that shows up here and there, and the excavators are out making those repairs.

Moss growth is beginning to accumulate in the waterways now. Generally, in the middle of June we have to treat the main canals. But certainly throughout the month of June we're putting chemicals in, and we're eradicating moss out of the system before the moss chokes the system up to the point that we cannot shove the water through to those water users at the end.

That's pretty much the extent of the -- well, that's a lot of what we do, anyway, this time of year.

During the nonirrigation season -- we typically have at least a large project or two during the nonirrigation season that can be -- that could be new lining projects, it could be new water quality projects.

And then we also do a lot of work on the bottoms of the canals throughout the year. As you go through the course of the season, as you can imagine, the channel ends up with silt berms here and there that need to get cleaned out, and we need to make sure that the water flows really well through those main canal systems.

We also have an extensive concrete program. We have over 10,000 concrete structures on our system,

so it's really, really important that we replace those on a regular basis. We always say if we replace 100 of those a year, I could overturn our inventory of concrete structures once every 100 years. So we do in excess of 100 concrete structures a year and those concrete structures are --

COURT REPORTER: Mr. Barlogi, can you slow down just a little bit for me, please.

THE WITNESS: Sure.

Those concrete structures are typically measuring devices that we rehab or replace.

Several new ones come in every now and again as water deliveries have changed as the transition from gravity to sprinkler irrigation continues to be ongoing on the project.

Maintenance crews are also -- maintenance -- the maintenance foreman and the field supervisor are also spending a lot of time during the offseason out working with water users. As they put sprinkler systems in, we make sure that the way those sprinkler systems are installed works well with our system and doesn't create adverse impacts.

Q. (BY MR. THOMPSON) So do you have dedicated staff for both maintenance and then water delivery operations?

A. Yes, sir.
Q. And it's fair to say that there really is no offseason for what you do in the canal?
A. No. No, there's not. No.
Q. And can you generally describe any larger projects since 2010 that have been implemented to help canal operations?
A. Certainly. We have -- we have -- since 2010 and prior, we have an ongoing list of projects that we continue to try to identify and implement.
We've put in several different lining projects. We've done lining projects on the Low Line Canal, on the High Line Canal, on the Shoestring Canal.
We've done canal work in the bottom of the Main Line Canal. We've put in multiple different water quality facilities. We've put in several different new automated structures at the heads of some of these waterways, and a few of these have specific diversions within the canal system.
Somewhere around 2010, 2011, we built the Kinyon Pond on the far west end of the system. That's somewhat of a re-regulating reservoir down on the far end of the High Line Canal.
Q. And those projects, would you characterize as

just helping you provide a level of service and delivery to your shareholders as you always have?

A. Absolutely. Yeah. It's all in the interest of providing a high level of service to our water users while operating the system prudently.

Bear in mind, most of these activities are all centered around the total capacity of the canal system. And if the capacity gets compromised, then we're operating with more risk than we need to be operating with.

So we manage the weeds, we manage the moss, we manage the flow in these waterways so as not to put any additional pressure on the banks and cause possible seeps or possible canal breaks throughout the season.

So we do everything we can to provide a high level of service to our water users while operating the system prudently.

MR. THOMPSON: That's all the questions I have, Director. I'll turn Mr. Barlogi over for cross-examination.

Oh, yeah, those two exhibits I would offer, Exhibits 1 and 1A, into the record.

HEARING OFFICER: Any objection to the documents marked as Exhibits 1 and 1A?

The attorneys for the groundwater users have

had a chance to, apparently, review this written testimony of Jay Barlogi and are comfortable with the admission of this document?

MR. BROMLEY: Yes.

HEARING OFFICER: Mr. Budge?

MR. BUDGE: I'm comfortable with it generally, but there's one item of hearsay that I would like to have stricken from it. It's on page 22. And it's lines 17 through 20. And it says, "Somewhere in the archives of historical information about the Twin Falls Canal Company a state engineer was quoted as saying," and then there's a quote. So that component of the prefiled testimony I would move to be stricken; the rest of it I'm okay.

HEARING OFFICER: Mr. Thompson?

MR. THOMPSON: That's fine. I can ask Mr. Barlogi on redirect about that statement.

HEARING OFFICER: Okay. Well, normally, I'm reluctant to accept written testimony because I like to hear the testimony of the witness, but in the interest of time and recognizing that this hearing has been expedited and we're trying to finish as soon as possible, I'll allow testimony into the record with the qualification that the quoted material and the written testimony is excerpted or deleted out of the testimony.

And so with that qualification, I'll accept Exhibit 1 and Exhibit 1A into evidence.

(Exhibits 1 and 1A received.)

HEARING OFFICER: Mr. Budge.

MR. BUDGE: Just logistically, does that mean the Department will take the action of redacting that portion of the exhibit?

HEARING OFFICER: Well, at least right now, I'm anticipating that there might be further questions related to that language. So at least right now, I'll leave it there, and let's see where it goes, Mr. Budge. But please remind me as we go through their testimony, though. Thank you.

Okay. Mr. Bromley.

MR. BROMLEY: Thank you, Director. Chris Bromley on behalf of the Coalition of Cites.

Mr. Barlogi, I took your deposition in Twin Falls. And thank you for being here.

And I do want to say I appreciate both what the attorneys from Surface Water Coalition and Mr. Barlogi, Director, that they prepared the prefiled testimony. It's helped us speed this process up. I know, ordinarily, it's not something we would do, but in the interest of time, it is helpful. And Mr. Barlogi and I discussed all of these topics, really, at his

deposition. So when I read the prefiled testimony, it meshed with, you know, what we discussed at the deposition. So I appreciate that we were able to truncate that, so thank you.

HEARING OFFICER: Good. Thank you.

CROSS-EXAMINATION

QUESTIONS BY MR. BROMLEY:

Q. Okay. Mr. Barlogi, I'd like to talk first about Twin Falls Canal Company's shares. So according to your direct testimony, there are 202,690.93 outstanding shares; is that correct?

A. Yes, sir.

Q. Okay. But Twin Falls Canal Company delivers to fewer than 200,000 acres; isn't that correct?

A. Yes, sir.

Q. Okay. What's the current assessment for the company?

A. Current maintenance fees per share?

Q. Yes, sir.

A. It's $27.

Q. And how often does the company increase its assessments?

A. I would say as needed. I think this last assessment increase was last year. I think -- I don't

know. I would tell you as needed. I don't think we'd had an increase prior to that for four or five years.

Q. What was the prior assessment fee? Do you recall?

A. 26.

Q. Okay. Is that generally what it goes up by, a dollar or so?

A. Yes.

Q. Thank you.

You stated in your deposition that the company operates on a continuous flow; is that correct?

A. Yes.

Q. And you'd agree, however, that every acre within the project isn't irrigated every day; correct?

A. Yes.

Q. You also stated in your deposition that the company doesn't require its farmers to rotate water with one another; is that correct?

A. Yes.

Q. But if Twin Falls rotated, wouldn't you agree that the supply would be extended?

A. No.

Q. Why is that?

A. Well, you suggested that they should be rotating water between farmers.

Q. That's correct. And if I didn't ask that well in the question, that is the question, that having farmers rotate water with one another. So, you know, Farmer A is on a Monday; Farmer B is on a Tuesday. They rotate with one another. So water is moving from field to field.

Do you follow that?

A. I do. And I think you need to understand our project a little bit. One farmer has likely got a field of hay and a field of grain and a field of corn and a field of potatoes and sugar beets, and he rotates within his farm. And that farmer is generally using his water every day throughout the irrigation season. And he's rotating within his own farm. The next farmer has a very similar situation throughout the project.

So, no, they don't rotate between farm -- between farmers. They rotate within their farm.

Q. Correct. And you had said that farmers are not rotating with one another; so, you know, one farm is on, the next farm is off.

I'm asking you, wouldn't it extend the supply of water if Twin Falls Canal Company farmers were to rotate water with one another?

A. No.

Q. And why is that?

A. Well, I would say that on any given day, the diversion is meeting the needs of the farmers every day. So I don't know where there would be a place to rotate that water to.

Q. But not every acre is irrigated every day; correct?

A. Correct.

Q. So if demand is off on one field and demand is on on another field and farmers are rotating with one another, as we see in other parts of the state, it ought to reduce demand; correct?

A. Yeah. I suppose if there was a need to do that, but there is not a need to do that. Again, they rotate within their own farm to do that.

Q. Okay. How does the company track share ownership?

A. Well, it's tracked through the certificates. We have a program in the office, they call it "Magic," who attracts -- who owns all of the shares within the project. As land sells, folks come in, we change the names on the certificates and transfer those shares to the new owners. Water moves from one farm to another. The certificate is changed to reflect the new point of diversion, the new place of use.

Q. Is that important for the ditch riders to

know?

A. Absolutely. Of course.

Q. How does the company track changes in place of use for shares?

A. Well, if the place of use changes, we call that a transfer. There is a transfer policy, and those folks will come in, and they will apply for the transfer. That paperwork then goes to the watermasters first who can look through the paperwork and identify if that transfer and physically moving that water from one place to another is feasible, or does it present a capacity issue? Does it present a flooding issue? Does it present a measurement issue at the headgate?

And if it does, of course, he will put his suggestions in there that this is not a very good transfer; and if it doesn't, then he will sign off on it. And then it goes to the board of directors, who reviews the application, compares it to the transfer policy, and if it complies with all of the parameters of the transfer policy, then they will approve it. If it doesn't, then they do not approve it.

Q. Thank you.

At your deposition, we discussed the percentage increase in sprinklers from 2008 to present.

Do you recall that discussion?

A. I do.
Q. I'll try and do a better job of finishing my question, and look at you.
A. I'll do better as well.
Q. Thank you, Mr. Barlogi.
Okay. So when we were discussing on that point, do you still agree that, in 2008, the percentage of fields that were irrigated by sprinkler was about 25 percent?
A. Yeah. Yes, I do.
Q. Okay. And then in your deposition, we also talked, and I see it as well in your direct testimony, that you state the Twin Falls Canal Company is approximately 50 to 60 percent sprinkler irrigated now?
A. Yes.
Q. So if -- the company's approximately doubled the number of sprinklers on the project in the last 15 years; is that correct?
A. Certainly doubled the percentage, yes.
Q. Okay. And as for conversion to drip irrigation, which we talked about in your deposition, we were discussing a 400-acre field that's now lettuce; is that correct?
A. Well, I think it's multiple different fields, but I think there is about 400 acres of lettuce on the

project this year.

Q. Okay. So Mr. Barlogi, let's look at Exhibit 332.

All right. Are you there, Mr. Barlogi?

A. Yes, sir.

Q. Do you recognize this exhibit?

A. I do.

Q. Okay. This was an exhibit we talked about at your deposition. And my understanding of this exhibit is that it explains what the deliveries are year by year, month by month, and day by day; is that correct?

A. What the rate of deliveries are, yes.

Q. Thank you.

And I notice the way that this exhibit has now been put together, it's kind of out of order in the years, but we've got years from -- oh, let's see -- 1990 to, I think, about the present.

Is that what you see?

A. Yes.

Q. And so we can look at this -- and just to make it easy, we'll be on the first page. In the 1990 -- and I see -- and this was produced -- is yours produced in color?

A. Yes.

Q. Okay. Great.

So the blue represents three-quarters of a miner's inch -- is that correct? -- in 1990?

A. Yes, the .75 blue.

Q. Yes, sir.

And so in 1990, it was a delivery of .75, or three-quarters of a miner's inch, from the beginning to the end of the irrigation season; is that what that shows?

A. Yes.

Q. Thank you.

And so then in a year like 1992, just to keep it simple and we're on the same first page, the company started with a delivery of three-quarters of a miner's inch from April until May 3rd; correct?

A. Yes.

Q. And then shifted on May 4th to 0.625, which is the equivalent of five-eighths of a miner's inch; correct?

A. Yes.

Q. And then on May 18th through the rest of the season, the company then reduced to .5, which is half a miner's inch; correct?

A. Yes.

Q. Okay. And so we could go through that exhibit and look at all of these different years, but I don't

see a reason to do that.

The benefit of the exhibit, as I understood it, Mr. Barlogi, from the deposition, was this helps explain what the company was delivering to its farmers; true?

A. Yes.

Q. Thank you.

Okay. How much is the company delivering this season, today?

A. Currently, we are currently delivering three-quarters of an inch per share.

Q. Let's talk about cropping patterns.

Okay. What have you noticed, Mr. Barlogi, with cropping patterns over the last 15 years?

A. I think the main thing that we've noticed over the last 15 years has been related to the dairy industry. The dairy industry has moved into our area in a very big way, and so high-water-consumptive crops have moved in as the dairies are looking, constantly, for alfalfa and corn to feed the cows. So alfalfa and corn acres have increased significantly.

I would also add that with the sprinklers and the sprinkler ground continuing to convert from gravity to sprinkler has brought the potato market, I think, further into the project, historically.

I think currently there are significantly more potatoes grown on the project than there were historically.

Q. How many acres do you think are planted in alfalfa this year?

A. I wouldn't have any idea.

Q. How about corn?

A. No idea.

Q. How about potatoes?

A. No idea.

Q. But they've gone up, in your estimation?

A. Certainly.

Q. Okay. We talked in your deposition -- you were saying that there are farmers within Twin Falls Canal Company who are now getting five cuttings of hay; is that correct?

A. I think, again, they're trying to meet the demands of the dairy industry. So if they can get it, they will.

Q. And could you explain how that's possible?

A. Yeah, I can, to some extent. I'm not a farmer. I know that very often times as we get into the spring, the dairies have exhausted their supply of feed. So quite often you'll see a hay crop go off when it's not near as high as it used to be, but they'll move in

there with the green choppers, and they'll take off the crop really quick and get it to the dairy industry.

And you'll see the same kind of thing with that last cutting. So often the first and last cutting of those five cuttings aren't real big cuttings.

But, absolutely, the needs of the dairy industry drive the market.

Q. And what we talked about at your deposition was something I believe you were calling a "green chop."

So the hay, it's being cut, and it's being taken off the field almost immediately; is that correct?

A. Yes, sir.

Q. How long has that practice been going on?

A. Well, I would say that -- gosh, I don't know how long. It came in kind of with the dairies.

Q. And the former practice was to cut hay, you'd let it dry, you wouldn't irrigate the field. Eventually, it would get baled, picked up in some way, and then water would be put back on 7 to 10 to 14 days later; is that right?

A. Yes.

Q. And that's changed now with the dairy industry?

A. Yes.

Q. Okay. Do you know how many acres are getting

five cuttings of hay?

A. I do not.

Q. And I believe you understand that the Director is now using the ESP model and what's referred to as "transient" as opposed to "steady state"?

A. Yes.

Q. And that's changed the curtailment date. And currently we have a 1953 curtailment date to produce 75,200 acre-feet to Twin Falls.

Do you understand that?

A. Yes.

Q. Do you think it's reasonable to curtail groundwater rights junior to 1953 so some Twin Falls Canal Company farmers can get five cuttings of hay?

A. I guess I wouldn't prospect to what is reasonable.

Q. Do you think it's fair?

A. I guess I wouldn't argue fairness either.

Q. Let's talk about subdivisions, Mr. Barlogi.

And if you could turn to Exhibit 334.

All right. Do you recall this exhibit?

A. Yes, I do.

Q. We talked about it at your deposition, and you agreed with me that, based on what's shown in the graph, that Twin Falls County has grown by 19 percent since

2010. Correct?
A. Yes.
Q. Okay. And you also stated during your deposition, Mr. Barlogi, that, in your opinion, most of the growth has been in the cities; is that correct?
A. Yes.
Q. So as to subdivisions, wouldn't you agree that rooftops, sidewalks, driveways, patios, and roads can't be irrigated?
A. Yes.
Q. Let's look at Exhibit 171. So you'll need another binder.
A. I'm sorry. Did you say 171?
Q. I did, yes.
Are you on Exhibit 171?
A. I am.
Q. And what's the title of that exhibit?
A. "Estimate of Non-Irrigated Acres Within Twin Falls Canal Company Service Area."
Q. And I'll represent to you, Mr. Barlogi, this was a document that was made an exhibit in the 2008 hearing. It was prepared by SPF Water Engineering on behalf of the Idaho Ground Water Appropriators. And it was looking at exactly what it says in the title; nonirrigated acres.

MR. THOMPSON: Mr. Director, I'm just going to lodge an objection, I guess, to prior exhibits contained in the underlying record in this case. I think it's unduly repetitious to have to go through this again. We did this once, we don't need to go through every exhibit that's already been part of the record and what the Department has considered in developing the methodology.

MR. BROMLEY: If I may respond?

HEARING OFFICER: Sure.

MR. BROMLEY: Well, Director, you know, we heard from the Court that this is an ongoing delivery call. We have heard -- and I'll get to the point with Mr. Barlogi with some foundation -- that he has a belief that subdivisions require more water to be applied.

I'm not talking about specific acres, but we can certainly get to there, Step 1 requires that. But what I'm trying to get at is use of water within subdivisions with an exhibit that's in the record in this ongoing delivery call to establish foundation with Mr. Barlogi about his opinions that subdivisions use as much or more water than an irrigated field.

HEARING OFFICER: So let me understand, Mr. Thompson. This document titled "Estimate of Non-Irrigated Acres Within Twin Falls Canal Company Service Area" is a document that was previously

submitted in a delivery call proceeding for the Methodology Order?

MR. THOMPSON: It was submitted in the 2008 hearing considered by the hearing officer, Justice Schroeder, at that time, part of the record for that proceeding.

HEARING OFFICER: So your objection is that this document shouldn't come into the record because it's already previously been considered?

MR. THOMPSON: That would be my objection.

HEARING OFFICER: Okay. I'll overrule the objection. I don't see harm in this document being in the record again.

Mr. Bromley, go ahead.

MR. BROMLEY: Thank you, Director. It already is part of the record, and we're trying to make it easier by pulling documents that are, in our opinion, helpful.

Q. (BY MR. BROMLEY) So, Mr. Barlogi, let's look at page 36.

MR. THOMPSON: Chris, Bates stamp, please?

MR. BROMLEY: As far as I know, it's 36, Travis. I don't see a Bates stamp on it. I see, at the bottom of Exhibit 171, dash, page 36. And it's page 36 on the PDF, too.

Q. (BY MR. BROMLEY) Are you there, Mr. Barlogi?
A. I am.
Q. And when I look at this, I see what, you know, I would call a typical subdivision with curbed streets and cul-de-sacs and roads.
Is that what you see?
A. I do.
Q. I see at the bottom it's called out as "Figure 6, Urban Subdivision 3 (North Pointe)"?
A. [Witness nods head.]
Q. Okay. So we're on the same page, then.
So in your deposition and in your direct testimony you stated that subdivisions require the same amount of water or more.
Do you recall that testimony?
A. I do.
Q. Is this your opinion as to subdivisions, or has Twin Falls Canal Company done any studies to prove this?
A. I would say currently this is not an opinion, this is a fact. As I told you in the conversation we had last week, if you develop land within the City of Twin Falls, they require that you have a share per acre.
So what my company does is when a water user calls and orders his water on, I'm obligated to turn on

the amount of water that he has, which is a share per acre.

Q. Okay. So have you done any studies that show that use of water in subdivisions -- so looking, again, at this page 36 -- with many fewer acres that cannot be irrigated, as you agreed with me previously, due to rooftops, streets, sidewalks, and such -- what studies do you have that show that use of water in a subdivision is more intensive than on an irrigated farm?

A. I don't think canal company -- this canal company doesn't do that kind of study, no.

Q. Okay. Thank you.

So on page 27 of your direct testimony -- and then Mr. Thompson gave us -- I think it's now marked 1A --

MR. BROMLEY: Travis --

MR. THOMPSON: Yes.

MR. BROMLEY: -- is that right?

Q. (BY MR. BROMLEY) -- which is this graph that Mr. Thompson had marked as Exhibit 1A.

It's now a loose -- yeah, we don't need to go into the binder. Helpful to pull that out.

So looking at Exhibit 1A, it seems to be, in what you were saying, that the company diverts at a fairly consistent rate of 1.1 million acre-feet;

correct?

A. Yes.

Q. And so I'll just represent to you, Mr. Barlogi, that if the company's diverting 1.1 million acre-feet for irrigation of 190,000 acres, the volume of water that's available per acre -- just simple math division -- is approximately 5.8 acre-feet.

Would you accept that as correct?

A. Yes.

Q. Thanks.

So if a subdivision reduces the irrigated area by half and Twin Falls Canal Company farmers are using up to 5.8 acre-feet -- that's what we were just discussing -- you're saying subdivisions are using at least 11.6 acre-feet?

A. I'm saying that they are entitled to the same diversion rate.

No, they are not using that. No, that's not what I'm saying.

Q. So if the irrigated area is half -- let's start it this way, if a 40-acre field is taking 5.8 acre-feet of water, the subdivision has contracted that space by half due to hardening of acres, only half of those acres are receiving the same volume of water, which would be 11.86 acre-feet; correct?

A. Yes.
Q. Let's talk about return flows, Mr. Barlogi. So you stated in your direct testimony, and we also discussed in your deposition, the Twin Falls Canal Company tracks return flows; correct?
A. Yes.
Q. And I'd like to just talk about what that's made up of. So when the company is tracking return flows, does that include local runoff?
A. To some extent.
Q. How about coulees?
A. As they are a part of our system, yes.
Q. Okay. And what about the tributaries?
A. I assume you're talking about Rock Creek, and we do not monitor those, no.
Q. But if those were monitored and water was going into them off of the project, that would be something that would be part of a return flow?
A. We monitor the location where the system spills into the tributary, not the tributary.
Q. Great. Thank you.
So at your deposition, you said you spoke with Matt Anders about the company's return flows to the Snake River below Milner.
Do you recall that testimony?

A. Yes.
Q. And in your deposition, you stated that Twin Falls was returning a significant percentage of water.
Do you recall that testimony?
A. No, I'm going to argue your words. I don't believe I stated that we were returning a significant amount of water. I think I said in my testimony that a pie chart that we had seen suggested that we were, off of our return flows, spilling significantly more water than we feel that we are.
Q. Okay. And thank you for correcting me on that, Mr. Barlogi. That's what I also see in your testimony, that you were having a discussion with Mr. Anders about what, in your words, he was looking at as a significant percentage, and you were having a discussion with Mr. Anders about you didn't think it was that much?
A. Yes.
Q. Whatever it was that Mr. Anders was showing you?
A. [Witness nods head.]
Q. So is it true that Twin Falls is returning in excess of 150,000 acre-feet per season?
A. I don't know. I don't know that I've totaled

it per season.

Q. Okay. And I'll represent to you -- and testimony will come in later -- but would it surprise you that Twin Falls Canal Company is returning in excess of 300,000 acre-feet per irrigation season?

A. Yes, I don't believe that number.

Q. Okay. Do you know if the return flow information that you discussed with Mr. Anders was incorporated into the Methodology Order?

A. No, I don't believe it had anything to do with it.

Q. And how many power plants are within Twin Falls Canal Company's boundary?

A. I would -- I'm going to throw a number out there and tell you ten.

Q. What was the most recent power plant that was constructed?

A. The most recent one is the Midway Power Plant.

Q. Do you recall when that was built?

A. Yeah, I want to tell you 2005, '6, '7-ish.

Q. Okay. And let's turn to Exhibit 338.

MR. THOMPSON: Mr. Director, before we start, I will object to this exhibit. I can explain why if you'd like.

HEARING OFFICER: Okay. Well, it's a

preliminary objection. I'll allow counsel to try to lay a foundation, and then I'll anticipate an objection forthcoming.

Mr. Bromley?

MR. BROMLEY: It was a deposition exhibit. I'll work through this.

Q. (BY MR. BROMLEY) Mr. Barlogi, you recall this exhibit?

A. I do.

Q. And at your deposition, you discussed this exhibit with Mr. Johnson [sic]; correct?

A. Yes.

Q. Okay. And you highlighted the power revenue in yellow; correct?

A. Well, I highlighted what I understand to be the power revenue. Typically, when I look through these documents, I have my accountant beside me.

Q. So you're aware of what this document is? You understand the document?

A. No, not thoroughly.

Q. So the yellow that you highlighted, what did you highlight? We discussed this at your deposition that you were highlighting revenue that the company was realizing from hydropower generation; correct?

A. Yes, that was the attempt, but we struggled as

we went through it and as we highlighted, but that was the attempt.

Q. So what were the struggles?

A. Well, for example, you can see Twin Falls Energy Midway reimbursement. We're not certain that that was revenue or whether that was expense that came back as a result of costs incurred.

Q. And your counsel can clean this up, I suppose, on redirect. We've produced this exhibit previously.

The more water the Twin Falls Canal Company returns, the more power revenue the company will realize; correct?

A. You know, our three big producers are South Forks Hydro, Midway Power, and Lower Low Line. Those are power plants that we own or are partners in. Those are the meat of all the income.

As I told you, there are probably another seven other projects in the system. We don't receive royalties from all of them. Some of them we do. They are privately owned. They are much smaller plants. And, yes, they exist on the tail ends or the returns of those drains. And so, absolutely, if there's more water there, they produce more, which makes our -- I believe we receive about half a percent from a base value as royalty from those.

Q. Thank you.

MR. BROMLEY: I'll offer Exhibit 338.

HEARING OFFICER: Mr. Thompson?

MR. THOMPSON: Yeah, I'll just object to the relevance, I guess. The economic issue has already been addressed by the Director. You know, if we want to get profit and loss statements from every water user, we can certainly do that. It's beyond the scope of this proceeding. Mr. Barlogi testified to the fact that they do receive income from hydropower operations incidental to the irrigation deliveries. Putting this type of exhibit in the record is irrelevant.

HEARING OFFICER: Mr. Bromley?

MR. BROMLEY: It doesn't have anything to do with the economic benefit between how much revenue a groundwater user would realize if allowed to stay on versus the economic benefit that a surface water user realizes by being able to stay on. That's the economic issue that's being discussed at Clear Springs. It's not this.

HEARING OFFICER: Mr. Barlogi, is this document a document from Twin Falls Canal Company records?

THE WITNESS: This document is a document that was created by our accountant; and yes, this is -- comes

from us.

HEARING OFFICER: Mr. Thompson, I agree with Mr. Bromley. The purpose of this is not to compare economic benefits or detriments from possible curtailment. My understanding is the purpose of this document is at least to show that there may be some incentive for additional diversions of water not necessary for irrigation, and, as a result, I'll receive it into evidence.

So the document marked as Exhibit 338 is received into evidence.

(Exhibit 338 received.)

MR. BROMLEY: Thank you, Director. And before I go on to the next topic, let me go back and let's offer and admit the exhibits that we've discussed.

So we had Exhibit 332, which were the headgate deliveries. This was the colorful document that showed three-quarters, five-eighths, half-inch. Offer that for admission.

HEARING OFFICER: Any objection?

Hearing no objection, the document marked as Document 332 is received into evidence.

(Exhibit 332 received.)

MR. BROMLEY: The next one that we talked about was Exhibit 334, which was a population graph of

Twin Falls County, with Mr. Barlogi agreeing with what the graph shows, which is the county has grown by 19 percent since 2020. I would offer that into evidence.

HEARING OFFICER: Any objection?

MR. THOMPSON: Yeah, I'll object to this exhibit. There's no foundation.

MR. BROMLEY: Well, Director, it's a document that's sourced off the internet with what says census data. That's kind of the best that we can do. Mr. Barlogi didn't disagree with me that Twin Falls County has grown.

THE WITNESS: Can I offer a comment?

MR. BROMLEY: No.

HEARING OFFICER: I'll receive the document into evidence. So the document marked as Exhibit 334 is received into evidence.

(Exhibit 334 received.)

MR. BROMLEY: Okay. That brings me up to current, Director.

Q. (BY MR. BROMLEY) Mr. Barlogi, I'd like to talk about irrigated area. So at your deposition, you said you were familiar with government programs like CRP and CREP that pay farmers money to fallow the fields.

Do you recall that testimony?

A. I do.
Q. And you stated that -- in your deposition testimony -- that the company doesn't keep track of acres that are enrolled in these programs; correct?
A. Yes.
Q. Wouldn't it be helpful for the company to know which acres are enrolled in these programs?
A. I am somewhat of the opinion that there are no acres enrolled in those programs on our tract or we would be aware of them.
Q. Okay. But in your deposition, you said that the company doesn't keep track of these acres. I suppose that's a different question than: Are there acres like that enrolled within the tract?
A. Yeah, I suppose it's relative. If there are no acres enrolled, then, no, we don't keep track of them.
Q. So your opinion is there are no acres enrolled in CRP or CREP within your tract?
A. That is my opinion.
Q. Let's say, though, that there were acres enrolled in those programs within the company's irrigation boundary. Don't you think it would be worth knowing that you have fallowed acres within the tract?
A. Certainly, if there were.

Q. And at your deposition, we talked about your familiarity with farmers who irrigate a field for a year or two, and then idle that field in order to rebuild soil health.

Do you recall that testimony?

A. No, I do not. I do not recall talking about fields that laid idle for a couple of years.

Q. You're not familiar with farmers who irrigate a field for a number of years, take the crop off, and let the field rehabilitate itself through nature by not having a crop on it for a year?

A. I am not, no.

Q. Wouldn't it be helpful for the company to know which fields are idled?

MR. THOMPSON: Objection; asked and answered.

MR. BROMLEY: The question I asked was as to CRP and CREP. The question I'm asking now, Director, is as to idling the fields.

HEARING OFFICER: I'll allow the question.

THE WITNESS: Assuming there were fields idled, of course it would.

Q. (BY MR. BROMLEY) So an idled field or a field enrolled in CRP or CREP has no water demand; true?

A. Again, I have no familiarity with lands that are enrolled in CREP.

Q. But if a field is idled, it's not being irrigated, it doesn't have a water demand; correct?

A. It certainly doesn't have a crop water need, yes.

Q. Does Twin Falls Canal Company keep track of strip malls, big-box stores, and industrial parks that have been built within the project boundary?

A. We do not.

Q. And isn't it true that acres that are hardened for commercial and industrial developments have no water demand?

A. No, not completely.

Q. And what is the water demand?

A. Many and most of the commercial developments still have some green space around them that has a water demand.

Q. So a rooftop, a parking lot, sidewalks, they're not receiving water; correct?

A. No.

Q. Mr. Barlogi, it was discussed during your deposition that you're familiar with the Department's requirement and the methodology, which is referred to as "Step 1," that the company state annually how many acres it's irrigating.

Do you recall that?

A. I do.
Q. And in your deposition you stated you didn't know how many acres Twin Falls Canal Company's irrigating; correct?
A. Yes.
Q. At your deposition, Mr. Budge, on behalf of IGWA, provided you with copies of each letter that the company has sent to the Department over the years regarding the company's irrigated area for purposes of the Methodology Order.
Do you recall that line of questioning?
A. Yes.
Q. And Exhibit 337 -- if you could turn to that -- do you recognize those documents?
A. Yes.
Q. And those are the documents that you went through with Mr. Budge; correct?
A. Yes.
Q. So if Twin Falls Canal Company doesn't keep track of the number of acres that it's irrigating, how is it that the company can provide the Department with an accurate count of the number of acres that are being irrigated each year?
A. We are required to represent whether or not our acreage has changed by more than 5 percent every

year. 5 percent of 194,000 is nearly 10,000 acres. It's very easily -- easy to know that we have not changed anything to the tune of 10,000 acres. We very carefully monitor transfers in water that moves within the project.

There are changes, there is development there, but 10,000 acres equates to about 15 square miles. There's been development in our area, but there hasn't been anywhere close to that kind of development in our area.

Q. You told me, Mr. Barlogi, that you don't know how many acres the company is irrigating; correct?

A. Yes.

Q. At your deposition, Mr. Barlogi, I asked you what the company's goals are in the delivery call.

Do you recall that question?

A. Not that specifically, no.

Q. And your answer to my question, Mr. Barlogi, was that the company has no goals.

Do you recall that answer?

A. So I don't specifically remember that specific question.

Q. Okay. I'm going to hand you, Mr. Barlogi, your deposition transcript.

MR. BROMLEY: If I may?

HEARING OFFICER: Yes.

MR. BROMLEY: Thank you.

Q. (BY MR. BROMLEY) Okay. Mr. Barlogi, that is the unsealed -- now-unsealed copy of your deposition transcript. I'd ask you to turn to page 57.

Are you on page 57?

A. I am.

Q. Line 7, I'm going to read.

"What are the surface water -- actually, let me ask it this way: What are Twin Falls Canal Company's goals in this methodology proceeding that we're in?"

That's lines 7 through 10.

MR. THOMPSON: I'll object to that.

Are you reading the deposition, or are you making up the question as you go?

What does it say, Chris?

MR. BROMLEY: I'm reading the deposition, Travis. Do you have the deposition transcript in front of you?

MR. THOMPSON: You said "Surface Water Coalition."

MR. BROMLEY: Travis, do you want to read it with me right here?

MR. THOMPSON: You changed it. I'm just curious --

MR. BROMLEY: No, Travis. I'm reading what the deposition transcript says. Why don't you come here and look at it with me.

MR. THOMPSON: No, that's fine.

HEARING OFFICER: All right.

MR. THOMPSON: I thought you said "Twin Falls Canal Company."

HEARING OFFICER: So do we have --

MR. BROMLEY: Travis --

HEARING OFFICER: -- an objection?

COURT REPORTER: Hey, guys --

HEARING OFFICER: Do we have an objection?

MR. BROMLEY: Come read it.

Q. (BY MR. BROMLEY) Do you see, Mr. Barlogi -- Sorry, Director.

HEARING OFFICER: I'm assuming the purpose of these questions are to either to refresh the memory of the witness or to impeach the witness, one or the other.

MR. BROMLEY: One or the other.

HEARING OFFICER: So let's read directly from the deposition.

MR. BROMLEY: That's what I'm doing, Director.

HEARING OFFICER: Okay. I don't have it in front of me, so I'm just, again, reminding you.

Q. (BY MR. BROMLEY) So, Mr. Barlogi, let's look

at line 7, page 57. And let's read along.

"Question: Okay. That's fine. What are the surface water -- actually, let me ask it this way: What are Twin Falls Canal Company's goals in this methodology proceeding that we're in?"

Would you please read your answer on line 14?

A. On line 14, I said: "I don't believe we have any goals" --

Q. Thank you.

A. -- "I don't believe it's our work."

But that is not the question that you asked me.

Q. So the question I asked you are what are the goals of Twin Falls Canal Company, which is --

A. In the surface water delivery call, that's the question you asked me here today.

Q. I'm asking you what Twin Falls Canal Company's goals are in this proceeding.

You just stated to me that you did not recall me asking you that question.

A. Because you didn't ask me -- you asked me what are the Twin Falls Canal Company's goals in the Surface Water Coalition call -- or in the -- you didn't ask me the same question that's in my transcript.

Q. So let's ask you that same question again

that's in the transcript.

What are your goals?

A. We don't have any goals. The methodology is not our product.

Q. Okay. So since Twin Falls Canal Company has no goals in the delivery call and since Twin Falls Canal Company doesn't know how many acres it's irrigating, how is it reasonable for Twin Falls Canal Company to curtail groundwater rights?

MR. THOMPSON: Objection; argumentative.

HEARING OFFICER: This is cross-examination. I'll allow the question to stand.

THE WITNESS: Again, you said we don't have any -- in the delivery call -- we do have goals in the delivery call. This is the methodology. That's not the question that I answered. The question is related to the surface water delivery call.

Q. (BY MR. BROMLEY) I would say it's one and the same.

Let's move on to the --

A. I would disagree.

MR. FLETCHER: I object. That's not a question, that's a statement. This is getting argumentative.

HEARING OFFICER: Okay. Well, let's move on.

MR. BROMLEY: I was moving on, Director.

HEARING OFFICER: Good.

Q. (BY MR. BROMLEY) Mr. Barlogi, I'd like to talk about Murtaugh Lake. You had mentioned that in your direct testimony again, with Counsel, this morning about how the system works.

Do you recall talking about Murtaugh Lake in your deposition?

A. I do.

Q. And you mentioned this morning -- you called it a "re-regulating reservoir." You also mentioned that -- some "recharge."

So when did Twin Falls Canal Company begin recharging in Murtaugh Lake?

A. So I'm going to guess. I think -- I think last year was, I want to tell you, maybe our eighth or ninth year of recharge. So I would say somewhere around, yeah, 2015-ish.

Q. Okay. So after we talked at your deposition, I went back and looked at the water right records of the Department just to see what the water right was that was going to go along with this recharge project. And what I found was a filing in 2020 that's numbered 45-14537. And that's an application filed by the company for recharge.

Does that sound about right?
A. Yeah. That's over my head. I don't --
Q. So let me hand you, Mr. Barlogi --
MR. BROMLEY: Director, if I might?
HEARING OFFICER: Yes.
MR. BROMLEY: So I think we're at Exhibit 363. Andrea, is that --
MS. KLAHN: 362.
MR. BROMLEY: 362?
MS. KLAHN: I don't think that -- yeah.
MR. BROMLEY: Okay. That one was -- you attempted to --
MS. KLAHN: Yeah, it wasn't in.
MR. BROMLEY: Okay. Should we mark this 362, then?
Let me mark this as 363.
(Discussion off the record.)
(Exhibit 363 marked.)
Q. (BY MR. BROMLEY) Just take a moment to familiarize yourself with that document, Mr. Barlogi.
A. Okay.
Q. All right. So I see when I look at this that it's an application for groundwater recharge. I see that in line 5.
Do you see that?

A. Yes.
Q. Okay. And it's from a source of Dry Creek, a tributary to the Snake River, in line 3?
A. Yes.
Q. Okay. And is this what we were talking about? This is likely the recharge right that you're using?
A. I think this recharge right came into play with it. I think we used Idaho Water Resource Board water right to recharge with.
Q. Okay. It's a document you filed with the Department for recharge, though; correct?
A. Yes.
Q. And I see on page 2 that you signed it?
A. Yes.
Q. That's your signature?
Do you know how much water is lost to seepage at Murtaugh?
A. I do not, off the top of my head, no. I mean, it is -- it is accounted for every year with the Idaho Water Resource Board recharge program.
Q. Okay. And I know, from experience with the board, that they're pretty particular about where they recharge. So I would assume it's probably a good amount that's lost, do you think?
A. Yeah, I think it's significant or they

wouldn't support it.

Q. So I see Dry Creek is listed as the source for this right; correct?

A. Yes.

Q. And I looked on a map, because I wasn't real familiar with the area, but what I was seeming to see is it looks like there's another source that comes in which is called Big Cottonwood Creek?

A. News to me.

Q. Okay. Yeah, the map had something coming in called Big Cottonwood Creek. If you don't know about it, I don't either.

Okay. And at your deposition, Mr. Barlogi, you said that since you've been recharging and when Twin Falls turns on for the irrigation season, you haven't had to fill Murtaugh in some years.

Do you recall that?

A. Yes.

Q. So Murtaugh, then, is -- it's filling with water from Dry Creek, some of that water is for irrigation, but then because Murtaugh Lake is filled when the irrigation season is starting in some of those years, that Dry Creek water is being used for irrigation; correct?

A. Yeah, I suppose so.

Q. There isn't a bypass channel around Murtaugh Lake from Dry Creek, is there?

A. No.

Q. So let's turn to page 2 of this document.

And I see in line 11, you say "see Attachment A" in a few places; and line 12, you see "Attachment A" in a few places.

Do you see that?

A. I do.

Q. Great.

So then when I go into Attachment A, and I go to the page that has some -- it's the second page in, so the first page of Attachment A looks like a legal description table. And then the second page, I see No. 10, "Supplemental Information," "11a & c, Supplemental Information."

Do you see that?

It would be on page 4 of the paper.

Yeah, there you go.

A. Okay.

Q. So in "11a & c Supplemental Information," three lines down, I see that it stated, "Twin Falls Canal Company as part of Carey Act filing 1900 that allowed for construction of these facilities."

Do you see that?

A. Yes, 11a & c.
Q. And then the page after that, there's a map of Murtaugh Lake; is that what that is?
A. Yes.
Q. And then the page after that, I see a document that's called "Contract."
Do you see that?
A. Yes.
Q. Okay. And this was attached by you to this document seeking a recharge water right at Dry Creek.
So on the -- and read to me what it says at the top of that document.
A. Of the contract?
Q. Yes.
A. It says: "Between State Board of Land Commissioners and Twin Falls Land & Water Company dated January 2nd, 1903."
Q. Thank you.
So I see a few headings on this first page. And then when I turn to the second page, I see some more headings -- the "Price of Water Rights" is one, "Water Right Dedicated" is another -- and I'd like to talk about the "Water Right Dedicated" piece.
And because that's pretty small font -- my eyes are getting worse the more of these that I do -- I

made a copy of -- trying to increase this so that people can read it.

HEARING OFFICER: So, Mr. Bromley, I'm trying to manage time a little closer today. How much longer do you have with Mr. Barlogi?

MR. BROMLEY: This is my last set of questions.

HEARING OFFICER: Okay. All right. Great.

MR. BROMLEY: Just five minutes, maybe.

HEARING OFFICER: Great.

(Exhibit 364 marked.)

Q. (BY MR. BROMLEY) Okay. Do you have Exhibit 364, Mr. Barlogi?

A. I do.

Q. Is that easier to read?

A. Yes.

Q. It is for me, too.

So let's look at this "Water Right Dedicated," and let's break it into parts. So starting at the word "Ninth."

Do you see that?

A. I do.

Q. And then from "Ninth" there's a colon, and then there's another colon after the word "to-wit."

Do you see that?

A. Yes.

Q. Okay. So at that second colon right after "to-wit," let's read from there. So starting with "One eightieth."

A. Okay.

Q. And would you read starting at "One eightieth"?

A. [As read] "One eightieth of a second foot allotted to each acre represented thereby, and carrying capacity of the canal sufficient thereof."

Q. Okay. So I'll represent to you that one eightieth of a cfs is the equivalent of five-eighths of a miner's inch.

So right after, then, you ended at "therefor." That was a perfect place to stop. Would you read from "the water to be delivered"?

A. "The water to be delivered from the canal during each and every irrigation season, said amount to be measured at or within one half-mile of the place of intended use in such quantities and at such times as the condition of the soil, crops and weather may determine but according to such rules and regulations based upon a system of distribution of water to the irrigators in turn and by rotation as will be best" -- "as will best protect and serve the interests of all users of water

from this canal system."

Q. Okay. And then read that last sentence, and that's the last of it I'd like you to read.

A. "It is agreed that said system of distribution by rotation shall be devised by the said party of the second part and used by it during the period while it retains the management of said system, and that it shall meet the approval of the State Engineer."

Q. Okay. Thank you, Mr. Barlogi.

So is the company measuring from one half -- or I should say at or within a half-mile of the place of intended use? Is that where you measure?

A. Yeah. Yeah. I would say by and large, yes, almost exclusively, yes.

Q. Great.

And then as to this system of rotation that you've stated and that you read in the last sentence, the company is not rotating; correct?

A. Well, I believe we are rotating. I would say this document was prepared in 1902. In 1902, a typical farm was 40 or 80 acres. That's not the case anymore. These farmers have all bought up the neighbors' farms and bought up the neighbors' farms to where the typical farm is now 800, 1,000 acres of those farms that, historically, per this document, were 40-acre farms, and

they are now rotating amongst all of those 40-acre farms. But it does all exist within one farm.

Q. And when we looked at -- well, let me say it this way: When we started at the beginning, maybe a little ways in, when I asked you how much water Twin Falls Canal Company is delivering this season, you said three-quarters of an inch; correct?

A. Yes.

Q. That's more than five-eighths?

A. Yes. I would also suggest that the time that this document was prepared, the system was envisioned to encompass 240,000 acres. That didn't come into fruition, but that's what we were decreed for, was the water for the 240,000. Since then we are down to 194; so, arguably, there's some balance there between five-eighths and three-quarters.

MR. BROMLEY: We could have some further discussion about the contract, but I'm going to leave it there, Director.

I would then move for the admission of these last two exhibits that we've discussed --

363 and 364, Andrea?

HEARING OFFICER: Any objection to the admission of these documents?

The documents marked as -- and, again, correct

me -- 363, is that correct, and 364, Mr. Bromley?

MR. BROMLEY: That is correct, Director.

HEARING OFFICER: -- are received into evidence.

(Exhibits 363 and 364 received.)

MR. BROMLEY: And then the one other one that I have on my list, just to clean up, is 337.

These were the letters, Mr. Barlogi, that we looked at that your counsel has sent in to the Department over the years as the irrigated area under Step 1 of the Methodology Order.

Director, I would offer those at this time.

HEARING OFFICER: Any objection to the admission of these documents?

Okay. The documents or document marked as Exhibit 337 is received into evidence.

(Exhibit 337 received.)

MR. BROMLEY: I have nothing further. Thank you.

HEARING OFFICER: Thank you, Mr. Bromley.

MR. BROMLEY: Thank you, Mr. Barlogi.

HEARING OFFICER: Let's break for 15 minutes. Let's come back at five to the hour.

(Break taken.)

HEARING OFFICER: We're back recording.

Okay. Next examiner, Mr. Bricker. Go ahead.

MR. BRICKER: Thank you, Director.

CROSS-EXAMINATION

QUESTIONS BY MR. BRICKER:

Q. Hello, Mr. Barlogi.

A. Hello.

Q. Nice to meet you -- or to see you in person.

I want to begin with some return flows. So does Twin Falls Canal Company track the entirety of its diversions that return to the Snake River above ground surface; in other words, spill back into the river?

A. Yes, in a manner of speaking.

Q. And the amount of the company's spills haven't significantly changed since 2010, have they?

A. No.

Q. Now, if the company were to take measures to reduce the amount of spills, thus, using that water before it leaves the system, couldn't the company thereby reduce its diversions?

A. Well, I think we do take measures to limit the amount of water that goes over those spills to the best extent possible. Operational spill is required at the ends of all of those laterals.

Q. Are there further measures that could be taken

to reduce them further?

A. If there are and we haven't already undertaken those measures, it's because we haven't identified them yet, and we certainly would if we saw them. We do everything we can to minimize the amount of spill.

Q. Fair enough.

All right. Does Twin Falls Canal Company want the Fifth Methodology Order to accurately represent its reasonable in-season demands?

A. Well, certainly, I would think so.

Q. Can we pull up Exhibit 1, that's your prefiled testimony. And while we're at it, also Exhibit 300, which is the Fifth Methodology Order.

So beginning with your prefiled testimony, can you please turn to page 27 of Exhibit 1.

A. Okay.

Q. On lines 8 to 14 therein, you state that the company's diversions have stayed around 1,100,000 acre-feet per year over the last 30 years; right?

A. Yes.

Q. But that's not consistent with the data presented in the Fifth Methodology Order on page 12, is it?

MR. THOMPSON: I guess I'll object to the form

of the question as those two pieces of information representing the same time periods. I don't think they do.

HEARING OFFICER: Well, I'll at least sustain the objection.

Mr. Bricker, just asking for more foundation, looking at the information in the Methodology Order.

MR. BRICKER: Sure.

Q. (BY MR. BRICKER) So isn't it true that the company's diversions from 2000 to 2021 averaged 1,062,098 acre-feet?

A. I assume so. I haven't done that math myself, but that's what the document says.

Q. And that number is, roughly, 38,000 acre-feet less than what you claim the company's annual diversions to be around?

A. No, I don't believe that's accurate. I believe I clearly state that it is right around 1.1 million. Some years a little less; some years a little more.

Q. Okay. But the Fifth Methodology Order states that the average diversions are 1,062,098 acre-feet?

A. Okay.

Q. Thank you.

Now, isn't it true that the Department uses

the company's 2018 diversions as the baseline in predicting the company's reasonable in-season demands?

A. You've got to restate that. Say it again.

Q. Isn't it true that the Department uses the company's 2018 diversions as the baseline for the company's reasonable in-season demand?

A. I believe that's accurate.

Q. Isn't it true, on page 12, that the company's baseline year demand under the Fifth Methodology is 1,121,717 acre-feet?

A. That's what it says in the book, yes.

MR. BRICKER: Can we pull up Exhibit 306, please.

Q. (BY MR. BRICKER) Do you have it?

A. Yes, sir.

Q. Also on page 12, please.

Isn't it true that the company's baseline year demands under the Fourth Methodology Order were quantified as 1,060,011 acre-feet?

A. Yes, sir.

Q. Isn't it also true that the company's baseline year demands under the Second Methodology Order were quantified as 1,045,382 acre-feet?

MR. BRICKER: And I realize this is not in an exhibit before us, but I would ask the Director to take

official notice of that Second Methodology Order.

HEARING OFFICER: I don't have it in front of me, Mr. Bricker. It certainly is part of the record. So whatever numbers are there, you know, I'll review if there's a need to do it.

Q. (BY MR. BRICKER) Well, I will represent to you that under the Second Methodology Order Twin Falls Canal Company's baseline year demands were quantified as 1,045,382 acre-feet.

Do you have any reason to deny that?

A. No.

Q. So isn't it true that the Department has increased Twin Falls Canal Company's baseline year demand by over 76,000 acre-feet since the Second Methodology Order?

I can read the numbers to you again if you'd like.

A. Well, I mean, I'll agree. That is somewhere around where the difference between those two numbers is, yes.

Q. Great. And the Department -- excuse me. Let's turn to Exhibit 301, page 3.

Isn't it true that the Department is predicting a shortfall for Twin Falls Canal Company in the magnitude of 75,200 acre-feet in 2023?

A. Yes.
Q. Isn't it also true that under the Second Methodology Order there would not be a shortfall predicted in this year, assuming that same baseline year demand?
A. I assume so. I have not done that math, I guess. I assume so.
Q. Great. Now, you've stated in your deposition that everything Twin Falls Canal Company does is in the interest of efficiency; is that correct?
A. Yes.
Q. And you've also stated that Twin Falls Canal Company's operations have absolutely become more efficient in the last two decades; correct?
A. Yes.
Q. And that's because the company has undertaken many projects, including lining canals and implementing automation into its operations; right?
A. Yes. Among other things.
Q. Turn back to Exhibit 300, please.
And I don't know if it's possible, but could you also have Exhibit 306 side by side?
MR. WOOD: What is the one that you want?
MR. BRICKER: Exhibit 300 and Exhibit 306.
MR. WOOD: What page?

MR. BRICKER: Page 14 in both.
MR. WOOD: Page 14?
MR. BRICKER: Correct, in both.
MR. WOOD: So here will be 306.
Q. (BY MR. BRICKER) Have you got those, Mr. Barlogi?
A. I do.
Q. Okay. So isn't it true that your assertion that Twin Falls Canal Company's project efficiencies have increased is not consistent with the difference between Twin Falls Canal Company's project efficiencies shown in the Fourth Methodology Order and the Fifth?
A. No, I don't, necessarily, believe that is true.
Q. If you look at those two tables, is Twin Falls Canal Company's project efficiency .35 in both?
A. Yes, it is.
Q. Thank you.
As we discussed a few minutes ago, the Department has predicted that the canal company will experience a shortfall in 2023; correct?
A. Yes.
Q. And the Department has predicted shortfalls in past years as well; correct?
A. Yes.

Q. Now, in your deposition, isn't it true you stated that it is not common for Twin Falls Canal Company shareholders to forgo planting crops because of a lack of water supply?

A. Yeah, I don't know if I said it quite that way or not. I would say that, typically, we have -- in my lifetime at the canal company, we have had more good water years than bad ones.

So, yeah, certainly. Typically, they don't forgo planting the crops that they would like to plant because, typically, we have a decent water supply.

Q. And, similarly, you've stated that you are not familiar with crops perishing within the canal company's project area because of inadequate water supply; correct?

A. No, I'm not.

Q. Could you turn to Exhibit 314, please. That's going to be page 224.

A. Okay.

Q. Do you see line 18 says, "I'm not familiar with crops perishing"?

A. Yes.

Q. Thank you. A few more questions.

You have stated that you haven't experienced Twin Falls Canal Company shareholders idling their land;

correct?

A. Yes.

Q. You also stated that there's typically a zero percent change in TFCC's irrigated acreage; correct?

A. Yes.

Q. So that must mean that the company must be -- the project area of the company must be planted wall to wall, then, each year; right?

A. No.

Q. Can the company ascertain when certain lands are not irrigated in a given year?

A. Well, certainly, I think -- I think we would know, yes.

MR. BRICKER: Thank you.

No further questions, Director.

HEARING OFFICER: Okay. Thank you, Mr. Bricker.

Further questions, Mr. Budge?

MR. BUDGE: Thank you, Director.

CROSS-EXAMINATION

QUESTIONS BY MR. BUDGE:

Q. And thank you, Mr. Barlogi, for being here today.

Do you mind if I call you "Jay"?

A. No, that's fine.

Q. Jay, I'm going to try to avoid duplicating other questions you've been asked, but I do have a little overlap just because I want to clarify a few items.

First, you testified earlier about different delivery rates of the company, three-quarters of an inch per share and five-eighths-inch delivery.

I just want to clarify, that's per share of stock?

A. Yes.

Q. Twin Falls Canal Company does not deliver water on a per-acre basis; it's a per-share basis?

A. Yes.

Q. And I understand from your direct testimony, there's 202,690 total outstanding shares in the company?

A. Yes.

Q. And if we've got somewhere between 180- and 194,000 irrigated acres, we end up with somewhere around 1.1 share per acre on average?

A. Okay.

Q. In your prefiled testimony, you discussed the challenges that development is causing for your company, specifically the changes of farmland from ag into

residential, commercial, and industrial use.

Do you remember that part of your testimony?

A. Yes.

Q. This is something I'm sure you've witnessed firsthand during your time with the company?

A. Yes.

Q. And you're personally familiar with farmland that used to be irrigated that now has got commercial or industrial development on it?

A. Of course.

Q. Has this transition happened relatively continuously during your time with the company?

A. No -- well, yes, at some level there's always been something going on. Certainly, in the earlier years very little. In the last couple of years, as the economy has been so fluid, a lot more.

Q. Okay. So probably fair to say it's accelerated in the last decade or so?

A. Fair.

Q. I understand Twin Falls Canal Company has three irrigation water rights. The water right numbers on file with the Department are 1-209, 1-4, and 1-10.

Are you familiar with those water right numbers?

A. No, I'm not.

Q. Maybe what I'll have you do, Jay, is turn briefly to Exhibit 184.

A. Okay.

Q. And you can take a moment just to briefly review that document and the attachments.

Jay, have you had a chance to review that?

A. Yeah, briefly.

Q. That's a document filed in the Snake River Basin Adjudication. There's a joint stipulation to withdraw objections, and then there's some water right recommendations for Water Right Nos. 1-4, 1-10, and 1-209.

A. Okay.

Q. Do you recognize those as Twin Falls Canal Company's irrigation water rights from the Snake River?

A. These are our natural flow water rights from the Snake River, yes.

Q. Okay. And you understand that, collectively, those three water rights authorize the irrigation of 196,162 acres?

A. No, I don't know that, but...

Q. Okay. If you'll look at the second page of the exhibit, which is part of the stipulation, there's paragraph 3(a), and it reads, "Evidence relating to water right use after November 19th, 1987, was not at

issue in the adjudication. These water rights are decreed in the Snake River Basin Adjudication based on the extent of beneficial use that existed prior to or at the time of the commencement of the Adjudication on November 19th, 1987.

Do you see that?

A. I do.

Q. Do you understand that the decrees issued by the SRBA are based on the extent of irrigation in 1987?

A. Yes.

Q. And you would agree that there's been a significant number of acres removed from irrigation since that time?

A. No -- well, yes, significant is somewhat relative, but I would say that certainly for some of these industrial complexes, they retained 25 percent of their water shares, and the other 25 -- or the other 75 percent were transferred to otherwise drylands.

Q. Okay. So as development has occurred, some land has been taken out of production, and some shares have been transferred to other farmers?

A. Yes.

Q. I understand.

I think you went over some of this with Mr. Bromley, but I just wanted to make sure it's clear

for me in the record. Twin Falls Canal Company does not maintain a record of the number of irrigated acres that it delivers water to annually?

A. No.

Q. So when farmland is developed or removed from production, there's not some book or other database that the company maintains to, you know, reflect that land being taken out of production?

A. Say that again, TJ.

Q. When farmland is developed and taken out of production, the company doesn't maintain any type of database where it keeps track of that land being taken out of production?

A. You know, I would suggest that some of that is likely in the Magic program that I talked about before. I'm not intimately familiar with the Magic program, but I do know that, you know, section-township-range information is there. So if we transfer water from one area to another, that certificate reflects that new section, township, and range. I believe you will find that in the Magic program as well.

Q. So you've got something that shows that -- if shares move from one delivery point to another?

A. Certainly, we track the shares.

Q. But you're not tracking the acres being taken

out of production?
A. No.
Q. Some Surface Water Coalition members maintain a GIS shapefile that they update annually with irrigated acres. That's not something that Twin Falls Canal Company does?
A. No.
Q. If you could turn to Exhibit 300 -- that's the Fifth Methodology Order -- and when you get there, flip to page 9.
A. Okay.
Q. Jay, have you read the Fifth Methodology Order before?
A. Yes.
Q. On page 9, there's a heading near the bottom titled "Irrigation Practices"?
A. Yes.
Q. And below that, there's a paragraph 19 referring to the baseline year, and it says, "A baseline year must be recent enough to represent current irrigation practices. Current conditions should be represented by (a) the net area of irrigated crops," and then I won't read the rest.
Do you understand that the methodology utilizes irrigated acreage to calculate water demand for

Twin Falls Canal Company?

A. Yes.

Q. You understand that if Twin Falls Canal Company reports to the Department more irrigated acres than are actually irrigated, then the methodology will calculate more water demand than if the correct number of acres were used?

A. Yes.

Q. And that this will result, in turn, in additional curtailment of groundwater users or additional mitigation being required of groundwater users?

A. Yes.

Q. So you understand that having -- the Department having accurate acreage figures is very important to ensure that the Department does not impose excess curtailment?

A. Yes, I do.

Q. Okay. And you understand that groundwater users don't have access to Twin Falls Canal Company's water delivery database?

A. Yes.

Q. Okay. So you understand that groundwater users have to trust that Twin Falls Canal Company will provide accurate acreage data to the Department?

A. Yes.
Q. And I believe you testified earlier that you don't think the irrigated acres within Twin Falls Canal has varied by more than 5 percent since the 2013 figure?
A. Yes.
Q. But there's not a mechanism in place to track total irrigated acres with the company?
A. No.
Q. So in the future if it exceeds that threshold, the company won't really know when that happens?
A. Well, I disagree with that. I believe we would know. It's a large enough number that we certainly would know. The reason we haven't created shapefiles in recent years is because we know for certain that we are within the 5 percent very, very easily.
Q. And how do you know that for certain?
A. Again, as I represented earlier, 5 percent of 194,000 is nearly 10,000 acres, nearly 15 square miles. Nothing close to that has happened.
Q. Let me reference -- I'm going to switch gears here and reference a portion of your prefiled testimony that talks about crops grown within the company's service area.
And you mentioned there's wheat, barley,

alfalfa, sugar beets, potatoes, dry beans, and corn.
I assume those are the primary crops?
A. Yes.
Q. Anything else would be on a small scale?
A. I'm sorry, I wasn't tracking everything that you said.
Q. Yeah. There may be some other greenhouse-type crops or something grown, but they would be very small?
A. Yes.
Q. What's your best estimate as to the percentage of the company's service area, on average, that's used to grow wheat and barley?
A. I don't have any idea.
Q. Is it a significant portion?
A. Yeah, yeah, I would say so.
Q. And I'm not a farmer, but I understand those crops are typically harvested in early August?
A. Yeah, I'm not a farmer either, but, yeah, I think you're right.
Q. And so when those crops are harvested, there would be a drop in irrigating acreage within the company's service area?
A. Not necessarily.
Q. Do those acres that were growing barley and wheat continue to be irrigated after they're harvested?

A. To some extent they do. A lot of times, the guys will irrigate the stubble to assist in the soil health to help the stubble break down. In recent years, we've seen some double cropping going on on the project. Furthermore, those acres that were under barley, that water has probably now been moved off of those acres and rotated around to the sugar beet crop or to the alfalfa crop or to the corn crop.

Q. Is it fair to say that the amount of irrigation that was occurring -- that occurs on wheat and barley acres declines on those acres collectively after those crops are harvested?

A. Yeah, I would say after a period of time, you know. Commonly during that time of year, every crop out there is needing water. So when the grain crops are done, it's very, very common for two or three weeks to see water users attempt to get caught up in areas where they were behind.

Once they begin to get caught up, if they had enough grain on their farm, you will see them reduce their delivery.

Q. And you explained earlier that the company doesn't do rotations, but individual stockholders can rotate their water supplies among their different fields on their farm?

A. Yes.
Q. Do most farmers take their diversion rate continuously through the irrigation system but have that type of rotating you discussed earlier?
A. Yes, more or less.
Q. And I understood from your deposition that the company, typically, delivers water from mid-April to mid-October?
A. We, typically, have water available for delivery from mid-April through mid-October, yes.
Q. And I understood from your deposition testimony that stockholders tell you in the spring when they're ready to turn on, and they tell you in the fall when they're ready to turn off?
A. Yes.
Q. I understand that Twin Falls Canal's water supply depends primarily on natural flow?
A. Yes.
Q. And when natural flow is sufficient to divert the full authorized diversion rate, I assume the company's going to take its full rate?
A. Well, likely. Likely -- I say that because, you know, 170 -- 170 cfs of our water right is a 1939 water right. And that water right is never available when you get into July, which leaves us at 3,600 cfs

with a 1915 of 600 and a 1900 of 3,000. So, typically, our system maxes out at 3,650. So throughout the June, July, and August period, you can expect to see those kinds of numbers with our diversion; and if the natural flow will sustain that, absolutely, we will divert it and need it.

Q. Yeah. Okay.

I assume from a canal management standpoint, it's easier to manage the system and get water to everybody with the full 3,600 cfs diversion than if you had to cut back to 3,000 or something like that?

A. Yeah, certainly. Yes.

Q. You testified a little bit today and in your deposition about all the work Twin Falls Canal Company has done to make its system more efficient.

A. Yes.

Q. In your deposition, you explained that you've installed a lot of automation. I think you mentioned there were 60 automated sites now within the company?

A. Yes, ballpark.

Q. You explained that the Kinyon Pond was constructed in 2012 or '13, which enables you to manage the water supply more efficiently?

A. Yes.

Q. You described a large canal lining project on

the High Line Canal in 2019?

A. Yes.

Q. And two large-scale projects -- lining projects planned for 2023 and 2024?

A. I think we have one planned, not two.

Q. Oh, one planned. Okay. I may have misunderstood that.

And you also explained that if funding were available, Twin Falls Canal would develop additional project efficiencies?

A. We are always looking for opportunities.

Q. And so if groundwater users were willing to fund an engineering study to identify additional efficiencies available to the company, is that something you would welcome?

A. I wouldn't say we would at this point, no.

Q. If groundwater users were to fund actual improvements that had been identified, would you welcome their support?

MR. THOMPSON: I'm going to object to this line of questioning going beyond the scope of this proceeding, relevance.

HEARING OFFICER: Mr. Budge?

MR. BUDGE: I think it's well within the scope of the proceeding.

HEARING OFFICER: Well, I'm torn, but I think I'll sustain the objection, Mr. Budge.

Q. (BY MR. BUDGE) Let me ask just a few follow-up questions about sprinkler efficiencies.

I think we covered some of this, but if I understood correctly, the company's gone from about 25 percent sprinkler to 50 to 60 percent sprinklers in the last 10 or 20 years?

A. That's our current estimate, yes.

Q. And when shareholders irrigate with sprinklers, they divert less water from the canal?

A. No.

Q. They apply just as much water per acre with sprinklers as they did with flood irrigation?

A. As I mentioned earlier, I'm not a farmer, I don't really know how they apply at all. I know that we continue to deliver the same amount.

I think on-farm efficiencies are certainly there. I think they have the ability to water their crops more efficiently, make better use of the water on the farm, and then move that water around to other crops.

Bear in mind, on our system one farmer is not growing just one great big hayfield. He's got hayfields. He's got cornfields. He's got grainfields.

So he may be able to more efficiently move his water around on his farm, but he still has a right, and we still deliver the same amount.

Q. You testified at your deposition that with the conversion from flood to sprinkler, there's less water that's accruing to waste ditches throughout the company?

A. Yes. Actually, I -- yeah, you know, the on-farm improved efficiencies, I believe, are there. The on-system efficiencies suffer.

Q. So when you say you deliver the same amount, what you're saying is you're making available to the stockholder the same amount of water, the three-quarters of an inch or five-eighths of an inch?

A. Yes.

Q. Does the company maintain meters at each delivery point to regulate how much water is diverted at each diversion point?

A. Yes, sir.

Q. And do those have totalizers on them?

A. Our meters are in the form of a concrete headgate that's measurable. They're not -- they're not electronic meters.

Q. You've got measuring devices, but not something that's keeping track of the total volume delivered --

A. No.
Q. -- each year?
Okay. But -- well, let me ask you this: In your prefiled testimony, you have a statement that there's less return flow into the system from flood irrigation, and as a result -- and here's a quote -- "We simply have to bring more water into the system to supply those needs."
Do you remember this part of your testimony?
A. Yeah, I remember that conversation and multiple parts of my testimony.
Q. And I'm referring to your prefiled testimony that's been admitted as Exhibit 1, I believe. And that's page 22, line 20.
A. So I would say that following that I believe there's a sentence that says that's simply not possible to just go get more water. We look at efficiencies and canal capacities as virtually synonyms. Our canal capacity doesn't allow us to just continually go to the head and get more and more water.
So we've had to become more and more efficient in order to meet with those needs and meet with the deficit that we now experience because we don't receive that wastewater to redeliver time and time again.
Q. Now, your testimony is that when somebody

converts from flood to sprinkler that wastewater diminishes, but they're diverting just as much onto the fields as they did with flood irrigation?

A. Yes.

Q. Okay. So with flood irrigation there's water that would discharge into waste ditches. Some of those waste ditches return to the company's system, and others just discharge out of the system; correct?

A. Yes.

Q. So when somebody converts from flood to sprinkler, and there's less wastewater discharging out of the system, there's no water savings there for the company?

A. No. There's a water shortage that exists as a result of that.

Q. So converting to sprinkler -- what you're saying is it actually takes Twin Falls Canal Company more water for its patrons to irrigate their crops with sprinkler than with flood?

A. No. I'm saying it takes the company a higher level of efficiency to operate with sprinklers versus flood.

Q. So less water?

A. The same.

Q. The same water? No difference?

A. Right. 1.1 million.
Q. Diverts the same at the head, is what you're saying?
A. Yes.
Q. So if the whole company was in sprinkler, you would still want to divert the full 1.1 million acre-feet at the head?
A. We will strive to improve our efficiencies so that we can do that. As we lose that wastewater, it becomes a challenge.
Q. Let me ask you a few questions about subdivisions.
You mentioned that subdivisions use as much water as the farmer used before the subdivision went in?
A. Yes.
Q. In your testimony, your prefiled testimony, you reported that most subdivisions divert most or all of their water between 5:00 and 10:00 a.m.?
A. No. I think they use most of their water between that. They divert it constantly.
Q. Where does it go when they're diverting it but not using it?
A. Back into our system or back into its historical waste path.
Q. Okay. So they divert it, they just don't use

it to grow landscaping and sod and stuff like that?

A. Right.

Q. So when you say subdivisions continue to divert just as much as before, the diversion hasn't changed, but the amount of crops grown -- considering sod a crop, that goes down. The amount of -- I'll do it this way: The amount of acres irrigated goes down, but the diversion stays the same?

A. Yes. There's hard-surface areas in there that aren't growing a crop.

Q. And then additional water comes back into the system through a waste ditch or whatever?

A. Yeah, it either comes back into the system or it goes back into a historical waste path and wastes beyond our system into the Snake River Canyon, the Rock Creek Canyon. Or in many cases they have built large storage ponds to store that capacity so that when the sprinklers all fire up at 5:00 o'clock tomorrow morning, there's been capacity built in order to sustain that need.

Q. Okay. Very good.

I've just got a few more questions, and it's about the hydropower facilities, and you covered some of this with Mr. Bromley.

I understand there's three facilities that

Twin Falls Canal Company is an owner and part-owner. It's Midway Power, Lower Low Line, and Twin Falls Energy.

Are those the three?

A. No. It's Midway Power and Lower Low Line we fully own, and we're partners in the South Forks Hydro.

Q. That's right. You explained that in your deposition, and I didn't get it straight. I apologize.

And then there's another seven plants that are owned by third parties?

A. Yes.

Q. You testified earlier today that most of these are at the tail end of drains?

A. Yes.

Q. And on some of the plants that Twin Falls doesn't own, they receive royalties from the third-party owner?

A. Yes.

Q. And I believe in your deposition you testified that Twin Falls has budgeted $1.8 million from hydropower revenue in 2023?

A. There is that kind of revenue expected, and there are expenses associated with that as well.

Q. Okay. And that's just for the three plants that the company has ownership interest in?

A. No, I believe that's all of it.
Q. That includes the other plants as well?
A. I believe so.
MR. BUDGE: That's all the questions I've got. Thanks.
HEARING OFFICER: Thank you, Mr. Budge.
Further questions from the groundwater group?
Redirect, Mr. Thompson.
MR. ANDERSON: Director, may I ask just one quick question? I'm sorry.
HEARING OFFICER: Of whom?
MR. ANDERSON: Of Jay. Sorry.
HEARING OFFICER: Sure.
MR. ANDERSON: Just real quick.
HEARING OFFICER: Yep. Come forward.
MR. ANDERSON: And I just will be quick.

CROSS-EXAMINATION

QUESTIONS BY MR. ANDERSON:
Q. I understand the objection and the sustaining of relevance on the question that was asked about technologies and efficiencies.
So my question is not what you would do or what you would allow groundwater districts to do, but I want to ask the question this way: Is there currently

factors or barriers to putting in new technologies into your system if those technologies existed?

A. No. We explore and entertain any new technology that comes along.

That being said, it's not all based -- all that it's cracked up to be.

Q. So other than the limitations of the technology itself, probably, there's no other factors, that you can think of, that would limit those technologies going in?

A. No.

MR. ANDERSON: Thank you. No further questions.

HEARING OFFICER: Thank you. Mr. Thompson.

REDIRECT EXAMINATION

QUESTIONS BY MR. THOMPSON:

Q. Mr. Barlogi, just a couple of questions on redirect here.

Can you turn to Exhibit 1. It should be in our small binder there in front of you.

A. Okay.

Q. Can you turn to page 22, please.

A. Okay. I am there.

Q. It's -- in lines 18 to 20 we have an objection

from the groundwater users as hearsay.

Can you just describe what you're discussing there?

A. Yes. I was just discussing the situation that we're talking about. As Twin Falls Canal Company has the opportunity to reuse each drop of water time after time after time as much of our -- all of our High Line ground, about 73,000 acres, wastes back into the Low Line. So all of that wastewater we get to recapture and reuse again. And then we deliver it, then, again, onto Low Line grounds that typically waste off of one farm back into our system. And we get to use it again and again and again.

It's part of our efficiency number within the company. And I was just citing a historical statement in one of the old documents of the canal company where a state engineer had made the comment that a drop of water is thoroughly exhausted by the Twin Falls Canal Company by the time they are done with it.

Q. So I guess you wouldn't have to rely upon that engineer's statement to know how that operation works?

A. No. Of course not, no.

Q. And do you also receive water from seeps and drain tiles?

A. Yes, sir.

Q. And what have you witnessed in regards to those flows, over time?

A. Well, seeps and drain tiles were installed originally between, I want to tell you, 1915 and 1930. We captured a huge amount of subsurface water and redirected it back into our system.

In recent years, certainly, that water supply has gone down, down, down. And the trajectory is still currently downward. We've seen a reduced amount of that water coming out of those seep tiles and tunnels.

Q. You heard some questions this morning about the hydropower projects within the canal company.

Does the canal company divert water from the Snake River only for hydropower purposes?

A. No. It's explicitly understood amongst all of our stockholders and amongst all of the power folks that those facilities exist incidental to irrigation demand.

Q. Can you turn to Exhibit 338.

A. I'm there.

Q. It's your testimony that these are annual income statements prepared by your accountant?

A. Yes.

Q. And would you agree that these statements do not show the company's annual expenses?

A. Yes, I would agree.

Q. And what are the company's annual expenses as far as an amount?
A. An amount?
Q. Yes.
A. Oh, for our total annual budget?
Q. Correct.
A. It is right between 7 and $8 million this year.
Q. Mr. Bromley went through the attachment to the company's groundwater recharge water right application; it was a 1903 contract.
Do you remember that testimony?
A. Yes.
Q. You talked with Mr. Budge about the water rights the company has decreed, 1900 right for 3,000 cfs.
So if that contract identified a water right for 3,400 cfs, what did the company actually get decreed over time?
I guess if there's a difference between your decree and that contract, what do you understand is your water right today?
A. Well, I understand my water right to be 3,780 cfs of natural flow in the river with various states with my 245,000 acre-foot of storage water

stacked on top of that.

Q. And I'll just focus on the 1900 water right. Is it your understanding that the 1900 priority right is for 3,000 cfs; is that correct?

A. Yes.

Q. So if that contract identified 3,400, that would be inconsistent with your water right; is that true?

A. Yes.

Q. Can you turn to page Exhibit 314. I think that's your deposition transcript.

A. Okay.

Q. Page 224.

A. Okay.

Q. I think Mr. Bricker asked you about crops perishing, and you read, I think, that answer on line 18; is that correct?

A. Yes.

Q. Can you read the rest of that answer, please.

A. From line 18: "Answer: I'm not familiar with crops perishing. I am familiar with complaints of reduced yields. Again, an inability to plant the crops that they would like to plant because they know it's going to be a short water year, so they go heavy on the grain, heavy on the wheat, heavy on the barley, and

forgo the corn and the high-priced alfalfa."

Q. I guess one last question, Mr. Barlogi. In terms of canal operations and efficiency, would you agree that the irrigated acreage within your project is not the only variable that affects that efficiency?

A. Absolutely.

MR. THOMPSON: That's all the questions I have. Thank you.

HEARING OFFICER: Thank you, Mr. Thompson.

Recross by anybody in the groundwater users group?

Mr. Budge?

RECROSS-EXAMINATION

QUESTIONS BY MR. BUDGE:

Q. Mr. Barlogi, Mr. Thompson was just talking to you about how farmers utilize their water. You testified earlier that you're not a farmer and not intimately familiar with their irrigation practices?

A. [Witness nods head.]

Q. And your testimony just given a moment ago was that the farmers go heavy on the wheat and barley until they're harvested and then move that water to the corn and the sugar beets and things like that?

Was that your testimony?

A. Just now?
Q. Yeah.
A. No, I don't think that was the intent of that conversation. Are you talking about the conversation I just had with Mr. Thompson?
Q. Yes.
A. No, I don't think -- I think that's out of context.
Q. Okay. I must have misunderstood.
Is it your testimony that while a farmer is growing their barley and wheat, they irrigate their corn and sugar beets and potatoes less, and then once the grain and wheat is -- the barley and wheat is off, then they irrigate them more at that point?
A. That is not the -- that is not the conversation that Travis and I just had, no.
Q. Okay. So just so I understand -- and you would agree that the cash crops are the corn and the hay and the sugar beets, things like that?
A. [Witness nods head.]
Q. And so it's not your testimony that the farmers are, you know, shorting those crops' water until the wheat and barley is off; you're just saying once the wheat and barley's off, there's just that much more water that they can put on their other crops?

A. My testimony was that farmers forgo the planting of corn and potato acres because they know it's a short water supply year, and they plant more grain and more barley and forgo those acres of going into the more valuable crops of alfalfa and corn.

Q. You don't really know what the individual farmer's rotations are on Twin Falls Canal's system because you're not involved in their farming practices?

A. I know from a general perspective, but not intimately with each farmer, no.

Q. You know from hearsay?

A. Well, from hearsay and from -- I mean, you can see it from the road. When it's a big grain year because it's a short water year, you can see noticeably more grain on the project, noticeably less corn and alfalfa.

MR. BUDGE: Yeah, Director, I would move to strike the testimony about farmers' crop rotation practices. This witness is not qualified to testify why farmers grow one crop versus another.

HEARING OFFICER: I'll deny the motion to strike. My impression is that Mr. Barlogi man ages and observes what's happening out there. He may not know exactly field to field because he's not a farmer, but, nonetheless, he has sufficient exposure that his

testimony should be considered. Thank you.

Q. (BY MR. BUDGE) Mr. Barlogi, you understand that commodity prices vary from year to year?

A. Certainly.

Q. And that commodity prices may drive farmers' decisions to grow one crop versus another?

A. Certainly.

Q. Do you understand that certain types of crops must be rotated with other crops to maintain soil health?

A. Certainly.

Q. And certain crops are grown based on contractual obligations to food producers?

A. Certainly.

Q. And you don't know why a given farmer may grow one crop versus another crop from year to year?

A. Not from those perspectives that you just mentioned, no.

Q. Okay. And then just one follow-up question about the conversion from flood to sprinkler, which I'm still struggling to wrap my mind around.

Do you understand when somebody irrigates with flood irrigation, there's excess water on the field and that excess water either sinks into the aquifer or it drains off into a waste ditch?

A. Yes.
Q. And when somebody irrigates with sprinkler, there's much less or maybe no excess water that runs off or sinks into the ground?
A. Yes.
Q. But your testimony is that the sprinkler farmers in your company's service area divert just as much water from the canal as happened under flood irrigation?
A. Yes.
MR. BUDGE: Okay. Nothing further.
HEARING OFFICER: Further questions by the groundwater group?
All right. Our timing seems to be very good again today. It's noon. Are we finished with Mr. Barlogi, then?
Mr. Barlogi, you can go back to --
MR. THOMPSON: Yeah, just a quick question on that. I'd like to release him. We did have certain parties identify him as a witness. I assume all of his testimony has been taken this morning; he can go home?
THE WITNESS: Okay. Thank you.
HEARING OFFICER: So the question is whether Mr. Barlogi can be excused?
MR. THOMPSON: Yes.

HEARING OFFICER: So you're excused, Mr. Barlogi, to go back to managing and delivering water, an important thing to the patrons of Twin Falls Canal Company.

I think we have one matter pending. Mr. Budge, you asked if the Department would redact a portion of Mr. Barlogi's written testimony.

MR. BUDGE: Yeah. And then I didn't object when he quoted it, so we're going to let it slide.

HEARING OFFICER: So you want to let it go?

MR. BUDGE: I think the objection is still appropriate, that it's based on hearsay, but --

MR. FLETCHER: It's in the record.

MR. BUDGE: It's not that critical at this point.

HEARING OFFICER: All right. That simplifies the operation of a black pen.

Okay. We'll come back at 1:00. Thanks, everybody.

(Lunch break taken.)

HEARING OFFICER: We are back on the record after a lunch break.

Mr. Sullivan, you're next. Will you stand and raise your right hand, please.

///

GREGORY K. SULLIVAN, P.E.,
called as a witness by the City of Pocatello, having been first duly sworn to tell the truth relating to said cause, testified as follows:

MS. TSCHOHL: Can you guys make sure the microphones are on?
(Discussion held off the record.)
HEARING OFFICER: Now, is that better, I hope?
MS. TSCHOHL: Yes, we can hear you loud and clear.
HEARING OFFICER: Okay. Good. Thank you, Sarah.
All right. Mr. Sullivan has been sworn in.
Ms. Klahn?
MS. KLAHN: Thank you.

DIRECT EXAMINATION

QUESTIONS BY MS. KLAHN:

Q. Good afternoon, Mr. Sullivan.
A. Good afternoon.
Q. I'm Sarah Klahn. I represent the City of Pocatello, and we're here to put on your expert report in this matter.
Could you start by stating your name and

spelling it for the record, please.

A. Gregory K. Sullivan, G-r-e-g-o-r-y, S-u-l-l-i-v-a-n.

Q. And are you a consultant engaged by the Cities to present opinions in this matter?

A. Yes.

Q. What's your present professional position?

A. I'm the president of Spronk Water Engineers.

Q. And do you have any professional registrations?

A. Yeah, I'm a licensed professional engineer in Colorado, New Mexico, and Idaho.

Q. And I believe the parties have stipulated to your admission as an expert in this matter, so I don't want to go over all the things we normally would go over in that context.

But can you describe, in just a couple sentences, your general work experience?

A. For my entire career I've been working in water rights and water resources engineering; for my present company since 1990, and then for a different company for the five years prior to that.

So I've been working in this area of water resources, water rights, modeling groundwater for my whole career.

Q. And have you participated in the -- in prior delivery calls?

A. Yes, I have.

Q. Which ones?

A. I was -- I've been involved in the Surface Water Coalition delivery call since its beginning. And then I was also heavily involved in the A&B delivery call and the Rangen delivery call.

Q. And you have experience with the SRBA as well?

A. Yes. I've assisted numerous clients in filing for their claims and reviewing the claims, helping them get them adjudicated.

Q. Can tell us about your modeling experience in Idaho.

A. I've been a member of the Eastern Snake Hydrologic Modeling Committee since its inception and, actually, prior to that, the Idaho -- ITCH, the Idaho Technical Committee on Hydrology, that was the predecessor group.

And both of those -- one of the major tasks of both of those groups has been to sort of oversee and provide peer review on the development of the Eastern Snake Plain Aquifer model over the years.

Q. Thank you.

Who exactly are you representing in this

matter?

A. The City of Pocatello, the City of Idaho Falls, and the Coalition of Cities, which is 15 smaller ESPA cities.

Q. And you mentioned that you've been working on the Surface Water delivery call for a number of years.

Were you involved in the original 2005 Surface Water delivery call?

A. Yes.

Q. Can you describe, in a general way, the investigations you conducted at that time?

A. Well, we compiled data, reviewed the voluminous data that was submitted by the parties, and then, importantly, we conducted a pretty thorough investigation of all of the Surface Water Coalition members. And that included reviewing, you know, a lot of their historical information, historical records.

We spent, like, three weeks in the field, you know, going through all of their systems, observing them and observing their water conveyance and delivery facilities involved, looking at their irrigation practices. It was quite extensive.

And that culminated in an analysis that was summarized in my original expert report of their operations during the period from -- I think it was 1990

to 2006.

Q. Okay. And have you produced an expert report in this matter?

A. Yes, I have.

Q. Okay. And that would -- is that Exhibit 347? Could you find that?

Now, Mr. Sullivan, I understand that you were out of the country immediately before the start of this hearing; is that right?

A. Yeah. I was in Spain and Morocco.

Q. And I believe that when you returned, you had a chance to review the report, which you had largely completed before you left; is that right?

A. Yes. I had a little bit of opportunity to work on it while I was away, but spotty internet connections and stuff like that. And so, yeah, I looked -- I was able to look at it in some more detail when I got back.

Q. And when you got back, did you discover that there were some errors -- editorial errors, primarily, in the report.

A. Yes, there's some things I would like to correct.

Q. Okay. And are you looking at Exhibit 347 that has the pages of errata? I just want to make sure we

have the current version in the exhibit binder.

MR. FLETCHER: Is this 347?

MS. KLAHN: 347A. Sorry.

THE WITNESS: I don't think it is.

MS. KLAHN: 347A, is there such a thing up there?

No, I know, but did we make a copy of it?

THE WITNESS: My copy has that.

MS. KLAHN: I know yours does.

MR. BROMLEY: I can get it printed.

MS. KLAHN: Let's just go off the record for a minute.

(Discussion held off the record.)

MS. KLAHN: Back on the record.

Q. (BY MS. KLAHN) So the conversation we just had off the record was about replacing 347 with 347A at the conclusion of your testimony.

However, Mr. Sullivan, did you have something to explain about the -- some of the errors maybe not being completely editorial?

A. There was a handful that were -- you know, I just missed a word. And, like, for example, the word "not" was in there and something -- in one of the statements; and that "not" should not have been there.

So that's substantive.

Q. Well, do you want to take a minute now and identify where that is so people can get in, if they have a paper copy of the old version, and change that?

A. I don't think I can do it thoroughly with what I have right here. I have, like, a redline on my computer.

Q. Well, we'll just keep going, then.

A. I'll try to remember if I see something.

MR. FLETCHER: Just to clarify this issue, the page numbers changed when you changed exhibit numbers. So it's going to be very -- is there anybody that has an extra copy or a copy of 347A that the witness can --

MR. WOOD: I can print one off if somebody emails it to me.

MR. BROMLEY: Yeah. So Max has it right here. Can he send it to you, Pete?

MR. WOOD: Okay. Email it to me, and I'll go print it.

MR. FLETCHER: Because otherwise this is going to be confusing.

MR. WOOD: Yeah, it's fine.

MR. BRICKER: What's your email?

MR. WOOD: pete.wood@idwr.

MS. KLAHN: Shall we take a five-minute recess maybe?

HEARING OFFICER: That would be fine.

(Break taken.)

(Exhibit 347A marked.)

HEARING OFFICER: All right. Back on the record.

Ms. Klahn.

MS. KLAHN: Thank you, Pete, for your help with that.

MR. WOOD: No problem.

Q. (BY MS. KLAHN) We're back on the record.

And, Mr. Sullivan, you've been presented with Exhibit 347A. And in that report, could you identify -- we were just talking before we broke to get a copy of this, we were talking about your involvement in the other delivery call matters.

Does this 347A -- Exhibit 347A show the -- have a list of the reports you've prepared in prior delivery call matters?

A. It does.

Q. Could you identify where that is?

A. It's on page 4. This isn't all the other delivery call matters, it's just the reports, like, related to this delivery call -- or the Surface Water Coalition.

Q. Yes, that's what I meant, in the Surface Water

Coalition delivery call. Okay. Thank you.

Do you still stand by the opinions in the prior reports?

A. I do.

Q. Do you still stand by the methods you used in the prior reports?

A. Yes.

Q. Have you updated any of those analyses?

A. I would have liked to, but there wasn't time.

Q. And then as far as your work in this case, you said you haven't updated your work from the last case, but have you identified changed conditions since you prepared the prior reports?

A. Yes.

Q. And what page is that on in your report?

A. It's the series of bullets near the bottom of page 2.

Q. And then one more sort of foundational question.

Were you involved in the 2022 technical work group process?

A. I was.

Q. How were you involved?

A. I received an invitation to that. And there was a series of meetings -- half a dozen meetings, I

think, that the Department hosted that I attended remotely. And then I presented some information at a couple of the meetings on a couple of the subjects. And then, ultimately, when the staff recommendation was issued, I reviewed that and submitted written comments to that.

Q. Okay. And just for the record, I'd ask you to take a look at Exhibit 316.

Is this the staff recommendation that you referred to?

A. Yes.

Q. And Exhibit 326, could you take a look at that? Is that the comments that you submitted in response to the staff recommendation?

A. 326, it looks like Sophia's comments.

Q. How about 327?

MR. BRICKER: I think it's 322.

MS. KLAHN: 322. Sorry.

THE WITNESS: Yes.

Q. (BY MS. KLAHN) So 322 are the comments that you and your colleagues at Spronk Water Engineers submitted in response to the technical work group?

A. Yeah, in response to the staff recommendation memo.

Q. I apologize. Yes, that's right. In response

to the staff memo.

Did you receive any feedback on your written comments from anybody at IDWR?

A. I did not.

Q. Now, let's take a look at Exhibit 300, which is the Fifth Methodology Order, and Exhibit 301, which is the As-Applied Order.

A. Okay.

Q. Have you previously reviewed Exhibit 300?

A. Yes.

Q. Were your comments submitted to the technical work group incorporated into the Fifth Methodology Order?

A. Not that I could tell.

Q. And as far as the hearing today on the two orders reflected in Exhibit 300 and 301, in your professional estimation, did you have adequate time to review the Fifth Methodology Order and the As-Applied Order to prepare for the hearing?

A. No. I mean, I did what I could, but there wasn't time to do all I would have liked to have done.

Q. So let's just -- for a high-level summary, let's talk about what work you were able to do.

And I believe if you turn to the table of contents in Exhibit 347A, that might be a guide for

your -- if you can give us an overview of what work you were able to do.

A. Yeah. So in addition to just reviewing the order and the Fifth Methodology and the As-Applied Order, then there was a number of issues that I identified that I ended up focusing on. And they're, basically, the subject of my expert report.

So that was looking at the new baseline year; looking at the updated project efficiencies for the Surface Water Coalition members; looking at the irrigated area that is used in the methodology; considering the supplemental groundwater as a potential source to the Surface Water Coalition members, which is a provision of the methodology; looked at the change from steady state to transient groundwater modeling for determination of the priority date of curtailment. So those are the main things I focused on.

Q. Okay. Could you identify the work you would have done if you'd had more time?

A. Well, I would have liked to have, you know, looked at the -- taken another -- a relook at the operations of the Surface Water Coalition members because there's been 15 years, roughly, since -- have elapsed since I last looked at them, and I know, anecdotally, there's been continued conversions to

sprinkler and canal lining and other automation, those things that we heard Jay Barlogi talk about today.

So I'd like to understand the extent of those things that have gone on. And then, you know, that would give me a good -- a better context, I guess, to then look at the records of what they've been using over that time and consider the sort of the reasonableness of their operations given what their efficiencies are. So that's one thing I would have liked to have done.

Q. Okay. The -- it has been 15 years since the 2008 hearing, exactly 15 years almost.

How does the changes during that time -- how would the changes during that time inform your, I guess, opinions if you'd had the time to look at those changes, potentially?

A. Well, you know, for example, these updated project efficiencies, you know, I think by analyzing the Surface Water Coalition numbers, it would give me -- operations over the last 15 years, that would give me a better ability to judge the reasonableness of those efficiencies and whether they're -- the revised efficiencies are consistent with the kind of facilities that they have and if the general, you know, industry standard of large -- of the operation of large irrigation systems.

MS. KLAHN: Now, I'd like to offer Exhibit 347A at this point just so I don't forget to do it.

HEARING OFFICER: Any objection?

MR. FLETCHER: I have an objection just to a couple of comments made by Mr. Sullivan where he's delving into the realm of judicial review. And, basically, I'm asking that certain portions of the report be stricken. They're very small, but one is on the bottom of page 6 and continues to page 7 where he talks about the findings of the Director to be arbitrary and no clear and convincing evidence.

On page 7, paragraph 2, he talks about the actions of the Director being arbitrary and capricious.

And in page 27, bullet point 3, he makes reference to Director's actions being arbitrary.

And those are standards for judicial review. They're really not an expert's standard dealing with data and data interpretation.

HEARING OFFICER: Ms. Klahn?

MS. KLAHN: Well, I would say what's sauce for the goose is sauce for the gander, and Mr. Brockway has similar statements in his report. I think that experts, especially in the water realm, routinely make those kinds of statements. And I'm assuming the Director has

seen that before and will take it for what it's worth and that it's certainly not going to control any appeal that might be filed and heard by Judge Wildman. So I would say they're not the sort of thing that should be stricken, but if they are, then the same thing should come out of Dr. Brockway's report.

HEARING OFFICER: Well, and of course, I don't know what Dr. Brockway's report even says.

MS. KLAHN: Oh, I think all I'm asking for is a global rule, not just a groundwater-specific rule.

HEARING OFFICER: I'll overrule the objection. I don't think these references will affect my decision-making in any way. Overruled.

MS. KLAHN: So is the exhibit accepted, then?

MR. FLETCHER: I don't have an objection.

HEARING OFFICER: So the document marked as Exhibit 347A is received into evidence. Thank you, Ms. Klahn.

(Exhibit 347A received.)

MS. KLAHN: Thank you.

Q. (BY MS. KLAHN) Mr. Sullivan, let's start with baseline year investigations that you had time to do.

Could you describe your review of the baseline year that was selected for the Fifth Methodology Order?

A. While there was some discussion of that at the

technical working group, it was one of the things that was brought to us. And the basic proposal was -- or the information that they submitted to us and is described in their -- I think in the Fifth Methodology Order was that the previous baseline year, which was an average of diversions during 2006, 2008, and 2012, was no longer representative of a year of above-average diversions, and that's because there had been -- they recomputed the average with an additional six or eight years, so the average changed, and now that baseline year, which -- '06, '08, '12 -- which was above average before now is just a tiny, tiny bit below average.

And so I endeavored, then, to just review that pretty simple data of the diversion data in relation to the new baseline year that was selected and just kind of verify or understand the math that went involved -- that was involved.

Q. Do you have a recollection of how much below average the post -- I'm going to call it '06/'08/'12 baseline year was?

A. Yeah. Well, based on the information that was provided by the Department, the '06 -- I'll call it '6/'8/'12.

Q. Okay.

A. The '6/'8/'12 baseline year was

5,666 acre-feet per year less now than the average. So that's, you know, 5,600 acre-feet out of 3.2 million. So just a very, very small amount, .18 percent less.

Q. So was there a problem with the backup spreadsheet for the '6/'8/'12 change that IDWR provided?

A. Well, I did note that when I looked at the information that was provided where they computed the new long-term average, which was now using data from 2000 to 2021, looking at the data within that spreadsheet, it looked like some of the numbers during the earlier part of the period had changed from what was used to compute the original '6/'8/'12 baseline, and I don't know why. Maybe that was provisional data that they updated, and it wasn't extensive, but there was some changes.

But, curiously, the Department was still using the original '6/'8/'12 value as the benchmark for comparison of the new average. That '6/'8/'12 benchmark was still from the old data, the uncorrected data, and I thought that was kind of -- I don't know if it was an oversight or intentional. But, anyways, when I plugged it -- I tried to recompute the '6/'8/'12 baseline with the new data, new diversion data, and it changed a little bit.

And now with the new '6/'8/'12 baseline -- or

with the updated diversion data, you know, is only now 40 acre-feet less than the 2000 to 2021 average. So just a tiny -- the tiniest bit less.

Q. So is 40 acre-feet pretty small in comparison to the total diversions?

A. Yeah, very small. I mean, it represents -- I put this calculation -- it represents about five minutes of diversion of the Surface Water Coalition members' total diversions on average. So it's a tiny, tiny amount. But to be sure, it's still below average.

Q. So the -- did IDWR include 2022 data when they were calculating the comparison for the '6/'8/'12 baseline year?

A. No, they didn't. And so that -- so that was something I thought might be interesting to look at, so I added on the data -- diversion data from 2022 and recomputed that long-term average, 2000 to 2022 now, instead of 2000 to 2021. And then when you compare that average to the updated '6/'8/'12 baseline year, then it turns out that '6/'8/'12 is still above average now.

Q. So based on your understanding of the Department's methodology for selecting a baseline year, if the average that's being compared to the old baseline year is greater, would it be appropriate to pick a new baseline year based on your understanding?

A. Well, I'm not sure if you -- maybe I misunderstood your question.

Q. Did I turn it around?

A. You might have turned it around. But I think if you include 2022 and then do that comparison, '6/'8/'12 will still qualify as a baseline year.

Q. That's what I was trying to get at. Thank you. Well, but a new baseline year was selected as 2018.

Do you recall what the total diversions were associated with 2018?

A. Yeah, it's 3,341,939 acre-feet.

Q. And what kind of increase is that over '6/'8/'12?

A. It's roughly 142,000 acre-feet more. So that tiny amount, you know, either 40 acre-feet or 5,000 acre-feet, that the old baseline year fell below the average, resulted in this huge increase in the baseline year, 142,000 acre-feet. And that was kind of eye-opening.

Q. Did you analyze whether the surface water -- well, let me ask you first: What was the diversion averaging period used in the Fourth Methodology Order?

A. I think it was 2000 to 20 --

Q. '14 sound right?

A. 2014, yes.
Q. Did you look at whether Surface Water Coalition member diversions increased since 2015?
A. I did, yes.
Q. And what was that amount?
A. Yeah, their diversions have increased on average by about 143,000 acre-feet.
Q. Which is --
A. So the diversions during the later period were 143,000 acre-feet greater than the 2000-to-2014 period.
Q. And the 143,000 is pretty close to the 142,000 increase in the baseline year from '06 -- '6/'8/'12 to 2018; correct?
A. Yes, uh-huh.
Q. Did you find any analysis in the materials provided by IDWR or Exhibit 300 that suggested that IDWR had analyzed why Surface Water Coalition member diversions increased?
A. I haven't seen anything like that.
Q. Okay. Were you surprised that the diversions increased from 2015 forward?
A. Yes, I was.
Q. Why?
A. Well, I mean, just my -- as I mentioned earlier, you know, the continued sprinkler conversions,

these efficiency improvements, those kinds of things would suggest that, if anything, the diversions should have gone down, anything -- that they should have been able to get by with less, but they've been diverting more.

Q. Do you have any concerns about the process that's used to develop the baseline year given these findings?

A. Yes. It seems like there's this positive feedback loop, I will call it, that exists in the process, whereby, essentially, the more they divert, the higher the baseline year needs to be to keep the baseline year as a year above average, and so there's really a disincentive to become more efficient because, you know, the more they divert, the higher the baseline year, the more the groundwater users have to come up with mitigation water.

Q. Thank you.

Let's move to project efficiencies. Were you here yesterday when Mr. Anders testified?

A. I was, uh-huh.

Q. Did you hear his testimony about the calculation used in the Methodology Order to calculate project efficiencies -- I'm sorry, to calculate -- about the use of project efficiencies to determine monthly

crop water demand?

A. Yes.

Q. Do you agree with how IDWR uses the project efficiencies in that calculation Methodology Order?

A. No.

Q. Why not?

MR. THOMPSON: I'd like to lodge an objection here. Just briefly, I think the methodology itself, these calculations Ms. Klahn is talking about, have been established, have been subject to judicial review. I don't think they've changed in the Fifth Order to the extent that we're opening up the methodology to redo it. So to the extent that she's asking for testimony about a separate methodology, I think it's beyond the scope.

HEARING OFFICER: Ms. Klahn.

MS. KLAHN: Mr. Director, our intention is to offer some suggestions about how to use the existing process that the Department has to make it more reliable. And the ground that was plowed in 2007 -- Mr. Sullivan will spend a little bit of time talking about why that was a good idea, but understanding, also, that that's not the direction the Department chose to go.

So when I ask if he agrees with how IDWR uses project efficiencies, it's to set up the testimony about

the improvements that he's proposing for the current approaches.

HEARING OFFICER: I think consistent in all of the discussions has been a theme that the Methodology Order was and is intended to be a dynamic document that would be subject to change and would change with better information, better data, and better analysis. And so as a result, I'll overrule the objection.

MS. KLAHN: Thank you.

HEARING OFFICER: Ms. Klahn -- or Mr. Sullivan, you may answer the question, if you remember it.

Q. (BY MS. KLAHN) I think the question was: Why don't you agree with how IDWR uses project efficiencies in the Methodology Order, generally?

A. Well, generally, it -- this is another one of these kind of feedback-loop things, that the historical diversions are used in determining the project efficiencies, and then the project efficiencies are used to determine the demand.

So it's kind of a self-fulfilling prophecy that the methodology that -- that the method will predict a demand that's equal to what they've been diverting. And so there's really no opportunity to interject and look at: Is what they're diverting

reasonable and consistent with industry standards, or do you never get to look at -- behind the curtain at the efficiency and the operation of the members?

So that's generally my concern.

And then, also, as I'll get into a little bit later, it presumes that crop water need is a good predictor of what they need to divert. And while, in theory, that is -- that would be true, and it's true of most systems, it doesn't seem to be true in this situation a lot of times, as we'll see, that they -- a lot of times these Surface Water Coalition members kind of divert what they divert no matter what the crop water need is.

So their diversions are kind of flat in relation to -- instead of going up with the crop water need.

So we'll get into that a little later.

Q. Okay. Well, I'm going to ask you to get into some of it a little bit right now.

First of all, when you talk about the IDWR calculation for project efficiency -- which, as Mr. Anders talked about yesterday, is crop water need times acres divided by diversions -- what kind of an efficiency is that, in your professional understanding?

A. Well, I've always called that an actual

efficiency.

Q. What's the result of an actual efficiency when you try and use it for administration?

A. Well, it does what I just talked about earlier. If you use the actual efficiencies, divide it into the crop water need, you're just going to get what they historically divert, more or less.

Q. And if you divert more, what happens to the efficiency number?

A. Then the efficiency goes lower, and then -- and then you get back to the same diversion.

Q. How did you analyze Surface Water Coalition member efficiencies in your first expert report in 2007?

A. Well, I applied what I would characterize as an industry standard approach for assessment of irrigation systems -- that I've done myself in a lot of situations and I've seen done in a lot of other situations -- in terms of both analysis of the historical use of irrigation systems for purposes of water rights transfers.

You know, I've done a bunch of those. And the procedure for doing that -- well, let me back up.

There's been hundreds or thousands of those kind of transfer analyses -- historical use analyses done for transfers in Colorado where I've done a lot of

my work, and that is the basis. Analyzing the systems in that way and the way that I did here for the Surface Water Coalition is what is done for those transfers.

And so those are very, you know, high -- you know, high-value or involving, you know, very important decisions about historical use. And a lot of money is at stake and all that.

And these are the methodologies that are used to do that -- you know, figure out how much water is being consumed and how efficient, you know, these systems are.

And then also in modeling, too, I've used these kinds of methods to evaluate the operations of irrigation systems.

Q. So in those calculations that you've done in those other situations, did you calculate a monthly or a seasonal efficiency?

A. So when I do those kinds of analyses -- and the standard is typically to calculate a seasonal efficiency. And the reason for that is that if you're trying to vary the efficiencies monthly, then it brings into question some other things that may be going on, particularly -- which is water moving in and out of soil moisture to help meet the crop demands. And if you don't accurately account for that, then you can get some

kind of misleading or monthly efficiencies.

And so, typically, to overcome that we will use a seasonal efficiency. Even when we're doing a monthly calculation, the input to that will still be a seasonal efficiency. And it helps to round out some of those curious-looking results that you get.

And we've seen in the methodology here where you've got, like, these very, very low efficiencies in some of the shoulder months that make the method real sensitive to -- you know, a small change in a crop water need divided by a low efficiency all of a sudden results in a large change in the diversion demand.

Q. Is the method you're describing one that's been used by IDWR in any prior delivery calls?

A. Yes. You know, the method that I used in my original analysis of the Surface Water Coalition ended up being, essentially, what the Department used in evaluating the delivery call of the -- for the B unit of the A&B system. And, in that, they were looking at, you know, whether -- the supplies of water that they were able to pump from the wells in the B unit and deliver to the farms, whether that was a supply that was adequate to meet the demands for those lands.

And so in that situation, the Department determined what the conveyance losses were in getting

water to the farms. And those are all real short conveyance systems because they're only delivering water down some laterals from a well. So in that situation I think the conveyance losses were on the order of 3 percent, say.

And then they looked at the on -- what the on-farm application efficiencies should be under a reasonable operation, and I think in total they ended up using a system efficiency -- or a project efficiency in A&B of about 75 percent. And that was, basically, the combination of the on-farm and the conveyance efficiency.

And that was used, then, to determine whether what they were able to deliver to the farm was enough to meet the crop water demand. And based on -- I think that was part of the reason that delivery call was denied was because there was a determination that they did have enough water.

Q. And the determination you're talking about, is that contained in an Idaho Department of Water Resources order dated January 29th, 2008?

A. That sounds right.

MS. KLAHN: Mr. Director, we'd ask you to take judicial notice of that Department document.

HEARING OFFICER: Any objection?

It is an order of the Department, so I'm willing to look at it. I'll take notice.

Q. (BY MS. KLAHN) Mr. Sullivan, let's go to figure -- let's go to your figures in Exhibit 347A. I'd like to start with Figure 3-1.

First of all, just let me just ask you: Does Figure 3-1 illustrate some of the testimony you've been giving about the concerns you have with the Department's use of the project efficiency crop water need determination?

HEARING OFFICER: What page are you on, Ms. Klahn?

MS. KLAHN: There's no page numbers at that point. If you go all the way through the report, it's right after the map. It's the first page of figures.

HEARING OFFICER: I found it. Thank you.

Q. (BY MS. KLAHN) Are you there?

A. Yes, I'm there.

Q. Do you remember my question?

A. You should read it again, if you wouldn't mind.

Q. Does Figure 3-1 illustrate some of the testimony you've been giving about your concerns with the Department's incorporation of project efficiency -- the Department's methods of incorporating project

efficiency into the Methodology Order?

A. Yes.

Q. Could you talk about what we're -- what Figure 3-1 shows?

A. Okay. So this is just showing a -- project efficiency information that was provided by the Department and that was used as the basis for the -- developing the monthly efficiencies -- project efficiencies that are used in the Methodology Order.

So on this page there's a -- several graphs. There's one graph for each of the Surface Water Coalition members. And the graphs depict project efficiency. That's the y-axis on each of these graphs. And it depicts monthly project efficiencies, at least for some of the data on here. So that's the months along the bottom.

And then the solid black line with the connecting -- the open white-and-black dots represents the monthly project efficiencies for each of the members that are used in the Methodology Order.

And then I also put on here, for reference purposes or comparison purposes, the dotted black line, which is the average of the monthly efficiencies used in the Methodology Order. And it's the same average number that I think is at the bottom of the table of monthly

efficiencies in the Fifth Methodology Order.

And then one more comparison I put in here is the blue line, and that's the -- what I term the "reasonable annual efficiency" or -- that I had previously determined for the Surface Water Coalition members based on my earlier work in my 2007 expert report.

Q. And what do you conclude from the figures we see -- the graphs we see on Figure 3-1?

A. Well, there's -- one thing is that, you know -- you can see the shape of these monthly efficiency curves are, you know -- with some exceptions, the efficiencies start out relatively low in the spring and then peak up in the middle of the irrigation season and then fall off quite a lot in some cases, in September and October.

The other thing I would note and just -- and compare in looking at -- comparing the dotted black line to the blue line is that in some cases the actual -- the actual efficiencies -- the actual project efficiencies represented by the average of the monthlies for some of the members it's pretty close to the number that I came up with previous ly.

So -- like for A&B, for example, they are operating at the level that -- near the level that I

thought they should be able to operate.

And -- but others -- you know, in cases where the dotted black line is quite a bit below what I had previously determined, then I think there's some room for improvement in some of those systems.

Q. Okay. Thank you.

Let's turn now to the next page, which is Figure 3-2. And would you talk about what we're seeing in Figure 3-2, please.

A. So this is just a depiction of some of the same information that was on Figure 3-1, and, specifically, the monthly project efficiencies for each of the members. And I just plotted them all on one graph here so that we could kind of see them next to -- or on top of each other.

Q. So would some of these differences in project efficiency be related to the nature of the -- nature and size of the canal system?

A. Yeah, it would. Because, you know, as I talked about earlier, this project efficiency is, basically, the -- has two components, there's a conveyance loss component, or a conveyance efficiency, and then there's an on-farm efficiency. And the product of those is the project efficiency.

And so for the conveyance efficiency piece of

that, you know, it's -- it makes sense, and it's true, that for long -- for very long and large conveyance systems that have more miles of canal, they're going to have more seepage loss in delivering water. So you'd expect them -- those kind of systems -- like an AFRD2, for example, they're going to have a lot larger conveyance efficiency -- oh, wait, conveyance loss than would be a smaller system like A&B, for example.

So you would expect that these monthly efficiencies wouldn't be the same, necessarily, but I don't think all of the differences between these are due to conveyance efficiency. I think that some of -- and we'll get into this, I think, a little bit later -- but some of this difference is due to some of these systems in pulling up, basically, a higher level of management and so that they're able to just generally be operating more efficiently both, you know, in delivering water to the farms with less waste and then also the farmers taking -- you know, having to operate more carefully, you know, to meet their crop water needs.

For example, because some of these -- some of the Surface Water Coalition member systems set an annual allotment so the user has to operate within that allotment, and so there's kind of a built-in incentive to only take the water and use it when you need it.

But other systems that are more on demand, like Twin Falls, for example, they don't have an annual allotment, so, you know, they can take up to a rate of flow whenever they want to order it. So in those systems, there's not as much incentive to conserve water, and I think that kind of thing plays into the reason why some of these efficiencies are different.

Q. Thank you.

Let's look at Figure 3-3, please.

This is titled, "Reasonable and Actual Project Efficiencies 2008 Hearing vs. Fifth Methodology Order."

What is this showing us?

A. This is some more of that information that I had on the previous page with some additional information as well.

So in this graph now, and then this graph at the top, and then the numbers in the table below, it's -- you know, they're both the same information. I'm graphing the numbers. And what the graph shows is the annual project efficiencies or seasonal project efficiencies for each of the members and different depictions of that.

And then along the bottom, I just have -- there are the members called out themselves.

And so the Fifth Methodology efficiency -- or

average -- the average efficiencies in the Fifth Methodology Order are the black dots joined by the black line.

And then the efficiencies that the average project -- actual project efficiency, so the comparable number that I determined for the Surface Water Coalition members for the 1990-to-2006 period that I analyzed earlier for the -- my 2007 expert report is shown with the red line.

And then I've also -- related to the red line is this pink area, and that pink area represents the range of annual efficiencies that I determined for each of the Surface Water Coalition members for that 1990-to-2006. So they vary from year to year, so I've got the range reflects the minimum and the maximum, and I've shaded the area in between.

And then, finally, I have shown on here what I've termed the reasonable efficiency, and that's that -- the reasonable project efficiency that I had previously determined from that -- from my work in the original Surface Water Coalition delivery call.

Q. What conclusions do you draw from Figure 3-3?

A. Well, one, is when I compare that -- the red line to the black line, that shows that for -- you know, most of the Surface Water Coalition members, that black

line is less than the red line, and so that indicates their actual efficiencies have gone down since 1990 to 2006. So I thought that was interesting.

That's going the opposite direction from what I would expect given these continued conversions to sprinkler, canal lining, better irrigation system operation technology, and that sort of thing.

The other thing that I would note from this is that my blue line, the reasonable efficiency line, is -- you can see that the -- that red-shaded area, which is the range of efficiencies, kind of butts up to that blue line for most of the users. And so that -- that indicates that during 1990 to 2006, most of the -- or at least, roughly -- well, five of the seven members were shown an ability to operate at a reasonable level that I had determined previously and determined independently.

And so this is kind of a validation, I think, of the method that I used previously. But then, you know, the exceptions here are over here for North Side and Twin Falls, whose operations -- you know, historical operations during 1990 to 2006 fell well below what I thought they should be operating at.

Q. Have there been -- I think you've already answered this question, but just to close the loop here: Had there been time, would you have updated the

reasonable project efficiencies for the Surface Water Coalitions based on your -- based on their operations during the last 15 years?

A. Yes, I would have liked to have updated that blue line.

Q. And if you had updated it, what would you have done with that?

A. Well, I would have -- I would expect that, you know, with -- just for the simple issue of the continued conversions to sprinklers, they should have a higher on-farm efficiency. So just for that reason alone, I think the blue line should be going -- ticking up a little bit, and there may be other reasons that the -- you know, for other efficiency improvements that the blue line ought to tick up a little.

Q. Now, in 2007 you were recommending that the Department incorporate efficiencies -- the reasonable project efficiencies as a way to -- as part of the administration of the Surface Water Coalition delivery call; correct?

A. That's right.

Q. And I want to just talk about that for just a second because, as I recall, there's a lot of hostility to that idea, and I wonder about whether you could explain how would you operationalize something like

that?

Are you talking about an army of Department of Water Resources employees going out and checking on Jay Barlogi when he decides to open a headgate, or are you talking about something different?

How would -- whether your old efficiency approach is used or whether the Department's current one is used, how would you operationalize that in context of the delivery call?

A. Well, you know, by -- back then and now, I'm not suggesting that the Surface Water Coalition members must operate at these levels. What I'm proposing under this methodology that the project efficiencies be evaluated as to whether they're reasonable and adjusted, if necessary -- or I think it would be necessary to adjust them. But even if you did that, it just becomes part of the analysis to determine whether they're short or not and then whether that shortage requires mitigation.

So if they want to continue to operate at a lower efficiency level because it's easier to operate their systems and they want to continue their customary ways, I have no objection with that. But it does bother me when junior groundwater users are forced to curtail in order to maintain that continued less-than-efficient

operation.

Q. Well, in your report, did you prepare an alternate approach to propose to the Department to determine project efficiencies for the Fifth Methodology Order?

A. I did. And so I developed an alternate approach. My preference would still be to -- my number one preference would be to use the -- you know, use these reasonable efficiencies or approach the problem in that way and consider the reasonableness of efficiencies and apply some industry standard techniques to determine efficiencies that are potentially more reasonable.

But if the Department doesn't want to go there, then I've developed an alternative that would kind of work within the current framework but apply some additional sort of analysis and checks for how those monthly efficiencies are used.

Q. Is that described on -- or does that start -- that discussion start on page 14 of Exhibit 347A?

A. I think it's on 13.

Q. Page 13. Okay. I just wanted to note that for the record.

And then do you have some illustrations of the discussion that you have starting at page 13, maybe starting at Figure 3-4 in the back?

A. Yes. I prepared a series of graphs, so there's -- it's all the way from 3-4 to 3-18, 3-19. But within those, there's basically two sets of graphs. So in this first set of graphs that we're going to talk about, I've plotted the annual diversions of the Surface Water Coalition members during 2007 to 2021 against the annual crop water need.

Q. So this is -- we're looking at Figure 3-4 right now; is that correct?

A. Yes.

Q. So what do you conclude from the plots that you created in Figure 3-4?

A. Well, so what I'm showing in Figure 3-4 is these are annual -- so it's the annual diversions plotted against the annual crop water need in a -- what I call a scatter plot, XY plot. And those are the dots that are shown for each of the Surface Water Coalition members.

And then I've also drawn a trendline, best fit line, through the points, and that's the colored, dotted line that's the same color as the dots.

And then for just comparison purposes, I also plotted this black line. What the black line is is taking the annual crop water need divided by the average annual efficiency in the Methodology Order.

So this depicts on an annual basis what you would compute as an annual diversion demand from the annual crop water need and the annual efficiency. And you can see, even -- we'll look at this on a monthly basis, too, in a minute -- but even on an annual basis, you can see that the black line for -- is, in all cases, steeper than the trendline, and in some cases much more -- some cases much more steep.

And so what that indicates is that this calculation involving crop water need and efficiency is, basically, predicting a diversion demand, and it's predicting a relationship between the diversion demand and the crop water need that is different than what is actually present in the data.

So the data shows -- you know, you can see this in an extreme way, you know, under AFRD2, for example, that their diversion -- and that's with the purple dots in the upper right -- that those purple dots and the line drawn through them are relatively flat. And so, you know, even when the crop water need is changing, they're just diverting, more or less, the same -- a similar amount every year; whereas, the black line would -- you know, and the Methodology Order suggests that it ought to be going up and down, and that's sort of an implied part of the Methodology Order.

Q. Okay. Do we need to look at each of the individual companies, Figures 3-5 through 3-11, or can you kind of maybe highlight a couple of them that are --

A. Yeah, we might do that, you know, flip through some of them.

One thing I would also say about Figure 3-4 and point out is the amount of scatter in those dots. And so, you know, that as the crop water -- for the same crop water need there might be a diversion, you know, even for just using -- like, I don't know, what's a good one? -- Milner, for example, you know, with a crop water need of 30,000 acre-feet, we see that they diverted 50,000 acre-feet in one year and then as much as 65,000 acre-feet in another year. So you just have a lot of scatter in this data.

So then moving on --

Q. Why don't you pick out a company or a canal and let's --

A. Well, I think like A&B, for example, that's the next one, there's a -- you know, you can see that -- and this is the same information on these next set of charts as I was just talking about, only in this case, it's annual -- I mean, it's monthly data for each of the users.

Q. And so you're starting with Figure 3-5?

A. Figure 3-5. So this is A&B. So here I'm plotting the monthly crop water need versus the monthly diversions, and I've got a graph for each month. So the graph in the upper-left is April, and then to the right is May, and then going down to the left is June, July, August, September, and October, finally, at the bottom. And each of those, again, I'm plotting, with the dots, the crop water need -- monthly crop water need versus monthly diversion and plotting a trendline through it.

And for A&B, you know, which is a user that I think operates pretty efficiently, you can see that there is a pretty good correlation between what they divert and the crop water need. And those trendlines are, you know, not too far off the theoretical line, which is the black line, you know, the crop water need divided by the project efficiency.

Q. Basically, the black line shows what is being administered --

A. Yes.

Q. -- correct?

Okay.

A. But for other of the users it's not -- it's different. And it can vary by month. And some months it line s up pretty good, and other months it could be way off.

So, like, for example, on the next one, the next graph, 3-6, when you look at May for AFRD2, you've got those orange dots, and the trendline through them has a much flatter slope than the black line would suggest.

And then just flipping through the rest of these BID, Milner, you see a similar looking situation where you've got -- sometimes the trendline lines up with the black line, but at other times it doesn't. And in a lot of cases you still have a lot of scatter, too.

Q. So does this -- what does this tell us about the crop water need divided by project efficiency term as a predictor of diversion demand? Or does it tell us anything?

A. Well, it doesn't -- it tells me that it's not a great predictor. It's not the -- you know, the crop water need divided by efficiency is not the only thing that's going into what they're diverting.

Q. So can we move now to Figure 3-12?

A. Well, I would just note, then, with the last couple of them, North Side and Twin Falls, you can see --

Q. And those are Figures 3-10 and 3-11? I apologize --

A. Yes, 3-10 and 3-11 where -- you know, and for

these users, you know, you see that -- quite a lot of mismatch in many or most of the months where what they divert is -- seems to be a lot less -- what they divert is a lot less sensitive to the crop water need than the relationship in the Methodology Order would suggest it ought to be, a black line.

Q. Now, I do have a question for you.

At the top of each of these graphs from 3-5 to 3-11 there's some blue text that says: "Exclude Project Efficiency Outlier Months (>+/-2 Standard Deviations)."

What does that refer to?

A. Well, that's a filter that the Department had put on when they were -- when it was evaluating these monthly efficiencies, that it was excluding the outliers. So I follow that same procedure to also exclude those.

But that's a good point, in that there's values that are straying even further -- historical values that are straying even further from the data that I have plotted on here that aren't plotted.

Q. Okay. So can we move on to this next group of graphs starting at Figure 3-12?

A. Yes.

Q. So this is titled -- these are a series, I think, by company -- or member, rather, titled, "Annual

Project Efficiency v. Annual Crop Water Need."

What are we seeing in Figure 3-12 through 3-19?

A. So this is a comparable set of graphs. So this first graph, 3-12, is one where I'm plotting the annual project efficiency versus the annual crop water need for -- and this is back on a graph where I've -- this graph where I've got a separate graph on this figure for each of the Surface Water Coalition members, the seven members.

So I'm plotting their annual project efficiency computed from the data against the annual crop water need.

Q. Okay.

A. And then similar to the last discussion or the last set of figures I was discussing, then I have some additional figures where I show the monthly values for each of the Surface Water Coalition members on separate pages.

Q. So can we pick out some of the monthly graphs that have strong correlations between project efficiency and crop water need?

A. Yes, I can do that.

And then also I would note that for each of these trendlines drawn through the data, I've got the

equation for the trendline and also the R-squared value for how good of a fit that trendline is through the data.

And so when I -- I considered a good relationship is when the R-squared was at least -- was above .5.

Q. Okay.

A. And so you can go through these and --

Q. Why don't you pick one or two, based on your professional understanding, then, of which ones would be significant. And then --

A. Well, there's, you know -- like, on A&B you can see that, you know, there's -- like, April and June there doesn't seem to be much relationship.

Q. Tell us which figures you're looking at. Sorry.

A. Oh, sorry. Figure 3-13.

Q. Okay.

A. Like, when you have a lot of spread in here, and there's not a good relationship, that suggests to me that they're operating probably at a higher level of efficiencies. And actually some of them vary -- the scatter that you're seeing in this plot, it reflects water that's going either into or coming out of soil moisture to meet the crop water need. And that's not

part of the calculated efficiency, and that would be a reason you'd get more scatter. If you could build that into the analysis, I think some of this would tighten up.

Q. So, actually, a poor R-squared in these graphs, 3-12 through 3-19, is an indicator of, potentially, good operational efficiency?

A. Probably operating at higher -- closer to the higher end.

Q. Okay.

A. Or at a more reasonable level.

Q. So if we go through these and find the graphs that have low R-squared, that would be an indication, in your professional opinion, that the operations are what?

A. Tend to be more efficient than not.

Q. So then if we go, for example, to 3-14, and we see AFRD No. 2 in July, R-squared .86, what does that tell you?

A. Well, so that tells me that their project efficiency is changing with the crop water need, which that, just by itself, doesn't make a whole lot of sense to me, that -- if you're operating at a reasonably high level of efficiency, your efficiency should be roughly the same or near the same regardless of what the crop -- the variation in the crop water need has been in that

month.

And if the crop -- if the efficiency is going up as the crop water need or the crop consumptive use increases, that suggests to me that they're diverting an excess of what they need. And the reason the efficiency is going up is because the enumerator is just getting larger and larger with the higher crop water use.

Q. Okay. Well, before we tie a bow on this, what else -- is there anything else that you would like to mention about these tables, 3-12 through 3-19 -- I'm sorry, Figures 3-12 through 3-19?

A. Well, just -- I mean, just because -- you know, I did note, like, for some of the users like North Side and Twin Falls, who we've been talking a lot about, you know, turning to the Twin Falls page, Figure 3-19, you can see that there's a pretty strong relationship now for them -- for Twin Falls and an R-squared much greater than .5 in all of the months but April. That -- that suggests to me that Twin Falls is probably, you know, operating at -- diverting more water than they need, and the only reason their efficiency is changing is because that numerator is changing.

Q. And remind us what the numerator is again?

A. When you're computing the efficiency, it's the -- the crop irrigation requirement, the CIR, times

the acres, and that's the crop water need.

And so as -- you know, in a hotter, drier year, that -- the crop water need will be greater, so that numerator becomes greater.

But you can imagine -- just for a simple example, then, if they divert the same amount of water every year, just in a hypothetical, and the crop water need is different every year, and you're always diverting enough water that the numerator stays the same and -- no, wait -- the denominator stays the same and the numerator, the crop water need, is changing from year to year, then you'll get that perfect relationship; that the computed efficiency will go up in lockstep with the crop water need.

And that's a reflection of the actual efficiency, but it's also a reflection that they're not operating at a reasonably high efficiency level, at least in those years where the efficiency -- the computed efficiency is lower.

Q. Okay. Well, what would you propose that -- what would you propose for the Department to do with all of this information?

A. Well, I guess, for one, I wish they would just consider it, you know, and apply some sort of -- take this information and think about what it reflects and

whether the efficiencies that are used in the methodology are reasonable or can be modified to consider this information.

And I have -- I've proposed a couple of alternatives as a couple of many potential things that you could do.

So what I propose, then, is based on this information that I was just talking about. It appears that at least for -- you know, for many of the members and in some or many of the months, there is a good relationship between the monthly project efficiency and the crop water need and -- even though I think it would be better to use that relationship just as a small fix than to just use a fixed average value in the Methodology Order.

And so what I propose, then, as one small fix would be that for the situations where we have an R-squared that's more than .5, that you would use that regression equation to compute the project efficiency.

Q. And what regression equation is that?

A. It's the regression equation that's shown on each of these -- in figures --

Q. So give us an example.

A. Yeah.

Q. Let's look at Figure 3-19, for example.

A. Okay. So let's go -- let's say for June -- this is Twin Falls. So for June we have a -- that's the second graph down on the left. It's with the green dots.

So that -- the trendline, that's the regression line I'm talking about. It has -- the equation for that line is over on the left with the R-squared of .781. So I would propose that you would use that line -- or that regression equation to compute the Twin Falls efficiency in June and for all of the other months that the R-squared is greater than .5.

But I would also propose that in addition to that, that you would establish a floor, and you would allow -- the efficiency that you would compute would be no lower than the average. And so that would prevent, then, you from using, in the methodology, these very, very low efficiencies on the lower end.

Q. So give us an example of one that you think is too low?

A. Well, let's go to, like, September, for example. September has efficiencies that are ranging from -- you know, that's the -- with the purple dots ranging from, you know, roughly, 12 percent up to 40 percent.

So I would propose that you would use that

regression line, but you would have the floor for what you would compute, from that regression line, be the average, or at about 25 percent.

Q. Oh, the average of the purple dots in September --

A. Yeah.

Q. -- would be the floor?

A. Would be the floor.

And then you would go up on that line from there.

Q. Okay. And so if you use -- and the regression business is beyond me, I'll admit.

So if you're using the regression to compute the efficiency, what are you not using?

A. Well, you're not using just a fixed monthly value, average value, all the time.

Q. Which is what IDWR does now?

A. Yes. And so this would result in -- in months with a higher crop water need, you would use a higher efficiency. And that is -- you know, that's actually reflected in the historical data. So in that case, I'm not applying any of my reasonableness test or anything, I'm just working within the historical data.

Because what happens in the methodology now is that if you get -- if you use the average efficiency and

it's a year with a -- or a month with a relatively high crop water need, you compute that average efficiency into the crop water need, and you end up with a diversion that's actually greater -- a diversion demand that's greater than what they actually diverted in that year.

Q. Oh, I see.

A. So it inflates it to more than what they historically diverted.

Q. Okay. I see.

Now, did you prepare any kind of -- I'm going to call it a hindcast to evaluate this proposal?

A. Yeah. Well, there's one more piece that we didn't talk about, and that's what to do when the R-squared is less than .5.

Q. Oh, right. I'm sorry.

A. So when the R-squared is less than .5, then I'm proposing that -- well, let's not use a regression equation, but we can just use a fixed value -- but I would propose that we would -- rather than using the average value, we should use like a -- and I'm proposing the 75th percentile value. So it's a value on the, you know -- well, at the 75th percentile, so it's not the highest they've shown they can operate at, stepping back down, right in between the average and the highest

values.

Q. So could we look at Figure 3-16 for a minute, that's Milner. Milner has a mixture of months that are -- for which the R-squared is below .5 and above .5.

So using Milner as an example, would it be -- would that mean that, for example, April where the R-squared is .13, what would you do in that month for purposes of an efficiency for the Methodology Order?

A. Well, in all of these when the R-squared is less than .5, you would just pick a value that's at the 75th percentile level; so in other words, excludes the upper one-quarter of the highest efficiencies.

Q. So pick one of the blue dots that's between the 50 percent and the 100 percent?

A. Yeah. I mean, April is not -- April is sort of -- let's not talk about April. April is kind of a weird month, and particularly for some of these users, where the reason we get these efficiencies that are greater than 100 percent is in -- some of the -- in the early months is that you can have a situation where they're only diverting for part of the month. So you've got a partial month diversion compared to a full month crop demand, so when you do that division, you can end up more than 100 percent.

Q. Oh, I see.

A. And that's because, you know, some of the crop demand is being met by soil moisture that's stored over the winter or from the previous season. So that's why --

Q. Well, can we talk about June, then?

A. Yeah, June. So, you know, just eyeballing what the 75th percentile here might be through those points would be, you know, maybe 60 percent, 65 percent or something like that. So higher than the average but not as high as, you know, the 75 or 80 percent that they've shown they have operated at in the past.

Q. So the 75th percentile not the 75th percent?

A. Yeah, the 75th percentile.

Q. Okay. Can we move to Tables 3-1 and 3-2 to talk about the hindcast?

A. Yes.

Q. Okay.

A. So --

Q. Let's start with 3-1.

A. So I did a -- I did this hindcast analysis, but I just picked out -- I did it for two examples. I didn't have time to do it for all of the Surface Water Coalition members. So Table 3-1 is a summary of the results of the hindcast analysis that I did for the Twin Falls Canal Company.

Q. And let me just stop you and ask you to go through the columns, but when you get to Column 5, talk about how this matches up with past orders.

A. Okay. So what -- this table represents an annual summary of the analysis that I did. But the analysis is done on a monthly basis, so this is just adding up the monthly results into annual values.

Excuse me. So this was done for -- this analysis was done -- the hindcast analysis for 2007 to 2021.

So in the first column is the annual, the sum of the monthly crop water need values or the annual crop water need, so that's the acres that the Surface Water Coalition members have reported times the CIR, crop irrigation requirement, for that month based on the crops that were grown and the like. So that's the same value that that reflected. These are the values being used by the Department.

The next column, which I guess is also Column 1, "Adjusted Historical Diversions." So these are the historical diversions that the Department used in their analysis. It says "adjusted" because they've been adjusted for the rentals and things for water that was diverted but not actually used for irrigation.

And then there's the -- this is the -- I have

the November 1 forecast supply so that -- the other thing that you should understand, and this reflects the hindcast analysis that would be done in November. So it's -- you're looking -- the forecast supply -- I mean, the supply is based not -- this is -- sorry.

Q. It's actual for the year?

A. It's actual for the year. And I'm using the term -- the column headings that the Department uses, so it's not really a November 1 forecast. Earlier in the year, it's partially a forecast. In the beginning of the year, it's wholly a forecast. But at November 1, you're using what they actually -- their actual natural flow diversions plus what their storage allocation was for that year, and that's their supply.

Q. So just to make sure it's clear, this 3-1 is based on an analysis that the Department does?

A. In part --

Q. Yeah.

A. -- and these first three columns I'm talking about is the Department's data.

Q. Okay. Thank you.

A. So then the next set of columns is titled -- it's under the combined heading of "Annual RISD," or reasonable in-season demand, and so I computed that three different ways. So the first column, it's -- it's

the column with the "2" above it -- "CWN Divided By Methodology Order 5 Project Efficiencies." That's where I've computed the -- you know, on a monthly basis, I computed the diversion demand based on the crop water need divided by the Department's average monthly project efficiencies, and I did that for each month and then added them up in this table.

And importantly, though -- and I'll talk about this more in a little bit -- I'm using the current 15-year average monthly project efficiencies that are in the Methodology Order in every year.

Q. Okay.

A. And that's a little different than what the Department did in its hindcast analysis, so keep that in mind.

And then under Column 3, this is one of the two alternative formulations that I had -- that I had proposed. So in this Column 3-1 is where I computed the monthly diversion demands based on the crop water need divided by the efficiency, and the efficiency was computed using that reference -- I'm sorry -- that regression equation. And then when the R-squared was less than .5, I used the Department's average monthly project efficiency.

Q. So Column 3 implements part of the discussion

we just had about the R-squared values on the Tables 3-12 to 19?

A. Yeah.

Q. Okay. Thanks.

A. And then Column 4 is the same except rather than -- in the months where the R-squared is less than .5, then I used the 75th percentile.

Q. More than .5, you mean?

A. No, when the R-squared is less than .5, I used the 75th percentile project efficiency instead of the average project efficiency. That's just the little difference between those two.

Q. Okay.

A. So then when you get -- the results, then, are shown over in the next set of columns. It's the "November 1 Reasonable in-Season Demand Shortfall." And here I've just calculated the shortage, which is based on Columns 2, 3, or 4 minus the forecast supply, which is the November 1 forecast supply column.

Q. I see. Okay.

A. And so in Column 5, this is what I get from the Methodology Order, and this is -- if you compare these numbers to the numbers that were in the Department's hindcast analysis, you'll see that they're the same, actually, in 2021 -- that shortage, the

179,066 -- but the Department has some different numbers in the above rows, and that's because the Department was -- used -- rather than -- the Department in their hindcast analysis didn't use the current methodology average efficiencies in every year.

They computed a new rolling average in some of the years, and then in the earlier years, they were using a fixed number that was based on a -- some prior number, prior average. So suffice it to say, anyways, that that's the reason why so many shortages -- the shortages that I have here are a little different than what the Department had computed.

Q. Okay. And --

A. And then just for -- then, for comparison purposes, then I've got the shortage for those two alternatives that I picked out -- that I had identified. And you can see that, in these cases when there's a shortage, by implementing just those very, like, modest changes to how you compute the efficiencies and, you know -- and those modest changes are still working within the efficiencies that the Surface Water Coalition members have been operating at. But just making some small changes, you can see that you get some, you know, fairly big swings or changes in some cases in what the shortage is.

And that's -- you know, that's indicative of just an overall observation that I have, is that this method is very sensitive to what you use for the project efficiencies just as a general matter because we're operating on the margin here when computing these -- you know, comparing this forecast supply to what their diversion demand is. So, you know, at that margin small changes in the efficiencies can make or break whether you have a shortage or not.

Q. Let's go on and look at Table 3-2. This is titled, "Summary of Annual Reasonable in-Season Demands and Shortages for AFRD2."

What is this showing us, Table 3-2?

A. It's the same thing that I was -- for AFRD2 that I was just talking about for Twin Falls. I went through the same analysis only this is for AFRD2.

And, again, it shows that by implementing these modest changes that you can have some effect on the computed shortages.

Q. So do you have a summary opinion here about the modifications you've offered for the Department's use of the project efficiency values in the Methodology Order?

A. Well, you know, again, as I said earlier, my preference would be to apply a reasonableness test, as I

talked about, but maybe we're -- maybe we take baby steps. So at least it's just a small step in the right direction. I think the methodology would be improved by using -- employing the proposal that I have regarding the progression equation and 75th percentile efficiencies, to use those in the methodology rather than the averages that are currently being used.

Q. Let's switch gears and talk a little bit about irrigated area.

This probably is old news by now, but just remind us what are the irrigated acreage values used for in the Methodology Order?

A. Well, they're used in two different ways actually. They're used to compute the crop water need, like I was just talking about. So in each month in the methodology, you take the irrigated area times the CIR for that month, you know, based on the actual climate conditions, weather conditions in that month, to compute what the crop needs for each of the members. And that's -- that's part of determining the demand for the members.

And then the irrigated area is also used in the derivation of those project efficiencies because the historical project efficiencies are based on crop water need divided by -- historical crop water need divided by

historical diversions.

Q. So we've heard testimony from several witnesses about the irrigated acres numbers that are used by IDWR.

Is it your understanding that IDWR scrutinizes the acreage figures that are provided by the companies?

A. No. Based on what we heard, they really don't provide any scrutiny.

Q. And we've heard testimony that the acreage numbers are based on either a permanent place of use or shapefiles that were created some time ago; correct?

A. Yes.

Q. At the technical work group, did IDWR present their own analyses of irrigated areas?

A. They did. As kind of incidental to some of the information they were showing us, they had provided some analysis of irrigated area for each of the Surface Water Coalition members based on aerial imagery and remote sensing analysis of the members.

Q. Do you remember what years they were -- presented their own data for?

A. It was 2011, 2017, and 2021.

Q. Okay. And do you recall how the Fifth Methodology Order acres compare with what IDWR's irrigated land set determined for 2011, 2017, and 2021?

A. Well, for some of them, they were -- you know, the methodology acres were, you know, close to or even less than the remote sense data. And I think that's because some of the remote sensing includes some additional areas or double-counted areas and all.

But for three of the users in particular, the methodology acres were significantly greater than the acreages that the Department had presented in their analysis. And those users are Burley, Minidoka, and Twin Falls.

Q. So -- and let's take Twin Falls as an example because we've talked a lot about Twin Falls the last few days.

What would be the effect if the Methodology Order incorporated IDWR's irrigated lands set acreage instead of the shapefile Twin Falls provides?

A. Well, it depends. Because if you -- if you insert the revised acres, keep everything else the same, then you can easily see that you compute a lower crop water need. Take CIR times the lower acres divided by the same efficiency, you get a lower demand.

And I say "it depends" because if you actually -- if you took the lower acres and then multiplied it by the CIR divided by the historical diversions and go recompute your efficiencies, then

you'd end up in the same place. Because if you took your lower acres, computed the lower efficiencies, and then stuck those lower efficiencies back in order, you'd end up with a diversion demand that's exactly the same.

Q. So it's kind of a feedback loop?

A. Yeah. And so that's why I say it depends.

And, to me, I mean, to put in lower acres and then to suggest, well, we'll just lower the efficiencies and move on, that doesn't make any sense to me.

Q. That's what the Surface Water Coalition expert, Chuck Brockway, suggests, though; right?

A. Yes.

Q. As the fix for all of this?

A. Yes.

Q. Just reduce the acres, but also recalculate the project efficiency.

But then they end up with the same demand --

A. Yeah.

Q. -- correct?

A. Yeah.

Q. Do you -- despite that problem, which you've talked about, I think, at some length related to your recommendations on how the Department could use project efficiencies differently, what would be -- would it be preferable for the Department to use its irrigated lands

dataset?

A. Yes. I mean, I think that data is far more reliable than what they're getting from the -- from the Surface Water Coalition members based on those old shapefiles with no scrutiny applied to it.

And I'd be reasonably certain that the acres that are determined by the Department are acceptable for -- to use in the methodology.

Q. So if there was to be a -- I mean, in the context of a challenge to the reliance on the shapefile, as an expert, then, you'd be comfortable relying on the IDWR dataset rather than the shapefile file dataset as far as showing acres that are actually irrigated?

A. Yes. And we heard some discussion that, well, maybe there's some examples in IDWR analysis that there'd been some acres that were misclassified or -- well, I mean, you could fix those. Right?

I mean -- and if you were going to use the IDWR analysis, well, then provide it to everyone, and everyone can look at it and suggest where it be fixed, and we end up with a much, much better irrigated acres dataset to use in the analysis.

Q. So the Department runs the Methodology Order every year. Would they need to update the irrigated area dataset every year?

A. No, I don't think so.
Q. Why not?
A. Well, I mean, acres do change a little bit from -- can change from year to year. But, I mean, in my experience, and particularly for these and for large irrigation systems, there may be some long-term trends in acreage because of urbanization and things like that.
But for these particular members that all have excellent water supplies that they generally are irrigating, you know, largely as much as they can and -- but not -- in all systems there's some lands that get fallowed for various reasons, but in my experience, while it's different lands that are going in and out of the fallowing, the overall amount of fallowing is roughly consistent from year to year.
Q. And, in fact, isn't that what we see in the 20 -- comparing 2011, 2017, and 2021 irrigated lands datasets? They're pretty similar, aren't they? 179,000, 187,000 for Twin Falls?
A. Yeah, they're all kind of in that same range, plus or minus a thousand acres or so. So that suggests to me that what the Department's doing is reliable and repeatable and should be used.
Q. Okay.
MS. KLAHN: Mr. Director, it's 3:00 o'clock,

and I have probably 30 minutes more. We can push through or we could take our afternoon break.

HEARING OFFICER: Thanks for the suggestion. I think we should break. We've been at it two hours. Let's break for 15 minutes. Come back at quarter after.

(Break taken.)

HEARING OFFICER: Back on the record. We're recording again after afternoon recess.

Ms. Klahn.

MS. KLAHN: Thank you.

Q. (BY MS. KLAHN) All right. Mr. Sullivan, let's switch gears and talk about your opinions related to the incorporation of supplemental groundwater considerations into the methodology.

How does the Fifth Methodology Order -- how does the Fifth Methodology Order consider supplemental groundwater?

A. Well, I think it's one of the -- supplemental groundwater uses is one of the things that can be considered in the methodology in terms of a supplemental supply or in the acres that are irrigated with supplemental groundwater.

So there's a framework to allow that to be -- that sort of information to be utilized, but, to my knowledge, it never has.

Q. And supplemental groundwater is one of those things that the district court has said could be incorporated if the standard is clear and convincing evidence; correct? Is that your understanding?

A. Yes.

Q. Okay. Do you have an understanding of why IDWR hasn't attempted to incorporate supplemental groundwater use into the demand determinations?

A. Well, I think they've said that they just -- they don't have an ability to do that or good enough information to do that. And I mean -- and they've been saying that for 15 years. And, you know, we've been, you know, asking about it and suggesting that it ought to be incorporated.

In fact, in a -- that was one of my specific comments that I gave in the 2015 technical working group, is that they consider that. And I suggested that again in the latest one, the 2021 technical working group.

And they keep saying they don't have enough information. And I think -- I mean, we've heard some testimony earlier that -- or based on some questioning earlier suggesting that -- I mean -- and I agree with this, the Department has water rights information -- detailed water rights information, they have pumping

information. They have an ability to use that information to come up with reasonable estimates of supplemental groundwater use.

And, you know, it's not going to be perfect, but in this business nothing's ever perfect. And you can make reasonable estimates. And there's -- the problem is, now, by completely ignoring the supplemental irrigation we know there's a bias one way. We're not even attempting to correct that bias by considering the supplemental groundwater use that we know is occurring.

Q. And during the original Surface Water Coalition delivery call hearing in 2008, did the Surface Water Coalition members submit supplemental pumping information in relation to a request from the Director?

A. Yes. Director Gray requested a bunch of information from the Surface Water Coalition members; one piece of which was how much supplemental groundwater acreage they had or within their boundaries. And so the -- most of the members or all of the members did submit that information.

And I had tabulated that in my expert -- my original expert report. And that was information from them, so it seems like that would have been easy to use the information they submitted, but it wasn't used.

Q. Let's move on to talk a little bit about --

well, let me just close the loop on that.

Did you have time to do an evaluation of the supplemental groundwater use from the Surface Water Coalition?

A. No, I did not.

Q. Okay. So let's talk a little bit about the change in the Fifth Methodology Order from steady state to transient modeling.

How would you characterize the shift from steady state to transient groundwater modeling in the Fifth Methodology Order?

A. Well, it's a sea change in procedure, and it results in a drastic change in the priority date for curtailment compared to what was being done previously.

Q. Do you have an understanding of why IDWR made the shift in 2023 from steady state to transient?

A. Well, I think they gave three reasons. There were at least three reasons. One of which was that they had a better understanding of transient and steady state modeling and how they could be used in the methodology.

That struck me as kind of curious because -- and I didn't quite understand that reasoning, because everyone is well aware of the difference between transient and steady state modeling and the use of the modeling and -- in the methodology. So it didn't seem

like there's anything new there.

I mean, so -- and then a second reason they gave is that now we have -- the ESPAM model is a monthly model, it has monthly stress periods, and so now it can be used in a transient way. But we've had a monthly model for a long time, and -- so why all of a sudden it should be now used for transient instead of steady state, that didn't -- I didn't quite understand that.

And then the last one was also one I questioned, I guess. And that was that they needed to determine curtailment dates with the steady state -- or the transient model so that curtailment would provide a backstop in providing wet water to the seniors in the event that the juniors don't mitigate -- don't mitigate enough -- and don't mitigate enough to meet the shortage.

And, I mean, to me, I didn't -- I don't know -- that doesn't make a -- well, I don't agree with that, I mean, for a number of reasons. I guess one is that I think if there's -- I mean -- and I'm not a lawyer, obviously, but if there's a mitigation order, there should be an expectation that the juniors will comply with it, and if they don't, there should be penalties for not complying with it, or curtailment. And that's the way it works where I come from in

Colorado.

And then, further, it's -- curtailment as the mechanism for conjunctive administration is horribly inefficient. You know, especially for an aquifer as vast as this, you have to curtail so much pumping to produce relatively little amounts to the seniors, you know, where they divert it, so...

Q. So in the Fifth Methodology Order, which I'm sorry -- I'm sorry, in Exhibit 301, which is the April 1st As-Applied Order, the curtailment date, I believe, is sometime in 1953; correct?

A. Yes.

Q. And so how much -- if curtailment was the reason for imposing the transient model approach, how much curtailment would it require to produce the 75,000 -- approximately 75,000 acre-feet of shortage by curtailing to 1953 priority date?

A. Well, if I'm --

Q. Approximately?

A. Yeah. What I recall is that for that -- the curtailment run that Jennifer made to determine the 1953 curtailment date, she was curtailing, roughly, 700,000 acres of groundwater use and 1.7 million acre-feet of groundwater consumptive use. So curtailing 1.7 million acre-feet of consumptive use to produce

75,000 acre-feet to the near Blackfoot to Minidoka reach. So I didn't do that math, but that's a very, very small percentage of the water that's curtailed that's going to reach that reach this year.

Q. So if you curtailed 700,000 acre-feet in order to achieve 75,000 acre-feet in the Blackfoot to Minidoka reach and the total CU curtailed is 1.4 million acre-feet, what happens to the other 1.325 million acre-feet of curtailed consumptive use? Where does that show up?

A. I think those numbers -- those are -- the numbers we talked about, that's not the right numbers. They're actually curtailing 1.7 million acre-feet.

Q. Okay. So 1.7 acre-feet, sorry.

A. So they're curtailing 1.7 million acre-feet, so 75,000 acre-feet will show up in the reach this year, and the other -- was it 1.625 million acre-feet? -- will either come back to different reaches this year, different reaches of the Snake River, or it will come back this winter, or the majority of it is just going to come back in future years.

So that 1.7 million acre-feet will come back to the river, and so -- you know, just -- then it sort of begs the question, well, what's going to happen with that water? And it seems to me that that, potentially,

just provides a windfall to all these other reaches and users and later in time, and so you -- and that doesn't seem a very good use of the resource. And that's why curtailment as a mechanism of conjunctive administration is not done.

Q. So what is the alternative? Is steady state the alternative to curtailment -- I'm sorry -- is curtailment based on steady state the alternative to curtailment based on transient modeling?

A. Well, I think you can use the steady state model to get there, but ultimately the solution is, you know, what is done routinely in Colorado and some other places, too, is you allow the juniors to keep pumping and then you require them to mitigate for their impacts.

And, you know, to be -- and, like, in places like Colorado when they come up with those replacement plans that are either judicially or administratively approved, those replacement plans need to be, you know, tested and proven that they can operate in wet years and dry years and all in order to be approved.

And if they don't -- if they can't function that way or don't have a way to get them -- reliably get the mitigation water they need, then they're not approved and those water users don't get to pump. So that's the safety net. You know, that prevents the

seniors from being injured and is way more efficient of the resource.

Q. Is the impact from curtailment under a transient model run disproportionate because of the moratorium on new wells in the ESPA?

A. Well, I think the moratorium provides -- the fact that there's been a moratorium in the ESPA since the early '90s presents some additional facts that make -- that are compelling to the use of the -- continued use of the steady state modeling to determine the curtailment date. And that's because since that -- because of the moratorium, you know, there's been, essentially, no new wells approved that -- since that time that -- and if they have been, then they have to mitigate for their impacts.

So, essentially, all of the wells that, you know -- prior to the moratorium order have been operating for at least 30 years and most of those wells for much longer than 30 years. So you have a situation where the current and prior pumping of virtually all of the wells in the Snake River Basin has reached a near stead y state; and so, therefore, we can use steady state modeling to evaluate the current -- the impact of the current and prior pumping from the wells on the Snake River. And that, to me, is a -- would be a better

way to establish or determine the curtailment date, is going back to using the steady state modeling, because I think that is the correct way to do it.

Q. Can I ask you to turn to page 24 in your report, please.

A. Okay.

Q. And I believe this is a graph that Jennifer Sukow produced but that you incorporated; is that right?

A. Yes. I just cut and pasted this from one of her presentations that she gave to the -- during the November 28th, 2022, meeting in the technical working group.

Q. And this was actually something that was discussed in Jennifer's testimony, too, wasn't it?

A. Yes.

Q. Let's see here.

A. Is there a question about this?

Q. Yes, there is.

A. Oh.

Q. I'm just trying to find it in my notes.

A. Oh.

MR. FLETCHER: No pressure.

MS. KLAHN: Yeah, right.

Q. (BY MS. KLAHN) So based on this graph, the curtailment of pumping from wells junior to sometime in

the mid-1980s for steady state would produce 75,200 acre-feet of water in the --

A. Which graph are we looking at? Sorry, I might be looking at the wrong one.

Q. I thought it was on the graph on page 24 of your report. I'll withdraw that question.

A. I think that question you were asking me was about --

Q. Page 26?

A. Yeah.

Q. All right. Let's go to page 26 of your report. Explain what's shown here on the graph on page 26 related to how you could produce -- how one could produce 75,200 acre-feet of water in the river from curtailment under the steady state approach.

A. Well, okay, so what this graph shows -- and when I talk about this graph, I'll be talking mainly about the yellow line and the orange line. So the yellow line represents the results of the steady state runs that Jennifer made. And so what this graph shows is that along the bottom -- the axis is labeled "Water Right Priority Date," and that's basically the curtailment date that she simulates, and each one of these dots is a separate run that she made.

And then the -- so -- and then on the y-axis,

that's the amount of water that's produced at the near Blackfoot to Minidoka reach resulting from curtailment.

And so the orange line is -- for the transient run -- represents the amount of water that's represented in the first year, I think May 1 to September 30 from curtailment in the first year. And so that's when -- kind of squint a little bit. If you go to around 1953, and that -- the dot there is at about 75,000 acre-feet, and so that's where you go and you can figure out how much -- you curtail back to 1953, and in the first year, you'll get 75,000 acre-feet at the key reach.

And then -- and when you look at the steady state line, the yellow line, you can see that you only need to curtail back to sometime in the mid-'80s to get 75,000 acre-feet. And that -- that will be -- that would produce 75,000 acre-feet at steady state, so after 30, 40, 50 years it would take to get that much.

But that also represents -- that 75,000 -- another way you can look at that is that the current and -- the current effect or the current depletion to the near Blackfoot to Minidoka reach today caused by wells junior to the mid-1980s is about 75,000 acre-feet. That's their -- the impact of those wells' current and prior pumping. And so had those wells not pumped, there would be 75,000 acre-feet more in the river.

So I think that's sort of an easy way -- that's why I think the steady state modeling should be used, because with that way of thinking, you can say that, well, the -- that last 75,000 acre-feet of depletion is what created the shortage, and the users that are, you know, junior to the mid-'80s are the ones responsible or the ones that caused that and they should be the ones responsible for the mitigation. And, again, that's why I think steady state modeling is the right way, particularly in this situation, for determining the curtailment date.

Q. Okay. Thank you.

Let me switch gears and let's cover some responses you might have to testimony we've heard.

MS. KLAHN: Mr. Director, we're assuming that you prefer we put on rebuttal testimony to the extent we can in the case in chief, and so I just have a couple questions to him to react to other witnesses.

HEARING OFFICER: That's great. I think it will contribute to efficiency.

MS. KLAHN: Well, efficiency is what we're after.

Q. (BY MS. KLAHN) One of the discussions we had at some length yesterday, I believe it was, was the nature and extent of Twin Falls Canal Company return

flows.

Do you recall that?

A. Yes.

Q. And I think we talked to both Department witnesses about whether they were aware of the Twin Falls Canal Company return flows and how much they were, and there was not really anything conclusive, I think, from that questioning. But the Department maintains a database of return flows for Twin Falls Canal Company?

A. Yeah, I mean, for all of the return flows to the river that's -- you know, they've -- over the years, they've -- they or other agencies have instrumented some of these return places to the river, draws or places where water collects and gets back in the river, because that information has been used in the groundwater modeling. It's good data. It helps you differentiate how much of the reach gains are due to water coming on, you know -- reaching the water -- river from the surface versus water that's coming through the underground and back to the river. And that's helpful information for the modeling.

Q. For purposes of determining what's attributable to reach gains from the aquifer versus other sources?

A. Yeah, for calibration particularly, yeah.
Q. I want to hand you this and ask you to identify it. Mr. Sullivan, would you identify this.
First of all, have you seen this before?
A. Yes, it was prepared under my direction.
Q. Okay. And what are -- what's the source of the information on here?
A. It's listed in footnote 5 there. It's daily data that's downloaded from IDWR's Aqua Info database. There's the URL code there. And so we had heard testimony from Jennifer Sukow --
Q. Well, wait. Let me just lay the foundation here so we can offer it.
So the data on here was from IDWR's database. This document was prepared at your direction.
MS. KLAHN: Mr. Director, I'd like to offer this as a demonstrative exhibit showing the -- summarizing the data in IDWR's database related to Twin Falls Canal Company return flows since we've had so much testimony about that for purposes of clarifying the record.
HEARING OFFICER: You want to mark the document?
MS. KLAHN: Yes, please.
MR. FLETCHER 365?

MS. KLAHN: 365.
HEARING OFFICER: We'll mark the post exhibit.
COURT REPORTER: I'm sorry, what?
MS. KLAHN: Can we mark this as exhibit --
HEARING OFFICER: Mark it with an exhibit sticker.
(Exhibit 365 marked.)
MS. KLAHN: So I'd like to offer Exhibit 365.
HEARING OFFICER: Any objections?
Hearing none, the document marked as Exhibit 365 is received into evidence.
(Exhibit 365 received.)
Q. (BY MS. KLAHN) All right. Mr. Sullivan, you started to describe what 365 shows.
Could you do that now, please.
A. Yeah, so these are the annual summaries of the daily data that we downloaded from the IDWR database for the places where return flows are measured, you know, all along the Twin Falls service area from top to bottom. So they're all measurement points that are at or near the river at the bottom -- the lower end of Twin Falls near the river.
And they're color-coded, just for informational purposes, as the blue represents gauges that are on the coulees, or the kind of gullies that

intersect or go through or depressions that bisect -- or intersect a bunch of the canal service area for Twin Falls.

And then there's also -- the orange represents measurements that are actually on some of the tributaries that come through the Twin Falls area.

And then the gray is some other lines that are identified.

And then -- and for each of those in the footnotes there, we've identified specifically which gauges are in each of those different categories.

Q. So what's the difference between a coulee and a tributary gauge?

A. The tributary is, like, a known -- mainly a -- what I identify as a tributary.

Q. Like a live stream?

A. Well, yeah. Or a creek or something that actually comes through.

And so there are return flows that improve to these creeks that go into the river. And then there's other of these coulees that are really not, like, a main tributary, but just a low spot in the Twin Falls area where water collects and comes out.

Q. Okay. And then one more question.

This morning Mr. Barlogi testified that the

conversions to sprinklers in the Twin Falls Canal Company had not changed demand, I believe. And he had some testimony about how losses couldn't be reused, and that's why the conversion to sprinklers didn't change demand.

Do you have a professional reaction to that?

A. Yeah. I disagree with that characterization. Because, in my experience, anytime you can improve the on-farm efficiency, you can make due with less water.

Now, it is true that with less efficient use you can have more runoff that can be reused in lower parts of the system. And there is some of that that does happen in Twin Falls.

But the issue is: I've never seen a system where you can reuse everything. So inevitably some of that -- you know, the return flow from the first use gets away from you, you know, through the groundwater or otherwise, and it can't be reused.

So in that process, yes, there's use and reuse and maybe a third use, but you're losing water every time that cycle happens.

And you're always going to be much better off making more efficient use and basically -- than delivering more first-use water and less reuse water. That will always be more efficient.

And, yeah, there will be less overall delivery to the users, but that's the way it should be. They don't need as much water if they're more efficient.

And so, you know, from a consumptive use basis, you can meet the same consumptive use with more efficient on-farm operations and, therefore, less water being diverted at the river heading.

Q. Okay. I think that's all the questions I have for you right now.

HEARING OFFICER: Thank you, Ms. Klahn.

Cross-examination?

MR. FLETCHER: Yeah, I guess. I hadn't thought of that.

Would it be better to see if there's any other groundwater questions first before I cross-examine?

HEARING OFFICER: Well, I was assuming that Ms. Klahn's -- this was Ms. Klahn's witness, and there wouldn't be follow-up, but I'm willing to ask that question.

Are there any of the groundwater user groups that want to question Mr. Sullivan further?

I see heads shaking no.

Mr. Fletcher, are you examining?

MR. FLETCHER: Yes. Thank you.

///

CROSS-EXAMINATION

QUESTIONS BY MR. FLETCHER:

Q. Good afternoon, Mr. Sullivan.

A. Good afternoon, Mr. Fletcher.

Q. Nice seeing you again.

A. Likewise.

Q. We have participated in several of these hearings over the years.

You mentioned in your direct examination that you've been involved in this water call since 2005, I guess; right?

A. Yes.

Q. And in 2007's hearing before the hearing officer, you rendered several opinions in your expert report; isn't that correct?

A. I did.

Q. And one of those opinions was that there was no injury occurring to the senior users; isn't that correct?

A. Not quite. I think I'd identified some limited instances where there was some shortages.

Q. You gave written direct testimony in that proceeding; is that correct?

A. Yeah, I think we did that.

Q. What's that?

A. Yes.
Q. And I believe the very last question you were asked -- I'll read it to you and see if you remember this -- was: "Did the Surface Water Coalition suffer injury during the 2005 and 2006 irrigation seasons?"
And your answer was: "No. The water budget analyses that are summarized in Exhibit 3023, together with the deposition testimony of the SWC managers, shows that the SWC members were not short of water in 2003 and did not suffer injury" -- or excuse me -- "2005 and did not suffer injury in 2005."
Do you recall that opinion?
A. Not specifically, but I'll take your word for it.
What I was referring to, I think, was I did an analysis over that longer period, and there were a handful of small shortages during that time.
Q. So your opinion in that case, ultimately, was not accepted by the hearing officer; is that correct? Your opinion concerning injury.
A. I don't recall.
Q. Well, did the hearing officer find that there was no injury?
A. No. No, he didn't. He didn't find any --
Q. He found there was injury; correct?

A. Right. Well, he found -- I don't remember the details, but he found that they needed to institute a methodology to address impacts and shortages.

Q. And you also rendered an opinion that the Department should use some sort of achievable farm efficiency formula; isn't that correct?

A. Yes.

Q. And that was rejected as well; correct?

A. At that time, yes.

Q. And you rendered an opinion that there should be no minimum carryover requirement in the Methodology Order; isn't that correct?

A. I think for purposes of -- well, in fact, yes. Yep.

Q. And that was rejected as well; correct?

A. Yes.

Q. And you also -- in your opinion, Twin Falls Canal Company's diversion rate should have been five-eighths of an inch per share; correct?

A. I think that's what it was at the time. Right?

Q. Well, the hearing officer accepted that.

Do you recall this?

A. Yes.

Q. So if you don't remember this, I'm not trying

to stump you here.

A. I know.

Q. But that was overruled by Judge Melanson in July 24, 2009; correct?

A. I'll take your word for it.

MR. FLETCHER: I'll just direct the Director toward the July 24th, 2009, order on petition for judicial review issued by Judge Melanson, page 31.

Q. (BY MR. FLETCHER) You also advocated for an industry standard when it came to determining whether the projects were being efficient; correct?

A. Yes.

Q. And that was rejected as well; correct?

A. Is that the same question you just asked me before?

I was advocating for using industry standard efficiencies and the -- as I recall, the hearing officer decided he didn't have the ability to differentiate that information.

Q. So you agree that that was rejected by the hearing officer?

A. Ultimately, it was, yes.

Q. So in all of these call proceedings, you have been representing groundwater pumpers, correct, the cities?

A. Yes.
Q. And you feel that it's your position to minimize the amount of mitigation that's required by a groundwater pumper?
A. No. My -- I feel like I have a role here to help assist the Department in determining that if mitigation is required, that it's required in amounts that are really needed to alleviate real shortages.
Q. Well, let's talk about that for a minute.
One of the things you talked to your counsel about was the change by the Fifth Methodology Order As-Applied Order using transient analysis to determine a curtailment date versus steady state; correct?
A. Yes, we talked about that.
Q. Right. And you agree, I mean, in principle, that all groundwater rights on the Eastern Snake River Plain are junior -- or substantially all of the groundwater rights on the plain are junior to all of the surface water users; is that correct? Junior and prior?
A. Well, with that -- with that "substantially" qualifier.
Q. Okay. So your opinion is that steady state modeling should be used to determine the priority date of curtailment?
A. Yeah.

Q. Does steady state modeling for a curtailment date mitigate in-season demand shortfall?

A. Yes, if -- I mean, the modeling itself doesn't, but the modeling identifies the user -- the groundwater users that are responsible for causing the shortage, and it's those users that should mitigate the shortage.

Q. Well, let me ask my question a different way: If steady state is used in the modeling to determine a curtailment date, will the amount of shortfall determined by the order be fulfilled in that year?

A. If you are using curtailment for the mechanism for conjunctive administration, it would not.

But that is not the way you conjunctively administer groundwater. The use of the model to determine the curtailment date should be determining -- the purpose of that should be determining the pool of users that are responsible for mitigating the impact. And the mitigation is what should be alleviating the shortage, not curtailment. Because, for the reasons I just talked about, curtailment is a very inefficient way of administering groundwater, and that's why it's not done in the West.

Q. That's a long answer to a "yes" or "no" question.

But the real point here is that steady state use will not provide water in-season to the injured party, the amount of water, the amount of injury?

A. Not if -- it would not if you only curtail back, like, to the mid-'80s. In the example I was giving, in the first year it won't.

Q. Do you agree with Jennifer Sukow's information that was on the chart that you referenced in your report, that only about 15 percent of the shortfall would be realized in the first year of mitigation?

A. I think the percentage is actually smaller than that. Because I think that 15 percent refers to the percent of water that ultimately will show up in that reach.

But if you look at that -- at the percentage as the percentage of the water curtailed, it's actually a much smaller percent.

Q. Well, I'm talking about the amount of injury that's determined.

According to her chart, 15 percent of the injury will show up in the first year of curtailment using steady state; correct?

A. Well, that's another way of asking the question you asked me before. Yeah, it won't -- the full 75,000 acre-feet would not show up in the first

year.

Q. About 15 percent will show up in the first year; correct?

A. If you only curtail back to 1980 -- the mid-'80s.

Q. Okay. So, in your opinion, an injured senior is only entitled to receive about 15 percent of the shortfall resulting from injury in one year in time, location, and amount.

MS. KLAHN: Objection; mischaracterizes testimony.

HEARING OFFICER: This is cross-examination. Overruled.

THE WITNESS: I think you mischaracterized my testimony.

Q. (BY MR. FLETCHER) What a surprise. Whose testimony, I'm not sure whose testimony?

A. Well, if I may explain.

Q. Sure.

A. In my mind, the proper way of conjunctive administration is to determine who has to mitigate, and we shouldn't be using curtailment as the way to mitigate, as the way to deliver the water to the seniors. We deliver them storage water, you know, the other kinds of mitigation that have been determined

previously. That is more targeted and more efficient, and it allows for a better use of the resource, it keeps the senior whole. And the curtailment analysis is just to determine who has to -- who has to provide the mitigation water, but the Surface Water Coalition gets their water.

Q. Yeah, I'm not disagreeing with you, and I don't think anyone is that if someone has a mitigation plan in place and it's effectively operating, then we're not talking about those people in this hearing; correct?

In fact, your client, the City of Pocatello and the other cities, have an effectively operating mitigation plan; correct?

A. They do.

Q. Right now?

A. Yes, they do.

Q. They've never breached that plan, have they?

A. No.

Q. They're not facing curtailment as a result of this hearing?

A. Well, they could ultimately if the curtailment -- or the shortage requirements become so much that it strains their mitigation supply. And so that's why it's in everyone's interest to make sure that the mitigation amounts that are necessary are truly

necessary to meet real shortages.

Q. Well, their obligation in their plan is capped at 9,000-some acre-feet; correct?

A. Yeah, but the plan doesn't last forever.

Q. So 30 years from now, or whenever that plan runs out, that's your concern for your clients?

A. That's one concern. I think our clients are interested in the viability of agriculture in the whole area, and so, you know, part of that viability is enhanced by maximizing the use of the resource.

Q. So I'm going to get back to the question you were working around earlier.

In your opinion, a senior should only receive 15 percent of the injury at the time of injury by using steady state; correct?

A. I absolutely disagree with that characterization.

Q. But that would be the result if steady state was used for curtailment?

A. If that was used and you didn't require those users to mitigate, you just were relying on curtailment alone, you would be right. But that's not what would happen. And if those users can't mitigate, then they should be curtailed and not allowed to operate at all.

And that whole -- I mean, in my experience in

Colorado, that whole -- that creates an incentive for these users to develop these plans and mitigate, and that's what I've seen happening in Idaho for the most part. I mean, most users are on a plan; right?

Q. Isn't every user in this room in a mitigation plan?

A. Well --

Q. Every groundwater user in this room is a party to a mitigation plan; is that correct?

A. Yes, but those plans aren't necessarily forever, and some I understand are being renegotiated; and so, I mean, there's changes afoot.

Q. So as I understand your testimony, if they breach those plans, then they should be curtailed?

A. Yeah. Well, and even those plans -- yes, if they breach the plans, they should be curtailed, and those plans should be -- you know, should be reliable plans so that the risk of breaching is very low and doesn't fall on the shoulders of the seniors.

Q. A steady state use of the model does not predict an instantaneous response to the reach in question; correct?

A. Well, no run does.

Q. Now, as I understand your testimony about the 1980s wells, first of all, none of those wells from the

1980s have been curtailed; correct?

A. Today.

Q. Today.

A. I don't know. I thought the -- I mean, I was out of the country for a while, but I thought that the Director had -- there was an order that he was going to curtail as of sometime in May. And maybe I just -- I don't know what happened since then.

Q. I missed that order the Director issued curtailing people to the mid-1980s.

The bottom line is that no one that's had a mitigation plan in place, none of the parties to this proceeding, have been curtailed; correct?

A. I think that's right.

Q. So for you to talk about if pumping had never occurred since 1980s, then 75,000 acre-feet would be in the reach this year and there would be no injury, that's just fantasy, isn't it?

A. No. That's just a different way of saying that the last 75,000 acre-feet of depletion that created the shortage was caused by the wells junior to the mid-'80s, and, therefore, they should be the ones responsible for mitigating it because they caused the problem.

Q. So your position, then, is only those wells

since the 1980s should be required to furnish all of the injury determination this year?

A. For this year. And next year if the shortages is more than -- maybe the curtailment date goes to, say, 1970, then that pool of users should have to replace in that year.

Q. And if they can't furnish the water or won't enter into a mitigation plan, then what?

A. I think -- well, the way that -- I don't want to get too far out in front of my client or anything, but in Colorado, you have -- you can't pump unless you have a mitigation plan. So I don't know if that's -- that's a solution, maybe there's other ways, too, but that's the way it works in Colorado.

Q. Yeah, I'm not disagreeing with that idea of yours. Trust me. I like it. But it's not what Idaho uses; isn't that correct?

A. That's correct. But my understanding also is that there's -- the amount of users that are operating without a plan is relatively small.

Q. So the -- under your 1980s theory, the 19 -- for that water to appear in this reach, the 75,000 acre-feet injury, the 1980s water rights and junior to that would have to be permanently curtailed; correct?

A. No. They would have to provide mitigation.
Q. Or provide mitigation?
A. Well, yeah, provide mitigation is --
Q. And if they don't provide mitigation, they would have to be permanently curtailed for that amount to appear in the reach?
A. The threat of curtailment is the stick to keep them mitigating.
Q. You know, you just won't answer the question.
The question is: If they don't mitigate, if they don't mitigate, your theory is they would be permanently curtailed so that that 75,000 acre-feet would show up in the reach; correct?
A. The point of curtailment is that they're not mitigated, and I'm not really looking at later stuff as when the water shows up or anything like that.
Q. Let's talk about your Colorado plan that you suggest to the Director in your report on pages 24 and 25.
You've explained this two or three times that, under Colorado, the water user -- groundwater user is required to have a plan in place before the season ever starts; correct?
A. Yes.
Q. And it has to be approved?

A. Well, and I should say, not everywhere, but in most places in Colorado, they have to.

Q. And what are those plans called in Colorado? They're not mitigation plans, they're augmentations?

A. There's augmentation plans that are approved by the court, and then they have substitute supply plans that can be approved by the agency in some limited instances.

Q. And our conjunctive management rules don't talk about augmentation plans or substantive water plans; correct?

A. Yeah, but I've always viewed a mitigation plan as functionally the equivalent.

Q. So as I understand -- the way they do it in Colorado, those plans have to be in place before the irrigation season. Not only the plan has to be in place, but the supply of mitigation water has to be in place before the irrigation season; correct?

A. Yeah, or, you know, reasonably certain that it can be there.

Q. And that depletion caused by that groundwater user has to be delivered in time, location, and place under that replacement plan or whatever it's called?

A. Sufficient in time, location, and amount to -- and such that it prevents injury. So it doesn't have to

exactly match the depletions, but it needs to get to the user before they're injured.

Q. And those plans do not cover 100 percent of the depletion?

A. Right. Because at times when there's -- the seniors have enough water, then there's not a mitigation plan.

Q. So it -- how is it determined each year how much should be covered under the replacement plan?

A. Well, there's routine accounting that's performed by these plans that is submitted, and it depends on, you know, how much water is available, how much the seniors are diverting, what the shutoff date is of the water rights and who's short and that sort of thing, and what depletions the juniors are creating. And it's become routine.

Q. Okay. When you say it's routine, who's doing that accounting?

A. Well, the accounting is done largely by the users and, you know, standard mechanisms have developed for reporting that information, and so the users do most of the work. It's submitted to the agency in a certain format so that it's relatively easy for the agency to review it, and it's also transparent because the users can review each other's accounting and make sure it's

all kosher. And it ends up working -- it's working very well, actually.

Q. So in addition to that requirement of having the water in place before the season starts, under the Colorado model that you're talking about, or method, those groundwater users are required to have telemetry on their meters or some sort of way to measure their diversions?

A. Well, similar to Idaho, there's -- in most areas, there's -- well, the groundwater users have to measure their use for -- sometimes they're allowed to calculate it, you know, with our data, but, yeah, there's typically measurement requirements.

Q. How often is it measured in Colorado?

A. Well, I mean, they're typically like a continuous meter, totalizing flowmeter, so it's measuring continuously. And then the reporting for these plans, it's typically monthly or annual.

Q. Yeah. Aren't there plans that require daily reporting?

A. For -- maybe a few, but not -- I mean, they may submit daily data, but ultimately, that's part of the -- you know, as input to the accounting. But ultimately, it's rolled up into sort of a balancing period that may be monthly or annual that they have to

balance --

Q. So monthly is more common than daily; is that what you're saying?

A. Well, it kind of -- it depends on the situation, you know, that -- yeah, it's kind of situation specific.

Q. To your knowledge, are the groundwater users in Idaho required to report, monthly, their diversions?

A. I don't think so, but I don't know.

Q. And aren't those meters calibrated every two years by a certified inspector?

A. In Colorado.

Q. In Colorado?

A. I think that that varies by basin.

Q. But, overall, those components of the Colorado plan, that's what you're recommending the Director adopt, that you've just talked about?

A. I mean, maybe some components. I haven't really thought that far ahead, but I think the -- there could be a mechanism developed that protects the senior and has, you know, accounting based on measured use and those sorts of things that could work here.

Q. Are all groundwater users in compliance with their replacement plans?

A. Where?

Q. In Colorado.
A. For the most part, yeah, or they get curtailed.
Q. So when you say they're curtailed, how are they curtailed?
A. That the sheriff comes out and tags their well and enjoins them from pumping.
Q. Okay. Does that have -- before that curtailment takes place, do you have to go through some kind of administrative proceeding?
A. Yes.
Q. I'd like to talk to you about your acreage just for a minute.
I'd like you to open page 19 of your report.
Exhibit 347A, I think; is that right?
And as I understand your recommendation to the Director, you're recommending that he use those acreage numbers that are in the column labeled, "2021 Acres"; is that correct?
A. Sorry. What page are you on?
Q. Page 19.
Let me double-check. Excuse me. Page 18.
A. Yeah. I mean, that was the most recent one or -- but, you know, the numbers are similar.
So I think that this would be a good place to

start for coming up with the acres.

Q. Yeah, it says in the report: "In my opinion, it would be more appropriate to use the 2021 acres for purposes of the demand calculations."

Correct?

A. Yeah.

Q. Have you totaled those acres in 2021 -- 2021?

A. And when I said that, I should have been clear. I meant for Burley and Minidoka and for Twin Falls.

Q. Well, that's not what your report says.

A. I should have been more clear.

Q. So that's a mistake. You only want to use --

A. Well, they shouldn't be able to -- you know, if they're irrigating more than their shapefile or more than they say they're irrigating, then that should be a consideration as well.

Q. Well, I don't disagree with you, I'm just reading what your report says.

A. Okay. I was --

Q. Because those 2021 acres total over 618,000 acres; correct?

A. Well, there's -- if you look at, like, North Side -- I used to know the answer to this -- but there's some -- there's a reason why North Side says 220

in 2021 and not 154.

Q. Okay. My question is: The 2021 column adds up to over 618,000 acres; correct?

A. I haven't done the math.

Q. Well, the math can be done, but I would advise you that if you do the math, you're showing an increase in acreage of about 57,000 acres by using 2021?

A. I think using the actual acreage would reduce the overall acres.

Q. What goes into determining crop water need?

A. Irrigated area, the crops that are being grown, and the weather.

Q. And is the crop mix an important factor of that crop water need?

A. Yes.

Q. And, in your opinion, the more current that information is, the better?

A. Yes. I mean -- yeah, I mean, assuming we're trying to figure out what the crop water need is today, we should be using current data.

Q. Yeah. If you had 2023 data available, it should be used; correct?

A. Yes.

Q. And how is the Department doing that now; do you know?

A. Yeah. I think they're -- they're using what they call CDL information. So it's remote sense crop data. And that data is not available in real time, so -- or at least not readily available in a form it can be used. So I think they use data from the previous year.

Q. Are they averaging previous years.

A. Oh, you're right.

Q. Yeah, I'm not trying to stop you --

A. No, you're right.

Q. A lot of details in this stuff.

A. Yeah.

Q. They're averaging about three years to determine what this year's crop data mix is; is that correct? Or is it more than that?

A. It's -- yeah, three to five. I don't remember exactly.

Q. I'd like to talk to you about project efficiencies. A little bit of reality instead of theory.

You toured these projects back in 2005 or '06. I don't know what year, but...

So you're familiar with how they're actually laid out on the ground; correct?

A. Yes.

Q. And, Twin Falls, who -- everybody's after Twin Falls in this proceeding. Twin Falls has, what, 100 miles of canals and about 1,000 miles of lateral ditches and other parts of its delivery system?

Sound right?

A. I don't know those exact statistics, but it's a large irrigation system.

Q. And when they design a system like Twin Falls, aren't they designing that system to carry peak demand, the amount -- the largest amount of water they need during the year to grow a crop?

A. They should be.

Q. And isn't that typically occurring in the months of June, July, and August when it's the hottest and all of the crops are growing, generally?

A. Typically.

Q. So your review, and I think the Department's review as well, shows when the demand is the highest and when the canals are near capacity, they're the most efficient. Wouldn't you agree with that? The project is most efficient?

A. I think that's what the -- the results, those monthly -- actual efficiencies that I calculate that are crop water need divided by diversion are at their highest in the mid-season.

Q. Right. And that's when the project efficiency is also the highest; correct?
A. And the reason that is, is because I think they're probably overdiverting in the other months when the demand is lower.
Q. That's what I want to talk to you about.
In the spring and fall, they still have to make deliveries to water users; correct?
A. Depending on how the company operates. But, yeah, I mean, they -- there's different mechanisms for ordering water, and they have to try to meet those deliveries.
Q. And using Twin Falls as an example, they may have to be delivering water still down 100 miles of canals and a 1,000 acres of lateral ditches?
A. Yeah.
Q. Even in the spring and fall; correct?
A. Correct.
Q. Now, that doesn't mean that every farm on that project is irrigating at that time; correct?
A. In the fall?
Q. In the fall or even in the early spring.
A. Well, the demand is generally less in the fall and the early spring.
Q. Some crops have been harvested by the fall;

correct?

A. Correct.

Q. But they still have to convey water to all their other water users on the system; correct?

A. But, overall, the demand is lower.

Q. I'm not talking about the demand; I'm talking about the fact they have to still convey water through their system to all other users.

A. Yeah, but the amount that's peeled off on the way is less because the demand is less.

Q. Okay. The headgate deliveries are less, is what you're talking about; correct?

A. Uh-huh.

Q. But you still have to push all that water through a system that was designed to carry the peak load of June, July, and August; correct?

A. Of course.

Q. And doesn't that effect those efficiencies in spring and fall?

A. You, typically, can see some lower efficiencies in the spring and fall, but I think to the extent to which these efficiencies have gotten so low are unreasonable.

Q. What I just described to you is true for almost all open-canal surface water systems; correct?

Their peak efficiencies -- project efficiencies tend to be in the midsummer, and their spring and fall efficiencies typically are lower?

A. Typically. But then the issue is: How much lower, okay, in the shoulder months?

Q. Well, Twin Falls -- do you know how many acre-feet per acre it delivers or that -- excuse me -- how many acre-feet per acre does Twin Falls divert at the Snake River to deliver to it's 180- or 90,000 acres, whatever we're talking about?

A. What, 1.1 million divided by --

Q. I'll just throw a number out there, and you can tell me if you disagree.

Around 5.8 acre-feet, something in that neighborhood?

A. We can use that for an example.

Q. And you believe that's an unreasonable amount of acre-feet to deliver -- whether it's 180- or 190,000 acre-feet -- over a system that's -- conveys water through, roughly, 1100 miles?

A. Well, I don't think you look at it that simply. And that's -- you would look at it in more detail.

Like, I've done that in the past, and I think that more detailed look shows that they're typically

diverting more than they need to.

Q. Well, it's my understanding --

A. And more than they -- and more than they would need to in comparison to -- in my experience, compared to other large irrigation systems that operate more efficiently.

Q. So what other irrigation system do you know that delivers water to close to 200,000 acres through lava soils and stretches -- well, you heard Mr. Barlogi talk about 10,000 acres covering, roughly, 15-square miles.

I mean, what other system are you talking about?

A. Well, there's -- I mean, I just got through with a long litigation in Texas v. New Mexico where, you know, analyzing the irrigation operations under the Rio Grande project. And those are huge systems, very long, hundreds of miles long, and they operate more efficiently than Twin Falls does.

Q. Have you looked at other irrigation systems in the Eastern Snake River Plain?

A. Well, all the Surface Water Coalition members.

Q. Have you looked at others up the river?

A. Not in this level of detail.

Q. Do you have any idea how many acre-feet per

acre those systems divert?

A. Well, they're not calling curtailing juniors, though.

Q. I understand. But you're talking about an industry standard or a reasonable diversion rate.

A. I'm talking about industry standard in the situation where there's conjunctive administration and curtailment going on.

Q. What is this industry standard that you're talking about? You don't put it in your report. What is the industry standard for Twin Falls Canal Company?

A. I don't understand the question.

Q. In your report, you say Twin Falls should be measuring against an industry standard; correct?

A. Well, I think when I use that terminology, I mean the reasonableness of their operation, vis-à-vis their irrigation efficiencies and all should be analyzed in an industry standard way where the efficiencies that they should be expected to operate at before juniors are curtailed, for their benefit, should be based on, you know, their reasonable conveyance efficiencies. And, you know, their conveyance efficiencies and conveyance losses are knowable. And the amount of waste that is running out, you know, just gets spilled through the waste gates or runs out into the canal is knowable.

And there are industry standards that large canal systems operate under with -- yeah, I agree with, you know, what Jay was saying, that there is a certain amount of waste that has to happen to operate these large systems; but there's also a limit or a point at which it becomes unreasonable. And it's certainly -- it's easier to operate a canal system with more waste. You don't have to manage it as carefully.

But I think in a situation of conjunctive administration, there should be a reasonableness test before you curtail others.

So that's the conveyance efficiency piece. And then there's the on-farm efficiency piece, and industry standards on that is that there's certain efficiencies for gravity irrigation, sprinkler irrigation, that the users should be operating up to before juniors are curtailed.

And as I testified earlier, I'm not saying they have to, it's just that if you're requiring mitigation and curtailment, there should be an obligation in the calculation that you don't calculate a shortage until they are operating at that level.

Q. And in the 2007 hearing, the hearing officer and the Court found that the Surface Water Coalition -- their operations were reasonable; isn't that correct?

A. I think the -- they did. I think the hearing officer chose not to engage in all the details of the analysis.

Q. Okay. So your -- the stuff you're talking about right now was rejected by the hearing officer?

A. Yes.

Q. On page 12 of your report, you make a statement where you say: "Declines in the average project efficiencies are due to these systems not being managed as well as they were in the past."

What facts do you have to back that up? Have you -- do you have any evidence that the projects are not being managed properly?

A. Well, that's -- so that's based simply on that -- I forget the figure, but the figure where I had tabulated the average efficiencies that I found -- actual efficiencies -- you know, crop water need divided by what they're actually diverting -- from my analysis using the data from, what is it, 1990 to 2006. And so that's -- that was a set of actual efficiencies for each of the members.

And when I -- and when those actual efficiencies are now computed again with the more recent data, they're actually lower. And so, you know, what has changed that they should be lower and one -- you

know, apparently, they're not being managed as well because they're having to divert more water to meet their demands than they did in the past. So that was the basis for that statement.

Q. And you heard Mr. Barlogi's explanation for that; correct?

A. That they're converting to --

Q. Well, first of all, they aren't diverting that much more water, are they, at Twin Falls Canal Company?

A. When you do the math, the efficiencies are lower.

Q. They've been -- you saw his chart where it showed he was diverting about 1.1 million acre-feet for I don't know 20, 30 years?

A. Well, but it goes up and -- you know, about -- but it goes up and down --

Q. Right.

A. -- and it's been more of late. I mean, that's why the baseline year has been going up.

Q. So that's an analytical analysis you did to come up with that determination they're not being managed as well. It's not based upon any facts; correct?

A. Facts?

Q. Dealing with observations of management?

A. I haven't done that.

Q. Do you believe that the Methodology Order should be used to protect seniors from injuries caused by junior diversions?

A. Yes.

Q. Do you agree that if injury is determined, the shortfall should be supplied in time, location, and amount that season?

A. Well, I still believe that they really shouldn't really have to pay it back. You know, make -- pay back the depletion until, you know -- it could be sometime later if the users still have storage available. But under the methodology, there's some constraints on that. So I mean, if we're working within that constraints of the methodology, then, yeah, they should provide the water in the season or at the time of need.

Q. Thank you.

HEARING OFFICER: Mr. Thompson, I assume that Mr. Fletcher's cross-examination was sufficient, or do you want to ask some questions as well?

MR. THOMPSON: I have a few, Director, if that's okay.

///

///

CROSS-EXAMINATION

QUESTIONS BY MR. THOMPSON:

Q. Good afternoon, Mr. Sullivan. Travis Thompson for A&B Irrigation District, et al.

A. Good afternoon, Travis.

Q. Just a couple of questions. Kent covered quite a bit, so I won't go back over that.

On page 6 to 7 of your report, you talk about -- I think you do a lot of comparison of an average year of diversions looking at 2000 to 2021; is that correct?

A. Yeah, that's what the Department did.

Q. And you just kind of compared that to the prior baseline year of '6/'8/'12?

A. Yeah, I was just basically stating what the Department did for that particular piece of that.

Q. So if we're looking at an average diversion, would you agree that that average diversion does not meet the methodologies criteria of an above average year of diversion?

A. The '06/'08/'12?

Q. I'm just -- whatever average we're talking about. We're just looking at a straight average.

A. Yeah, as I testified earlier, I mean, if you still just use 2000 to 2021, it's 40 acre-feet short of

being above average.

Q. And the criteria in the order requires that you're above average diverting; would you agree?

A. It does.

Q. And are you familiar with the order on judicial review of the Methodology Order issued by Judge Wildman back in 2014?

A. I'm sure I read it.

Q. I guess would you agree that an average year of diversion does not meet the standard that he approved?

MS. KLAHN: Objection; the document speaks for itself.

THE WITNESS: I don't recall exactly --

HEARING OFFICER: Just a moment.

I'll allowing questioning in this area. I think it's important. If there's an objection, it's overruled.

Q. (BY MR. THOMPSON) I'm just curious. Arguments made in that case by Pocatello and IGWA were requesting that an average year be used.

Were you aware that those were rejected by the Court?

A. I'll take your word for it.

Q. I guess would you agree that the average of

the combined diversions for all Coalition members is not reflective of a standard of an above-average year for an individual Coalition member?

A. Yeah, I mean, that's different. It seemed like the methodology doesn't require it to be done user by user.

Q. And it's not average whether it's the Coalition or if it's a single user; is that correct?

A. I'm sorry, can you say that question again, please.

Q. The methodology does not require an average year; isn't that correct?

A. Above average.

Q. Yes.

A. Uh-huh.

Q. So you talked about increased diversions the last few years. Would you turn to Exhibit 300. I think that's the Fifth Methodology Order.

Could you turn to page 7, Mr. Sullivan.

A. Okay.

Q. And what is that table depicting?

A. The graph here?

Q. Yes.

A. It says: "April Through September Growing Degree Days."

Q. So would you agree that warmer climatic conditions could contribute to increased diversions in recent years?

A. They could.

Q. And based on that graph, have we seen a greater number of years with growing degrees higher than that average than the years prior? I'm going to look at, like, 2012 through '21.

A. Yeah, there's more years above average.

Q. How about more water consumptive use crops? Could that contribute to greater demand?

A. It could.

Q. So you talked about 2022 in your report. Would you agree that was a year of limited water supply for certain Coalition members?

A. I don't recall.

Q. Are you aware of reduced deliveries by certain Coalition members in 2022?

A. Reduced delivery?

Q. Yes.

A. I haven't studied that 2022 diversion data in detail.

Q. Or shortened irrigation seasons?

A. I don't know.

Q. So if that were the case, if those certain

members had reduced supplies in 2022, reduced deliveries, shortened irrigation seasons, would you agree that that year would not meet the Methodology Order's criteria for a baseline year?

A. I don't think I was suggesting that 2022 be a baseline year, but if I -- it could be used in computing the average over the period.

Q. Right. Which is not used by the methodology?

A. Well, the methodology does require, as I understand it, a computation of some average with which the baseline year is then compared to, to see if the baseline year is above average.

Q. Yeah, I think the criteria we talked about, it needed to reflect a year of above average to protect the senior at the outset?

A. Right.

Q. So would 2022 be above or below average?

A. I think it's probably below average, but maybe -- I don't know if I misunderstand or there's some misunderstanding, but I didn't propose that 2022 be a baseline year.

Q. No, that wasn't my question.

A. Oh, okay.

Q. Turn to page 7. I just have a statement I wanted to ask you about -- back in your report, I'm

sorry, Mr. Sullivan.

So you make this statement about Twin Falls Canal Company's, I'll quote, legally established delivery rate.

Do you see that?

A. Yeah, on the second-to-last paragraph.

Q. I think you testified earlier today that you're not an attorney; is that correct?

A. That is correct.

Q. So would you agree that you're not qualified to give an opinion on what the legally established delivery rate is?

A. Well, I can -- I'm not a lawyer, but I can read documents and see where information comes from.

Q. So you talked about looking at the Unit B part of the A&B project. Do you remember that testimony? I think it's in your report as well.

A. Yes.

Q. And would you consider that project to be similar to a large open canal system in Idaho?

A. I mean, there's some similarities, but one difference is that the distance between the point of diversion and the point of delivery is typically pretty short, and there's some open canals up there, but there's a lot of piping too.

Q. And that system has a number of groundwater wells; do you recall?

A. I think at the time it was fully supplied by groundwater. I think maybe they get some surface water now.

Q. So I'll represent probably over 180 wells delivering water to individual farms.

Would you agree with that?

A. That sounds right.

Q. And so these large canal systems that we're looking at for the Surface Water Coalition, would you agree that they have a large diversion point at the Snake River not over hundreds of individual points of diversion?

A. Yes.

Q. And you talk about the Director's order in that case. Did you agree with the Director's and hearing officers' recommended diversion rate for A&B at three-quarters of an inch per acre?

A. No. I think that's probably too much.

Q. So you disagree with the finding and the order?

A. Yeah, I don't -- I haven't studied that part of the order in quite a while, so I'm a little fuzzy on that piece.

Q. Is the requirement for a water user to put water to beneficial use different when you are making a call as opposed to not making a call?

A. I think so, yeah.

Q. And is that based upon your experience in Idaho or other states?

A. I would answer in the context of Idaho, that in the context of the conjunctive management rules and the decisions that have been made, and all, that they're expected to be operating reasonably and without waste before they are curtailed -- or before juniors are curtailed on their behalf.

Q. And does that apply to surface-to-surface water right administration?

A. I don't know.

Q. So is a diversion rate of 5 to 7 acre-feet per acre reasonable for large open canal systems in Idaho?

A. It depends. It depends on what their conveyance losses are and what their on-farm irrigation application practices are.

Q. You have a per-acre-feet, per-acre standard as an industry standard?

A. No.

Q. Or would it be different for every entity?

A. It would vary.

Q. I'd like to talk to you about your supplemental groundwater testimony in your report, pages 20 to 21.

And you represent that table was provided by the Surface Water Coalition; is that correct?

A. Yes.

Q. And do you know if that information related to potential groundwater lands within their project or specific lands that were overlapped with surface water as well?

A. I don't remember the specifics of that.

Q. So would you agree that some of these projects cover vast areas of certain counties in southern Idaho?

A. Yes.

Q. Not every one of those users may have a surface water right; is that true?

A. That's true.

Q. Some may have groundwater?

A. There may be, uh-huh.

But I think that this information was represented as supplemental groundwater acreage by the canal companies, to my recollection.

Q. Have you compiled any information on supplemental groundwater rights since 2007?

A. No.

Q. Are you aware of any groundwater right transfers since that time?
A. Just in the ESPA.
Q. Yes?
A. Yes.
Q. Would that change the analysis of supplemental groundwater available within certain projects?
A. Yes. And I don't -- I wasn't necessarily advocating that these values be used, but they were put in here as an example that this information has been considered before and, for whatever reason, hasn't been considered for a long time. And if it is to be considered, would it make sense to use more recent data.
Q. How about groundwater rights enrolled in CREP since that time?
COURT REPORTER: Wait, I didn't hear that. Can you repeat that?
MR. THOMPSON: Groundwater rights enrolled in CREP, C-R-E-P.
THE WITNESS: I mean, if they're not delivering groundwater, then I don't think that should be considered as an alternate source. I suppose the lawyers may have some reason that legally it should be considered, but...
Q. (BY MR. THOMPSON) How about groundwater

rights used in mitigation plans, have you looked at those?

A. So what do you mean by that?

Q. Well, I just want to know if -- you haven't done any analysis on supplemental groundwater rights since that time, could those rights be not available today, not being used today, if they're in other programs?

A. Did you say enrolled in mitigation plans?

Q. Yes.

A. So the wells would still be in use?

Q. Maybe not. I don't know. That's the question.

A. It should be based on the wells that are -- I think that the wells that are actually in use.

Q. So do you know how long it takes the groundwater districts to compile their annual use of their members' groundwater rights?

A. I do not.

Q. One last question: Would the priority date of a supplemental groundwater right matter if it was subject to a curtailment order?

A. It might.

Q. I'd like to ask you a few final questions, I guess, looking at Exhibit 365.

Do you have that in front of you?
A. Yes.
Q. How many gauges did you query for these tables or graphs? I'll call them graphs.
A. Well, they're listed in the footnotes. I haven't counted them up.
Q. So the only ones that are totaled here are the ones actually listed --
A. Yes.
Q. -- in the notes?
A. Yes.
Q. How do you define the term "TFCC Return Flows" at the top?
A. I think that's the -- that's the sort of general terminology that's used -- that the Department has used. It's return flows coming off a tract, so it's measured water below that canal service area.
Q. So does it include water from other sources, not just irrigation return flow?
A. It could.
Q. So the orange tributary bars, are those natural streams?
A. Yes. So, I mean -- and as we heard Jay Barlogi talk -- testify earlier, there's -- some of their runoff off the waste or surface runoff goes into

tributaries.

Q. Certainly, during irrigation season that could be a component of that flow at that particular time?

A. Yes.

Q. How about runoff precipitation events?

A. It could be in high -- like it rained here last night.

Q. 3 inches, I think, at Crane Creek.

A. It was a lot. Almost as much as it rains down in Florida now, like that.

Q. Did you differentiate the irrigation return flows from other natural runoff in this graph?

A. I did.

Q. And it appears that some of these run year-round; is that correct?

A. Yes, there's some water in the winter.

Q. Are you aware of seeps in groundwater returns that might be included in these numbers?

A. Probably is some of that, yes.

MR. THOMPSON: That's all the questions I have.

HEARING OFFICER: Okay. Thank you, Mr. Thompson.

MR. THOMPSON: Oh, sorry. I've got a couple more.

HEARING OFFICER: Go ahead.

Q. (BY MR. THOMPSON) Getting back to your question on project efficiencies, would your proposed use of an efficiency regression with that 75th percentile, essentially, disfavor seniors?

A. No.

Q. How so?

A. Because it would be using the efficiency values that they have shown to be able to operate at.

Q. At certain times? Is that correct?

A. Yeah, but I think it's entirely reasonable to be -- I'm not picking the very top, I'm just picking within the upper part of the range that they've shown they can operate at.

Q. So do you agree that large canal companies would need some sort of base level to operate their diversion system?

A. What do you mean, "base level"?

Q. Can they simply follow the ET curve seasonally or annually crop --

A. Well, that's why -- well, I'm not sure if I understand your question. But that's why these efficiencies are not 100 percent, and there's allowances for losses and inefficiencies.

Q. So do you agree there's beneficial diversions

of water to bear crops that go beyond just meeting the consumptive irrigation requirement of the plan?

A. When you're, like, storing water and soil moisture for subsequent use, yes.

Q. How about canal charging?

A. Yep. And that's the reason that the efficiencies -- the conveyance efficiency can be temporarily higher in the spring. Although, I understand, you know, canals like Twin Falls and some others run year-round now because of the recharge.

So maybe some of that charging part is not as big a deal as it used to be.

Q. I guess, are you aware of the location of Murtaugh Lake compared to the rest of the project on Twin Falls Canal Company?

A. It's up near the top.

Q. How about having an available steady supply of water, if that's how they deliver?

A. Can you be more specific on what you mean?

Q. Yeah. Do you consider that a beneficial diversion of water that goes just beyond meeting the crop water need for the plan?

A. I think that's part of the reason Twin Falls is so inefficient is because they -- their operational practice is to basically guarantee a rate of water to

their users rather than an allotment system. It's more typically used by these large systems, and it leads to a less efficient operation.

It's great for the users, and it's great if you have enough water, but you can -- a system can be operated more efficiently under an allotment system. There's incentives for saving water.

Q. So which entities are you referring to that use an allotment system?

A. I know some of the Surface Water Coalition members do, but I just -- I haven't -- and that's something we looked at back -- way back when. I just didn't have a chance to refresh myself on that.

Q. How about diverting water for chemigation and soil tillage, is that a beneficial use of water?

COURT REPORTER: Okay. Wait. Can you repeat your question?

Q. (BY MR. THOMPSON) Using water for chemigation or soil tillage, is that a beneficial use of water?

A. It's a beneficial use. I think it, you know -- and I don't know how much of that is happening, how big of a deal that is. I mean, if they're -- yeah, I don't know. It's a beneficial use, though.

MR. THOMPSON: Thank you. That's all I have.

HEARING OFFICER: Thank you, Mr. Thompson.

Redirect?

MR. BUDGE: Director, the cross-examination by Mr. Fletcher and especially -- and partly by Mr. Thompson went way outside of what's in Mr. Sullivan's expert report and what was offered in direct, so I would like to also ask a few follow-up questions.

HEARING OFFICER: Well, I'm not sure that I agree with you, that it went way outside the boundaries of direct.

I disagree, but I don't object to your asking some questions. But before you do, Mr. Budge, and before you come all the way forward, I want to give Ms. Klahn an opportunity to ask questions.

MS. KLAHN: I'd rather go after Mr. Budge because I don't know what he's going to say, if that's okay, Mr. Director.

HEARING OFFICER: Well, let's stay as long as we have to.

Mr. Budge.

MR. BUDGE: I'll be as quick as I can.

MR. FLETCHER: 30 minutes; right?

///

///

///

CROSS-EXAMINATION

QUESTIONS BY MR. BUDGE:

Q. Thank you, Mr. Sullivan.

I want to follow up on some of the questions that were asked by Mr. Fletcher.

You'll recall there was a lot of questions about Colorado replacement water plans?

A. Yes.

Q. That is not something I am familiar with, but I assume they're governed by Colorado law?

A. Yes.

Q. And they're designed to accommodate Colorado water systems?

A. Yes.

Q. They're not governed by Idaho's conjunctive management rules?

A. No.

Q. And you're not advocating today that the Director replace the Fifth Methodology Order with --

COURT REPORTER: So, Mr. Budge, I'm going to need you to slow down, please.

MR. BUDGE: He's telling me to speed up.

COURT REPORTER: I can't get it, though.

HEARING OFFICER: No, I'm encouraging you to be more articulate.

MR. BUDGE: Touché.

MR. FLETCHER: More efficient and articulate.

Q. (BY MR. BUDGE) You're not advocating the Director replace the Fifth Methodology Order with a Colorado replacement water plan?

A. No.

Q. Let me ask you about a question Mr. Fletcher asked about some rulings by Judge Melanson related to the five-eighths-inch versus three-quarter-inch delivery for Twin Falls Canal Company.

Do you remember those questions?

A. Yes.

Q. Do you remember Mr. Fletcher asking if you knew that Judge Melanson had rejected or overruled the five-eights-inch standard?

A. Yes.

Q. And your response was that you'll take Mr. Fletcher's word for it?

A. Yes.

Q. So the record's clear, you don't know whether -- that Judge Melanson accepted five-eighths inch or three-quarters of an inch?

A. No.

Q. And to the extent that's in the record, that would reflect Mr. Fletcher's testimony and not your own?

A. Yes.
Q. Mr. Fletcher asked you if there had been any curtailment of groundwater rights to date, and I believe your answer to that was, to your knowledge, no?
A. This year?
Q. I think it was to date.
A. To date this year; right?
Q. Yes. Was your answer with respect to this year alone?
A. Yes.
Q. Okay. You weren't referring to curtailment in prior years?
A. No.
Q. There was a dialog between you and Mr. Fletcher about who should be curtailed when the seniors are short of water.
You said something to the effect that those who caused the problem should be curtailed; is that right?
A. Yes.
Q. You also testified that curtailment is extremely inefficient in the conjunctive management context?
A. Very.
Q. And it should be a matter of last resort?

A. Yes.
Q. And so it's fair to say that your testimony has been that curtailment should only be pursued to meet genuine water needs by the senior?
A. Well, not exactly. I mean mitigation should be provided to meet genuine water need, and curtailment, like I say, is a -- at last resort. If the user doesn't want to mitigate, then they shouldn't be allowed to pump.
Q. And in terms of calculating mitigation obligations, mitigation should only be required to the extent the senior actually needs it to grow crops?
A. Yes.
Q. And did I understand your testimony that the Fifth Methodology Order has created no incentive for seniors to become more efficient in their water use?
A. That's correct.
Q. In fact, if I understood your testimony earlier, there's some incentive built into the methodology that encourages the seniors to divert more water than may be required for their crops?
A. Yes. There's this feedback loop that the more they divert, the more they're entitled to under the methodology.
Q. And then, lastly, there was some discussion

about prior court rulings involving reasonable use of water. And I think Mr. Fletcher represented that a prior decision found Twin Falls Canal's diversions to be reasonable.

Do you remember that?

A. Yes.

Q. Do you recall whether that decision was based on efficiency or just based on whether Twin Falls was wasting water?

A. I don't recall.

Q. And efficiency is a spectrum. You can be highly efficient or --

A. Absolutely.

Q. -- poorly efficient?

And the waste threshold, as you understand that, would be at the very bottom end of the spectrum?

A. Well, my understanding is that it's -- they're really two sides to the same coin, the way that it's evolved and put out in the conjunctive management rules and the decisions that are being made.

If you're operating with reasonable efficiency, you're not wasting, and if you're wasting, then you're not operating with reasonable efficiency.

I used to think there was, like, some multiple tiers, but I don't think that anymore.

Q. Does your analysis show that since 2008 when the Methodology Order was first developed and we last had an evidentiary hearing, that Twin Falls Canal Company and other members of the Surface Water Coalition are not demonstrating increased efficiency even though you would expect that given the improvements made to the canal system?

A. Yes, that's correct.

MR. BUDGE: That's all I've got. Thank you.

HEARING OFFICER: Mr. Budge, I want to compliment you on your articulate questioning of the witness.

MR. BUDGE: It's about time.

MS. KLAHN: It was a lot less than ten minutes, TJ.

HEARING OFFICER: I did not mean it as a personal shot at you, so please accept my apology.

I also want to observe in the -- as I scanned the document and as I listened to the testimony, that the expert report is replete with references that say "in Colorado" and "in Colorado" and "in Colorado," as well as the testimony. I'll just observe that I think there's a lot of reference there, but I won't draw any more conclusions than that.

So, Ms. Klahn, from Colorado, you may question

the witness from Colorado.

THE WITNESS: I'm not in Colorado anymore.

MS. KLAHN: He's from Florida now.

HEARING OFFICER: Florida now, huh?

MR. FLETCHER: I can't wait to hear what they do in Florida.

HEARING OFFICER: Following the water problems.

MR. FLETCHER: The drain ditch problems.

MS. KLAHN: You should see the returns flows down there.

HEARING OFFICER: Ms. Klahn?

MS. KLAHN: Thank you.

REDIRECT EXAMINATION

QUESTIONS BY MS. KLAHN:

Q. Just a couple of things.

The discussion you had with Mr. Fletcher about the project efficiency aspects of crop water need, do you recall that?

A. Yeah.

Q. And I feel like there might have been some confusion about what the Methodology Order calculates and what's shown in Figures 3-1, et cetera, versus what your conclusions are.

Could we take a look at that real quick?
A. Sure. 3-1?
Q. Yeah. So in Figure 3-1, just to make sure the testimony is clear, you included on that figure your -- I don't remember what the terminology is because I didn't bring the report up with me -- the efficiency number you calculated in 2007; is that right?
A. Yeah, the seasonal efficiency. That's the blue lines.
Q. Right. And that was for purposes of comparison with the actual efficiencies that the Surface Water Coalition is currently experiencing; is that right?
A. That's one of the purposes, yes.
Q. Okay. There was a question about the -- whether chemigation and soil tillage were beneficial uses; do you recall that?
A. Yes.
Q. Would you agree that chemigation and soil tillage are not part of the crop water need?
A. I don't know.
MS. KLAHN: And I think those are all the questions I have, Mr. Director. Thank you.
HEARING OFFICER: Thank you for being succinct.

Recross?

Recross, Mr. Fletcher?

MR. FLETCHER: No, I don't have any.

HEARING OFFICER: Mr. Thompson?

MR. THOMPSON: No. Thank you.

HEARING OFFICER: Okay. Are we finished with Mr. Sullivan?

MS. KLAHN: I think so.

HEARING OFFICER: It sounds like we are.

Okay. It's 5:00 o'clock. The timing of examination of counsel is admirable.

Do we want to call the next witness? I assume not?

So looking at the schedule, I assume that Sophia Sigstedt will be scheduled tomorrow morning to testify, is that right, Ms. Klahn?

MS. PATTERSON: That's correct.

HEARING OFFICER: Oh, wait a minute.

TJ?

MR. BUDGE: That's correct.

HEARING OFFICER: Do you want to start at 9:00, everyone? Are we on schedule to finish on Friday, looking at the witness list?

MS. PATTERSON: I think we are, Director. We are only going to call one late witness, Mr. Carlquist.

And then I believe we just have a witness from Amalgamated, a witness from McCain, and then your expert witnesses.

I think that we can get Ms. Sigstedt and Mr. Contor done by midday tomorrow, leaving time in the afternoon for rubuttal.

MR. BUDGE: That's only if they'll be as succinct as I am.

MS. KLAHN: No, you're not succinct, I'm succinct.

HEARING OFFICER: And articulate.

MR. JOHNS: I can't make any promises about midday.

MR. FLETCHER: You're articulate, she's succinct.

HEARING OFFICER: Let's go off the record because we're devolving downward, I think. So let's go off the record.

So we'll adjourn until tomorrow at 9:00 a.m.

(Hearing adjourned at 5:03 p.m.)

REPORTER'S CERTIFICATE

I, ANDREA L. CHECK, CSR No. 748, Certified Shorthand Reporter, certify;

That the foregoing proceedings were taken before me at the time and place therein set forth, at which time the witness was put under oath;

That the testimony and all objections made were recorded stenographically by me and transcribed by me or under my direction;

That the foregoing is a true and correct record of all testimony given, to the best of my ability;

I further certify that I am not a relative or employee of any attorney or party, nor am I financially interested in the action.

IN WITNESS WHEREOF, I set my hand and seal this 19th day of June, 2023.



_____

ANDREA L. CHECK, CSR No. 748, RPR, CRR
Notary Public
P.O. Box 2636
Boise, Idaho 83701-2636
My Commission expires July 20, 2028.

$

$1.8 (1)
98:20
$27 (1)
24:21
$8 (1)
103:7

&

&gt+/-2 (1)
155:10

/

/// (7)
110:25;197:25;229:24,25;
246:23,24,25

[

[As (1)
66:8
[sic] (1)
45:11
[Witness (4)
39:10;43:22;105:20;
106:20

A

A&B (13)
13:15;113:7;137:19;
138:10;141:24;143:8;
152:19;153:1,10;157:12;
230:4;235:16;236:18
ability (6)
92:19;123:20;146:15;
180:10;181:1;201:18
able (13)
24:3;47:18;93:1;115:17;
121:23;122:2;131:4;137:21;
138:14;142:1;143:16;
217:14;243:9
above (16)
70:11;126:11;128:20;
131:13;157:6;165:4;169:1;
171:2;230:19;231:1,3;
232:13;233:9;234:12,14,17
above-average (2)
126:7;232:2
Absolutely (9)
21:3;28:2;34:6;46:22;
75:13;90:5;105:6;207:16;
251:13
accelerated (1)
80:18
accept (5)
10:24;22:19;23:1;41:8;
252:17
acceptable (1)
177:7
accepted (4)
125:14;199:19;200:22;
248:21
access (1)
85:20
accommodate (1)
247:12
according (3)
24:10;66:22;204:20
account (1)
136:25
accountant (3)
45:17;47:25;102:21
accounted (1)
61:19
accounting (7)
15:8;213:10,18,19,25;
214:23;215:21
accruing (1)
93:6
accumulate (1)
18:3
accurate (5)
53:22;72:17;73:7;85:15,25
accurately (2)
71:8;136:25
achievable (1)
200:5
achieve (1)
185:6
acre (13)
25:13;27:5;39:23;40:2;
41:6;66:9;79:21;92:13;
223:7,8;225:1;236:19;
237:17
acreage (18)
53:25;78:4;84:25;85:15,
25;87:21;105:4;173:11;
174:6,9;175:15;178:7;
181:18;216:12,17;218:7,8;
238:21
acreages (1)
175:8
acre-feet (73)
35:9;40:25;41:5,7,13,15,
22,25;43:24;44:5;71:19;
72:11,14,22;73:10,19,23;
74:9,14,25;96:7;127:1,2;
128:2,4;129:12,15,16,17,19;
130:7,10;152:12,13,14;
184:16,24,25;185:1,5,6,8,9,
13,14,15,16,17,22;189:2,14;
190:8,11,15,16,22,25;191:4;
204:25;207:3;209:16,20;
210:23;211:12;223:7,8,14,
18,19;224:25;228:13;
230:25;237:16
acre-foot (1)
103:25
acres (89)
24:15;29:25;32:21;33:4;
34:25;36:18,25;37:15,24;
**40:5;41:5,23,24;50:4,7,9,12,
14,16,18,21,24;52:9,23;53:3,
20,22;54:1,3,7,12;58:7;
67:21,24;68:12;79:20;81:20;
82:12;83:2,25;84:5;85:4,7;
86:3,7,19;87:24;88:5,6,11,
11;97:7;101:8;107:2,4;
134:23;160:1;167:13;174:3,
24;175:2,7,18,20,23;176:2,7,
15;177:6,13,16,21;178:3,21;
179:21;184:23;216:18;
217:1,3,7,21,22;218:3,7,9;
221:15;223:9;224:8,10**
Act (1)
63:23
action (1)
23:6
actions (2)
124:14,16
activities (4)
16:25;17:3,5;21:6
actual (21)
91:17;134:25;135:2,5;
141:19,20,20;144:10;145:5;
146:2;160:15;168:6,7,12;
173:17;218:8;220:23;
227:17,20,22;254:11
actually (33)
10:23;55:9;57:3;85:5;
93:7;95:17;103:18;113:17;
151:14;157:22;158:5;
163:20;164:4,5;167:24;
168:12;170:25;173:14;
175:23;177:13;185:13;
188:13;195:5,18;204:11,16;
214:2;219:23;227:18,24;
240:15;241:8;250:12
add (1)
32:22
added (2)
128:16;169:7
adding (1)
167:7
addition (3)
122:3;162:12;214:3
additional (13)
21:13;48:7;85:10,11;91:9,
13;97:11;126:9;144:14;
149:16;156:17;175:5;187:8
address (3)
8:23;11:5;200:3
addressed (2)
12:2;47:6
adds (1)
218:2
adequate (2)
121:17;137:22
adjourn (1)
256:19
adjourned (1)
256:21
adjudicated (1)
113:12
Adjudication (4)
81:9;82:1,2,4
adjust (1)
148:16
adjusted (4)
148:14;167:20,22,23
administer (1)
203:15
administered (1)
153:18
administering (1)
203:22
administration (9)
135:3;147:19;184:3;
186:4;203:13;205:21;225:7;
226:10;237:14
administrative (1)
216:10
administratively (1)
186:17
admirable (1)
255:11
admission (6)
22:3;48:19;68:20,24;
69:14;112:14
admit (2)
48:15;163:12
admitted (1)
94:13
adopt (1)
215:17
adverse (1)
19:22
advise (1)
218:5
advocated (1)
201:9
advocating (4)
201:16;239:9;247:18;
248:3
aerial (1)
174:18
affect (1)
125:12
affects (1)
105:5
afoot (1)
208:12
AFRD (1)
158:17
AFRD2 (6)
143:5;151:16;154:2;
172:12,14,16
afternoon (9)
111:20,21;179:2,8;198:3,
4;230:3,5;256:6
ag (1)
79:25
again (36)
12:6;19:12;27:13;33:17;
37:4;38:13;40:4;51:24;
56:24;57:25;58:13;59:5;
68:25;73:3;74:16;83:9;

86:18;94:24;101:10,10,12,13,13;104:22;109:15;139:20;153:7;159:23;172:17,24;179:8;180:18;191:8;198:5;227:23;232:9
against (4)
150:6,15;156:12;225:14
agencies (1)
192:13
agency (3)
212:7;213:22,23
ages (1)
107:22
ago (3)
76:19;105:21;174:11
agree (37)
25:13,20;29:7;36:7;48:2;74:18;82:11;102:23,25;105:4;106:18;132:3;133:14;180:23;183:18;201:20;202:15;204:7;220:20;226:2;229:6;230:18;231:3,9,25;233:1,14;234:3;235:10;236:8,12,17;238:12;243:15,25;246:9;254:19
agreed (3)
35:24;40:6;67:4
agreeing (1)
49:1
agrees (1)
132:24
agriculture (1)
207:8
ahead (5)
8:9;38:14;70:1;215:19;243:1
al (2)
13:15;230:4
alfalfa (8)
32:20,20;33:5;87:1;88:7;105:1;107:5,16
alleviate (1)
202:8
alleviating (1)
203:19
allocated (1)
11:23
allocating (1)
11:22
allocation (1)
168:13
allotment (6)
143:23,24;144:3;245:1,6,9
allotted (1)
66:9
allow (11)
9:21;12:7;22:23;45:1;51:19;58:12;94:19;99:24;162:14;179:23;186:13
allowances (1)
243:23
allowed (5)
47:16;63:24;207:24;214:11;250:8
allowing (1)
231:16
allows (1)
206:2
almost (5)
34:11;67:14;123:11;222:25;242:9
alone (3)
147:11;207:22;249:9
along (8)
17:9;57:1;59:22;100:4;140:16;144:23;189:21;194:19
alternate (3)
149:3,6;239:22
alternative (5)
149:14;169:17;186:6,7,8
alternatives (2)
161:5;171:16
Although (1)
244:8
always (10)
16:4;19:2;21:2;80:13;91:11;134:25;160:8;196:22,25;212:12
Amalgamated (1)
256:2
amending (1)
12:5
amendment (1)
11:2
among (3)
11:23;75:19;88:24
amongst (3)
68:1;102:15,16
amount (48)
16:23;39:14;40:1;43:8;61:23;66:18;70:14,18,22;71:5;88:9;92:17;93:3,10,12;97:5,6,7;102:5,9;103:2,3;127:3;128:10;129:16;130:5;151:22;152:7;160:6;178:14;190:1,4;202:3;203:10;204:3,3,18;205:9;210:19;211:5;212:24;220:10,10;222:9;223:17;225:23;226:4;229:8
amounts (3)
184:6;202:7;206:25
analyses (6)
119:8;135:24,24;136:18;174:14;199:7
analysis (36)
114:23;130:15;133:7;135:18;137:16;148:17;149:16;158:3;166:20,24;167:5,6,9,9,22;168:3,16;169:14;170:24;171:4;172:16;174:17,19;175:9;177:15,19,22;199:16;202:12;206:3;227:3,18;228:20;239:6;240:5;252:1
analytical (1)
228:20
analyze (2)
129:21;135:12
analyzed (3)
130:17;145:7;225:17
analyzing (3)
123:17;136:1;224:16
Anders (7)
42:23;43:15,17,20;44:8;131:20;134:22
Anderson (7)
9:1;99:9,12,14,16,19;100:12
Andrea (6)
8:6,8,10;10:18;60:7;68:22
anecdotally (1)
122:25
annual (40)
15:20;72:15;102:20,24;103:1,5;141:4;143:22;144:2,20;145:12;150:5,7,14,14,15,24,25;151:1,2,3,3,5;152:23;155:25;156:1,6,6,11,12;167:5,7,11,12;168:23;172:11;194:16;214:18,25;240:17
annually (4)
52:23;83:3;84:4;243:20
answered (3)
51:15;58:16;146:24
anticipate (1)
45:2
anticipating (1)
23:9
anymore (3)
67:21;251:25;253:2
anyways (2)
127:21;171:9
apologize (3)
98:8;120:25;154:24
apology (1)
252:17
apparently (2)
22:1;228:1
appeal (2)
9:24;125:2
appear (2)
210:22;211:6
appears (2)
161:8;242:14
application (6)
28:18;59:24;60:23;103:10;138:7;237:20
applied (3)
37:14;135:14;177:5
apply (8)
28:7;92:13,16;149:11,15;160:24;172:25;237:13
applying (1)
163:22
appreciate (2)
23:19;24:3
approach (8)
15:10;135:15;148:7;149:3,7,9;184:14;189:15
approaches (1)
133:2
appropriate (4)
16:22;110:12;128:24;217:3
appropriator (1)
11:17
appropriators (3)
11:11,21;36:23
approval (1)
67:8
approve (2)
28:20,21
approved (8)
186:18,20,24;187:13;211:25;212:5,7;231:11
approximately (5)
29:14,16;41:7;184:16,19
April (12)
15:20;31:14;153:4;157:13;159:19;165:6,15,15,16,16;184:10;232:24
Aqua (1)
193:9
aquifer (4)
108:24;113:23;184:4;192:24
arbitrary (3)
124:11,14,16
archives (1)
22:10
area (38)
32:17;36:19;37:25;41:11,20;49:22;53:9;54:8,10;62:6;69:10;77:14;78:8;83:19;84:22;86:24;87:11,22;109:7;112:23;122:11;145:11,11,16;146:10;173:9,16,22;174:17;177:25;194:19;195:2,6,22;207:9;218:11;231:16;241:17
areas (7)
88:17;97:9;174:14;175:5,5;214:10;238:13
arguably (1)
68:15
argue (2)
35:18;43:6
argued (1)
11:14
argumentative (2)
58:10,24
Arguments (1)
231:20
army (1)
148:2
around (20)
16:8;20:21;21:7;52:15;59:18;63:1;71:18;72:16,18;74:19;79:20;88:7;92:21;93:2;108:21;129:3,4;190:7;

207:12;223:14
articulate (5)
247:25;248:2;252:11;
256:11,14
As-Applied (5)
121:7,18;122:4;184:10;
202:12
ascertain (1)
78:11
aspects (1)
253:19
assertion (1)
76:8
assessment (4)
24:17,25;25:3;135:15
assessments (1)
24:23
assist (2)
88:2;202:6
assisted (1)
113:10
associated (3)
11:1;98:23;129:11
assume (14)
13:11;42:14;61:23;72:12;
75:6,7;87:2;89:20;90:8;
109:20;229:19;247:10;
255:12,14
Assuming (7)
51:20;56:16;75:4;124:25;
191:15;197:16;218:18
attached (1)
64:9
Attachment (5)
63:5,6,11,13;103:9
attachments (1)
81:5
attempt (3)
45:25;46:2;88:17
attempted (2)
60:12;180:7
attempting (1)
181:9
attended (1)
120:1
attorney (1)
235:8
attorneys (2)
21:25;23:20
attracts (1)
27:19
attributable (1)
192:24
augmentation (2)
212:5,10
augmentations (1)
212:4
August (5)
87:17;90:3;153:6;220:14;
222:16
authorize (1)
81:19
authorized (1)
89:20
automated (2)
20:18;90:19
automation (3)
75:18;90:18;123:1
available (14)
41:6;89:9,24;91:9,14;
93:11;213:12;218:21;219:3,
4;229:13;239:7;240:6;
244:17
average (70)
72:22;79:21;87:11;126:5,
9,10,11,12,19;127:1,8,18;
128:2,9,10,17,19,20,23;
129:18;130:7;131:13;
140:23,24;141:21;145:1,1,4;
150:24;161:14;162:15;
163:3,4,16,25;164:2,21,25;
166:9;169:5,10,23;170:11;
171:5,6,9;227:8,16;230:10,
17,18,19,22,23;231:1,3,9,21,
25;232:7,11,13;233:7,9;
234:7,10,12,14,17,18
averaged (1)
72:10
averages (1)
173:7
averaging (3)
129:23;219:7,13
avoid (1)
79:3
aware (9)
45:18;50:10;182:23;
192:5;231:22;233:17;239:1;
242:17;244:13
away (2)
115:15;196:17
axis (1)
189:21

B

baby (1)
173:1
back (60)
10:1,5,17;34:19;46:7;
48:14;59:20;69:23,25;70:12;
75:20;90:11;96:23,23;97:11,
13,14;101:8,12;102:6;
109:17;110:2,18,21;115:18,
19;116:14;118:4,10;135:11,
22;148:10;149:25;156:7;
164:24;176:3;179:5,7;
185:18,20,21,22;188:2;
190:10,14;192:15,21;204:5;
205:4;207:11;219:21;
227:11;229:10,11;230:7;
231:7;234:25;243:2;245:12,
12
backstop (1)
183:13
backup (1)
127:4
bad (1)
77:8
balance (2)
68:15;215:1
balancing (1)
214:24
baled (1)
34:18
ballpark (1)
90:20
banks (1)
21:13
bar (2)
15:17,18
barley (11)
86:25;87:12,24;88:5,11;
104:25;105:22;106:11,13,
23;107:4
barley's (1)
106:24
Barlogi (70)
12:24,25;13:3,6,19,21;
14:15;19:7;21:19;22:2,17;
23:17,21,24;24:9;29:5;30:2,
4;32:3,13;35:19;36:4,20;
37:13,20;38:19;39:1;41:4;
42:2;43:13;45:7;47:9,21;
49:1,11,21;52:20;54:11,14,
18,23;55:3;56:14,25;59:3;
60:3,20;62:13;65:5,13;67:9;
69:8,21;70:6;76:6;78:24;
100:18;105:2,16;107:22;
108:2;109:16,17,24;110:2;
123:2;148:4;195:25;224:9;
241:24
B-a-r-l-o-g-i (1)
13:22
Barlogi's (2)
110:7;228:5
barriers (1)
100:1
bars (1)
241:21
base (3)
46:24;243:16,18
based (45)
9:19;11:23;14:18;35:24;
66:22;82:2,9;100:5;108:12;
110:12;126:21;128:21,25;
138:15;141:6;147:2,2;157:9;
161:7;167:15;168:5,16;
169:4,19;170:17;171:8;
173:17,24;174:7,10,18;
177:4;180:22;186:8,9;
188:24;215:21;225:20;
227:14;228:22;233:5;237:5;
240:14;251:7,8
baseline (42)
73:1,5,9,17,21;74:8,13;
75:4;84:19,19;122:8;125:22,
23;126:5,10,15,20,25;
127:12,22,25;128:13,19,22,
23,25;129:6,8,17,19;130:12;
131:7,12,13,15;228:19;
230:14;234:4,6,11,12,21
basic (1)
126:2
basically (12)
122:7;124:8;138:10;
142:21;143:15;150:3;
151:11;153:17;189:22;
196:23;230:15;244:25
Basin (4)
81:9;82:2;187:21;215:14
basis (13)
11:22;19:2;79:14,14;
136:1;140:7;151:1,5,5;
167:6;169:3;197:5;228:4
Bates (2)
38:21,23
BAXTER (2)
12:15,17
bean (1)
17:18
beans (1)
87:1
Bear (3)
21:6;92:23;244:1
become (6)
75:13;94:21;131:14;
206:22;213:16;250:16
becomes (4)
96:10;148:16;160:4;226:6
beet (1)
88:7
beets (5)
26:11;87:1;105:24;106:12,
19
begin (3)
59:13;70:9;88:19
beginning (9)
17:10,11,20;18:3;31:6;
68:4;71:14;113:6;168:10
begs (1)
185:24
behalf (4)
23:16;36:23;53:6;237:12
behind (3)
14:7;88:18;134:2
belief (1)
37:13
below (13)
42:24;84:18;126:12,18;
128:10;129:17;142:3;
144:17;146:21;165:4;
234:17,18;241:17
benchmark (2)
127:17,18
beneficial (9)
82:3;237:2;243:25;
244:20;245:15,19,20,23;
254:16
benefit (5)
11:18;32:2;47:15,17;
225:20
benefits (1)

48:4
berms (1)
18:20
beside (1)
45:17
best (6)
49:10;66:24,24;70:22;
87:10;150:19
better (19)
15:12;29:2,4;92:20;111:9;
123:5,20;133:6,7,7;146:6;
161:13;177:21;182:19;
187:25;196:22;197:14;
206:2;218:17
beyond (7)
47:8;91:21;97:15;132:14;
163:12;244:1,21
bias (2)
181:8,9
BID (1)
154:7
bifurcates (1)
16:9
big (10)
32:18;34:5;46:13;62:8,11;
92:24;107:13;171:24;
244:12;245:22
big-box (1)
52:6
binder (5)
14:8;36:12;40:22;100:21;
116:1
bisect (1)
195:1
bit (21)
19:8;26:9;90:13;115:14;
126:12;127:24;128:3;
132:20;134:5,19;142:3;
143:13;147:13;169:9;173:8;
178:3;181:25;182:6;190:7;
219:19;230:7
black (18)
110:17;140:17,22;141:18;
142:3;145:2,2,24,25;150:23,
23;151:6,22;153:15,17;
154:4,9;155:6
Blackfoot (4)
185:1,6;190:2,21
blue (13)
31:1,3;141:3,19;146:9,11;
147:5,12,15;155:9;165:13;
194:24;254:9
board (5)
28:17;61:8,20,22;64:15
book (2)
73:11;83:6
both (13)
11:20;16:11;19:24;23:19;
76:1,3,16;113:20,21;135:18;
143:17;144:18;192:4
bother (1)
148:23
bottom (15)
20:15;38:24;39:8;84:15;
119:16;124:10;140:16,25;
144:23;153:6;189:21;
194:20,21;209:11;251:16
bottoms (2)
17:17;18:18
bought (2)
67:22,23
boundaries (2)
181:18;246:9
boundary (3)
44:13;50:23;52:7
bow (1)
159:8
breach (2)
208:14,16
breached (1)
206:17
breaching (1)
208:18
Break (13)
10:16;65:19;69:22,24;
88:3;110:20,22;118:2;172:8;
179:2,4,5,6
breaks (1)
21:14
Bricker (20)
70:1,2,5;72:6,8,9;73:12,14,
24;74:3,6;75:24;76:1,3,5;
78:15,18;104:15;117:22;
120:17
briefly (4)
81:2,4,7;132:8
bring (3)
17:25;94:7;254:6
brings (2)
49:19;136:21
Brockway (2)
124:22;176:11
Brockway's (2)
125:6,8
broke (1)
118:13
BROMLEY (67)
22:4;23:14,15,16;24:8;
37:8,10;38:14,15,19,22;39:1;
40:16,18,19;45:4,5,7;47:2,
13,14;48:3,13,24;49:8,14,19,
21;51:16,22;54:25;55:2,3,17,
22;56:1,9,13,14,19,22,25;
58:18;59:1,3;60:4,6,9,11,14,
19;65:3,6,9,12;68:17;69:1,2,
6,18,20,21;82:25;97:24;
103:9;116:10;117:15
brought (2)
32:24;126:2
Budge (41)
22:5,6;23:4,5,11;53:6,17;
78:19,20,23;91:23,24;92:2,3;
99:4,6;103:14;105:12,15;
107:17;108:2;109:11;110:6,
8,11,14;246:2,12,15,20,21;
247:2,20,22;248:1,3;252:9,
10,13;255:20;256:7
budget (2)
103:5;199:6
budgeted (1)
98:20
build (1)
158:2
built (6)
20:21;44:19;52:7;97:16,
19;250:19
built-in (1)
143:24
bullet (1)
124:15
bullets (1)
119:16
bunch (3)
135:21;181:15;195:2
Burley (2)
175:9;217:9
business (2)
163:12;181:5
Butte (1)
16:9
butts (1)
146:11
bypass (1)
63:1

C

calculate (9)
84:25;85:6;131:23,24;
136:16,19;214:12;220:23;
226:21
calculated (3)
158:1;170:17;254:7
calculates (1)
253:23
calculating (2)
128:12;250:10
calculation (7)
128:7;131:23;132:4;
134:21;137:4;151:10;226:21
calculations (3)
132:9;136:15;217:4
calibrated (1)
215:10
calibration (1)
193:1
call (46)
11:1,10;16:18;27:18;28:5;
37:12,19;38:1;39:4;54:15;
57:15,23;58:6,14,15,17;79:1;
113:6,8,8;114:6,8;118:15,18,
22,23;119:1;126:19,22;
131:10;137:18;138:16;
145:21;147:20;148:9;
150:16;164:12;181:12;
198:10;201:23;219:2;237:3,
3;241:4;255:12,25
called (12)
12:24;13:7;39:8;59:10;
62:8,11;64:6;111:2;134:25;
144:24;212:3,23
calling (2)
34:9;225:2
calls (4)
16:20;39:25;113:2;137:14
came (5)
34:15;46:6;61:7;141:22;
201:10
Can (143)
10:7,13,21;13:19;14:12;
15:15,25;16:25;17:9,24;
18:14,19;19:7;20:5;21:15;
22:16;28:9;30:20;33:18,21;
35:14;37:16;44:23;46:4,8;
47:7;49:10,13;53:21;65:2;
71:5,11,14;73:12;74:16;
78:11;81:4;88:23;90:3;96:9;
100:9,20,23;101:2;102:18;
104:10,19;106:25;107:12,
14;109:17,21,24;111:6,10;
112:17;113:13;114:10;
116:10;117:2,4,12,13,16;
122:1;136:25;141:11;144:3;
146:10;151:4,6,15;152:2,20;
153:11,23;154:19,21;
155:21;156:20,23;157:8,13;
159:16;160:5;161:2;164:19,
24;165:20,23;166:5,14;
171:17,23;172:8,18;175:19;
177:20;178:4,10;179:1,19;
181:6;183:4;186:10,19;
187:22;188:4;190:9,13,19;
191:3,17;193:13;194:4;
196:8,9,11,11,15;197:5;
212:7,20;213:25;218:5;
219:4;222:20;223:13,16;
232:9;235:13,13;239:17;
243:14,19;244:7,19;245:5,5,
16;246:21;251:11;256:4
Canal (127)
13:24;14:17,25;16:5,8,10;
18:22;20:3,7,13,13,14,15,16,
20,24;21:7,14;22:11;24:10,
14;26:22;29:13;33:15;35:14;
36:19;37:24;39:18;40:10,10;
41:12;42:4;44:4,13;46:10;
47:22;52:5;53:3,19;55:10;
56:7;57:4,14,17,22;58:5,6,8;
59:13;63:23;66:10,17;67:1;
68:6;70:10;71:7;74:8,13,24;
75:9,12;76:9,11,16,20;77:2,
7,13,25;79:13;80:20;81:14;
83:1;84:5;85:1,3,20,24;86:3;
90:8,14,25;91:1,9;92:11;
94:18,18;95:17;98:1;101:5,
16,18;102:12,13;105:3;
109:8;110:4;123:1;142:18;
143:3;146:6;152:17;166:25;
191:25;192:6,10;193:19;
195:2;196:1;200:18;225:11,
25;226:2,7;228:9;235:3,20;
236:10;237:17;238:22;

241:17;243:15;244:5,15;
248:10;252:3,7
canals (16)
16:13,15;17:9,16,17,22,23;
18:1,5,18;75:17;220:3,19;
221:15;235:24;244:9
Canal's (3)
89:16;107:7;251:3
Candice (2)
8:18,20
Canyon (2)
97:15,16
capacities (1)
94:18
capacity (8)
21:7,8;28:12;66:10;94:19;
97:17,19;220:19
capped (1)
207:2
capricious (1)
124:14
capture (1)
10:20
captured (1)
102:5
career (2)
112:19,25
carefully (3)
54:4;143:19;226:8
Carey (1)
63:23
Carlquist (1)
255:25
carry (2)
220:9;222:15
carrying (1)
66:9
carryover (1)
200:11
case (11)
37:3;67:21;119:10,11;
152:22;163:21;191:17;
199:18;231:20;233:25;
236:17
cases (10)
97:16;141:15,19;142:2;
151:6,7,8;154:10;171:17,24
cash (1)
106:18
categories (1)
195:11
caught (2)
88:17,19
cause (3)
13:9;21:13;111:4
caused (7)
190:21;191:7;209:21,23;
212:21;229:3;249:18
causing (2)
79:24;203:5
CDL (1)
219:2
census (1)
49:9
centered (1)
21:7
certain (19)
46:5;78:11;86:15,17;
108:8,12;109:19;124:8;
177:6;212:19;213:22;226:3,
14;233:15,17,25;238:13;
239:7;243:10
Certainly (29)
16:3;17:4;18:5;20:8;
29:19;33:12;37:16;47:8;
50:25;52:3;71:4,10;74:3;
77:9;78:13;80:14;82:15;
83:24;86:13;90:12;92:18;
102:7;108:4,7,11,14;125:2;
226:6;242:2
certificate (2)
27:23;83:19
certificates (2)
27:17,21
certified (1)
215:11
cetera (1)
253:24
cfs (8)
66:12;89:23,25;90:10;
103:16,18,24;104:4
challenge (2)
96:10;177:10
challenges (1)
79:24
chance (4)
22:1;81:6;115:12;245:13
change (17)
27:20;78:4;117:3;122:14;
127:5;133:6,6;137:10,12;
178:3,4;182:7,12,13;196:4;
202:11;239:6
changed (18)
19:13;27:23;34:22;35:7;
53:25;54:3;55:24;70:15;
97:5;117:10,10;119:12;
126:10;127:11,23;132:11;
196:2;227:25
changes (15)
28:3,5;54:6;79:25;123:12,
13,14;127:15;171:19,20,23,
24;172:8,18;208:12
changing (5)
151:21;158:20;159:22,22;
160:11
channel (2)
18:20;63:1
channels (1)
17:13
characterization (2)
196:7;207:17
characterize (3)
20:25;135:14;182:9
charging (2)
244:5,11
chart (4)
43:9;204:8,20;228:12
charts (1)
152:22
Check (2)
8:6,10
checking (1)
148:3
checks (1)
149:16
chemicals (1)
18:6
chemigation (4)
245:14,18;254:16,19
chief (1)
191:17
chokes (1)
18:8
chop (1)
34:9
choppers (1)
34:1
chose (2)
132:22;227:2
Chris (3)
23:16;38:21;55:16
Chuck (1)
176:11
CIR (5)
159:25;167:14;173:16;
175:20,24
Cites (1)
23:16
cities (6)
36:5;112:4;114:3,4;
201:25;206:12
citing (1)
101:15
City (6)
39:22;111:2,22;114:2,2;
206:11
claim (1)
72:15
claims (2)
113:11,11
clarify (3)
79:5,10;117:9
clarifying (1)
193:20
clean (2)
46:8;69:7
cleaned (1)
18:21
cleaning (3)
17:16,17,22
Clear (12)
11:7,7;47:19;82:25;
111:11;124:12;168:15;
180:3;217:9,12;248:20;
254:4
clearly (1)
72:18
client (2)
206:11;210:10
clients (3)
113:10;207:6,7
climate (1)
173:17
climatic (1)
233:1
close (8)
54:9;86:20;130:11;
141:22;146:24;175:2;182:1;
224:8
closer (2)
65:4;158:8
Coalition (61)
9:9;13:7;14:8;23:16,20;
55:21;57:23;84:3;113:6;
114:3,15;118:24;119:1;
122:10,13,22;123:18;128:8;
130:3,17;134:11;135:12;
136:3;137:16;140:12;141:5;
143:22;145:6,13,21,25;
147:19;148:11;150:6,17;
156:9,18;166:23;167:14;
171:21;174:18;176:10;
177:4;181:12,13,16;182:4;
199:4;206:5;224:22;226:24;
232:1,3,8;233:15,18;236:11;
238:5;245:10;252:4;254:12
Coalitions (1)
147:2
code (1)
193:10
coin (1)
251:18
colleagues (1)
120:21
collectively (2)
81:18;88:11
collects (2)
192:15;195:23
colon (3)
65:23,24;66:2
color (2)
30:23;150:21
Colorado (29)
112:12;135:25;184:1;
186:12,16;208:1;210:11,14;
211:17,21;212:2,3,15;214:5,
14;215:12,13,15;216:1;
247:7,10,12;248:5;252:21,
21,21,25;253:1,2
color-coded (1)
194:23
colored (1)
150:20
colorful (1)
48:17
Column (15)
167:2,11,19,20;168:8,25;
169:1,16,18,25;170:5,19,21;
216:18;218:2
columns (5)
167:2;168:19,22;170:15,
18

combination (1)
138:11
combined (2)
168:23;232:1
comfortable (3)
22:2,6;177:11
coming (7)
62:10;102:10;157:24;
192:18,20;217:1;241:16
commencement (1)
82:4
comment (2)
49:13;101:17
comments (8)
120:5,13,15,20;121:3,11;
124:6;180:16
commercial (4)
52:10,14;80:1,8
Commissioners (1)
64:16
Committee (2)
113:16,18
commodity (2)
108:3,5
common (3)
77:2;88:16;215:2
Commonly (1)
88:14
companies (4)
152:2;174:6;238:22;
243:15
Company (128)
13:24;14:17,19,25;16:1;
17:1;22:11;24:14,18,22;
25:10,17;26:22;27:15;28:3;
29:13;31:12,21;32:4,8;
33:15;35:14;36:19;37:24;
39:18,24;40:10,11,24;41:12;
42:5,8;44:4;45:23;46:10,11;
47:22;50:3,6,12;51:13;52:5,
23;53:8,19,21;54:12,19;
56:7;57:14;58:5,7,8;59:13,
24;63:23;64:16;67:10,18;
68:6;70:10,17,19;71:7;
74:24;75:9,16;76:20;77:3,7,
25;78:7,8,11;79:8,13,17,24;
80:5,12,20;83:1,7,11;84:6;
85:1,4,24;86:7,10;88:22;
89:7;90:14,19;91:14;93:6,
15;95:13,17,20;96:5;98:1,
25;101:5,15,16,18;102:12,
13;103:15,18;110:4;112:21,
22;152:17;155:25;166:25;
191:25;192:6,10;193:19;
196:2;221:9;225:11;228:9;
244:15;248:10;252:4
Company's (45)
24:10;29:16;41:4;42:23;
44:13;50:22;53:3,9;54:15;
55:10;57:4,17,22;70:14;
71:18;72:10,15;73:1,2,5,6,8,
17,21;74:8,13;75:13;76:9,11,
16;77:13;81:15;85:20;86:23;
87:11,22;89:21;92:6;95:7;
102:24;103:1,10;109:7;
200:18;235:3
comparable (2)
145:5;156:4
compare (6)
48:3;128:18;141:18;
145:23;170:22;174:24
compared (7)
128:23;165:22;182:14;
224:4;230:13;234:11;244:14
compares (1)
28:18
comparing (3)
141:18;172:6;178:17
comparison (11)
127:18;128:4,12;129:5;
140:22;141:2;150:22;
171:14;224:4;230:9;254:11
comparisons (1)
12:13
compelling (1)
187:9
compile (1)
240:17
compiled (2)
114:12;238:23
complaints (1)
104:21
completed (1)
115:13
completely (3)
52:12;116:20;181:7
complexes (1)
82:16
compliance (1)
215:23
complies (1)
28:19
compliment (1)
252:11
comply (1)
183:23
complying (1)
183:24
component (3)
22:12;142:22;242:3
components (3)
142:21;215:15,18
compromised (1)
21:8
computation (1)
234:10
compute (12)
127:12;151:2;161:19;
162:9,14;163:2,13;164:2;
171:19;173:14,18;175:19
computed (14)
127:7;156:12;160:13,19;
168:24;169:3,4,18,21;171:6,
12;172:19;176:2;227:23
computer (1)
117:6
computing (3)
159:24;172:5;234:6
concern (3)
134:4;207:6,7
concerning (1)
199:20
concerns (3)
131:6;139:8,23
conclude (2)
141:8;150:11
conclusion (1)
116:17
conclusions (3)
145:22;252:24;253:25
conclusive (1)
192:7
concrete (7)
18:24,25;19:3,5,5,10;
93:20
condition (1)
66:21
conditions (5)
84:21;119:12;173:18,18;
233:2
conducted (2)
114:11,14
confusing (1)
117:20
confusion (1)
253:23
conjunctive (11)
184:3;186:4;203:13;
205:20;212:9;225:7;226:9;
237:8;247:15;249:22;251:19
conjunctively (1)
203:14
connecting (1)
140:18
connections (1)
115:16
conserve (1)
144:5
consider (8)
123:7;149:10;160:24;
161:3;179:16;180:17;
235:19;244:20
consideration (1)
217:17
considerations (1)
179:14
considered (13)
9:25;12:5;37:7;38:4,9;
108:1;157:4;179:20;239:11,
12,13,22,24
considering (3)
97:5;122:12;181:9
consistent (7)
40:25;71:22;76:10;
123:22;133:3;134:1;178:15
constantly (2)
32:19;96:20
constitutional (1)
11:15
constraints (2)
229:14,15
constructed (2)
44:17;90:22
construction (1)
63:24
consultant (1)
112:4
consumed (1)
136:10
consumptive (8)
159:3;184:24,25;185:9;
197:4,5;233:10;244:2
contained (3)
15:23;37:2;138:20
contents (1)
121:25
context (8)
106:8;112:16;123:5;
148:8;177:10;237:7,8;
249:23
continually (1)
94:19
continue (6)
20:10;87:25;92:17;97:3;
148:20,22
continued (6)
122:25;130:25;146:5;
147:9;148:25;187:10
continues (2)
19:14;124:10
continuing (1)
32:23
continuous (2)
25:11;214:16
continuously (3)
80:12;89:3;214:17
Contor (1)
256:5
Contract (7)
64:6,13;68:18;103:11,17,
21;104:6
contracted (1)
41:22
contractual (1)
108:13
contribute (3)
191:20;233:2,11
control (1)
125:2
conversation (6)
39:21;94:10;106:4,4,16;
116:15
conversion (4)
29:20;93:5;108:20;196:4
conversions (5)
122:25;130:25;146:5;
147:10;196:1
convert (1)
32:23
converting (2)
95:16;228:7
converts (2)

95:1,10
convey (2)
222:3,7
conveyance (18)
114:20;137:25;138:2,4,11;
142:22,22,25;143:2,7,7,12;
225:21,22,22;226:12;
237:19;244:7
conveys (1)
223:19
convincing (2)
124:12;180:3
copies (1)
53:7
copy (9)
15:12;55:4;65:1;116:7,8;
117:3,12,12;118:13
corn (13)
26:10;32:20,20;33:7;87:1;
88:8;105:1,23;106:11,18;
107:2,5,15
cornfields (1)
92:25
correcting (1)
43:12
correctly (1)
92:6
correlation (1)
153:12
correlations (1)
156:21
costs (1)
46:7
Cottonwood (2)
62:8,11
coulee (1)
195:12
coulees (3)
42:11;194:25;195:21
counsel (6)
45:1;46:8;59:5;69:9;
202:10;255:11
count (1)
53:22
counted (1)
241:6
counties (1)
238:13
country (2)
115:8;209:5
County (4)
35:25;49:1,2,12
couple (16)
11:6;51:7;80:15;100:18;
112:17;120:3,3;124:6;152:3;
154:21;161:4,5;191:17;
230:6;242:24;253:17
course (8)
18:19;28:2,14;51:21;
80:10;101:22;125:7;222:17
court (22)
8:4,6,10;10:7,10,13,19;
11:9,9;19:7;37:11;56:11;
180:2;194:3;212:6;226:24;
231:23;239:16;245:16;
247:20,23;251:1
courts (2)
9:24;12:2
cover (3)
191:13;213:3;238:13
covered (4)
92:5;97:23;213:9;230:6
covering (1)
224:10
cows (1)
32:20
cracked (1)
100:6
Crane (1)
242:8
create (1)
19:22
created (7)
47:25;86:13;150:12;
174:11;191:5;209:20;250:15
creates (1)
208:1
creating (1)
213:15
Creek (13)
16:12;42:14;61:2;62:2,8,
11,20,23;63:2;64:10;97:16;
195:17;242:8
creeks (1)
195:20
CREP (7)
49:24;50:19;51:17,23,25;
239:14,19
C-R-E-P (1)
239:19
crews (2)
17:7;19:16
criteria (4)
230:19;231:2;234:4,13
critical (1)
110:14
crop (92)
33:24;34:2;51:9,11;52:3;
88:7,8,8,14;97:6,10;107:18,
20;108:6,16,16;132:1;134:6,
12,15,22;135:6;136:24;
137:10;138:15;139:9;
143:20;150:7,15,24;151:3,
10,13,20;152:8,9,11;153:2,8,
8,13,15;154:12,16;155:4;
156:1,6,13,22;157:25;
158:20,24,25;159:2,3,3,7,25;
160:1,3,7,11,14;161:12;
163:19;164:2,3;165:23;
166:1;167:12,12,14;169:4,
19;173:14,19,24,25;175:19;
218:10,13,14,19;219:2,14;
220:11,24;227:17;243:20;
244:22;253:19;254:20
cropping (3)
32:12,14;88:4
crops (36)
11:24;32:18;66:21;77:3,
10,13,21;84:22;86:23;87:2,8,
17,20;88:12,15;92:20,22;
95:18;97:5;104:15,21,22;
106:18,25;107:5;108:8,9,12;
167:16;218:11;220:15;
221:25;233:10;244:1;
250:12,21
crops' (1)
106:22
cross-examination (13)
21:20;24:7;58:11;70:4;
78:22;99:18;197:11;198:1;
205:12;229:20;230:1;246:2;
247:1
cross-examine (1)
197:15
CRP (4)
49:23;50:19;51:17,23
CU (1)
185:7
cul-de-sacs (1)
39:5
culminated (1)
114:23
curbed (1)
39:4
curious (3)
55:25;182:21;231:19
curious-looking (1)
137:6
curiously (1)
127:16
current (21)
24:17,19;49:20;84:20,21;
92:9;116:1;133:1;148:7;
149:15;169:9;171:4;187:20,
23,24;190:19,20,20,23;
218:16,20
Currently (9)
32:10,10;33:1;35:8;39:20;
99:25;102:9;173:7;254:12
curtail (10)
35:12;58:8;148:24;184:5;
190:10,14;204:4;205:4;
209:7;226:11
curtailed (22)
185:3,5,7,9;204:16;
207:24;208:14,16;209:1,13;
210:24;211:5,12;216:3,4,5;
225:20;226:17;237:11,12;
249:15,18
curtailing (7)
184:17,22,24;185:13,15;
209:10;225:2
curtailment (58)
10:25;11:10;35:7,8;48:5;
85:10,17;122:16;182:14;
183:11,12,24;184:2,10,13,
15,21,22;186:4,7,8,9;187:3,
11;188:1,25;189:15,23;
190:2,6;191:11;202:13,24;
203:1,10,12,16,20,21;
204:21;205:22;206:3,19,22;
207:19,21;210:4;211:7,14;
216:9;225:8;226:20;240:22;
249:3,11,21;250:3,6
curtain (1)
134:2
curve (1)
243:19
curves (1)
141:12
customary (1)
148:22
cut (5)
8:8;34:10,16;90:11;188:9
cutting (2)
34:4,4
cuttings (5)
33:15;34:5,5;35:1,14
CWN (1)
169:1
cycle (1)
196:21

D

daily (5)
193:8;194:17;214:19,22;
215:2
dairies (3)
32:19;33:23;34:15
dairy (6)
32:16,17;33:18;34:2,6,22
Dam (1)
16:4
Darryll (1)
9:6
dash (1)
38:24
data (55)
15:6,9;49:10;71:22;85:25;
114:12,13;124:19,19;126:14,
14;127:8,9,13,19,19,23,23;
128:1,11,16,16;133:7;
140:15;151:14,15;152:15,
23;155:19;156:12,25;157:3;
163:21,23;168:20;174:21;
175:3;177:2;192:17;193:9,
14,18;194:17;214:12,22;
218:20,21;219:3,3,5,14;
227:19,24;233:21;239:13
database (8)
83:6,12;85:21;192:9;
193:9,14,18;194:17
dataset (5)
177:1,12,12,22,25
datasets (1)
178:18
date (23)
35:7,8;122:16;182:13;
184:10,17,22;187:11;188:1;
189:22,23;191:11;202:13,
23;203:2,10,16;210:4;

213:13;240:20;249:3,6,7
dated (2)
64:16;138:21
dates (1)
183:11
day (7)
25:14;26:13;27:1,2,5;
30:11,11
days (3)
34:19;175:13;232:25
deal (2)
244:12;245:22
dealing (2)
124:18;228:25
decade (1)
80:18
decades (1)
75:14
decent (1)
77:11
decided (1)
201:18
decides (1)
148:4
decision (3)
11:7;251:3,7
decision-making (1)
125:13
decisions (5)
10:6;108:6;136:6;237:9;
251:20
declines (2)
88:11;227:8
decree (1)
103:21
decreed (4)
68:13;82:2;103:15,18
decrees (1)
82:8
dedicated (4)
19:23;64:22,23;65:18
Deep (1)
16:12
deficit (1)
94:23
define (1)
241:12
Degree (1)
232:25
degrees (1)
233:6
deleted (1)
22:25
deliver (12)
79:13;92:17;93:3,10;
101:10;137:21;138:14;
205:23,24;223:9,18;244:18
delivered (4)
66:16,17;93:25;212:22
deliveries (10)
19:13;30:10,12;47:11;
48:17;221:8,12;222:11;
233:17;234:2
delivering (13)
16:21;32:4,8,10;68:6;
110:2;138:2;143:4,17;
196:24;221:14;236:7;239:21
delivers (6)
16:1;24:14;83:3;89:7;
223:7;224:8
delivery (49)
10:12;11:1,9;19:24;21:1;
31:5,13;37:11,19;38:1;
54:15;57:15;58:6,14,15,17;
79:8,9;83:23;85:21;88:21;
89:10;93:16;113:2,6,7,8;
114:6,8,20;118:15,18,22,23;
119:1;137:14,18;138:16;
145:21;147:19;148:9;
181:12;197:1;220:4;233:19;
235:4,12,23;248:9
delving (1)
124:7
demand (49)
27:8,8,11;51:23;52:2,11,
13,16;73:6,9;74:14;75:5;
84:25;85:6;102:17;132:1;
133:20,23;137:12;138:15;
144:1;151:2,11,12;154:13;
164:4;165:23;166:2;168:24;
169:4;170:16;172:7;173:20;
175:21;176:4,17;180:8;
196:2,5;203:2;217:4;220:9,
18;221:5,23;222:5,6,10;
233:11
demands (11)
33:18;71:9;73:2,18,22;
74:8;136:24;137:23;169:19;
172:11;228:3
demonstrating (1)
252:5
demonstrative (1)
193:17
denied (2)
11:10;138:17
denominator (1)
160:10
deny (3)
12:6;74:10;107:21
Department (60)
23:6;37:7;53:8,21;59:21;
61:11;69:10;72:25;73:4;
74:12,21,23;76:20,23;80:22;
85:4,15,16,25;110:6;120:1;
126:22;127:16;132:18,22;
137:17,24;138:20,24;139:1;
140:7;147:17;148:2;149:3,
13;155:12;160:21;167:18,
21;168:8,16;169:14;171:1,2,
3,12;175:8;176:23,25;177:7,
23;180:24;192:4,8;200:5;
202:6;218:24;230:12,16;
241:15
Department's (13)
52:21;128:22;139:8,24,25;
148:7;168:20;169:5,23;
170:24;172:21;178:22;
220:17
Depending (1)
221:9
depends (8)
89:17;175:17,22;176:6;
213:12;215:4;237:18,18
depict (1)
140:12
depicting (1)
232:21
depiction (1)
142:10
depictions (1)
144:22
depicts (3)
14:24;140:14;151:1
depletion (6)
190:20;191:5;209:20;
212:21;213:4;229:11
depletions (2)
213:1,15
deposition (50)
23:17;24:1,3;25:10,16;
28:23;29:11,21;30:9;32:3;
33:13;34:8;35:23;36:4;
39:12;42:4,22;43:2;45:5,10,
22;49:22;50:2,11;51:1;
52:21;53:2,6;54:14,24;55:4,
14,17,18;56:2,21;59:8,19;
62:13;75:8;77:1;89:6,11;
90:14,17;93:4;98:8,19;
104:11;199:8
depressions (1)
195:1
derivation (1)
173:23
describe (10)
14:12;15:15;16:1;17:1;
20:5;101:2;112:17;114:10;
125:23;194:14
described (4)
90:25;126:3;149:18;
222:24
describing (1)
137:13
description (1)
63:14
design (1)
220:8
designed (2)
222:15;247:12
designing (1)
220:9
despite (1)
176:21
detail (4)
115:17;223:23;224:24;
233:22
detailed (2)
180:25;223:25
details (3)
200:2;219:11;227:2
determination (6)
122:16;138:17,19;139:10;
210:2;228:21
determinations (1)
180:8
determine (19)
9:24;66:21;131:25;
133:20;138:13;148:17;
149:4,11;183:11;184:21;
187:10;188:1;202:12,23;
203:9,16;205:21;206:4;
219:14
determined (15)
137:25;141:5;142:4;145:6,
12,20;146:16,16;174:25;
177:7;203:11;204:19;
205:25;213:8;229:6
determining (9)
133:18;173:20;191:10;
192:23;201:10;202:6;
203:16,17;218:10
detriments (1)
48:4
develop (4)
39:22;91:9;131:7;208:2
developed (7)
83:5,10;149:6,14;213:20;
215:20;252:2
developing (2)
37:7;140:8
development (8)
11:16;54:6,8,9;79:24;80:9;
82:19;113:22
development' (1)
11:14
developments (2)
52:10,14
Deviations (1)
155:10
devices (2)
19:11;93:23
devised (1)
67:5
devolving (1)
256:17
dialog (1)
249:14
difference (9)
74:19;76:10;95:25;
103:20;143:14;170:12;
182:23;195:12;235:22
differences (2)
142:16;143:11
different (33)
16:17;17:6,8;20:11,16,17;
29:24;31:25;50:13;79:7;
88:24;112:21;144:7,21;
148:5;151:13;153:23;160:8;
168:25;169:13;171:1,11;
173:13;178:13;185:18,19;
195:11;203:8;209:19;
221:10;232:4;237:2,24
differentiate (3)

192:17;201:18;242:11
differently (1)
176:24
diminishes (1)
95:2
DIRECT (15)
13:17;14:15;24:11;29:12;
39:12;40:13;42:3;59:5;
79:16;111:18;198:9,22;
201:6;246:6,10
direction (5)
132:22;146:4;173:3;193:5,
15
directly (1)
56:20
Director (51)
12:15;15:10;21:19;23:15,
21;35:3;37:1,10;38:15;
44:22;47:6;48:13;49:8,20;
51:17;56:15,22;59:1;60:4;
68:19;69:2,12;70:2;73:25;
78:16,20;99:9;107:17;
124:11,14,25;132:16;
138:23;178:25;181:14,15;
191:15;193:16;201:6;209:6,
9;211:18;215:16;216:17;
229:22;246:2,17;247:19;
248:4;254:23;255:24
directors (1)
28:17
Director's (3)
124:16;236:16,17
disagree (9)
49:11;58:21;86:11;196:7;
207:16;217:18;223:13;
236:21;246:11
disagreeing (2)
206:7;210:15
discharge (2)
95:6,8
discharging (1)
95:11
discomfort (1)
13:12
discover (1)
115:19
discussed (15)
23:25;24:2;28:23;42:4;
44:8;45:10,22;47:19;48:15;
52:20;68:21;76:19;79:23;
89:4;188:14
discussing (7)
11:4;29:6,22;41:14;101:2,
4;156:16
discussion (15)
28:25;43:14,17;60:17;
68:18;111:8;116:13;125:25;
149:19,24;156:15;169:25;
177:14;250:25;253:18
discussions (2)
133:4;191:23
disfavor (1)
243:5
disincentive (1)
131:14
disproportionate (1)
187:4
distance (1)
235:22
distribution (2)
66:23;67:4
District (4)
13:15;15:8;180:2;230:4
districts (2)
99:24;240:17
ditch (6)
14:3;16:19;27:25;97:12;
108:25;253:9
ditches (5)
93:6;95:6,7;220:4;221:15
diversion (47)
27:2,24;41:17;89:2,20;
90:4,10;93:17;97:4,8;
126:14;127:23;128:1,8,16;
129:22;135:11;137:12;
151:2,11,12,17;152:9;153:9;
154:13;164:4,4;165:22;
169:4,19;172:7;176:4;
200:18;220:24;225:5;
230:17,18,20;231:10;
233:21;235:23;236:12,14,
18;237:16;243:17;244:21
diversions (43)
14:25;15:20;20:19;48:7;
70:11,20;71:18;72:10,15,22;
73:1,5;126:6,7;128:5,9;
129:10;130:3,6,9,18,20;
131:2;133:18;134:14,23;
150:5,14;153:3;167:20,21;
168:13;174:1;175:25;214:8;
215:8;229:4;230:10;232:1,
16;233:2;243:25;251:3
divert (30)
16:4,5,16;89:19;90:5;
92:11;96:6,17,20,25;97:4;
102:13;109:7;131:11,15;
134:7,12,12;135:7,8;153:13;
155:3,3;160:6;184:7;223:8;
225:1;228:2;250:20,23
diverted (6)
93:16;152:12;164:5,9;
167:24;197:7
diverting (19)
41:4;95:2;96:21;131:4;
133:24,25;151:21;154:18;
159:4,20;160:9;165:21;
213:13;224:1;227:18;228:8,
13;231:3;245:14
diverts (2)
40:24;96:2
divide (1)
135:5
divided (16)
134:23;137:11;150:24;
153:16;154:12,17;169:1,5,
20;173:25,25;175:20,24;
220:24;223:11;227:17
division (2)
41:7;165:23
document (48)
9:10,20,23;12:7,8;14:12,
14;22:3;36:21;37:23,25;
38:8,12;45:18,19;47:22,22,
24,24;48:6,10,17,21,22;49:8,
15,16;60:20;61:10;63:4;
64:5,10,12;67:20,25;68:11;
69:15;72:13;81:5,8;125:16;
133:5;138:24;193:15,23;
194:10;231:12;252:19
documents (11)
21:24;38:17;45:17;53:14,
16;68:24,25;69:14,15;
101:16;235:14
dollar (1)
25:7
done (36)
20:12,15;39:18;40:3;
72:12;75:6;88:16;90:15;
101:19;121:21;122:19;
123:9;135:16,17,21,25,25;
136:3,15;147:7;167:6,8,9;
168:3;182:14;186:5,12;
203:23;213:19;218:4,5;
223:24;229:1;232:5;240:5;
256:5
dot (1)
190:8
dots (14)
140:18;145:2;150:16,21;
151:18,18;152:7;153:7;
154:3;162:4,22;163:4;
165:13;189:24
dotted (4)
140:22;141:18;142:3;
150:20
double (1)
88:4
double-check (1)
216:22
double-counted (1)
175:5
doubled (2)
29:16,19
down (23)
16:5;19:8;20:23;63:22;
68:14;88:3;97:6,7;102:8,8,8;
131:3;138:3;146:2;151:24;
153:5;162:3;164:25;221:14;
228:16;242:9;247:21;253:11
downloaded (2)
193:9;194:17
downward (2)
102:9;256:17
dozen (1)
119:25
Dr (2)
125:6,8
drain (3)
101:24;102:3;253:9
drains (3)
46:22;98:13;108:25
drastic (1)
182:13
draw (2)
145:22;252:23
drawn (3)
150:19;151:19;156:25
draws (1)
192:14
drier (1)
160:2
drip (1)
29:20
drive (2)
34:7;108:5
driveways (1)
36:8
drop (3)
87:21;101:6,17
dry (9)
34:17;61:2;62:2,20,23;
63:2;64:10;87:1;186:20
drylands (1)
82:18
due (7)
40:6;41:23;143:11,14;
192:18;196:9;227:9
duly (2)
13:8;111:3
duplicating (1)
79:3
during (29)
17:4,6,7;18:12,13;19:18;
36:3;52:20;66:18;67:6;80:5,
12;88:14;114:25;123:12,13;
126:6;127:10;130:9;146:13,
21;147:3;150:6;181:11;
188:10;199:5,17;220:11;
242:2
dynamic (1)
133:5

E

earlier (26)
79:7;80:14;86:2,18;88:22;
89:4;92:15;98:12;105:18;
127:11;130:25;135:5;141:6;
142:20;145:8;168:9;171:7;
172:24;180:22,23;207:12;
226:18;230:24;235:7;
241:24;250:19
early (6)
17:25;87:17;165:20;
187:8;221:22,24
easier (5)
38:17;65:15;90:9;148:21;
226:7
easily (3)
54:2;86:16;175:19
East (1)
14:4

Eastern (4)
113:15,22;202:16;224:21
easy (5)
30:21;54:2;181:23;191:1;
213:23
economic (14)
9:6;10:25;11:12,13,16,18,
19;12:12,13;47:5,15,17,18;
48:4
economy (1)
80:16
edges (1)
17:9
editorial (2)
115:20;116:20
effect (5)
172:18;175:14;190:20;
222:18;249:17
effectively (2)
206:9,12
efficiencies (106)
76:9,11;91:10,14;92:4,18;
93:8,9;94:17;96:8;99:22;
122:9;123:8,17,21,22;
131:19,24,25;132:4,25;
133:14,19,19;135:5,13;
136:21;137:1,8;138:7;140:8,
9,14,19,23;141:1,13,20,20;
142:12;143:10;144:7,11,20,
21;145:1,4,12;146:2,11;
147:1,17,18;148:13;149:4,9,
10,12,17;155:14;157:22;
161:1;162:17,21;165:12,18;
169:2,6,10;171:5,19,21;
172:4,8;173:6,23,24;175:25;
176:2,3,8,24;201:17;219:19;
220:23;222:18,21,22;223:1,
1,3;225:17,18,21,22;226:15;
227:9,16,17,20,23;228:10;
243:3,23;244:7;254:11
efficiency (106)
75:10;76:16;95:21;
101:14;105:3,5;131:1;134:3,
21,24;135:1,2,9,10;136:17,
20;137:3,5,11;138:9,9,12;
139:9,24;140:1,6,13;141:4,
12;142:17,20,22,23,24,25;
143:7,12;144:25;145:5,18,
19;146:9;147:11,14;148:6,
21;150:25;151:3,10;153:16;
154:12,17;155:10;156:1,6,
12,21;158:1,7,20,23,23;
159:2,5,21,24;160:13,16,17,
18,19;161:11,19;162:10,14;
163:14,20,25;164:2;165:8;
169:20,20,24;170:10,11;
172:22;175:21;176:16;
191:20,21;196:9;200:6;
221:1;226:12,13;243:4,8;
244:7;251:8,11,22,23;252:5;
253:19;254:6,8
efficient (21)
75:14;90:15;94:21;
131:14;136:10;158:15;
187:1;196:10,23,25;197:3,6;
201:11;206:1;220:20,21;
245:3;248:2;250:16;251:12,
14
efficiently (8)
90:23;92:20;93:1;143:17;
153:11;224:6,19;245:6
eight (1)
126:9
eighth (1)
59:16
eightieth (4)
66:4,7,8,12
either (11)
35:18;56:17;62:12;87:18;
97:13;108:24;129:16;
157:24;174:10;185:18;
186:17
elapsed (1)
122:24
electronic (1)
93:22
else (5)
8:22;87:4;159:9,9;175:18
Email (2)
117:17,22
emails (1)
117:14
employees (1)
148:3
employing (1)
173:4
enables (1)
90:22
encompass (1)
68:12
encourages (1)
250:20
encouraging (1)
247:24
End (19)
14:4;16:11;17:14;18:9;
20:22,24;31:7;79:20;98:13;
158:9;162:17;164:3;165:23;
176:1,4,17;177:21;194:21;
251:16
endeavored (1)
126:13
ended (4)
66:14;122:6;137:16;138:8
ends (5)
17:19;18:20;46:21;70:24;
214:1
Energy (2)
46:5;98:3
engage (1)
227:2
engaged (1)
112:4
engineer (4)
22:11;67:8;101:17;112:11
Engineering (3)
36:22;91:13;112:20
Engineers (2)
112:8;120:21
engineer's (1)
101:21
enhanced (1)
207:10
enjoins (1)
216:7
enough (13)
71:6;84:20;86:12;88:20;
138:14,18;160:9;180:10,20;
183:15,15;213:6;245:5
enrolled (12)
50:4,7,9,14,16,18,22;
51:23,25;239:14,18;240:9
ensure (1)
85:16
enter (1)
210:8
entertain (1)
100:3
entire (1)
112:19
entirely (1)
243:11
entirety (1)
70:10
entities (1)
245:8
entitled (4)
11:19;41:16;205:7;250:23
entity (1)
237:24
enumerator (1)
159:6
envisioned (1)
68:11
equal (1)
133:23
equates (1)
54:7
equation (9)
157:1;161:19,20,21;162:7,
9;164:19;169:22;173:5
equivalent (3)
31:17;66:12;212:13
eradicating (1)
18:7
errata (1)
115:25
errors (3)
115:20,20;116:19
ESP (1)
35:4
ESPA (4)
114:4;187:5,7;239:3
ESPAM (1)
183:3
especially (3)
124:24;184:4;246:3
essentially (5)
131:11;137:17;187:13,16;
243:5
establish (3)
37:19;162:13;188:1
established (3)
132:10;235:3,11
Estimate (4)
36:18;37:23;87:10;92:9
estimates (2)
181:2,6
estimation (2)
33:11;121:17
et (4)
13:15;230:4;243:19;
253:24
evaluate (3)
136:13;164:12;187:23
evaluated (1)
148:14
evaluating (2)
137:18;155:13
evaluation (1)
182:2
even (16)
125:8;137:3;148:16;151:4,
5,20;152:10;155:18,19;
161:12;175:2;181:9;208:15;
221:17,22;252:5
event (1)
183:14
events (1)
242:5
Eventually (1)
34:18
everybody (3)
8:13;90:10;110:19
everybody's (1)
220:1
everyone (5)
8:22;177:19,20;182:23;
255:22
everyone's (1)
206:24
everywhere (1)
212:1
evidence (17)
10:24;12:12;23:2;48:9,11,
22;49:4,16,17;69:4,16;
81:24;124:12;125:17;180:4;
194:11;227:12
evidentiary (1)
252:3
evolved (1)
251:19
exact (1)
220:6
exactly (9)
36:24;107:24;113:25;
123:11;176:4;213:1;219:17;
231:14;250:5
EXAMINATION (6)
13:17;100:16;111:18;
198:9;253:15;255:11
examiner (1)

70:1
examining (1)
197:23
example (25)
46:4;116:22;123:16;
141:24;143:6,8,21;144:2;
151:17;152:11,19;154:1;
158:16;160:6;161:23,25;
162:18,21;165:5,6;175:11;
204:5;221:13;223:16;239:10
examples (2)
166:21;177:15
excavators (3)
17:15,21;18:2
exceeds (1)
86:9
excellent (1)
178:9
except (1)
170:5
exceptions (2)
141:12;146:19
excerpt (1)
10:6
excerpted (2)
11:6;22:25
excess (8)
19:4;43:24;44:4;85:17;
108:23,24;109:3;159:5
Exclude (2)
155:9,16
excludes (1)
165:11
excluding (1)
155:14
exclusively (1)
67:14
excuse (5)
74:21;167:8;199:10;
216:22;223:7
excused (2)
109:24;110:1
exhausted (2)
33:23;101:18
Exhibit (106)
9:3,18,21;10:2;12:8;14:11,
21;15:13,14,16;23:2,2,7;
30:3,6,8,9,14;31:24;32:2;
35:20,21;36:11,15,17,21;
37:5,18;38:24;40:20,23;
44:21,23;45:5,8,11;46:9;
47:2,12;48:10,12,16,23,25;
49:7,16,18;53:13;60:6,18;
65:11,13;69:16,17;71:11,12,
15;73:12,25;74:22;75:20,22,
24,24;77:17;81:2,23;84:8;
94:13;100:20;102:18;
104:10;115:5,24;116:1;
117:10;118:3,12,16;120:8,
12;121:5,6,9,16,25;124:2;
125:14,17,19;130:16;139:4;
149:19;184:9;193:17;194:2,
4,5,7,8,11,12;199:7;216:15;
232:17;240:25
exhibits (9)
14:9;21:21,22,24;23:3;
37:2;48:15;68:21;69:5
exist (3)
46:21;68:2;102:17
existed (2)
82:3;100:2
existing (1)
132:17
exists (2)
95:14;131:10
expect (6)
90:3;143:5,9;146:5;147:8;
252:6
expectation (1)
183:22
expected (4)
11:24;98:22;225:19;
237:10
expedited (1)
22:22
expense (1)
46:6
expenses (3)
98:23;102:24;103:1
experience (13)
14:18;61:21;76:21;94:23;
112:18;113:9,13;178:5,12;
196:8;207:25;224:4;237:5
experienced (1)
77:24
experiencing (1)
254:12
expert (17)
111:23;112:14;114:24;
115:2;122:7;124:23;135:13;
141:6;145:8;176:11;177:11;
181:21,22;198:14;246:5;
252:20;256:2
expert's (1)
124:18
expire (1)
16:11
explain (7)
32:4;33:20;44:23;116:19;
147:25;189:12;205:18
explained (6)
88:22;90:17,21;91:8;98:7;
211:20
explains (2)
14:16;30:10
explanation (1)
228:5
explicitly (1)
102:15
explore (1)
100:3
exposure (1)
107:25
extend (1)
26:21
extended (1)
25:21
extensive (3)
18:24;114:22;127:14
extent (15)
18:10;33:21;42:10;70:23;
82:3,9;88:1;123:3;132:12,
13;191:16,25;222:22;
248:24;250:12
extra (1)
117:12
extreme (1)
151:16
extremely (1)
249:22
eyeballing (1)
166:6
eye-opening (1)
129:20
eyes (1)
64:25

F

facilities (7)
20:17;63:24;97:23,25;
102:17;114:21;123:22
facing (1)
206:19
fact (9)
39:21;47:9;178:16;
180:15;187:7;200:13;
206:11;222:7;250:18
factor (1)
218:13
factors (2)
100:1,8
facts (5)
12:4;187:8;227:11;228:22,
24
fair (7)
20:2;35:17;71:6;80:17,19;
88:9;250:2
fairly (2)
40:25;171:24
fairness (1)
35:18
fall (12)
89:13;141:15;208:19;
221:7,17,21,22,23,25;
222:19,21;223:2
fallow (1)
49:24
fallowed (2)
50:24;178:12
fallowing (2)
178:14,14
Falls (129)
13:24;14:17,24;22:10;
23:18;24:10,14;25:20;26:22;
29:13;33:14;35:9,13,25;
36:19;37:24;39:18,23;41:12;
42:4;43:3,23;44:4,13;46:4,
10;47:22;49:1,11;52:5;53:3,
19;55:10;56:6;57:4,14,17,
22;58:5,6,8;59:13;62:15;
63:22;64:16;68:6;70:10;
71:7;74:7,13,24;75:9,12;
76:9,11,15;77:2,25;79:13;
80:20;81:14;83:1;84:5;85:1,
3,20,24;86:3;89:16;90:14;
91:9;95:17;98:1,2,15,20;
101:5,18;107:7;110:3;114:3;
144:2;146:20;154:21;
159:14,15,17,19;162:2,10;
166:25;172:15;175:10,11,12,
16;178:19;191:25;192:6,9;
193:19;194:19,22;195:3,6,
22;196:1,13;200:17;217:10;
220:1,2,2,8;221:13;223:6,8;
224:19;225:11,13;228:9;
235:2;244:9,15,23;248:10;
251:3,8;252:3
familiar (15)
49:23;51:8;52:21;62:6;
77:13,20;80:7,23;83:16;
104:20,21;105:19;219:23;
231:5;247:9
familiarity (2)
51:2,24
familiarize (1)
60:20
fantasy (1)
209:18
far (11)
20:22,23;38:22;103:2;
119:10;121:15;153:14;
177:2,13;210:10;215:19
farm (20)
26:12,14,16,17,19,20;
27:14,22;40:9;67:21,24;
68:2;88:20,25;92:21;93:2;
101:12;138:14;200:5;221:19
Farmer (16)
26:4,4,9,12,14;33:22;
87:16,18;92:15,23;96:14;
105:18;106:10;107:10,24;
108:15
farmers (26)
11:23;25:17,25;26:3,17,
18,22;27:2,9;32:4;33:14;
35:14;41:12;49:24;51:2,8;
67:22;82:21;89:2;105:17,22;
106:22;107:1,20;109:7;
143:18
farmers' (2)
107:18;108:5
farmer's (1)
107:7
farming (1)
107:8
farmland (4)
79:25;80:7;83:5,10
farms (9)
67:22,23,24,25;68:2;
137:22;138:1;143:18;236:7
feasible (1)

28:11
fee (1)
25:3
feed (2)
32:20;33:23
feedback (4)
121:2;131:10;176:5;
250:22
feedback-loop (1)
133:17
feel (4)
43:11;202:2,5;253:22
fees (1)
24:19
fell (2)
129:17;146:21
few (16)
20:19;63:6,7;64:19;76:19;
77:23;79:5;92:3;96:11;
97:22;175:12;214:21;
229:22;232:17;240:24;246:6
fewer (2)
24:15;40:5
field (26)
14:5;19:17;26:5,6,9,10,10,
11;27:8,9;29:22;34:11,17;
37:21;41:21;51:2,3,9,10,22,
22;52:1;107:24,24;108:23;
114:18
fields (10)
17:19;29:8,24;49:24;51:7,
14,18,20;88:24;95:3
Fifth (31)
71:8,13,23;72:21;73:9;
76:12;84:9,12;121:6,12,18;
122:4;125:24;126:4;132:11;
141:1;144:11,25;145:1;
149:4;174:23;179:15,16;
182:7,11;184:8;202:11;
232:18;247:19;248:4;250:15
Figure (35)
39:9;86:4;136:9;139:4,5,7,
22;140:4;141:9;142:8,9,11;
144:9;145:22;149:25;150:8,
12,13;152:6,25;153:1;
154:19;155:22;156:2,9;
157:17;159:16;161:25;
165:2;190:9;218:19;227:15,
15;254:3,4
figures (13)
85:15;139:4,15;141:8;
152:2;154:23;156:16,17;
157:15;159:11;161:22;
174:6;253:24
file (2)
80:22;177:12
filed (4)
59:24;61:10;81:8;125:3
filing (3)
59:23;63:23;113:10
fill (3)
17:21,21;62:16
filled (1)
62:21
filling (1)
62:19
filter (1)
155:12
final (1)
240:24
finally (2)
145:17;153:6
find (7)
83:20;115:6;130:15;
158:12;188:20;199:22,24
finding (1)
236:21
findings (2)
124:11;131:8
fine (7)
10:15;22:16;56:4;57:2;
79:2;117:21;118:1
finish (2)
22:22;255:22
finished (2)
109:15;255:6
finishing (1)
29:2
fire (1)
97:18
first (34)
13:8;24:9;28:9;30:21;
31:12;34:4;63:13;64:19;
79:7;111:3;129:22;134:20;
135:13;139:6,15;150:4;
156:5;167:11;168:19,25;
190:5,6,10;193:4;196:16;
197:15;204:6,10,21,25;
205:2;208:25;228:8;252:2
firsthand (1)
80:5
first-use (1)
196:24
fit (2)
150:19;157:2
five (11)
25:2;33:15;34:5;35:1,14;
65:9;69:23;112:22;128:7;
146:14;219:16
five-eighths (8)
31:17;48:18;66:12;68:9,
16;93:13;200:19;248:21
five-eighths-inch (2)
79:9;248:9
five-eights-inch (1)
248:15
five-minute (1)
117:24
fix (4)
161:13,16;176:13;177:17
fixed (5)
161:14;163:15;164:19;
171:8;177:20
flat (2)
134:14;151:19
flatter (1)
154:4
FLETCHER (34)
9:12,16;58:22;110:13;
116:2;117:9,19;124:5;
125:15;188:22;193:25;
197:12,23,24;198:2,4;201:6,
9;205:16;246:3,22;247:5;
248:2,7,13;249:2,15;251:2;
253:5,9,18;255:2,3;256:14
Fletcher's (3)
229:20;248:18,25
flip (2)
84:9;152:4
flipping (1)
154:6
flood (12)
92:14;93:5;94:5;95:1,3,5,
10,19,22;108:20,23;109:8
flooding (1)
28:12
floor (4)
162:13;163:1,7,8
Florida (4)
242:10;253:3,4,6
flow (15)
21:12;25:11;42:18;44:7;
81:16;89:17,19;90:5;94:5;
103:24;144:4;168:13;
196:16;241:19;242:3
flowmeter (1)
214:16
flows (21)
16:8;17:23;18:22;42:2,5,9,
23;43:10;70:9;102:2;192:1,
6,9,11;193:19;194:18;
195:19;241:12,16;242:12;
253:10
fluid (1)
80:16
focus (1)
104:2
focused (1)
122:17
focusing (1)
122:6
folks (3)
27:20;28:7;102:16
follow (4)
26:7;155:15;243:19;247:4
following (2)
94:15;253:7
follows (2)
13:9;111:4
follow-up (4)
92:4;108:19;197:18;246:6
font (1)
64:24
food (1)
108:13
Foods (1)
11:8
foot (1)
66:8
footnote (1)
193:8
footnotes (2)
195:10;241:5
forced (1)
148:24
forces (1)
17:13
forecast (8)
168:1,4,9,10,11;170:18,19;
172:6
foreman (1)
19:17
forever (2)
207:4;208:11
forget (2)
124:2;227:15
forgo (5)
77:3,10;105:1;107:1,4
forks (3)
16:9;46:14;98:6
form (3)
71:25;93:20;219:4
format (1)
213:23
former (1)
34:16
formula (1)
200:6
formulations (1)
169:17
forthcoming (1)
45:3
forward (4)
13:4;99:15;130:21;246:13
found (8)
59:23;139:16;199:25;
200:1,2;226:24;227:16;
251:3
foundation (6)
37:13,19;45:2;49:7;72:6;
193:12
foundational (1)
119:18
four (1)
25:2
Fourth (3)
73:18;76:12;129:23
framework (2)
149:15;179:23
freely (1)
17:23
Friday (1)
255:22
front (7)
10:23;55:18;56:24;74:2;
100:21;210:10;241:1
fruition (1)
68:13
fulfilled (1)
203:11
full (6)
89:20,21;90:10;96:6;

165:22;204:25

'

'Full (2)
11:13,15

F

fully (2)
98:6;236:3
function (1)
186:21
functionally (1)
212:13
fund (2)
91:13,17
funding (1)
91:8
furnish (2)
210:1,7
further (17)
11:13;23:9;32:25;68:17;
69:18;70:25;71:1;78:16,19;
99:7;100:12;109:11,12;
155:18,19;184:2;197:21
furthermore (2)
12:3;88:5
future (2)
86:9;185:21
fuzzy (1)
236:24

G

gains (2)
192:18,24
gander (1)
124:22
gate (2)
16:23,24
gates (1)
225:25
gauge (1)
195:13
gauges (3)
194:24;195:11;241:3
gave (6)
40:14;180:16;182:17;
183:3;188:10;198:22
gears (4)
86:21;173:8;179:12;
191:13
general (7)
14:6;107:9;112:18;
114:10;123:23;172:4;241:15
generally (15)
14:12;15:25;17:1;18:4;
20:5;22:6;25:6;26:12;
133:15,16;134:4;143:16;
178:9;220:15;221:23
generation (1)
45:24
genuine (2)
250:4,6
gets (5)
21:8;192:15;196:17;
206:5;225:24
GIS (1)
84:4
given (8)
27:1;78:12;105:21;
108:15;123:8;131:7;146:5;
252:6
giving (3)
139:8,23;204:6
global (1)
125:10
goals (12)
54:15,19;55:11;57:4,8,14,
18,22;58:2,3,6,14
goes (15)
23:11;25:6;28:8,17;70:22;
97:6,7,14;135:10;210:4;
218:10;228:15,16;241:25;
244:21
Good (32)
8:7,10;24:5;28:15;59:2;
61:23;77:7;97:21;109:14;
111:12,20,21;123:5;132:21;
134:6;152:10;153:12,24;
155:17;157:2,4,20;158:7;
161:10;180:10;186:3;
192:17;198:3,4;216:25;
230:3,5
goose (1)
124:22
gosh (1)
34:14
governed (2)
247:10,15
government (1)
49:23
grain (8)
26:10;88:15,20;104:25;
106:13;107:3,13,15
grainfields (1)
92:25
Grande (1)
224:17
graph (33)
14:24;15:4,7,17,23;35:24;
40:19;48:25;49:2;140:11;
142:14;144:16,16,19;153:3,
4;154:2;156:5,7,8,8;162:3;
188:7,24;189:3,5,12,16,17,
20;232:22;233:5;242:12
graphing (1)
144:19
graphs (15)
140:10,12,13;141:9;150:1,
3,4;155:8,22;156:4,20;158:6,
12;241:4,4
grass (2)
17:11,12
gravity (3)
19:14;32:23;226:15
Gray (2)
181:15;195:7
Great (13)
30:25;42:21;63:10;65:8,
10;67:15;74:21;75:8;92:24;
154:16;191:19;245:4,4
greater (14)
11:18,19;128:24;130:10;
159:18;160:3,4;162:11;
164:4,5;165:19;175:7;233:6,
11
green (4)
34:1,9;52:15;162:3
greenhouse-type (1)
87:7
GREGORY (2)
111:1;112:2
G-r-e-g-o-r-y (1)
112:2
ground (8)
17:18;32:23;36:23;70:11;
101:8;109:4;132:19;219:24
grounds (3)
9:17;11:10;101:11
groundwater (74)
11:17,20;21:25;35:13;
47:16;58:9;60:23;85:10,11,
19,23;91:12,17;99:7,24;
101:1;103:10;105:10;
109:13;112:24;122:12,15;
131:16;148:24;179:13,17,19,
22;180:1,8;181:3,10,17;
182:3,10;184:23,24;192:16;
196:17;197:15,20;201:24;
202:4,16,18;203:5,15,22;
208:8;211:21;212:21;214:6,
10;215:7,23;236:1,4;238:2,8,
18,21,24;239:1,7,14,18,21,
25;240:5,17,18,21;242:17;
249:3
groundwater-specific (1)
125:10
group (13)
99:7;105:11;109:13;
113:19;119:21;120:22;
121:12;126:1;155:21;
174:13;180:17,19;188:12
groups (2)
113:21;197:20
grow (9)
17:11,11;87:12;97:1;
107:20;108:6,15;220:11;
250:12
growing (7)
87:24;92:24;97:10;
106:11;220:15;232:24;233:6
grown (10)
33:2;35:25;49:2,12;86:23;
87:8;97:5;108:12;167:16;
218:12
growth (3)
17:12;18:3;36:5
guarantee (1)
244:25
guess (25)
9:8;10:5;17:4;35:15,18;
37:2;47:5;59:15;71:25;75:7;
101:20;103:20;105:2;123:5,
13;160:23;167:19;183:10,
19;197:12;198:11;231:9,25;
240:25;244:13
guide (1)
121:25
gullies (1)
194:25
guys (3)
56:11;88:2;111:6

H

half (8)
31:21;41:12,20,23,23;
46:24;67:10;119:25
half-inch (1)
48:18
half-mile (2)
66:19;67:11
hand (5)
13:4;54:23;60:3;110:24;
193:2
handful (2)
116:21;199:17
hang (1)
10:7
Hansen (1)
16:9
happen (4)
185:24;196:13;207:23;
226:4
happened (4)
80:11;86:20;109:8;209:8
happening (3)
107:23;208:3;245:21
happens (5)
86:10;135:8;163:24;
185:8;196:21
hardened (1)
52:9
hardening (1)
41:23
harder (1)
17:13
hard-surface (1)
97:9
harm (3)
11:12;12:12;38:12
harvested (6)
87:17,20,25;88:12;105:23;
221:25
hay (8)
26:10;33:15,24;34:10,16;
35:1,14;106:18
hayfield (1)
92:24
hayfields (1)

92:25
head (5)
60:2;61:18;94:20;96:2,7
head] (4)
39:10;43:22;105:20;
106:20
headgate (5)
28:13;48:16;93:21;148:4;
222:11
headgates (1)
16:17
heading (3)
84:15;168:23;197:7
headings (3)
64:19,21;168:8
heads (2)
20:18;197:22
health (3)
51:4;88:3;108:10
hear (5)
22:20;111:10;131:22;
239:16;253:5
heard (15)
37:11,12;102:11;123:2;
125:3;174:2,7,9;177:14;
180:21;191:14;193:10;
224:9;228:5;241:23
HEARING (149)
8:3,8,12,20;9:15,19;10:4,9,
11,15,17;12:16,19;13:3,11;
15:11;21:23;22:5,15,18,21;
23:4,8;24:5;36:22;37:9,22;
38:4,4,7,11;44:25;47:3,13,
21;48:2,20,21;49:5,15;
51:19;55:1;56:5,8,10,12,16,
20,23;58:11,25;59:2;60:5;
65:3,8,10;68:23;69:3,13,20,
22,25;72:4;74:2;78:17;
91:23;92:1;99:6,11,13,15;
100:14;105:9;107:21;
109:12,23;110:1,10,16,21;
111:9,12;115:9;118:1,4;
121:15,19;123:11;124:4,20;
125:7,11,16;132:15;133:3,
10;138:25;139:11,16;
144:11;179:3,7;181:12;
191:19;193:22;194:2,5,9,10;
197:10,16;198:13,13;199:19,
22;200:22;201:17,21;
205:12;206:10,20;226:23,
23;227:1,5;229:19;231:15;
236:18;242:22;243:1;
245:25;246:8,18;247:24;
252:3,10,16;253:4,7,12;
254:24;255:4,6,9,18,21;
256:11,16,21
hearings (1)
198:8
hearsay (5)
22:7;101:1;107:11,12;
110:12
heavily (1)
113:7
heavy (4)
104:24,25,25;105:22
held (3)
14:1;111:8;116:13
Hello (2)
70:6,7
help (5)
20:6;88:3;118:7;136:24;
202:6
helped (1)
23:22
helpful (6)
23:24;38:18;40:22;50:6;
51:13;192:21
helping (2)
21:1;113:11
helps (3)
32:3;137:5;192:17
here's (1)
94:6
Hey (1)
56:11
High (15)
16:10,14;20:13,24;21:4,
15;33:25;91:1;101:7;136:4;
158:22;160:17;164:1;
166:10;242:6
higher (14)
95:20;131:12,15;143:15;
147:10;157:21;158:8,9;
159:7;163:19,19;166:9;
233:6;244:8
highest (6)
164:24,25;165:12;220:18,
25;221:2
high-level (1)
121:22
highlight (2)
45:22;152:3
highlighted (4)
45:13,15,21;46:1
highlighting (1)
45:23
highly (1)
251:12
high-priced (1)
105:1
high-value (1)
136:5
high-water-consumptive (1)
32:18
hindcast (9)
164:12;166:15,20,24;
167:9;168:3;169:14;170:24;
171:4
historical (20)
22:10;96:24;97:14;
101:15;114:17,17;133:17;
135:19,24;136:6;146:20;
155:18;163:21,23;167:20,
21;173:24,25;174:1;175:24
historically (5)
32:25;33:3;67:25;135:7;
164:9
history (1)
14:19
hits (1)
16:9
home (1)
109:21
hope (1)
111:9
horribly (1)
184:3
hosted (1)
120:1
hostility (1)
147:23
hotter (1)
160:2
hottest (1)
220:14
hour (1)
69:23
hours (1)
179:4
huge (3)
102:5;129:18;224:17
huh (1)
253:4
hundreds (3)
135:23;224:18;236:13
Hydro (2)
46:14;98:6
Hydrologic (1)
113:16
Hydrology (1)
113:18
hydropower (6)
45:24;47:10;97:23;98:21;
102:12,14
hypothetical (1)
160:7

I

Idaho (19)
11:8;36:23;61:8,19;
112:12;113:14,17,17;114:3;
138:20;208:3;210:16;214:9;
215:8;235:20;237:6,7,17;
238:13
Idaho's (1)
247:15
idea (8)
33:6,8,10;87:13;132:21;
147:24;210:15;224:25
identified (10)
71:3;91:18;103:17;104:6;
119:12;122:6;171:16;195:8,
10;198:20
identifies (1)
203:4
identify (11)
20:10;28:9;91:13;109:20;
117:2;118:12,20;122:18;
193:3,3;195:15
idle (2)
51:3,7
idled (4)
51:14,21,22;52:1
idling (2)
51:18;77:25
IDWR (20)
121:3;127:5;128:11;
130:16,16;132:3,24;133:14;
134:20;137:14;163:17;
174:4,5,13;177:12,15,19;
180:7;182:15;194:17
IDWR's (5)
174:24;175:15;193:9,14,
18
ignoring (1)
181:7
IGWA (2)
53:7;231:20
illustrate (2)
139:7,22
illustrations (1)
149:23
imagery (1)
174:18
imagine (4)
17:10,24;18:19;160:5
immediately (2)
34:11;115:8
impact (4)
187:3,23;190:23;203:18
impacts (6)
9:6;10:25;19:22;186:14;
187:15;200:3
impeach (1)
56:18
implement (1)
20:10
implemented (1)
20:6
implementing (3)
75:17;171:18;172:17
implements (1)
169:25
implied (1)
151:25
important (9)
10:5;17:11;19:1;27:25;
85:16;110:3;136:5;218:13;
231:17
importantly (2)
114:14;169:8
impose (1)
85:16
imposing (1)
184:14
impression (1)
107:22
improve (3)
96:8;195:19;196:8
improved (2)
93:8;173:3

improvement (1)
142:5
improvements (5)
91:18;131:1;133:1;
147:14;252:6
inability (1)
104:22
inadequate (1)
77:14
inarticulate (1)
10:12
incentive (6)
48:7;143:24;144:5;208:1;
250:15,19
incentives (1)
245:7
inception (1)
113:16
inch (15)
31:2,6,14,17,22;32:11;
66:13;68:7;79:8;93:13,13;
200:19;236:19;248:22,22
inches (1)
242:8
incidental (3)
47:10;102:17;174:15
include (4)
42:9;128:11;129:5;241:18
included (3)
114:16;242:18;254:4
includes (2)
99:2;175:4
including (1)
75:17
income (3)
46:16;47:10;102:21
inconsistent (1)
104:7
incorporate (2)
147:17;180:7
incorporated (6)
44:9;121:12;175:15;180:3,
14;188:8
incorporating (1)
139:25
incorporation (2)
139:24;179:13
increase (9)
24:22,25;25:2;28:24;65:1;
129:13,18;130:12;218:6
increased (10)
32:21;74:13;76:10;130:3,
6,18,21;232:16;233:2;252:5
increases (1)
159:4
incurred (1)
46:7
independently (1)
146:16
indicates (3)
146:1,13;151:9
indication (1)
158:13
indicative (1)
172:1
indicator (1)
158:6
individual (7)
15:18;88:23;107:6;152:2;
232:3;236:7,13
individuals (1)
16:18
industrial (5)
52:6,10;80:1,9;82:16
industry (21)
32:17,17;33:18;34:2,7,23;
123:23;134:1;135:15;
149:11;201:10,16;225:5,6,9,
11,14,18;226:1,14;237:22
inefficiencies (1)
243:24
inefficient (4)
184:4;203:21;244:24;
249:22
inevitably (1)
196:15
inflates (1)
164:8
Info (1)
193:9
inform (1)
123:13
informal (3)
8:24;9:14;11:2
information (50)
22:10;44:8;63:15,16,21;
72:1,7;83:18;114:17;120:2;
126:3,21;127:7;133:7;140:6;
142:11;144:13,15,18;
152:21;160:22,25;161:3,8;
174:16;179:24;180:11,21,24,
25;181:1,2,14,16,20,22,24;
192:16,21;193:7;201:19;
204:7;213:21;218:17;219:2;
235:14;238:7,20,23;239:10
informational (1)
194:24
injured (4)
187:1;204:2;205:6;213:2
injuries (1)
229:3
injury (18)
198:18;199:5,10,11,20,23,
25;204:3,18,21;205:8;
207:14,14;209:17;210:2,23;
212:25;229:6
input (2)
137:4;214:23
in-season (9)
16:18;71:9;73:2,6;168:24;
170:16;172:11;203:2;204:2
insert (1)
175:18
inspector (1)
215:11
installed (3)
19:21;90:18;102:3
instances (2)
198:21;212:8
instantaneous (1)
208:21
instead (6)
128:18;134:15;170:10;
175:16;183:7;219:19
institute (1)
200:2
instrumented (1)
192:13
insufficient (1)
11:20
intended (3)
66:20;67:12;133:5
intensive (1)
40:9
intent (1)
106:3
intention (1)
132:16
intentional (1)
127:21
interest (6)
21:3;22:20;23:24;75:10;
98:25;206:24
interested (1)
207:8
interesting (2)
128:15;146:3
interests (1)
66:25
interject (1)
133:25
internet (2)
49:9;115:15
interpretation (1)
124:19
intersect (2)
195:1,2
intimately (3)
83:16;105:19;107:10
into (74)
14:4,6;16:8,10;21:22;
22:23;23:2;32:17,25;33:22;
38:8;40:22;42:17,20;44:9;
48:9,11,22;49:3,16,17;61:7;
63:11;65:19;68:12;69:3,16;
70:12;75:18;79:25;89:25;
94:5,7;95:6;96:23,23;97:11,
13,14,15;100:1;101:8,12;
102:6;107:4;108:24,25;
109:4;121:12;124:7;125:17;
134:5,17,18;135:6;136:22;
140:1;143:13;144:6;154:18;
157:24;158:3;164:3;167:7;
179:14;180:8;194:11;
195:20;210:8;214:24;
218:10;225:25;241:25;
250:19
introduce (1)
8:5
introduced (1)
9:18
inventory (1)
19:3
investigation (1)
114:15
investigations (2)
114:11;125:22
invitation (1)
119:24
involved (10)
107:8;113:5,7;114:7,21;
119:20,23;126:16,17;198:10
involvement (1)
118:14
involving (3)
136:5;151:10;251:1
irrelevant (1)
47:12
irrigate (8)
34:17;51:2,8;88:2;92:10;
95:18;106:11,14
irrigated (47)
25:14;27:5;29:8,14;36:9;
37:21;40:6,9;41:11,20;
49:22;52:2;53:9,23;69:10;
78:4,12;79:20;80:8;83:2;
84:4,22,25;85:4,5;86:3,7;
87:25;97:7;105:4;122:11;
173:9,11,16,22;174:3,14,17,
25;175:15;176:25;177:13,
21,24;178:17;179:21;218:11
irrigates (2)
108:22;109:2
irrigating (11)
17:18;52:24;53:4,20;
54:12;58:7;87:21;178:10;
217:15,16;221:20
Irrigation (65)
13:15;17:5,7;19:14;26:13;
29:21;31:7;41:5;44:5;47:11;
48:8;50:23;62:15,21,22,24;
66:18;80:21;81:15,19;82:9,
12;84:16,21;88:10;89:3;
92:14;94:6;95:3,5;102:17;
105:19;108:23;109:9;
114:21;123:25;135:16,19;
136:14;141:14;146:6;
159:25;167:15,24;178:6;
181:8;199:5;212:16,18;
220:7;224:5,7,16,20;225:17;
226:15,16;230:4;233:23;
234:2;237:19;241:19;242:2,
11;244:2
irrigators (1)
66:23
issue (12)
12:2,3;28:12,12,13;47:5,
19;82:1;117:9;147:9;196:14;
223:4
issued (6)
11:8;82:8;120:5;201:8;
209:9;231:6

issues (1)
122:5
ITCH (1)
113:17
item (1)
22:7
items (1)
79:6

J

January (2)
64:17;138:21
Jay (17)
12:24;13:6,21;14:15;
15:15,25;22:2;79:1,3;81:1,6;
84:12;99:12;123:2;148:4;
226:3;241:24
J-a-y (1)
13:21
Jennifer (5)
184:21;188:7;189:20;
193:11;204:7
Jennifer's (1)
188:14
job (1)
29:2
JOHNS (1)
256:12
Johnson (1)
45:11
joined (1)
145:2
joint (1)
81:9
judge (8)
123:20;125:3;201:3,8;
231:7;248:8,14,21
judicial (6)
124:7,17;132:10;138:24;
201:8;231:6
judicially (1)
186:17
July (8)
89:25;90:3;153:5;158:17;
201:4,7;220:14;222:16
June (12)
18:4,6;90:2;153:5;157:13;
162:1,2,10;166:5,6;220:14;
222:16
junior (13)
11:11,21;35:13;148:24;
188:25;190:22;191:6;
202:17,18,19;209:21;
210:24;229:4
juniors (8)
183:14,22;186:13;213:15;
225:2,19;226:17;237:11
Justice (1)
38:5

K

keep (13)
31:11;50:3,12,16;52:5;
53:19;117:7;131:12;169:14;
175:18;180:20;186:13;211:7
keeping (1)
93:24
keeps (2)
83:12;206:2
Kent (1)
230:6
key (1)
190:11
kind (41)
14:16;17:3;30:15;34:3,15;
40:11;49:10;54:9;98:22;
123:22;126:15;127:20;
129:13,19;133:17,21;134:11,
14,23;135:24;137:1;142:14;
143:5,24;144:6;146:11,17;
149:15;152:3;164:11;
165:16;174:15;176:5;
178:20;182:21;190:7;
194:25;215:4,5;216:10;
230:13
kinds (6)
90:4;124:25;131:1;136:13,
18;205:25
Kinyon (2)
20:22;90:21
KLAHN (69)
60:8,10,13;111:15,16,19,
22;116:3,5,9,11,14,15;
117:24;118:6,7,10;120:18,
20;124:1,20,21;125:9,14,18,
20,21;132:9,15,16;133:9,10,
13;138:23;139:3,12,13,17;
178:25;179:9,10,11;188:23,
24;191:15,21,23;193:16,24;
194:1,4,8,13;197:10;205:10;
231:12;246:14,15;252:14,
25;253:3,10,12,13,16;
254:22;255:8,16;256:9
Klahn's (2)
197:17,17
knew (1)
248:14
knowable (2)
225:23,25
knowing (1)
50:24
knowledge (3)
179:25;215:7;249:4
known (1)
195:14
kosher (1)
214:1

L

labeled (2)
189:21;216:18
lack (1)
77:4
laid (2)
51:7;219:24
Lake (8)
16:6;59:4,7,14;62:21;63:2;
64:3;244:14
land (9)
27:20;39:22;64:15,16;
77:25;82:20;83:7,12;174:25
lands (10)
51:24;78:11;137:23;
175:15;176:25;178:11,13,
17;238:8,9
landscaping (1)
97:1
language (1)
23:10
large (20)
18:13;67:13;86:12;90:25;
97:17;123:24,24;137:12;
143:2;178:5;220:7;224:5;
226:1,5;235:20;236:10,12;
237:17;243:15;245:2
largely (3)
115:12;178:10;213:19
larger (6)
15:22;16:16;20:5;143:6;
159:7,7
large-scale (1)
91:3
largest (1)
220:10
last (40)
13:22;24:24,25;29:17;
32:14,16;34:4,4;39:22;
59:16;65:6;67:2,3,17;68:21;
71:19;75:14;80:15,18;92:8;
105:2;119:11;122:24;
123:19;147:3;154:20;
156:15,16;175:12;183:9;
191:4;199:2;207:4;209:20;
232:17;240:20;242:7;
249:25;250:7;252:2
lastly (1)
250:25
late (3)
8:25;228:18;255:25
later (9)
34:20;44:3;130:9;134:6,
17;143:13;186:2;211:15;
229:12
lateral (2)
220:3;221:15
laterals (2)
70:24;138:3
latest (1)
180:18
lava (1)
224:9
law (1)
247:10
lawyer (2)
183:21;235:13
lawyers (1)
239:23
lay (2)
45:1;193:12
leads (1)
245:2
leak (1)
18:1
least (23)
8:18,22;9:2,5,22;10:20;
11:5;12:9;18:13;23:8,10;
41:15;48:6;72:4;140:14;
146:14;157:5;160:18;161:9;
173:2;182:18;187:18;219:4
leave (3)
8:14;23:11;68:18
leaves (2)
70:19;89:25
leaving (1)
256:5
left (4)
115:13;153:5;162:3,7
legal (1)
63:13
legally (3)
235:3,11;239:23
length (2)
176:22;191:24
less (41)
14:16;72:15,19;89:5;
92:11;93:5;94:5;95:11,23;
106:12;107:15;109:3;127:1,
3;128:2,3;131:4;135:7;
143:18;146:1;151:21;155:3,
4;164:15,17;165:10;169:23;
170:6,9;175:3;196:9,10,24;
197:1,6;221:23;222:10,10,
11;245:3;252:14
less-than-efficient (1)
148:25
letter (1)
53:7
letters (1)
69:8
lettuce (2)
29:22,25
level (20)
17:25;21:1,4,16;80:13;
95:21;141:25,25;143:15;
146:15;148:21;157:21;
158:11,23;160:17;165:11;
224:24;226:22;243:16,18
levels (1)
148:12
licensed (1)
112:11
lifetime (1)
77:7
liked (5)
119:9;121:21;122:20;
123:9;147:4
likely (5)
26:9;61:6;83:15;89:22,22
Likewise (1)

198:6
limit (3)
70:21;100:9;226:5
limitations (1)
100:7
limited (3)
198:21;212:7;233:14
Line (77)
16:8,10,10,14,14,14;20:13,13,16,24;46:14;53:11;55:8;57:1,6,7;60:24;61:3;63:5,6;77:20;91:1,21;94:14;98:2,5;101:7,9,11;104:16,20;140:17,22;141:3,18,19;142:3;145:3,9,10,24,24;146:1,1,9,9,12;147:5,12,15;150:20,21,23,23;151:6,19,23;153:14,15,17,24;154:4,9;155:6;162:6,7,9;163:1,2,9;189:18,18,19;190:3,13,13;209:11
lines (8)
22:9;55:12;63:22;71:17;100:25;154:8;195:7;254:9
lining (8)
18:15;20:11,12;75:17;90:25;91:3;123:1;146:6
list (4)
20:9;69:7;118:17;255:23
listed (4)
62:2;193:8;241:5,8
listened (1)
252:19
listening (1)
8:17
litigation (1)
224:15
little (30)
19:8;26:9;65:4;68:5;72:19,20;79:5;80:15;90:13;115:14;127:24;132:20;134:5,17,19;143:13;147:13,15;169:9,13;170:11;171:11;173:8;178:3;181:25;182:6;184:6;190:7;219:19;236:24
live (1)
195:16
load (1)
222:16
local (1)
42:9
location (6)
42:19;205:9;212:22,24;229:7;244:13
lock (1)
16:23
lockstep (1)
160:13
lodge (2)
37:2;132:7
lodged (6)
9:3,10,13,20;12:8,9
logistically (1)
23:5
long (12)
34:13,15;143:2,2;183:6;203:24;224:15,18,18;239:12;240:16;246:18
longer (4)
65:4;126:6;187:19;199:16
long-term (3)
127:8;128:17;178:6
look (46)
14:7,11;28:9;29:3;30:2,20;31:25;36:11;38:19;39:3;45:16;56:3,25;60:22;65:18;76:15;81:22;94:17;115:17;120:8,12;121:5;123:6,14;128:15;130:2;133:25;134:2;139:2;144:9;151:4;152:1;154:2;161:25;165:2;172:10;177:20;190:12,19;204:15;217:23;223:21,22,25;233:7;254:1
looked (15)
59:20;62:5;68:3;69:9;115:17;122:14,21,24;127:6,10;138:6;224:20,23;240:1;245:12
looking (30)
32:19;36:24;40:4,23;43:15;72:7;91:11;114:21;115:24;122:8,9,10;127:9;137:19;141:18;150:8;154:7;157:15;168:4;189:3,4;211:15;230:10,17,23;235:15;236:11;240:25;255:14,23
looks (4)
8:21;62:7;63:13;120:15
loop (5)
131:10;146:24;176:5;182:1;250:22
loose (1)
40:21
lose (1)
96:9
losing (1)
196:20
loss (5)
11:19;47:7;142:22;143:4,7
losses (6)
137:25;138:4;196:3;225:23;237:19;243:24
lost (2)
61:16,24
lot (34)
18:11,17;19:18;52:17;80:16;88:1;90:18;114:16;134:10,11;135:16,17,25;136:6;141:15;143:6;147:23;152:15;154:10,10;155:1,3,4;157:19;158:21;159:14;175:12;219:11;230:9;235:25;242:9;247:6;252:14,23
loud (1)
111:10
Low (17)
16:10,14;20:13;46:14;98:2,5;101:9,11;137:8,11;141:13;158:13;162:17,19;195:22;208:18;222:22
Lower (27)
46:14;98:2,5;135:10;148:21;160:19;162:15,17;175:19,20,21,23;176:2,2,3,7,8;194:21;196:11;221:5;222:5,20;223:3,5;227:24,25;228:11
Lunch (2)
110:20,22
ly (1)
141:23

M

machine (1)
10:10
Magic (4)
27:18;83:15,16,21
magnitude (1)
74:25
Main (8)
16:8,14;18:5,22;20:16;32:15;122:17;195:21
mainly (2)
189:17;195:14
maintain (8)
17:2,12;83:2,11;84:3;93:15;108:9;148:25
maintains (2)
83:7;192:9
maintenance (8)
16:25;17:3,5;19:16,16,17,24;24:19
major (1)
113:20
majority (1)
185:20
makes (3)
46:23;124:15;143:1
making (8)
17:22;18:2;55:15;93:11;171:22;196:23;237:2,3
malls (1)
52:6
man (1)
107:22
manage (7)
21:11,11,12;65:4;90:9,22;226:8
managed (4)
227:10,13;228:1,22
management (9)
67:7;90:8;143:15;212:9;228:25;237:8;247:16;249:22;251:19
manager (1)
14:6
managers (1)
199:8
managing (1)
110:2
manner (1)
70:13
many (21)
17:20;33:4;34:25;40:5;44:12;52:14,23;53:3;54:12;58:7;75:17;97:16;155:2;161:5,9,10;171:10;223:6,8;224:25;241:3
map (4)
62:5,10;64:2;139:15
margin (2)
172:5,7
mark (6)
60:14,16;193:22;194:2,4,5
marked (19)
9:3;12:8;15:12,14,16;21:24;40:14,20;48:10,21;49:16;60:18;65:11;68:25;69:15;118:3;125:16;194:7,10
market (3)
11:23;32:24;34:7
match (1)
213:1
matches (1)
167:3
material (1)
22:24
materials (1)
130:15
math (9)
41:7;72:12;75:6;126:16;185:2;218:4,5,6;228:10
Matt (1)
42:23
matter (12)
8:23;11:5;110:5;111:24;112:5,14;114:1;115:3;134:12;172:4;240:21;249:25
matters (5)
10:23;12:21;118:15,18,22
Max (1)
117:15
maxes (1)
90:2
maximizing (1)
207:10
maximum (1)
145:15
may (33)
13:11;31:14,16,20;37:8;48:6;54:25;66:21;87:7;91:6;93:1;99:9;107:23;108:5,15;133:11;136:22;147:13;153:5;154:2;178:6;190:5;205:18;209:7;214:22,25;221:13;238:15,18,19;239:23;250:21;252:25

maybe (26)
8:14;59:16;65:9;68:4;
81:1;109:3;116:19;117:25;
127:13;129:1;149:24;152:3;
166:8;173:1,1;177:15;
196:20;209:7;210:4,13;
214:21;215:18;234:19;
236:4;240:12;244:11
McCain (1)
256:2
McHugh (2)
8:18,19
mean (60)
11:17;23:5;61:18;74:18;
78:7;107:12;121:20;128:6;
130:24;152:23;159:12;
165:6,15;168:4;170:8;176:7;
177:2,9,17,18;178:3,4;
180:11,21,23;183:2,17,19,
20;192:11;202:15;203:3;
207:25;208:4,12;209:4;
214:15,21;215:18;216:23;
218:18,18;221:10,19;224:12,
14;225:16;228:18;229:14;
230:24;232:4;235:21;
239:20;240:3;241:23;
243:18;244:19;245:22;
250:5;252:16
meant (2)
118:25;217:9
measurable (1)
93:21
measure (5)
16:18,22;67:12;214:7,11
measured (5)
66:19;194:18;214:14;
215:21;241:17
measurement (3)
28:13;194:20;214:13
measurements (1)
195:5
measures (4)
70:17,21,25;71:3
measuring (5)
19:11;67:10;93:23;
214:17;225:14
meat (1)
46:16
mechanism (5)
86:6;184:3;186:4;203:12;
215:20
mechanisms (2)
213:20;221:10
meet (20)
33:17;67:8;70:8;94:22,22;
136:24;137:23;138:15;
143:20;157:25;183:15;
197:5;207:1;221:11;228:2;
230:19;231:10;234:3;250:3,
6
meeting (4)
27:2;188:11;244:1,21
meetings (3)
119:25,25;120:3
Melanson (5)
201:3,8;248:8,14,21
member (7)
113:15;130:3,17;135:13;
143:22;155:25;232:3
members (47)
84:3;114:16;122:10,13,22;
134:3,11;140:12,19;141:6,
22;142:13;144:21,24;145:7,
13,25;146:14;148:11;150:6,
18;156:9,10,18;161:9;
166:23;167:14;171:22;
173:19,21;174:18,19;177:4;
178:8;181:13,16,19,19;
199:9;224:22;227:21;232:1;
233:15,18;234:1;245:11;
252:4
members' (2)
128:8;240:18
memo (2)
120:24;121:1
memory (1)
56:17
mention (1)
159:10
mentioned (11)
59:4,10,11;86:25;90:18;
92:15;96:13;108:18;114:5;
130:24;198:9
meshed (1)
24:2
met (1)
166:2
meter (2)
16:22;214:16
meters (5)
93:15,20,22;214:7;215:10
method (7)
133:22;137:9,13,15;
146:18;172:3;214:5
methodologies (2)
136:8;230:19
methodology (112)
11:2;12:4,5;37:7;38:2;
44:9;52:22;53:10;55:11;
57:4;58:3,15;69:11;71:8,13,
23;72:7,21;73:9,18,22;74:1,
7,15;75:3;76:12;84:9,12,24;
85:5;121:6,12,18;122:4,11,
14;125:24;126:4;128:22;
129:23;131:23;132:4,8,12,
14;133:4,15,22;137:7;140:1,
9,20,24;141:1;144:11,25;
145:2;148:13;149:4;150:25;
151:23,25;155:5;161:2,15;
162:16;163:24;165:8;169:2,
11;170:22;171:4;172:22;
173:3,6,12,16;174:24;175:2,
7,14;177:8,23;179:14,15,16,
20;182:7,11,20,25;184:8;
200:3,11;202:11;229:2,13,
15;231:6;232:5,11,18;234:3,
8,9;247:19;248:4;250:15,20,
24;252:2;253:23
methods (3)
119:5;136:13;139:25
Mexico (2)
112:12;224:15
microphone (1)
12:17
microphones (2)
8:13;111:7
mid-1980s (3)
189:1;190:22;209:10
mid-'80s (5)
190:14;191:6;204:5;
205:5;209:22
mid-April (2)
89:7,10
midday (2)
256:5,13
middle (2)
18:4;141:14
mid-October (2)
89:8,10
mid-season (1)
220:25
midsummer (1)
223:2
Midway (5)
44:18;46:5,14;98:2,5
might (16)
10:13;15:10;23:9;60:4;
121:25;125:3;128:15;129:4;
152:4,9;166:7;189:3;191:14;
240:23;242:18;253:22
miles (10)
16:15;54:7;86:19;143:3;
220:3,3;221:14;223:20;
224:11,18
million (18)
40:25;41:5;72:19;96:1,6;
98:20;103:7;127:2;184:23,
25;185:7,8,13,15,17,22;
223:11;228:13
Milner (7)
16:4;42:24;152:11;154:7;
165:3,3,5
mind (7)
21:6;79:1;92:23;108:21;
139:21;169:15;205:20
miner's (6)
31:2,6,13,17,22;66:13
Minidoka (6)
175:9;185:1,6;190:2,21;
217:9
minimize (2)
71:5;202:3
minimum (2)
145:15;200:11
minus (2)
170:18;178:21
minute (8)
10:14;116:12;117:1;
151:5;165:2;202:9;216:13;
255:18
minutes (8)
65:9;69:22;76:19;128:7;
179:1,5;246:22;252:15
mischaracterized (1)
205:14
mischaracterizes (1)
205:10
misclassified (1)
177:16
misleading (1)
137:1
mismatch (1)
155:2
missed (2)
116:22;209:9
mistake (1)
217:13
misunderstand (1)
234:19
misunderstanding (1)
234:20
misunderstood (3)
91:7;106:9;129:2
mitigate (15)
183:14,14,15;186:14;
187:15;203:2,6;205:21,23;
207:21,23;208:2;211:10,11;
250:8
mitigated (1)
211:15
mitigating (3)
203:18;209:23;211:8
mitigation (35)
85:11;131:17;148:19;
183:21;186:23;191:8;202:3,
7;203:19;204:10;205:25;
206:5,8,13,23,25;208:5,9;
209:12;210:8,12;211:1,2,3,4;
212:4,12,17;213:6;226:20;
240:1,9;250:5,10,11
mix (2)
218:13;219:14
mixture (1)
165:3
model (12)
35:4;113:23;183:3,4,6,12;
184:14;186:11;187:4;
203:15;208:20;214:5
modeling (23)
112:24;113:13,16;122:15;
136:12;182:8,10,20,24,25;
186:9;187:10,23;188:2;
191:2,9;192:17,22;202:23;
203:1,3,4,9
modest (3)
171:18,20;172:18
modifications (1)
172:21
modified (1)
161:2
moisture (4)
136:24;157:25;166:2;

244:4
moment (4)
60:19;81:4;105:21;231:15
Monday (1)
26:4
money (2)
49:24;136:6
monitor (3)
42:15,19;54:4
monitored (1)
42:16
month (17)
18:6;30:11,11;153:3,23;
159:1;164:1;165:7,17,21,22,
22;167:15;169:6;173:15,17,
18
monthlies (1)
141:21
monthly (41)
131:25;136:16,21;137:1,4;
140:8,14,19,23,25;141:11;
142:12;143:9;149:17;151:4;
152:23;153:2,2,8,9;155:14;
156:17,20;161:11;163:15;
167:6,7,12;169:3,5,10,19,23;
183:3,4,5;214:18,25;215:2,8;
220:23
months (16)
137:9;140:15;153:23,24;
155:2,10;159:18;161:10;
162:11;163:18;165:3,20;
170:6;220:14;221:4;223:5
moratorium (5)
187:5,6,7,12,17
more (124)
14:16;21:9;33:1;37:14,21;
39:14;40:9;43:10;46:10,11,
22,23;53:25;64:20,25;68:9;
72:6,20;75:13;77:7,23;
80:16;85:4,6;86:4;89:5;
90:15,23;92:20;93:1;94:7,
17,20,20,21,21;95:18;97:22;
106:14,24;107:3,4,4,15;
115:17;119:18;122:19;
129:15;131:5,11,14,15,16;
132:18;135:7,8;141:2;143:3,
4,17,19;144:1,13;149:12;
151:8,8,21;158:2,11,15;
159:20;161:18;164:8,13;
165:24;169:9;170:8;177:2;
179:1;187:1;190:25;195:24;
196:11,23,24,25;197:3,5;
206:1,1;210:4;215:2;217:3,
12,15,15;218:16;219:15;
223:22,25;224:1,3,3,5,18;
226:7;227:23;228:2,9,18;
233:9,10;239:13;242:25;
244:19;245:1,6;247:25;
248:2;250:16,20,22,23;
252:24
morning (14)
8:4,7,11,19,23;12:22;
16:20;59:5,10;97:19;102:11;
109:21;195:25;255:15
Morocco (1)
115:10
Moss (4)
18:3,7,7;21:11
most (26)
21:6;36:4;44:16,18;52:14;
89:2;96:17,17,19;98:12;
134:9;145:25;146:12,13;
155:2;181:19;187:18;208:3,
4;212:2;213:21;214:9;216:2,
23;220:19,21
motion (4)
10:23;11:5;12:7;107:21
move (16)
22:13;33:25;58:20,25;
68:20;83:23;92:21;93:1;
105:23;107:17;131:19;
154:19;155:21;166:14;
176:9;181:25
moved (6)
14:3,4,5;32:17,19;88:6
moves (2)
27:22;54:4
moving (5)
26:5;28:10;59:1;136:23;
152:16
mowing (2)
17:8,8
much (54)
16:3;17:16;18:10;32:8;
37:21;43:18;46:20;47:15;
61:16;65:4;68:5;92:13;
93:16;95:2;96:13;97:4;
101:7;106:24;109:3,8;
126:18;136:9;144:5;151:7,8;
152:13;154:4;157:14;
159:18;177:21,21;178:10;
181:17;184:5,13,15;187:19;
190:10,17;192:6,18;193:20;
196:22;197:3;204:17;
206:23;213:9,12,13;223:4;
228:9;236:20;242:9;245:21
multiple (5)
17:15;20:16;29:24;94:11;
251:24
multiplied (1)
175:24
Murtaugh (11)
16:6;59:4,7,14;61:17;
62:16,19,21;63:2;64:3;
244:14
must (7)
78:7,7,8;84:20;106:9;
108:9;148:12
myself (3)
72:12;135:16;245:13

N

name (5)
8:6;13:20,21,22;111:25
names (1)
27:21
natural (8)
81:16;89:17,19;90:4;
103:24;168:12;241:22;
242:12
nature (4)
51:10;142:17,17;191:25
near (13)
33:25;84:15;119:16;
141:25;158:24;185:1;
187:21;190:1,21;194:21,22;
220:19;244:16
nearly (3)
54:1;86:19,19
necessarily (5)
76:13;87:23;143:10;
208:10;239:8
necessary (5)
48:8;148:15,15;206:25;
207:1
need (90)
8:13;10:13;12:21;18:21,
21;21:9;26:8;27:12,13;
36:11;37:5;40:21;52:3;74:5;
90:6;97:20;134:6,7,13,16,22;
135:6;137:11;139:9;143:25;
150:7,15,24;151:3,10,13,20;
152:1,9,12;153:2,8,8,13,15;
154:12,17;155:4;156:1,7,13,
22;157:25;158:20,25;159:3,
5,21;160:1,3,8,11,14;161:12;
163:19;164:2,3;167:12,13;
169:5,19;173:14,25,25;
175:20;177:24;186:18,23;
190:14;197:3;218:10,14,19;
220:10,24;224:1,4;227:17;
229:17;243:16;244:22;
247:21;250:6;253:19;254:20
needed (6)
24:24;25:1;183:10;200:2;
202:8;234:14
needing (1)
88:15
needs (10)
27:2;34:6;94:8,22;131:12;
143:20;173:19;213:1;250:4,
12
neighborhood (1)
223:15
neighbors' (2)
67:22,23
net (2)
84:22;186:25
new (26)
8:4;18:15,15;19:12;20:17;
27:22,23,24;83:19;100:1,3;
112:12;122:8;126:15;127:8,
18,23,23,25;128:24;129:8;
171:6;183:1;187:5,13;
224:15
News (2)
62:9;173:10
next (20)
12:24;16:24;26:14,20;
48:14,24;70:1;110:23;142:7,
14;152:20,21;154:1,2;
155:21;167:19;168:22;
170:15;210:3;255:12
Nice (2)
70:8;198:5
night (1)
242:7
ninth (3)
59:17;65:20,23
nods (4)
39:10;43:22;105:20;
106:20
none (3)
194:10;208:25;209:12
nonetheless (1)
107:25
nonirrigated (1)
36:25
Non-Irrigated (2)
36:18;37:24
nonirrigation (3)
17:6;18:12,14
noon (1)
109:15
normally (2)
22:18;112:15
North (6)
39:9;146:19;154:21;
159:14;217:24,25
Nos (1)
81:11
note (7)
127:6;141:17;146:8;
149:21;154:20;156:24;
159:13
notes (2)
188:20;241:10
nothing's (1)
181:5
notice (4)
30:14;74:1;138:24;139:2
noticeably (2)
107:14,15
noticed (2)
32:13,15
November (9)
81:25;82:5;168:1,3,9,11;
170:16,19;188:11
now-unsealed (1)
55:4
number (27)
8:16;29:17;44:6,14;51:9;
53:20,22;72:14;82:12;83:2;
85:6;86:12;101:14;114:6;
122:5;135:9;140:24;141:22;
145:6;149:7;171:8,9;183:19;
223:12;233:6;236:1;254:7
numbered (1)
59:23
numbers (24)
74:4,16,19;80:21,24;90:4;

117:10,10;123:18;127:10;
139:13;144:17,19;170:23,
23;171:1;174:3,10;185:11,
12,12;216:18,24;242:18
numerator (5)
159:22,23;160:4,9,11
numerous (1)
113:10

O

object (10)
9:18;44:23;47:4;49:6;
55:13;58:22;71:25;91:20;
110:8;246:11
objection (34)
9:10,17;21:23;37:2;38:7,
10,12;45:1,2;48:20,21;49:5;
51:15;56:10,12;58:10;68:23;
69:13;72:5;92:2;99:20;
100:25;110:11;124:4,5;
125:11,15;132:7;133:8;
138:25;148:23;205:10;
231:12,17
objections (2)
81:10;194:9
obligated (1)
39:25
obligation (2)
207:2;226:21
obligations (2)
108:13;250:11
observation (1)
172:2
observations (1)
228:25
observe (2)
252:18,22
observes (1)
107:23
observing (2)
114:19,20
obviously (1)
183:21
occludes (1)
17:13
occurred (2)
82:19;209:16
occurring (4)
88:10;181:10;198:18;
220:13
occurs (1)
88:10
o'clock (3)
97:18;178:25;255:10
October (3)
15:21;141:16;153:6
off (40)
8:9;10:14;12:20,20;16:13,
15;26:20;27:8;28:16;33:24;
34:1,11;42:17;43:9;49:9;
51:9;60:17;61:18;88:6;
89:14;101:11;106:13,23,24;
108:25;109:3;111:8;116:11,
13,16;117:13;141:15;
153:14,25;196:22;222:9;
241:16,25;256:16,18
offer (21)
8:24;9:1,4,8,14,20,22;
10:2;11:2;21:21;47:2;48:15,
18;49:3,13;69:12;124:1;
132:17;193:13,16;194:8
offered (3)
8:24;172:21;246:5
office (1)
27:18
OFFICER (131)
8:3,8,12,20;9:15,19;10:4,9,
11,15,17;12:16,19;13:3,11;
15:11;21:23;22:5,15,18;
23:4,8;24:5;37:9,22;38:4,7,
11;44:25;47:3,13,21;48:2,
20;49:5,15;51:19;55:1;56:5,
8,10,12,16,20,23;58:11,25;
59:2;60:5;65:3,8,10;68:23;
69:3,13,20,22,25;72:4;74:2;
78:17;91:23;92:1;99:6,11,
13,15;100:14;105:9;107:21;
109:12,23;110:1,10,16,21;
111:9,12;118:1,4;124:4,20;
125:7,11,16;132:15;133:3,
10;138:25;139:11,16;179:3,
7;191:19;193:22;194:2,5,9;
197:10,16;198:14;199:19,
22;200:22;201:17,21;
205:12;226:23;227:2,5;
229:19;231:15;242:22;
243:1;245:25;246:8,18;
247:24;252:10,16;253:4,7,
12;254:24;255:4,6,9,18,21;
256:11,16
officers' (1)
236:18
official (1)
74:1
offseason (2)
19:18;20:3
often (5)
24:22;33:22,24;34:4;
214:14
old (8)
101:16;117:3;127:19;
128:23;129:17;148:6;
173:10;177:4
Olsen (1)
9:6
once (5)
19:4;37:5;88:19;106:12,23
one (108)
8:14,22;10:7,14,23;16:22;
22:7;25:18;26:3,5,9,19,19,
23;27:8,9,22;28:10;44:18;
48:24;56:18,19;58:18;60:11;
64:21;66:3,6,8,11,19;67:10;
68:2;69:6,6;75:23;83:18,23;
91:5,6;92:23,24;99:9;
101:11,16;105:2;107:20;
108:6,16,19;110:5;113:20;
116:23;117:13;119:18;
123:9;124:9;126:1;133:16;
137:13;140:11;141:2,10;
142:13;145:23;148:7;149:8;
152:6,11,13,20;154:1;156:5;
157:9;160:23;161:16;
162:18;164:13;165:13;
169:16;179:18,19;180:1,15,
18;181:8,17;182:18;183:9,9,
19;188:9;189:4,13,23;
191:23;195:24;198:17;
202:10;205:8;207:7;209:11;
216:23;227:25;235:21;
238:15;240:20;254:14;
255:25
one-quarter (1)
165:12
ones (10)
19:12;77:8;113:4;157:10;
191:6,7,8;209:22;241:7,8
on-farm (10)
92:18;93:8;138:7,11;
142:23;147:11;196:9;197:6;
226:13;237:19
ongoing (4)
19:14;20:9;37:11,19
only (26)
10:3;41:23;102:14;105:5;
128:1;138:2;143:25;152:22;
154:17;159:21;165:21;
172:16;190:13;204:4,9;
205:4,7;207:13;209:25;
212:16;217:13;241:7;250:3,
11;255:25;256:7
on-system (1)
93:9
onto (2)
95:2;101:11
open (6)
140:18;148:4;216:14;
235:20,24;237:17
open-canal (1)
222:25
opening (1)
132:12
operate (21)
14:16;95:21;142:1;143:19,
23;146:15;148:12,20,21;
164:24;186:19;207:24;
224:5,18;225:19;226:2,4,7;
243:9,14,16
operated (2)
166:11;245:6
operates (3)
25:11;153:11;221:9
operating (23)
21:5,9,9,16;141:25;
143:16;146:22;157:21;
158:8,22;159:20;160:17;
171:22;172:5;187:18;206:9,
12;210:19;226:16,22;
237:10;251:21,23
operation (9)
101:21;110:17;123:24;
134:3;138:8;146:7;149:1;
225:16;245:3
Operational (3)
70:23;158:7;244:24
operationalize (2)
147:25;148:8
operations (18)
19:25;20:7;47:10;75:13,
18;105:3;114:25;122:22;
123:8,19;136:13;146:20,21;
147:2;158:14;197:6;224:16;
226:25
opinion (21)
36:4;38:17;39:17,20;50:8,
18,20;158:14;172:20;
199:12,18,20;200:4,10,17;
202:22;205:6;207:13;217:2;
218:16;235:11
opinions (7)
37:20;112:5;119:2;
123:14;179:12;198:14,17
opportunities (1)
91:11
opportunity (4)
101:6;115:14;133:24;
246:14
opposed (2)
35:5;237:3
opposite (1)
146:4
orange (5)
154:3;189:18;190:3;
195:4;241:21
order (100)
11:2,4;12:4,5;30:15;38:2;
44:9;51:3;53:10;69:11;71:8,
13,23;72:7,21;73:18,22;74:1,
7,15;75:3;76:12;84:9,12;
94:22;97:19;121:6,7,13,18,
19;122:4,5;125:24;126:4;
129:23;131:23;132:4,11;
133:5,15;138:4,21;139:1;
140:1,9,20,24;141:1;144:4,
11;145:2;148:25;149:5;
150:25;151:23,25;155:5;
161:15;165:8;169:2,11;
170:22;172:23;173:12;
174:24;175:15;176:3;
177:23;179:15,16;182:7,11;
183:21;184:8,10;185:5;
186:20;187:17;200:12;
201:7;202:11,12;203:11;
209:6,9;229:2;231:2,5,6;
232:18;236:16,22,24;
240:22;247:19;248:4;
250:15;252:2;253:23
ordering (1)
221:11
orders (3)
39:25;121:16;167:3

Order's (1)
234:4
ordinarily (1)
23:23
original (8)
114:7,24;127:12,17;
137:16;145:21;181:11,22
originally (1)
102:4
others (5)
95:7;142:2;224:23;
226:11;244:10
other's (1)
213:25
otherwise (3)
82:18;117:19;196:18
ought (6)
11:5;27:10;147:15;
151:24;155:6;180:13
out (59)
14:3;16:4,8,17,21,23;17:7,
17,22;18:2,7,21;19:18;
22:25;30:15;39:8;40:22;
44:14;82:20;83:8,10,13;
84:1;88:14;90:2;95:8,11;
102:10;106:7;107:23;115:8;
125:6;127:2;128:20;136:9,
23;137:5;141:13;144:24;
148:3;152:7,17;156:20;
157:24;166:21;171:16;
178:13;190:9;195:23;207:6;
209:5;210:10;216:6;218:19;
219:24;223:12;225:24,25;
251:19
Outlier (1)
155:10
outliers (1)
155:15
outset (1)
234:15
outside (2)
246:4,9
outstanding (2)
24:12;79:17
over (35)
16:15,17;18:25;21:19;
32:14,15;53:8;60:2;69:10;
70:22;71:19;74:14;82:24;
102:2;103:19;112:15,15;
113:23;123:6,19;129:13;
146:19;162:7;166:2;170:15;
192:12;198:8;199:16;
217:21;218:3;223:19;230:7;
234:7;236:6,13
overall (6)
172:2;178:14;197:1;
215:15;218:9;222:5
overcome (1)
137:2
overdiverting (1)
221:4
overlap (1)
79:5
overlapped (1)
238:9
overrule (3)
38:11;125:11;133:8
Overruled (5)
125:13;201:3;205:13;
231:18;248:14
oversee (1)
113:21
oversight (1)
127:21
overturn (1)
19:3
overview (1)
122:1
own (8)
26:14;27:14;46:15;98:6,
16;174:14,21;248:25
owned (2)
46:20;98:10
owner (2)
98:1,17
owners (1)
27:22
ownership (2)
27:16;98:25
owns (1)
27:19

P

page (73)
14:21;15:23;22:8;30:21;
31:12;38:20,24,24;39:11;
40:5,13;55:5,6;57:1;61:13;
63:4,12,12,13,14,18;64:2,5,
19,20;71:15,23;73:8,16;
74:22;75:25;76:1,2;77:18;
81:22;84:10,15;94:14;
100:23;104:10,13;117:10;
118:21;119:15,17;124:10,10,
13,15;139:11,13,15;140:10;
142:7;144:14;149:19,21,24;
159:15;188:4;189:5,9,11,13;
201:8;216:14,20,21,22;
227:7;230:8;232:19;234:24
pages (4)
115:25;156:19;211:18;
238:3
paper (2)
63:18;117:3
paperwork (2)
28:8,9
paragraph (4)
81:24;84:18;124:13;235:6
parameters (1)
28:19
parking (1)
52:17
parks (1)
52:6
part (36)
9:11;10:4;12:3,10;37:6;
38:5,16;42:12,18;63:23;
67:6;74:3;80:2;81:23;94:9;
101:14;127:11;138:16;
147:18;148:17;151:25;
158:1;165:21;168:17;
169:25;173:20;207:9;208:4;
214:22;216:2;235:15;
236:23;243:13;244:11,23;
254:20
partial (1)
165:22
partially (1)
168:10
participants (1)
8:16
participated (2)
113:1;198:7
particular (6)
12:1;61:22;175:6;178:8;
230:16;242:3
particularly (5)
136:23;165:17;178:5;
191:10;193:1
parties (5)
98:10;109:20;112:13;
114:13;209:12
partly (1)
246:3
partners (2)
46:15;98:6
part-owner (1)
98:1
parts (5)
27:10;65:19;94:11;
196:12;220:4
party (3)
67:5;204:3;208:8
passages (1)
11:7
past (6)
76:24;166:11;167:3;
223:24;227:10;228:3
pasted (1)
188:9
path (2)
96:24;97:14
patios (1)
36:8
patrons (2)
95:18;110:3
patterns (2)
32:12,14
PATTERSON (2)
255:17,24
pay (3)
49:24;229:10,11
PDF (1)
38:25
PE (1)
111:1
peak (4)
141:14;220:9;222:15;
223:1
peeled (1)
222:9
peer (1)
113:22
pen (1)
110:17
penalties (1)
183:24
pending (1)
110:5
people (4)
65:1;117:2;206:10;209:10
per (21)
24:19;32:11;39:23;40:1;
41:6;43:24;44:1,5;67:25;
71:19;79:9,10,21;92:13;
127:1;200:19;223:7,8;
224:25;236:19;237:16
per-acre (2)
79:14;237:21
per-acre-feet (1)
237:21
percent (39)
29:9,14;35:25;46:24;49:3;
53:25;54:1;78:4;82:16,18;
86:4,15,18;92:7,7;127:3;
138:5,10;162:23,24;163:3;
165:14,14,19,24;166:8,8,10,
12;204:9,12,13,17,20;205:2,
7;207:14;213:3;243:23
percentage (10)
28:24;29:7,19;43:3,16;
87:10;185:3;204:11,15,16
percentile (10)
164:22,23;165:11;166:7,
12,13;170:7,10;173:5;243:5
perfect (4)
66:15;160:12;181:4,5
performed (1)
213:11
period (12)
67:6;88:13;90:3;114:25;
127:11;129:23;130:9,10;
145:7;199:16;214:25;234:7
periods (2)
72:2;183:4
perishing (4)
77:13,21;104:16,21
permanent (1)
174:10
permanently (3)
210:24;211:5,12
per-share (1)
79:14
person (1)
70:8
personal (2)
14:18;252:17
personally (1)
80:7
perspective (2)
12:1;107:9
perspectives (1)

108:17
Pete (2)
117:16;118:7
petewood@idwr (1)
117:23
petition (1)
201:7
physically (1)
28:10
pick (6)
128:24;152:17;156:20;
157:9;165:10,13
picked (3)
34:18;166:21;171:16
picking (2)
243:12,12
pie (1)
43:9
piece (8)
64:23;142:25;164:13;
181:17;226:12,13;230:16;
236:25
pieces (1)
72:1
pink (2)
145:11,11
piping (1)
235:25
place (21)
27:3,24;28:3,5,11;66:15,
19;67:11;86:6;174:10;176:1;
206:9;209:12;211:22;
212:15,17,18,22;214:4;
216:9,25
places (8)
63:6,7;186:13,15;192:14,
14;194:18;212:2
Plain (4)
113:23;202:17,18;224:21
plan (24)
206:9,13,17;207:2,4,5;
208:4,6,9;209:12;210:8,12,
20;211:17,22;212:12,16,23;
213:7,9;215:16;244:2,22;
248:5
planned (3)
91:4,5,6
plans (24)
186:17,18;208:2,10,14,15,
16,17,18;212:3,4,5,6,10,11,
15;213:3,11;214:18,19;
215:24;240:1,9;247:7
plant (6)
44:16,18;77:10;104:22,23;
107:3
planted (2)
33:4;78:8
planting (3)
77:3,10;107:2
plants (7)
44:12;46:15,20;98:9,15,
24;99:2
play (1)
61:7
plays (1)
144:6
please (28)
8:5;12:18;13:4,19;14:11,
22;15:16;19:8;23:12;38:21;
57:6;71:15;73:13,16;75:20;
77:17;100:23;104:19;
110:24;112:1;142:9;144:9;
188:5;193:24;194:15;
232:10;247:21;252:17
plot (3)
150:16,16;157:23
plots (1)
150:11
plotted (6)
142:13;150:5,15,23;
155:20,20
plotting (5)
153:2,7,9;156:5,11
plowed (1)
132:19
plugged (1)
127:21
plus (2)
168:13;178:21
pm (1)
256:21
Pocatello (5)
111:2,23;114:2;206:11;
231:20
point (21)
18:8;27:23;29:7;37:12;
83:23;91:16;93:16,17;
106:14;110:15;124:2,15;
139:14;152:7;155:17;204:1;
211:14;226:5;235:22,23;
236:12
Pointe (1)
39:9
points (4)
150:20;166:8;194:20;
236:13
policy (3)
28:6,19,20
Pond (2)
20:22;90:21
ponds (2)
17:19;97:17
pool (2)
203:17;210:5
poor (1)
158:5
poorly (1)
251:14
population (1)
48:25
portion (4)
23:7;86:22;87:14;110:7
portions (1)
124:8
position (5)
14:5,6;112:7;202:2;209:25
positions (1)
14:1
positive (1)
131:9
possible (9)
10:25;21:13,14;22:23;
33:20;48:4;70:23;75:21;
94:16
post (2)
126:19;194:2
potato (2)
32:24;107:2
potatoes (5)
26:11;33:2,9;87:1;106:12
potential (3)
122:12;161:5;238:8
potentially (4)
123:15;149:12;158:7;
185:25
power (11)
44:12,16,18;45:13,16;
46:11,14,15;98:2,5;102:16
practice (3)
34:13,16;244:25
Practices (7)
84:16,21;105:19;107:8,19;
114:22;237:20
precipitation (1)
242:5
predecessor (1)
113:19
predict (2)
133:23;208:21
predicted (3)
75:4;76:20,23
predicting (4)
73:2;74:24;151:11,12
predictor (3)
134:7;154:13,16
prefer (1)
191:16
preferable (1)
176:25
preference (3)
149:7,8;172:25
prefiled (10)
22:13;23:21;24:1;71:11,
14;79:23;86:22;94:4,12;
96:16
preirrigating (1)
17:18
preliminary (2)
8:23;45:1
prepare (4)
15:4;121:19;149:2;164:11
prepared (10)
23:21;36:22;67:20;68:11;
102:21;118:17;119:13;
150:1;193:5,15
present (10)
28:11,12,13,24;30:17;
112:5,7,21;151:14;174:13
presentation (1)
12:11
presentations (1)
188:10
presented (6)
8:24;71:23;118:11;120:2;
174:21;175:8
presents (1)
187:8
president (1)
112:8
pressure (2)
21:13;188:22
presumes (1)
134:6
pretrial (1)
15:23
pretty (15)
16:3;18:10;61:22;64:24;
114:14;126:14;128:4;
130:11;141:22;153:11,12,
24;159:16;178:18;235:23
prevent (1)
162:15
prevents (2)
186:25;212:25
previous (6)
126:5;141:23;144:14;
166:3;219:5,7
previously (13)
12:2;37:25;38:9;40:6;
46:9;121:9;141:5;142:4;
145:20;146:16,18;182:14;
206:1
Price (1)
64:21
prices (3)
11:24;108:3,5
primarily (2)
89:17;115:20
primary (1)
87:2
principle (1)
202:15
print (2)
117:13,18
printed (1)
116:10
prior (26)
10:6;20:9;25:2,3;37:2;
82:3;112:22;113:1,17;
118:17;119:3,6,13;137:14;
171:8,9;187:17,20,24;
190:24;202:19;230:14;
233:7;249:12;251:1,3
priority (7)
104:3;122:16;182:13;
184:17;189:22;202:23;
240:20
privately (1)
46:20
probably (16)
11:4;46:17;61:23;80:17;
88:6;100:8;157:21;158:8;

159:20;173:10;179:1;221:4;
234:18;236:6,20;242:19
problem (7)
118:9;127:4;149:9;
176:21;181:7;209:24;249:18
problems (2)
253:8,9
procedure (3)
135:22;155:15;182:12
proceeding (12)
38:1,6;47:9;55:11;57:5,18;
91:22,25;198:23;209:13;
216:10;220:2
proceedings (1)
201:23
process (6)
23:22;119:21;131:6,11;
132:18;196:19
produce (9)
35:8;46:23;184:6,15,25;
189:1,13,14;190:16
produced (6)
30:22,22;46:9;115:2;
188:8;190:1
producers (2)
46:13;108:13
producing (1)
11:18
product (2)
58:4;142:23
production (6)
82:20;83:6,8,11,13;84:1
professional (8)
112:7,9,11;121:17;134:24;
157:10;158:14;196:6
profit (1)
47:7
program (6)
18:24;27:18;61:20;83:15,
16,21
programs (6)
49:23;50:4,7,9,22;240:8
progression (1)
173:5
project (94)
18:13;19:15;25:14;26:9,
15;27:20;29:17;30:1;32:25;
33:2;42:17;52:7;54:5;59:22;
76:9,11,16;77:14;78:8;88:4;
90:25;91:10;105:4;107:15;
122:9;123:17;131:19,24,25;
132:3,25;133:14,18,19;
134:21;138:9;139:9,24,25;
140:5,8,12,14,19;141:20;
142:12,16,20,24;144:10,20,
20;145:5,5,19;147:1,18;
148:13;149:4;153:16;
154:12;155:9;156:1,6,11,21;
158:19;161:11,19;169:2,5,
10,24;170:10,11;172:3,22;
173:23,24;176:16,23;
219:18;220:20;221:1,20;
223:1;224:17;227:9;235:16,
19;238:8;243:3;244:14;
253:19
projects (18)
17:20;18:15,16;20:6,9,12,
12,25;46:18;75:17;91:3,4;
102:12;201:11;219:21;
227:12;238:12;239:7
promises (1)
256:12
proof (8)
8:24;9:1,9,14,21,22;10:2;
11:3
proper (2)
11:4;205:20
properly (1)
227:13
prophecy (1)
133:21
proposal (3)
126:2;164:12;173:4
propose (10)
149:3;160:20,21;161:7,16;
162:8,12,25;164:20;234:20
proposed (3)
161:4;169:18;243:3
proposing (4)
133:1;148:12;164:18,21
prospect (1)
35:15
protect (3)
66:25;229:3;234:14
protects (1)
215:20
prove (1)
39:18
proven (1)
186:19
provide (15)
21:1,15;53:21;85:25;
113:22;174:8;177:19;
183:12;204:2;206:4;211:1,2,
3,4;229:16
provided (10)
53:7;126:22;127:5,7;
130:16;140:6;174:6,16;
238:4;250:6
provides (3)
175:16;186:1;187:6
providing (2)
21:4;183:13
provision (1)
122:14
provisional (1)
127:13
provisions (1)
11:15
prudently (2)
21:5,17
pull (3)
40:22;71:11;73:12
pulling (2)
38:17;143:15
pump (4)
137:21;186:24;210:11;
250:9
pumped (1)
190:24
pumper (1)
202:4
pumpers (1)
201:24
pumping (10)
180:25;181:13;184:5;
186:13;187:20,24;188:25;
190:24;209:15;216:7
purple (4)
151:18,18;162:22;163:4
purports (1)
9:5
purpose (5)
9:16;48:3,5;56:16;203:17
purposes (17)
9:13;10:3;53:9;102:14;
135:19;140:22,22;150:22;
165:8;171:15;192:23;
193:20;194:24;200:13;
217:4;254:10,14
pursued (1)
250:3
push (3)
17:13;179:1;222:14
put (22)
14:14;15:17;19:19;20:11,
16,17;21:12;28:14;30:15;
34:19;106:25;111:23;128:7;
140:21;141:2;155:13;176:7;
191:16;225:10;237:1;239:9;
251:19
putting (3)
18:6;47:11;100:1

Q

qualification (2)
22:24;23:1
qualified (2)
107:19;235:10
qualifier (1)
202:21
qualify (1)
129:6
quality (3)
17:20;18:15;20:17
quantified (3)
73:19,23;74:8
quantities (1)
66:20
quarter (1)
179:5
query (1)
241:3
quick (7)
34:2;99:10,14,16;109:18;
246:21;254:1
quite (11)
33:24;77:5;114:22;
141:15;142:3;155:1;182:22;
183:8;198:20;230:7;236:24
quote (3)
22:12;94:6;235:3
quoted (3)
22:11,24;110:9

R

rained (1)
242:6
rains (1)
242:9
raise (2)
13:4;110:24
range (6)
83:20;145:12,15;146:11;
178:20;243:13
Rangen (1)
113:8
ranging (2)
162:21,23
rate (14)
30:12;40:25;41:17;89:2,
20,21;144:3;200:18;225:5;
235:4,12;236:18;237:16;
244:25
rates (1)
79:8
rather (9)
15:19;155:25;164:20;
170:5;171:3;173:6;177:12;
245:1;246:15
reach (16)
185:2,4,4,7,16;190:2,11,
21;192:18,24;204:14;
208:21;209:17;210:22;
211:6,13
reached (1)
187:21
reaches (3)
185:18,19;186:1
reaching (1)
192:19
react (1)
191:18
reaction (1)
196:6
read (25)
24:1;55:8,22;56:13,20;
57:1,6;64:11;65:2,15;66:3,6,
15;67:2,3,17;74:16;84:12,
23;104:16,19;139:20;199:3;
231:8;235:14
read] (1)
66:8
readily (1)
219:4
reading (4)
55:14,17;56:1;217:19
reads (1)
81:24
ready (2)

89:13,14
real (10)
34:5;62:5;99:14;137:9;
138:1;202:8;204:1;207:1;
219:3;254:1
reality (1)
219:19
realize (3)
46:12;47:16;73:24
realized (1)
204:10
realizes (1)
47:18
realizing (1)
45:24
really (24)
9:17;17:3;18:22;19:1,1;
20:2;23:25;34:2;86:10;
92:16;107:6;124:18;131:14;
133:24;168:9;174:7;192:7;
195:21;202:8;211:15;
215:19;229:9,10;251:18
realm (2)
124:7,24
reason (20)
32:1;74:10;86:13;136:20;
138:16;144:7;147:11;158:2;
159:5,21;165:18;171:10;
183:2;184:14;217:25;221:3;
239:11,23;244:6,23
reasonable (35)
35:12,16;58:8;71:9;73:2,6;
134:1;138:8;141:4;144:10;
145:18,19;146:9,15;147:1,
17;148:14;149:9,12;158:11;
161:2;168:24;170:16;
172:11;181:2,6;225:5,21;
226:25;237:17;243:11;
251:1,4,21,23
reasonableness (7)
123:7,20;149:10;163:22;
172:25;225:16;226:10
reasonably (5)
158:22;160:17;177:6;
212:19;237:10
reasoning (1)
182:22
reasons (6)
147:13;178:12;182:17,18;
183:19;203:20
rebuild (1)
51:3
rebuttal (1)
191:16
recalculate (1)
176:15
recall (35)
25:4;28:25;35:21;39:15;
42:25;43:5;44:19;45:7;
49:25;51:5,6;52:25;53:11;
54:16,20;57:19;59:7;62:17;
129:10;147:23;174:23;
184:20;192:2;199:12,21;
200:23;201:17;231:14;
233:16;236:2;247:6;251:7,
10;253:20;254:17
recapture (1)
101:9
receive (11)
46:18,24;47:10;48:8;
49:15;94:23;98:16;101:23;
121:2;205:7;207:13
received (17)
10:2;23:3;48:11,12,22,23;
49:17,18;69:3,5,16,17;
119:24;125:17,19;194:11,12
receiving (2)
41:24;52:18
recent (10)
44:16,18;84:20;86:14;
88:3;102:7;216:23;227:23;
233:3;239:13
recess (2)
117:24;179:8
recharge (16)
16:6,6;59:12,17,22,25;
60:23;61:6,7,9,11,20,23;
64:10;103:10;244:10
recharging (2)
59:14;62:14
recognize (3)
30:6;53:14;81:14
recognizing (1)
22:21
recollection (2)
126:18;238:22
recommendation (5)
120:4,9,14,23;216:16
recommendations (2)
81:11;176:23
recommended (1)
236:18
recommending (3)
147:16;215:16;216:17
recompute (2)
127:22;175:25
recomputed (2)
126:8;128:17
reconsider (2)
10:24;12:7
reconsideration (1)
11:6
record (40)
9:3,11;10:14,17;12:9,10;
13:20;14:13;15:16;21:22;
22:23;37:3,6,18;38:5,8,13,
16;47:12;60:17;74:3;83:1,2;
110:13,21;111:8;112:1;
116:11,13,14,16;118:5,10;
120:7;149:22;179:7;193:21;
248:24;256:16,18
recording (3)
8:3;69:25;179:8
records (4)
47:23;59:20;114:17;123:6
record's (1)
248:20
Recross (3)
105:10;255:1,2
RECROSS-EXAMINATION (1)
105:14
red (4)
145:9,10,23;146:1
redact (1)
110:6
redacting (1)
23:6
redeliver (1)
94:24
redirect (7)
22:17;46:9;99:8;100:16,
19;246:1;253:15
redirected (1)
102:6
redline (1)
117:5
redo (1)
132:12
red-shaded (1)
146:10
reduce (7)
27:11;70:18,20;71:1;
88:20;176:15;218:8
reduced (7)
31:21;102:9;104:22;
233:17,19;234:1,1
reduces (1)
41:11
refer (1)
155:11
reference (6)
86:21,22;124:16;140:21;
169:21;252:23
referenced (2)
11:15;204:8
references (2)
125:12;252:20
referred (3)
35:4;52:22;120:10
referring (5)
84:19;94:12;199:15;
245:8;249:11
refers (1)
204:12
reflect (4)
27:23;83:7;234:14;248:25
reflected (3)
121:16;163:21;167:17
reflection (2)
160:15,16
reflective (1)
232:2
reflects (5)
83:19;145:15;157:23;
160:25;168:2
refresh (2)
56:17;245:13
regarding (5)
9:6;10:25;12:12;53:9;
173:4
regardless (1)
158:24
regards (1)
102:1
registrations (1)
112:10
regression (12)
161:19,20,21;162:6,9;
163:1,2,11,13;164:18;
169:22;243:4
regular (1)
19:2
regulate (1)
93:16
regulations (1)
66:22
rehab (1)
19:11
rehabilitate (2)
10:21;51:10
reimbursement (1)
46:5
rejected (7)
200:8,15;201:13,20;227:5;
231:22;248:14
related (12)
23:10;32:16;58:16;
118:23;142:17;145:10;
176:22;179:12;189:13;
193:18;238:7;248:8
relating (3)
13:8;81:24;111:3
relation (3)
126:14;134:15;181:14
relationship (9)
151:12;155:5;157:5,14,20;
159:17;160:12;161:11,13
relative (2)
50:15;82:15
relatively (7)
80:11;141:13;151:19;
164:1;184:6;210:20;213:23
release (1)
109:19
relevance (3)
47:5;91:22;99:21
reliable (4)
132:19;177:3;178:22;
208:17
reliably (1)
186:22
reliance (1)
177:10
relook (1)
122:21
reluctant (1)
22:19
rely (1)
101:20
relying (2)
177:11;207:21
remember (19)

54:21;80:2;94:9,10;
103:12;117:8;133:12;
139:19;174:20;199:3;200:1,
25;219:16;235:16;238:11;
248:11,13;251:5;254:5
remind (3)
23:12;159:23;173:11
reminding (1)
56:24
remote (4)
174:19;175:3,4;219:2
remotely (2)
8:17;120:2
removed (2)
82:12;83:5
rendered (3)
198:14;200:4,10
renegotiated (1)
208:11
rentals (1)
167:23
repairs (1)
18:2
repeat (2)
239:17;245:16
repeatable (1)
178:23
repetitious (1)
37:4
replace (6)
19:1,2,11;210:5;247:19;
248:4
replacement (7)
186:16,18;212:23;213:9;
215:24;247:7;248:5
replacing (1)
116:16
replete (1)
252:20
report (41)
9:5;111:23;114:24;115:2,
12,21;118:12;119:15;122:7;
124:9,23;125:6,8;135:13;
139:14;141:7;145:8;149:2;
181:22;188:5;189:6,12;
198:15;204:9;211:18;215:8;
216:14;217:2,11,19;225:10,
13;227:7;230:8;233:13;
234:25;235:17;238:2;246:5;
252:20;254:6
reported (2)
96:17;167:14
reporter (14)
8:4,6,10;10:7,10,13,19;
19:7;56:11;194:3;239:16;
245:16;247:20,23
reporting (3)
213:21;214:17,20
reports (6)
85:4;118:17,22;119:3,6,13
represent (11)
36:20;41:3;44:2;53:24;
66:11;71:8;74:6;84:20;
111:22;236:6;238:4
representative (1)
126:7
represented (7)
66:9;84:22;86:18;141:21;
190:4;238:21;251:2
representing (3)
72:2;113:25;201:24
represents (12)
15:18;31:1;128:6,7;
140:18;145:11;167:4;
189:19;190:4,18;194:24;
195:4
request (2)
9:20;181:14
requested (1)
181:15
requesting (1)
231:21
require (11)
25:17;37:14;39:13,23;
184:15;186:14;207:20;
214:19;232:5,11;234:9
required (12)
53:24;70:23;85:11;202:3,
7,7;210:1;211:22;214:6;
215:8;250:11,21
requirement (7)
52:22;159:25;167:15;
200:11;214:3;237:1;244:2
requirements (2)
206:22;214:13
requires (3)
37:16;148:18;231:2
requiring (1)
226:19
re-regulating (3)
16:7;20:23;59:11
reservoir (3)
16:7;20:23;59:11
residential (1)
80:1
resort (2)
249:25;250:7
Resource (6)
61:8,20;186:3;187:2;
206:2;207:10
resources (4)
112:20,24;138:20;148:3
resources' (1)
11:16
respect (1)
249:8
respective (2)
11:24;12:12
respond (1)
37:8
response (6)
120:14,22,23,25;208:21;
248:17
responses (1)
191:14
responsible (5)
191:7,8;203:5,18;209:23
rest (6)
22:13;31:20;84:23;
104:19;154:6;244:14
restate (1)
73:3
restrictions (1)
9:7
result (12)
11:11;12:6;46:7;48:8;
85:9;94:6;95:15;133:8;
135:2;163:18;206:19;207:18
resulted (1)
129:18
resulting (3)
11:1;190:2;205:8
results (8)
137:6,11;166:24;167:7;
170:14;182:13;189:19;
220:22
retained (1)
82:16
retains (1)
67:7
return (24)
42:2,5,8,18,23;43:10;44:7;
70:9,11;94:5;95:7;191:25;
192:6,9,11,14;193:19;
194:18;195:19;196:16;
241:12,16,19;242:11
returned (1)
115:11
returning (4)
43:3,7,23;44:4
returns (4)
46:11,21;242:17;253:10
reuse (5)
101:6,10;196:15,19,24
reused (3)
196:3,11,18
revenue (8)
45:13,16,23;46:6,11;
47:15;98:21,22
reverses (1)
12:11
review (19)
9:19;22:1;74:4;81:5,6;
113:22;115:12;121:18;
124:7,17;125:23;126:13;
132:10;201:8;213:24,25;
220:17,18;231:6
reviewed (3)
114:12;120:5;121:9
reviewing (5)
9:23;12:10;113:11;
114:16;122:3
reviews (1)
28:18
revised (2)
123:21;175:18
rider (1)
14:3
riders (2)
16:19;27:25
right (119)
8:12,21;9:7;12:23;13:4;
17:8,22;23:8,10;30:4;34:20;
35:21;40:18;55:23;56:5;
59:20,21;60:1,22;61:6,7,9;
62:3;64:10,22,23;65:8,18;
66:2,14;71:7,20;72:18;
75:18;78:9;80:21,23;81:10,
11,25;87:19;89:23,24,24;
93:2;96:1;97:2;98:7;103:7,
10,15,17,22,23;104:2,3,7;
109:14;110:16,24;111:14;
115:9,13;117:5,15;118:4;
120:25;129:25;134:19;
138:22;139:15;147:21;
150:9;151:18;153:4;164:16,
25;173:2;176:11;177:17;
179:11;185:12;188:8,23;
189:11,22;191:9;194:13;
197:9;198:11;200:1,21;
202:15;206:15;207:22;
208:4;209:14;213:5;216:15;
219:8,10;220:5;221:1;227:5;
228:17;234:8,16;236:9;
237:14;238:16;239:1;
240:21;246:22;249:7,19;
254:7,10,13;255:16
rights (26)
35:13;58:9;64:21;80:21;
81:15,16,19;82:1;103:15;
112:20,24;135:20;180:24,
25;202:16,18;210:23;
213:14;238:24;239:14,18;
240:1,5,6,18;249:3
Rio (1)
224:17
RISD (1)
168:23
risk (2)
21:9;208:18
River (31)
42:24;61:3;70:11,12;81:8,
15,17;82:2;97:15;102:14;
103:24;185:19,23;187:21,
25;189:14;190:25;192:12,
14,15,19,21;194:21,22;
195:20;197:7;202:16;223:9;
224:21,23;236:13
road (1)
107:13
roads (2)
36:8;39:5
Rock (2)
42:14;97:16
role (1)
202:5
rolled (1)
214:24
rolling (1)
171:6
rooftop (1)
52:17

rooftops (2)
36:8;40:7
room (4)
8:21;142:4;208:5,8
rotate (9)
25:17;26:3,5,16,17,23;
27:3,14;88:24
rotated (3)
25:20;88:7;108:9
rotates (1)
26:11
rotating (8)
25:25;26:14,19;27:9;
67:18,19;68:1;89:4
rotation (4)
66:24;67:5,16;107:18
rotations (2)
88:23;107:7
roughly (10)
72:14;122:23;129:15;
146:14;158:23;162:23;
178:15;184:22;223:20;
224:10
round (1)
137:5
routine (3)
213:10,16,17
routinely (2)
124:24;186:12
rows (1)
171:2
royalties (2)
46:19;98:16
royalty (1)
46:25
R-squared (18)
157:1,5;158:5,13,17;
159:18;161:18;162:8,11;
164:15,17;165:4,7,9;169:22;
170:1,6,9
rubuttal (1)
256:6
rule (3)
9:8;125:10,10
rules (5)
66:22;212:9;237:8;
247:16;251:19
ruling (3)
10:4,24;12:11
rulings (2)
248:8;251:1
run (8)
16:10;184:21;187:4;
189:24;190:4;208:23;
242:14;244:10
running (1)
225:24
runoff (6)
42:9;196:11;241:25,25;
242:5,12
runs (5)
109:3;177:23;189:20;
207:6;225:25

S

safety (1)
186:25
same (50)
16:3;31:12;34:3;39:11,13;
41:16,24;57:24,25;58:19;
72:2;75:4;92:17;93:3,10,12;
95:24,25;96:2;97:8;125:5;
135:11;140:24;142:11;
143:10;144:18;150:21;
151:22;152:8,21;155:15;
158:24,24;160:6,9,10;
167:16;170:5,25;172:14,16;
175:18,21;176:1,4,17;
178:20;197:5;201:14;251:18
Sarah (2)
111:13,22
sauce (2)
124:21,22
saving (1)
245:7
savings (1)
95:12
saw (2)
71:4;228:12
saying (17)
22:11;33:14;40:24;41:14,
16,19;93:11;95:17,20;96:3;
106:23;180:12,20;209:19;
215:3;226:3,18
scale (1)
87:4
scan (1)
8:21
scanned (1)
252:18
scatter (6)
150:16;152:7,15;154:10;
157:23;158:2
schedule (2)
255:14,22
scheduled (1)
255:15
Schroeder (1)
38:5
scope (4)
47:8;91:21,24;132:14
scrutinizes (1)
174:5
scrutiny (2)
174:8;177:5
sea (1)
182:12
season (28)
17:5,6,7,25;18:12,14,19;
21:14;26:13;31:7,21;32:9;
43:24;44:1,5;62:15,22;
66:18;68:6;141:14;166:3;
211:22;212:16,18;214:4;
229:8,16;242:2
seasonal (6)
136:17,19;137:3,5;144:20;
254:8
seasonally (1)
243:19
seasons (4)
17:4;199:5;233:23;234:2
seat (1)
13:12
second (16)
10:8;63:12,14;64:20;66:2,
8;67:6;73:22;74:1,7,14;75:2;
81:22;147:23;162:3;183:2
second-to-last (1)
235:6
section (1)
83:20
section-township-range (1)
83:17
sediment (2)
17:17,19
seeing (4)
142:8;156:2;157:23;198:5
seeking (1)
64:10
seem (4)
134:9;157:14;182:25;
186:3
seemed (1)
232:4
seeming (1)
62:6
seems (6)
40:23;109:14;131:9;
155:3;181:23;185:25
seep (1)
102:10
seepage (2)
61:16;143:4
seeps (4)
21:14;101:23;102:3;
242:17
selected (3)
125:24;126:15;129:8
selecting (1)
128:22
self-fulfilling (1)
133:21
sells (1)
27:20
send (1)
117:16
senior (9)
11:21;198:18;205:6;
206:3;207:13;215:20;
234:15;250:4,12
seniors (12)
183:13;184:6;187:1;
205:24;208:19;213:6,13;
229:3;243:5;249:16;250:16,
20
sense (6)
143:1;158:21;175:3;
176:9;219:2;239:13
sensing (2)
174:19;175:4
sensitive (3)
137:10;155:4;172:3
sent (2)
53:8;69:9
sentence (3)
67:2,17;94:16
sentences (1)
112:18
separate (4)
132:14;156:8,18;189:24
September (7)
141:16;153:6;162:20,21;
163:5;190:5;232:24
series (4)
119:16,25;150:1;155:24
serve (1)
66:25
service (12)
21:1,4,16;36:19;37:25;
86:24;87:11,22;109:7;
194:19;195:2;241:17
set (12)
65:6;132:25;143:22;
150:4;152:21;156:4,16;
168:22;170:15;174:25;
175:15;227:20
sets (1)
150:3
seven (4)
46:18;98:9;146:14;156:10
several (8)
17:8;19:12;20:11,17;
140:10;174:2;198:7,14
shaded (1)
145:16
shaking (1)
197:22
shall (3)
67:5,7;117:24
shape (1)
141:11
shapefile (5)
84:4;175:16;177:10,12;
217:15
shapefiles (3)
86:14;174:11;177:5
share (9)
24:19;27:15;32:11;39:23;
40:1;79:9,10,21;200:19
shareholders (6)
16:2,17;21:2;77:3,25;
92:10
shares (10)
24:10,12;27:19,21;28:4;
79:17;82:17,20;83:23,24
sheriff (1)
216:6
shift (2)
182:9,16
shifted (1)
31:16

Shoestring (3)
16:5,13;20:14
short (10)
104:24;107:3,14;138:1;
148:17;199:9;213:14;
230:25;235:24;249:16
shortage (18)
11:22;95:14;148:18;
170:17,25;171:15,18,25;
172:9;183:16;184:16;191:5;
203:6,7,20;206:22;209:21;
226:22
shortages (10)
171:10,11;172:12,19;
198:21;199:17;200:3;202:8;
207:1;210:3
shortened (2)
233:23;234:2
shortfall (9)
74:24;75:3;76:21;170:16;
203:2,10;204:9;205:8;229:7
shortfalls (1)
76:23
shorting (1)
106:22
shot (1)
252:17
shoulder (2)
137:9;223:5
shoulders (1)
208:19
shove (1)
18:8
show (14)
40:3,8;48:6;102:24;
118:16;156:17;185:10,16;
204:13,21,25;205:2;211:13;
252:1
showed (2)
48:17;228:13
showing (9)
43:20;140:5;144:12;
150:13;172:13;174:16;
177:13;193:17;218:6
shown (14)
35:24;76:12;145:8,17;
146:15;150:17;161:21;
164:24;166:11;170:15;
189:12;243:9,13;253:24
shows (18)
8:17;18:1;31:8;49:2;
83:22;140:4;144:19;145:24;
151:15;153:17;172:17;
189:16,20;194:14;199:8;
211:16;220:18;223:25
shutoff (1)
213:13
side (7)
75:22,22;146:19;154:21;
159:14;217:24,25
sides (1)
251:18
sidewalks (3)
36:8;40:7;52:17
sign (1)
28:16
signature (1)
61:15
signed (1)
61:13
significant (8)
43:3,7,16;61:25;82:12,14;
87:14;157:11
significantly (5)
32:21;33:1;43:10;70:15;
175:7
Sigstedt (2)
255:15;256:4
silt (1)
18:20
similar (9)
26:15;124:23;151:22;
154:7;156:15;178:18;214:9;
216:24;235:20
similarities (1)
235:21
similarly (1)
77:12
simple (5)
31:12;41:7;126:14;147:9;
160:5
simplifies (1)
110:16
simply (5)
94:7,16;223:22;227:14;
243:19
simulates (1)
189:23
single (1)
232:8
sinks (2)
108:24;109:4
sites (1)
90:19
situation (13)
26:15;101:4;134:10;
137:24;138:3;154:7;165:20;
187:19;191:10;215:5,6;
225:7;226:9
situations (4)
135:17,18;136:16;161:17
six (1)
126:9
size (1)
142:18
slated (1)
12:23
slide (1)
110:9
slope (1)
154:4
slow (2)
19:7;247:21
small (17)
64:24;87:4,8;100:21;
124:9;127:3;128:4,6;137:10;
161:13,16;171:23;172:7;
173:2;185:3;199:17;210:20
smaller (6)
16:15;46:20;114:4;143:8;
204:11,17
Snake (18)
42:24;61:3;70:11;81:8,15,
17;82:2;97:15;102:14;
113:15,23;185:19;187:21,
25;202:16;223:9;224:21;
236:13
sod (2)
97:1,6
soil (12)
51:4;66:21;88:2;108:9;
136:23;157:24;166:2;244:3;
245:15,19;254:16,19
soils (1)
224:9
solid (1)
140:17
solution (2)
186:11;210:13
somebody (5)
94:25;95:10;108:22;
109:2;117:13
someone (1)
206:8
sometime (5)
184:11;188:25;190:14;
209:7;229:12
sometimes (2)
154:8;214:11
somewhat (3)
20:23;50:8;82:14
Somewhere (6)
20:21;22:9;59:17;74:18;
79:19,20
soon (1)
22:22
Sophia (1)
255:15
Sophia's (1)
120:15
sorry (27)
8:8;12:19;15:2;36:13;
56:15;87:5;99:10,12;116:3;
120:18;131:24;157:16,17;
159:11;164:16;168:5;
169:21;184:9,9;185:14;
186:7;189:3;194:3;216:20;
232:9;235:1;242:24
sort (18)
113:21;119:18;123:7;
125:4;146:7;149:16;151:25;
160:24;165:15;179:24;
185:23;191:1;200:5;213:14;
214:7,24;241:14;243:16
sorts (1)
215:22
sound (3)
60:1;129:25;220:5
sounds (3)
138:22;236:9;255:9
source (8)
15:6,8;61:2;62:2,7;122:13;
193:6;239:22
sourced (1)
49:9
sources (2)
192:25;241:18
South (2)
46:14;98:6
southern (1)
238:13
space (2)
41:23;52:15
Spackman (1)
11:8
Spain (1)
115:10
speaking (1)
70:13
speaks (1)
231:12
specific (7)
20:19;37:15;54:21;
180:15;215:6;238:9;244:19
specifically (6)
54:17,21;79:25;142:12;
195:10;199:13
specifics (1)
238:11
spectrum (2)
251:11,16
speed (2)
23:22;247:22
spell (1)
13:19
spelling (1)
112:1
spend (2)
17:15;132:20
spending (1)
19:18
spent (1)
114:18
SPF (1)
36:22
spill (3)
70:12,23;71:5
spilled (1)
225:24
spilling (1)
43:10
spills (4)
42:20;70:14,18,22
spoke (1)
42:22
spot (1)
195:22
spotty (1)
115:15
spread (1)
157:19
spreadsheet (2)

127:5,10
spring (11)
33:23;89:12;141:13;221:7, 17,22,24;222:19,21;223:2; 244:8
Springs (3)
11:7,7;47:19
sprinkler (22)
19:14,19,20;29:8,14; 32:23,24;92:4,7;93:5;95:1, 11,16,19;96:5;108:20;109:2, 6;123:1;130:25;146:6; 226:15
sprinklers (11)
28:24;29:17;32:22;92:7, 11,14;95:21;97:18;147:10; 196:1,4
Spronk (2)
112:8;120:21
square (2)
54:7;86:19
squint (1)
190:7
SRBA (2)
82:9;113:9
stacked (1)
104:1
staff (6)
19:24;120:4,9,14,23;121:1
stake (1)
136:7
stamp (2)
38:21,23
stand (4)
58:12;110:23;119:2,5
standard (21)
123:24;124:18;135:15; 136:19;149:11;155:10; 180:3;201:10,16;213:20; 225:5,6,9,11,14,18;231:10; 232:2;237:21,22;248:15
standards (4)
124:17;134:1;226:1,14
standpoint (1)
90:8
start (15)
13:23;16:21;17:18;41:21; 44:22;111:25;115:8;125:21; 139:5;141:13;149:18,19; 166:19;217:1;255:21
started (5)
13:25;14:3;31:13;68:4; 194:14
starting (9)
17:21;62:22;65:19;66:3,6; 149:24,25;152:25;155:22
starts (2)
211:23;214:4
state (42)
13:19;22:11;27:10;29:13; 35:5;52:23;64:15;67:8; 71:17;72:18;101:17;122:15; 182:7,10,16,19,24;183:8,11; 186:6,8,10;187:10,22,23; 188:2;189:1,15,19;190:13, 16;191:2,9;202:13,22;203:1, 9;204:1,22;207:15,18; 208:20
stated (18)
25:10,16;36:3;39:13;42:3; 43:2,7;50:2;53:2;57:19; 63:22;67:17;75:8,12;77:2, 12,24;78:3
statement (9)
22:17;58:23;94:4;101:15, 21;227:8;228:4;234:24; 235:2
statements (6)
47:7;102:21,23;116:24; 124:23,25
states (3)
72:21;103:25;237:6
stating (2)
111:25;230:15
statistics (1)
220:6
stay (3)
47:16,18;246:18
stayed (1)
71:18
stays (3)
97:8;160:9,10
stead (1)
187:22
steady (32)
35:5;122:15;182:7,10,16, 19,24;183:7,11;186:6,8,10; 187:10,22;188:2;189:1,15, 19;190:12,16;191:2,9; 202:13,22;203:1,9;204:1,22; 207:15,18;208:20;244:17
steep (1)
151:8
steeper (1)
151:7
Step (4)
37:16;52:23;69:11;173:2
stepping (1)
164:24
steps (1)
173:2
stick (1)
211:7
sticker (1)
194:6
still (28)
29:7;52:15;93:2,3;96:6; 102:8;108:21;110:11;119:2, 5;127:16,19;128:10,20; 129:6;137:4;149:7;154:10; 171:20;221:7,14;222:3,7,14; 229:9,12;230:25;240:11
stipulated (1)
112:13
stipulation (2)
81:9,23
stock (1)
79:11
stockholder (1)
93:12
stockholders (3)
88:23;89:12;102:16
stop (3)
66:15;167:1;219:9
stopped (1)
10:10
storage (5)
97:17;103:25;168:13; 205:24;229:12
store (1)
97:17
stored (1)
166:2
stores (1)
52:6
storing (1)
244:3
straight (2)
98:8;230:23
strains (1)
206:23
straying (2)
155:18,19
stream (1)
195:16
streams (1)
241:22
streets (2)
39:4;40:7
stress (1)
183:4
stretches (1)
224:9
stricken (4)
22:8,13;124:9;125:5
strike (2)
107:18,22
strip (1)
52:6
strive (1)
96:8
strong (2)
156:21;159:16
struck (1)
182:21
structures (6)
18:25;19:4,5,6,10;20:18
struggled (1)
45:25
struggles (1)
46:3
struggling (2)
10:12;108:21
stubble (2)
88:2,3
stuck (1)
176:3
studied (2)
233:21;236:23
studies (3)
39:18;40:3,7
study (2)
40:11;91:13
stuff (5)
97:1;115:16;211:15; 219:11;227:4
stump (1)
201:1
subdivision (6)
39:4,9;40:8;41:11,22; 96:14
subdivisions (13)
35:19;36:7;37:14,18,20; 39:13,17;40:4;41:14;96:12, 13,17;97:3
subject (4)
122:7;132:10;133:6; 240:22
subjects (1)
120:3
submit (3)
181:13,20;214:22
submitted (11)
38:1,3;114:13;120:5,13, 22;121:11;126:3;181:24; 213:11,22
subsequent (2)
9:24;244:4
substantial (1)
11:11
substantially (2)
202:17,20
substantive (2)
116:25;212:10
substitute (1)
212:6
subsurface (1)
102:5
succinct (5)
254:25;256:8,9,10,15
sudden (2)
137:11;183:6
suffer (5)
11:18;93:9;199:4,10,11
suffice (1)
171:9
sufficient (5)
66:10;89:19;107:25; 212:24;229:20
sugar (6)
26:11;87:1;88:7;105:24; 106:12,19
suggest (8)
68:10;83:14;131:2;154:5; 155:5;176:8;177:20;211:18
suggested (4)
25:24;43:9;130:16;180:17
suggesting (4)
148:11;180:13,23;234:5
suggestion (1)
179:3
suggestions (2)

28:15;132:17
suggests (6)
151:24;157:20;159:4,19;
176:11;178:21
Sukow (2)
188:8;193:11
Sukow's (1)
204:7
Sullivan (23)
110:23;111:1,14,20;112:2;
115:7;116:18;118:11;124:6;
125:21;132:20;133:11;
139:3;179:11;193:3;194:13;
197:21;198:3;230:3;232:19;
235:1;247:3;255:7
S-u-l-l-i-v-a-n (1)
112:3
Sullivan's (1)
246:5
sum (1)
167:11
summaries (1)
194:16
summarized (2)
114:24;199:7
summarizing (1)
193:18
summary (5)
121:22;166:23;167:5;
172:11,20
supervisor (2)
14:5;19:17
Supplemental (23)
63:15,16,21;122:12;
179:13,16,18,20,22;180:1,7;
181:3,7,10,13,17;182:3;
238:2,21,24;239:6;240:5,21
supplied (2)
229:7;236:3
supplies (4)
88:24;137:20;178:9;234:1
supply (26)
9:7;25:21;26:21;33:23;
77:4,11,14;89:17;90:23;
94:8;102:7;107:3;137:22;
168:1,4,5,14;170:18,19;
172:6;179:21;206:23;212:6,
17;233:14;244:17
support (2)
62:1;91:19
suppose (6)
27:12;46:8;50:13,15;
62:25;239:22
Supreme (1)
11:9
Sure (26)
10:9,15;17:3,22;18:21;
19:9,20;37:9;72:8;80:4;
82:25;99:13;111:6;115:25;
128:10;129:1;168:15;
205:17,19;206:24;213:25;
231:8;243:21;246:8;254:2,3
Surface (71)
9:9;13:7;14:8;23:20;
47:17;55:9,20;57:3,15,22;
58:17;70:12;84:3;113:5;
114:6,7,15;118:23,25;
122:10,13,22;123:18;128:8;
129:21;130:2,17;134:11;
135:12;136:2;137:16;
140:11;141:5;143:22;145:6,
13,21,25;147:1,19;148:11;
150:5,17;156:9,18;166:22;
167:13;171:21;174:17;
176:10;177:4;181:11,12,16;
182:3;192:19;199:4;202:19;
206:5;222:25;224:22;
226:24;236:4,11;238:5,9,16;
241:25;245:10;252:4;254:11
surface-to-surface (1)
237:13
surprise (2)
44:3;205:16
surprised (1)
130:20
surrounding (1)
9:6
sustain (4)
72:4;90:5;92:2;97:19
sustaining (1)
99:20
SWC (2)
199:8,9
swings (1)
171:24
switch (4)
86:21;173:8;179:12;
191:13
sworn (3)
13:8;111:3,14
synonyms (1)
94:18
system (67)
16:7,11;17:2;18:7,8,25;
19:21;20:20,22;21:5,7,17;
42:12,19;46:18;59:6;66:23;
67:1,4,7,16;68:11;70:19;
89:3;90:2,9,15;92:23;94:5,7;
95:7,8,12;96:23;97:12,13,15;
100:2;101:12;102:6;107:7;
137:19;138:9;142:18;143:8;
146:6;196:12,14;220:4,7,8,9;
222:4,8,15;223:19;224:7,12;
226:7;235:20;236:1;243:17;
245:1,5,6,9;252:7
systems (34)
18:23;19:19,20;114:19;
123:25;134:9;135:16,19;
136:1,11,14;138:2;142:5;
143:3,5,14,22;144:1,5;
148:22;178:6,11;222:25;
224:5,17,20;225:1;226:2,5;
227:9;236:10;237:17;245:2;
247:13

T

table (11)
63:14;121:24;140:25;
144:17;166:23;167:4;169:7;
172:10,13;232:21;238:4
tables (5)
76:15;159:10;166:14;
170:2;241:3
tabulated (2)
181:21;227:16
tags (1)
216:6
tail (2)
46:21;98:13
talk (39)
12:21;24:9;32:12;35:19;
42:2,7;49:22;59:4;64:22;
121:23;123:2;134:20;140:3;
142:8;147:22;150:4;164:14;
165:16;166:5,15;167:2;
169:8;173:8;179:12;181:25;
182:6;189:17;202:9;209:15;
211:17;212:10;216:12;
219:18;221:6;224:10;230:8;
236:16;238:1;241:24
talked (27)
29:12,21;30:8;33:13;34:8;
35:23;48:24;51:1;59:19;
83:15;103:14;134:22;135:4;
142:20;173:1;175:12;
176:22;185:12;192:4;
202:10,14;203:21;215:17;
232:16;233:13;234:13;
235:15
talking (36)
37:15;42:14;51:6;59:7;
61:5;101:5;105:16;106:4;
118:13,14;132:9,20;138:19;
148:2,5;152:22;159:14;
161:8;162:6;168:19;172:15;
173:15;189:17;204:18;
206:10;214:5;222:6,6,12;
223:10;224:12;225:4,6,10;
227:4;230:22
talks (3)
86:23;124:11,13
targeted (1)
206:1
tasks (1)
113:20
Technical (9)
113:18;119:20;120:22;
121:11;126:1;174:13;
180:16,18;188:11
techniques (1)
149:11
technologies (4)
99:22;100:1,2,10
technology (3)
100:4,8;146:7
telemetry (1)
214:6
telling (1)
247:22
tells (2)
154:15;158:19
temporarily (1)
244:8
ten (2)
44:15;252:14
Tend (2)
158:15;223:1
term (5)
9:14;141:3;154:12;168:8;
241:12
termed (1)
145:18
terminology (3)
225:15;241:15;254:5
terms (4)
105:3;135:18;179:20;
250:10
test (3)
163:22;172:25;226:10
tested (1)
186:19
testified (16)
13:9;47:9;79:7;86:2;
90:13;93:4;98:12,19;105:18;
111:4;131:20;195:25;
226:18;230:24;235:7;249:21
testify (3)
107:19;241:24;255:16
Testimony (85)
14:15;15:23;22:2,13,19,
20,23,25,25;23:12,22;24:1,
11;29:12;39:13,15;40:13;
42:3,25;43:5,8,14;44:3;
49:25;50:3;51:5;59:5;71:12,
14;79:16,23;80:2;86:22;
89:12;94:4,9,11,12,25;96:16,
16;102:20;103:12;105:21,
25;106:10,21;107:1,18;
108:1;109:6,21;110:7;
116:17;131:22;132:13,25;
139:7,23;174:2,9;180:22;
188:14;191:14,16;193:11,
20;196:3;198:22;199:8;
205:11,15,17,17;208:13,24;
235:16;238:2;248:25;250:2,
14,18;252:19,22;254:4
Texas (1)
224:15
TFCC (1)
241:12
TFCC's (1)
78:4
Thanks (6)
8:12;41:10;99:5;110:18;
170:4;179:3
theme (1)
133:4
theoretical (1)
153:14

theory (4)
134:8;210:21;211:11;
219:20
thereby (2)
66:9;70:20
there'd (1)
177:16
therefor (1)
66:14
therefore (3)
187:22;197:6;209:22
therein (1)
71:17
thereof (1)
66:10
thinking (1)
191:3
third (2)
98:10;196:20
third-party (1)
98:16
Thompson (61)
13:1,2,13,14,14,18;15:12,
15;19:23;21:18;22:15,16;
37:1,23;38:3,10,21;40:14,17,
20;44:22;47:3,4;48:2;49:6;
51:15;55:13,20,24;56:4,6;
58:10;71:25;91:20;99:8;
100:14,17;105:7,9,16;106:5;
109:18,25;132:7;229:19,22;
230:2,3;231:19;239:18,25;
242:20,23,24;243:2;245:18,
24,25;246:4;255:4,5
thorough (1)
114:14
thoroughly (3)
45:20;101:18;117:4
though (10)
23:13;50:21;61:11;
161:12;169:8;176:11;225:3;
245:23;247:23;252:5
thought (12)
10:11;56:6;127:20;
128:15;142:1;146:3,22;
189:5;197:13;209:4,5;
215:19
thousand (1)
178:21
thousands (1)
135:23
threat (1)
211:7
three (17)
46:13;63:22;80:21;81:19;
88:16;97:25;98:4,24;114:18;
168:19,25;175:6;182:17,18;
211:20;219:13,16
three-quarter-inch (1)
248:9
three-quarters (11)
31:1,6,13;32:11;48:18;
68:7,16;79:8;93:12;236:19;
248:22
threshold (2)
86:9;251:15
throughout (7)
18:5,18;21:14;26:13,15;
90:2;93:6
throw (2)
44:14;223:12
thus (1)
70:18
tick (1)
147:15
ticking (1)
147:12
tie (1)
159:8
tiers (1)
251:25
tighten (1)
158:3
tiles (3)
101:24;102:3,10
tillage (4)
245:15,19;254:16,20
times (15)
11:22;33:22;66:20;88:1;
134:10,11,23;154:9;159:25;
167:14;173:16;175:20;
211:20;213:5;243:10
timing (2)
109:14;255:10
tiniest (1)
128:3
tiny (6)
126:12,12;128:3,9,9;
129:16
title (2)
36:17,24
titled (8)
14:15;37:23;84:16;
144:10;155:24,25;168:22;
172:11
TJ (3)
83:9;252:15;255:19
today (18)
32:9;57:16;65:4;78:25;
90:13;98:12;103:22;109:15;
121:15;123:2;190:21;209:2,
3;218:19;235:7;240:7,7;
247:18
together (4)
14:14;15:17;30:15;199:7
told (3)
39:21;46:17;54:11
tomorrow (4)
97:18;255:15;256:5,19
took (3)
23:17;175:23;176:1
top (10)
61:18;64:12;104:1;
142:15;144:17;155:8;
194:19;241:13;243:12;
244:16
topic (1)
48:14
topics (1)
23:25
torn (1)
92:1
total (11)
21:7;79:17;86:7;93:24;
103:5;128:5,9;129:10;138:8;
185:7;217:21
totaled (3)
43:25;217:7;241:7
totalizers (1)
93:19
totalizing (1)
214:16
Touché (1)
248:1
toured (1)
219:21
toward (1)
201:7
to-wit (2)
65:24;66:3
township (1)
83:20
track (12)
27:15;28:3;50:3,12,16;
52:5;53:20;70:10;83:12,24;
86:6;93:24
tracked (1)
27:17
tracking (3)
42:8;83:25;87:5
tracks (1)
42:5
tract (5)
50:9,14,19,24;241:16
tractors (1)
17:8
trajectory (1)
102:8
transcript (7)
54:24;55:5,18;56:2;57:24;
58:1;104:11
transfer (10)
27:21;28:6,6,8,10,16,18,
20;83:18;135:24
transferred (2)
82:18,21
transfers (5)
54:4;135:20,25;136:3;
239:2
transient (15)
35:5;122:15;182:8,10,16,
19,24;183:5,7,12;184:14;
186:9;187:4;190:3;202:12
transition (2)
19:13;80:11
transparent (1)
213:24
Travis (10)
13:14;38:23;40:16;55:18,
22;56:1,9;106:16;230:3,5
treat (1)
18:5
trendline (8)
150:19;151:7;153:9;154:3,
8;157:1,2;162:5
trendlines (2)
153:13;156:25
trends (1)
178:6
tribunal (1)
12:10
tributaries (3)
42:13;195:6;242:1
tributary (8)
42:20,20;61:3;195:13,14,
15,22;241:21
tried (1)
127:22
true (25)
32:5;43:23;51:23;52:9;
72:9,25;73:4,8,17,21;74:12,
23;75:2;76:8,14;77:1;104:8;
134:8,8,9;143:1;196:10;
222:24;238:16,17
truly (1)
206:25
truncate (1)
24:4
trust (2)
85:24;210:16
truth (2)
13:8;111:3
try (7)
20:10;29:2;45:1;79:3;
117:8;135:3;221:11
trying (12)
22:22;33:17;37:17;38:16;
65:1,3;129:7;136:21;188:20;
200:25;218:19;219:9
TSCHOHL (2)
111:6,10
Tuesday (1)
26:4
tune (1)
54:3
tunnels (1)
102:10
turn (33)
8:13,14;12:17;14:21;
21:19;35:20;39:25;44:21;
53:13;55:5;63:4;64:20;
66:24;71:15;74:22;75:20;
77:17;81:1;84:8;85:9;89:13,
14;100:20,23;102:18;
104:10;121:24;129:3;142:7;
188:4;232:17,19;234:24
turned (2)
16:19;129:4
turning (1)
159:15
turns (2)
62:15;128:20
Twin (128)

13:24;14:17,24;22:10;
23:18;24:10,14;25:20;26:22;
29:13;33:14;35:9,13,25;
36:19;37:24;39:18,23;41:12;
42:4;43:3,23;44:4,13;46:4,
10;47:22;49:1,11;52:5;53:3,
19;55:10;56:6;57:4,14,17,
22;58:5,6,8;59:13;62:15;
63:22;64:16;68:6;70:10;
71:7;74:7,13,24;75:9,12;
76:9,11,15;77:2,25;79:13;
80:20;81:14;83:1;84:5;85:1,
3,20,24;86:3;89:16;90:14;
91:9;95:17;98:1,2,15,20;
101:5,18;107:7;110:3;144:2;
146:20;154:21;159:14,15,17,
19;162:2,10;166:25;172:15;
175:10,11,12,16;178:19;
191:25;192:6,9;193:19;
194:19,22;195:3,6,22;196:1,
13;200:17;217:10;220:1,2,2,
8;221:13;223:6,8;224:19;
225:11,13;228:9;235:2;
244:9,15,23;248:10;251:3,8;
252:3
two (26)
10:23;17:4;18:13;21:21;
51:3;68:21;72:1;74:19;
75:14;76:15;88:16;91:3,5;
121:15;142:21;150:3;157:9;
166:21;169:17;170:12;
171:15;173:13;179:4;
211:20;215:10;251:18
type (3)
47:11;83:11;89:4
types (1)
108:8
typical (3)
39:4;67:20,23
typically (25)
18:13;19:10;45:16;77:6,9,
11;78:3;87:17;89:7,9;90:1;
101:11;136:19;137:2;
214:13,15,18;220:13,16;
222:20;223:3,4,25;235:23;
245:2

U

ultimately (8)
120:4;186:11;199:18;
201:22;204:13;206:21;
214:22,24
uncorrected (1)
127:19
under (26)
69:10;73:9,18,22;74:7;
75:2;88:5;109:8;138:7;
148:12;151:16;168:23;
169:16;187:3;189:15;193:5;
210:21;211:21;212:23;
213:9;214:4;224:16;226:2;
229:13;245:6;250:23
underground (2)
11:16;192:20
underlying (2)
12:4;37:3
understood (6)
32:2;89:6,11;92:6;102:15;
250:18
undertaken (2)
71:2;75:16
unduly (1)
37:4
unit (3)
137:18,21;235:15
unless (1)
210:11
unreasonable (3)
222:23;223:17;226:6
unsealed (1)
55:4
up (89)
12:11;14:3;16:23;17:21,
21;18:1,1,8,20;23:22;25:6;
33:11;34:18;41:13;42:8;
46:8;49:19;55:15;67:22,23;
69:7;71:11;73:12;79:20;
88:17,19;97:18;100:6;116:5;
122:6;131:16;132:12,25;
134:15;135:22;137:17;
138:8;141:14,23;143:15;
144:3;146:11;147:12,15;
151:24;153:24;154:8;158:4;
159:3,6;160:13;162:23;
163:9;164:3;165:24;167:3,7;
169:7;176:1,4,17;177:21;
181:2;185:10,16;186:16;
204:13,21,25;205:2;211:13,
16;214:1,24;217:1;218:3;
224:23;226:16;227:11;
228:15,16,19,21;235:24;
241:6;244:16;247:4,22;
254:6
update (2)
84:4;177:24
updated (10)
119:8,11;122:9;123:16;
127:14;128:1,19;146:25;
147:4,6
upon (6)
11:23;14:18;66:22;
101:20;228:22;237:5
upper (3)
151:18;165:12;243:13
upper-left (1)
153:4
Urban (1)
39:9
urbanization (1)
178:7
URL (1)
193:10
use (106)
11:19;27:24;28:4,5;37:17,
20;40:4,8;66:20;67:12;80:1;
81:25;82:3;92:20;96:13,19,
25;101:12;131:25;132:17;
135:3,5,19,24;136:6;137:3;
139:9;143:25;149:8,8;159:3,
7;161:13,14,18;162:9,25;
163:11,19,25;164:18,19,21;
171:4;172:3,22;173:6;
174:10;176:23,25;177:8,18,
22;180:8;181:1,3,10,23;
182:3,24;184:23,24,25;
185:9;186:3,10;187:9,10,22;
196:10,16,19,20,23;197:4,5;
200:5;203:15;204:2;206:2;
207:10;208:20;214:11;
215:21;216:17;217:3,13;
219:5;223:16;225:15;
230:25;233:10;237:2;
239:13;240:11,15,17;243:4;
244:4;245:9,15,19,20,23;
250:16;251:1
used (71)
9:14;33:25;61:8;62:23;
67:6;80:8;85:7;87:11;96:14;
119:5;122:11;127:12;
129:23;131:7,23;133:18,19;
136:8,12;137:14,15,17;
138:13;140:7,9,20,23;
146:18;148:7,8;149:17;
161:1;167:18,21,24;169:23;
170:7,9;171:3;173:7,11,13,
14,22;174:4;178:23;181:24;
182:20;183:5,7;191:3;
192:16;202:23;203:9;
207:19,20;217:24;218:22;
219:5;229:3;231:21;234:6,8;
239:9;240:1,7;241:15,16;
244:12;245:2;251:24
user (19)
39:24;47:7,16,17;143:23;
153:10;197:20;203:4;208:5,
8;211:21,21;212:22;213:2;
232:5,6,8;237:1;250:7
users (55)
18:9;19:19;21:4,16,25;
66:25;85:10,12,20,24;88:17;
91:12,17;101:1;105:10;
131:16;146:12;148:24;
152:24;153:22;155:1;
159:13;165:17;175:6,9;
186:2,24;191:5;197:2;
198:18;202:19;203:5,6,18;
207:21,23;208:2,4;210:5,19;
213:20,21,24;214:6,10;
215:7,23;221:8;222:4,8;
226:16;229:12;238:15;
245:1,4
uses (9)
72:25;73:4;132:3,24;
133:14;168:8;179:19;
210:17;254:17
using (40)
26:12;35:4;41:12,14,18;
61:6;70:18;96:22;123:6;
127:8,16;138:9;152:10;
162:16;163:13,14,15;
164:20;165:5;168:7,12;
169:9,21;171:8;173:4;188:2;
201:16;202:12;203:12;
204:22;205:22;207:14;
218:7,8,20;219:1;221:13;
227:19;243:8;245:18
utilize (1)
105:17
utilized (1)
179:24
utilizes (1)
84:25

V

validation (1)
146:17
valuable (1)
107:5
value (12)
46:24;127:17;157:1;
161:14;163:16,16;164:19,21,
22,22;165:10;167:17
values (12)
155:18,19;156:17;165:1;
167:7,12,17;170:1;172:22;
173:11;239:9;243:9
variable (1)
105:5
variation (1)
158:25
varied (1)
86:4
varies (1)
215:14
various (2)
103:24;178:12
vary (6)
108:3;136:21;145:14;
153:23;157:22;237:25
vast (2)
184:5;238:13
verbally (1)
12:6
verify (1)
126:16
version (3)
15:22;116:1;117:3
versus (14)
11:8;47:17;95:21;107:20;
108:6,16;153:2,8;156:6;
192:20,24;202:13;248:9;
253:24
viability (2)
207:8,9
viewed (1)
212:12
virtually (2)
94:18;187:20
vis-à-vis (1)
225:16

volume (3)
41:6,24;93:24
voluminous (1)
114:13
vs (1)
144:11

W

wait (7)
143:7;160:10;193:12;
239:16;245:16;253:5;255:18
wall (2)
78:8,9
wants (1)
12:10
warmer (1)
233:1
waste (16)
93:6;95:6,7;96:24;97:12,
14;101:11;108:25;143:18;
225:23,25;226:4,7;237:10;
241:25;251:15
wastes (2)
97:14;101:8
wastewater (5)
94:24;95:1,11;96:9;101:9
wasting (3)
251:9,22,22
water (419)
9:7,7,9;11:16,20,22,23;
13:7;14:8;15:8;16:1,4,16,19,
21;17:14,20,22,25;18:9,9,15,
22;19:13,19,24;20:16;21:4,
16;23:20;25:17,25;26:3,5,12,
22,23;27:4,22;28:10;34:19;
36:22,23;37:14,17,21;39:14,
24,25;40:1,4,8;41:6,22,24;
42:16;43:4,8,10;46:10,22;
47:7,17;48:7;51:23;52:2,3,
10,13,15,18;54:4;55:9,20;
57:3,15,23;58:17;59:20,21;
61:8,9,16,20;62:20,20,23;
64:10,16,21,21,23;65:18;
66:16,17,23,25;68:5,14;
70:18,22;77:4,8,11,14;79:14;
80:21,21,23;81:10,11,15,16,
19,25;82:1,17;83:3,18;84:3,
25;85:6,21;88:6,15,17,24;
89:7,9,16,23,24,24;90:9,23;
92:11,13,19,20,21;93:1,5,12,
16;94:7,17,20;95:5,12,14,18,
23,25;96:14,18,19;97:11;
101:6,17,23;102:5,7,10,13;
103:10,14,17,22,23,25;
104:2,7,24;105:17,23;
106:22,25;107:3,14;108:23,
24;109:3,8;110:3;112:8,20,
20,23,24;113:6;114:6,8,15,
20;118:23,25;120:21;
122:10,13,22;123:18;
124:24;128:8;129:21;130:2,
17;131:17;132:1;134:6,11,
12,15,22;135:6,12,20;136:3,
9,23;137:10,16,20;138:1,2,
15,18,20;139:9;140:11;
141:5;143:4,17,20,22,25;
144:6;145:6,13,21,25;147:1,
19;148:3,11;150:6,7,15,17,
24;151:3,10,13,20;152:8,9,
11;153:2,8,8,13,15;154:12,
17;155:4;156:1,6,9,13,18,22;
157:24,25;158:20,25;159:3,
7,20;160:1,3,6,7,9,11,14;
161:12;163:19;164:2,3;
166:22;167:12,13,13,23;
169:4,19;171:21;173:14,24,
25;174:18;175:20;176:10;
177:4;178:9;180:24,25;
181:11,13,16;182:3;183:13;
185:3,25;186:23,24;189:2,
14,21;190:1,4;192:15,18,19,
20;195:23;196:9,20,24,24;
197:3,6;198:10;199:4,6,9;
202:19;204:2,3,13,16;
205:23,24;206:5,5,6;210:7,
22,23;211:16,21;212:10,17;
213:6,12,14;214:4;218:10,
14,19;220:10,24;221:8,11,
14;222:3,4,7,14,25;223:20;
224:8,22;226:24;227:17;
228:2,9;229:16;233:10,14;
236:4,7,11;237:1,2,14;238:5,
9,16;241:17,18;242:16;
244:1,3,18,21,22,25;245:5,7,
10,14,15,18,19;247:7,13;
248:5;249:16;250:4,6,16,21;
251:2,9;252:4;253:7,19;
254:12,20
watermaster (1)
14:4
watermasters (1)
28:8
waterways (4)
16:16;18:4;20:19;21:12
way (55)
16:3,11;19:20;30:14;
32:18;34:18;41:21;55:10;
57:3;68:4;77:5;97:7;99:25;
114:10;125:13;136:2,2;
139:14;147:18;149:10;
150:2;151:16;153:25;181:8;
183:5,25;186:22,22;187:1;
188:1,3;190:19;191:1,3,10;
197:2;203:8,14,21;204:23;
205:20,22,23;209:19;210:9,
14;212:14;214:7;222:10;
225:18;245:12;246:4,9,13;
251:18
ways (5)
68:5;148:23;168:25;
173:13;210:13
weather (3)
66:21;173:18;218:12
weed (1)
17:12
weeds (3)
17:9,10;21:11
week (1)
39:22
weeks (2)
88:16;114:18
weird (1)
165:17
welcome (2)
91:15,18
wells (19)
137:21;187:5,13,16,18,21,
24;188:25;190:22,24;
208:25,25;209:21,25;236:2,
6;240:11,14,15
wells' (1)
190:23
weren't (1)
249:11
west (3)
16:11;20:22;203:23
wet (2)
183:13;186:19
what's (21)
9:2;15:16;24:17;35:4,24;
36:17;87:10;107:23;112:7;
117:22;124:21;135:2;
152:10;185:24;189:12;
192:23;193:6;195:12;
198:25;246:4;253:24
wheat (11)
86:25;87:12,25;88:10;
104:25;105:22;106:11,13,13,
23,24
whenever (2)
144:4;207:5
whereas (1)
151:22
whereby (1)
131:11
white-and-black (1)
140:18
whole (7)
96:5;112:25;158:21;
206:3;207:8,25;208:1
wholly (1)
168:11
who's (2)
213:14,17
whose (3)
146:20;205:16,17
Wildman (2)
125:3;231:7
willing (3)
91:12;139:2;197:18
windfall (1)
186:1
winter (3)
166:3;185:20;242:16
wish (1)
160:23
withdraw (2)
81:10;189:6
within (44)
16:7;20:20;25:14;26:11,
14,17;27:14,19;33:14;36:18;
37:17,24;39:22;44:12;50:14,
19,22,24;52:7;54:4;66:19;
67:11;68:2;77:13;86:3,15,
23;87:21;90:19;91:24;
101:14;102:12;105:4;127:9;
143:23;149:15;150:3;
163:23;171:21;181:18;
229:14;238:8;239:7;243:13
without (2)
210:20;237:10
witness (31)
12:23,24;13:7;19:9;22:20;
47:24;49:13;51:20;56:18,18;
58:13;107:19;109:20,22;
111:2;116:4,8;117:12;
120:19;197:17;205:14;
231:14;239:20;252:12;
253:1,2;255:12,23,25;256:1,
2
witnessed (2)
80:4;102:1
witnesses (4)
174:3;191:18;192:5;256:3
wonder (1)
147:24
WOOD (9)
75:23,25;76:2,4;117:13,
17,21,23;118:9
word (8)
65:19,24;116:22,22;
199:13;201:5;231:24;248:18
words (4)
43:6,15;70:12;165:11
work (23)
14:19;18:17;20:15;45:6;
57:10;90:14;112:18;115:15;
119:10,11,20;120:22;121:12,
23;122:1,18;136:1;141:6;
145:20;149:15;174:13;
213:22;215:22
working (16)
13:23,25;19:19;112:19,23;
114:5;126:1;163:23;171:20;
180:16,18;188:11;207:12;
214:1,1;229:14
works (5)
19:21;59:6;101:21;
183:25;210:14
worry (1)
8:15
worse (1)
64:25
worth (2)
50:23;125:1
wrap (1)
108:21
written (7)
22:1,19,24;110:7;120:5;
121:2;198:22
wrong (1)

189:4

X

XY (1)
150:16

Y

y-axis (2)
140:13;189:25
year (136)
15:18;17:10,16,19,24;
18:11,18;19:3,5;24:25;30:1,
10,11;31:11;33:5;51:2,11;
53:23;54:1;59:16,17;61:19;
71:19;73:9,17,22;74:8,13;
75:4,4;78:9,12;84:19,20;
88:14;94:2;103:8;104:24;
107:3,13,14;108:3,3,16,16;
122:8;125:22,24;126:5,7,10,
15,20,25;127:1;128:13,19,
22,24,25;129:6,8,17,19;
130:12;131:7,12,13,13,16;
145:14,14;151:22;152:13,
14;160:3,7,8,12,12;164:1,6;
168:6,7,10,11,14;169:11;
171:5;177:24,25;178:4,4,15,
15;185:4,16,18;190:5,6,10;
203:11;204:6,10,21;205:1,3,
8;209:17;210:2,3,3,6;213:8;
219:6,22;220:11;228:19;
230:10,14,19;231:9,21;
232:2,12;233:14;234:3,4,6,
11,12,14,21;249:5,7,9
year-round (2)
242:15;244:10
years (59)
15:21;19:4;25:2;29:18;
30:16,16;31:25;32:14,16;
51:7,9;53:8;62:16,23;69:10;
71:19;72:19,19;76:24;77:8;
80:15,15;86:14;88:3;92:8;
102:7;112:22;113:23;114:6;
122:23;123:10,11,19;126:9;
147:3;160:18;171:7,7;
174:20;180:12;185:21;
186:19,20;187:18,19;
190:17;192:12;198:8;207:5;
215:11;219:7,13;228:14;
232:17;233:3,6,7,9;249:12
year's (1)
219:14
yellow (5)
45:14,21;189:18,19;
190:13
Yep (3)
99:15;200:14;244:6
yesterday (5)
8:25;11:14;131:20;
134:22;191:24
yields (2)
11:25;104:22

Z

zero (1)
78:4

0

0.625 (1)
31:16
06 (4)
126:11,22;130:12;219:21
06/'08/'12 (2)
126:19;230:21
08 (1)
126:11

1

1 (20)
14:11;15:8;21:22,24;23:2,
3;37:16;52:23;69:11;71:11,
15;94:13;100:20;167:20;
168:1,9,11;170:16,19;190:5
1,000 (4)
16:15;67:24;220:3;221:15
1,045,382 (2)
73:23;74:9
1,060,011 (1)
73:19
1,062,098 (2)
72:11,22
1,100,000 (1)
71:19
1,121,717 (1)
73:10
1.1 (8)
40:25;41:5;72:19;79:21;
96:1,6;223:11;228:13
1.325 (1)
185:8
1.4 (1)
185:7
1.625 (1)
185:17
1.7 (6)
184:23,25;185:13,14,15,22
1:00 (1)
110:18
10 (4)
34:19;55:12;63:15;92:8
10,000 (6)
18:25;54:1,3,7;86:19;
224:10
10:00 (1)
96:18
100 (10)
19:2,4,5;165:14,19,24;
213:3;220:3;221:14;243:23
11 (1)
63:5
11.6 (1)
41:15
11.86 (1)
41:25
1-10 (2)
80:22;81:11
1100 (1)
223:20
11a (3)
63:15,21;64:1
12 (7)
63:6;71:23;73:8,16;
126:11;162:23;227:7
1-209 (2)
80:22;81:12
13 (5)
90:22;149:20,21,24;165:7
14 (8)
34:19;57:6,7;71:17;76:1,2;
129:25;149:19
1-4 (2)
80:22;81:11
142,000 (3)
129:15,19;130:11
143,000 (3)
130:7,10,11
15 (20)
29:18;32:14,16;54:7;
69:22;86:19;114:3;122:23;
123:10,11,19;147:3;179:5;
180:12;204:9,12,20;205:2,7;
207:14
150,000 (1)
43:24
154 (1)
218:1
15-square (1)
224:10
15-year (1)
169:10
17 (1)
22:9
170 (2)
89:23,23
171 (4)
36:11,13,15;38:24
179,000 (1)
178:19
179,066 (1)
171:1
18 (6)
77:20;100:25;104:17,20;
127:3;216:22
180 (1)
236:6
180- (3)
79:19;223:9,18
184 (1)
81:2
187,000 (1)
178:19
18th (1)
31:20
19 (7)
35:25;49:3;84:18;170:2;
210:21;216:14,21
190,000 (2)
41:5;223:19
1900 (5)
63:23;90:1;103:15;104:2,3
1902 (2)
67:20,20
1903 (2)
64:17;103:11
1915 (2)
90:1;102:4
1930 (1)
102:4
1939 (1)
89:23
194 (1)
68:14
194,000 (3)
54:1;79:20;86:19
1953 (7)
35:8,13;184:11,17,21;
190:7,10
196,162 (1)
81:20
1970 (1)
210:5
1980 (1)
205:4
1980s (6)
208:25;209:1,16;210:1,21,
23
1987 (3)
81:25;82:5,9
1988 (3)
14:25;15:19,21
1990 (10)
30:16,21;31:2,5;112:21;
114:25;146:2,13,21;227:19
1990-to-2006 (2)
145:7,14
1992 (1)
31:11
1993 (1)
13:25
1998 (1)
15:19
19th (2)
81:25;82:5
1A (10)
15:13,14,16;21:22,24;
23:2,3;40:15,20,23
1st (2)
15:20;184:10

2

2 (7)
61:13;63:4;119:17;
124:13;158:17;169:1;170:18
20 (8)
22:9;92:8;94:14;100:25;
129:24;178:17;228:14;238:3
200,000 (2)

24:15;224:8
2000 (8)
72:10;127:9;128:2,17,18;129:24;230:10,25
2000-to-2014 (1)
130:10
2002 (1)
14:25
2003 (1)
199:9
2005 (7)
44:20;114:7;198:10;199:5,10,11;219:21
2006 (7)
115:1;126:6;146:3,13,21;199:5;227:19
2007 (10)
132:19;135:13;141:6;145:8;147:16;150:6;167:9;226:23;238:24;254:7
2007's (1)
198:13
2008 (10)
28:24;29:7;36:21;38:3;123:11;126:6;138:21;144:11;181:12;252:1
2009 (2)
201:4,7
2010 (6)
15:25;20:6,8,21;36:1;70:15
2011 (5)
11:8;20:21;174:22,25;178:17
2012 (3)
90:22;126:6;233:8
2013 (1)
86:4
2014 (2)
130:1;231:7
2015 (3)
130:3,21;180:16
2015-ish (1)
59:18
2017 (3)
174:22,25;178:17
2018 (5)
73:1,5;129:9,11;130:13
2019 (1)
91:1
202,690 (1)
79:17
202,690.93 (1)
24:11
2020 (2)
49:3;59:23
2021 (21)
72:10;127:9;128:2,18;150:6;167:10;170:25;174:22,25;178:17;180:18;216:18;217:3,7,7,21;218:1,2,7;230:10,25
2022 (15)
15:2,19;119:20;128:11,16,17;129:5;188:11;233:13,18,21;234:1,5,17,20
2023 (6)
74:25;76:21;91:4;98:21;182:16;218:21
2024 (1)
91:4
21 (2)
233:8;238:3
22 (3)
22:8;94:14;100:23
220 (1)
217:25
224 (2)
77:18;104:13
24 (4)
188:4;189:5;201:4;211:18
240,000 (2)
68:12,14
245,000 (1)
103:25
24th (1)
201:7
25 (6)
29:9;82:16,17;92:7;163:3;211:19
26 (4)
25:5;189:9,11,13
27 (5)
14:21;15:23;40:13;71:15;124:15
28th (1)
188:11
29th (1)
138:21
2nd (1)
64:17

3

3 (9)
39:9;61:3;74:22;124:15;138:5;169:16,25;170:18;242:8
3,000 (4)
90:1,11;103:16;104:4
3,341,939 (1)
129:12
3,400 (2)
103:18;104:6
3,600 (2)
89:25;90:10
3,650 (1)
90:2
3,780 (1)
103:24
3.2 (1)
127:2
3:00 (1)
178:25
30 (9)
71:19;179:1;187:18,19;190:5,17;207:5;228:14;246:22
30,000 (1)
152:12
300 (9)
71:12;75:20,24;84:8;121:5,9,16;130:16;232:17
300,000 (1)
44:5
301 (4)
74:22;121:6,16;184:9
3023 (1)
199:7
306 (4)
73:12;75:22,24;76:4
31 (1)
201:8
3-1 (14)
139:5,7,22;140:4;141:9;142:11;166:14,19,23;168:15;169:18;253:24;254:2,3
3-10 (2)
154:23,25
3-11 (4)
152:2;154:23,25;155:9
3-12 (8)
154:19;155:22;156:2,5;158:6;159:10,11;170:2
3-13 (1)
157:17
314 (2)
77:17;104:10
3-14 (1)
158:16
316 (1)
120:8
3-16 (1)
165:2
3-18 (1)
150:2
3-19 (7)
150:2;156:3;158:6;159:10,11,16;161:25
31st (1)
15:21
3-2 (5)
142:8,9;166:14;172:10,13
322 (3)
120:17,18,20
326 (2)
120:12,15
327 (1)
120:16
3-3 (2)
144:9;145:22
332 (4)
30:3;48:16,22,23
334 (4)
35:20;48:25;49:16,18
337 (4)
53:13;69:7,16,17
338 (5)
44:21;47:2;48:10,12;102:18
3-4 (6)
149:25;150:2,8,12,13;152:6
347 (4)
115:5,24;116:2,16
347A (15)
116:3,5,16;117:12;118:3,12,16,16;121:25;124:2;125:17,19;139:4;149:19;216:15
35 (1)
76:16
3-5 (4)
152:2,25;153:1;155:8
36 (5)
38:20,22,24,24;40:5
3-6 (1)
154:2
362 (3)
60:8,9,14
363 (6)
60:6,16,18;68:22;69:1,5
364 (5)
65:11,13;68:22;69:1,5
365 (8)
193:25;194:1,7,8,11,12,14;240:25
38,000 (1)
72:14
3a (1)
81:24
3rd (1)
31:14

4

4 (4)
63:18;118:21;170:5,18
4,000 (1)
16:17
40 (7)
67:21;128:2,4;129:16;162:24;190:17;230:25
400 (4)
9:3;10:2;12:8;29:25
400-acre (1)
29:22
40-acre (3)
41:21;67:25;68:1
45-14537 (1)
59:23
4th (1)
31:16

5

5 (25)
31:21;53:25;54:1;60:24;86:4,15,18;157:6;159:18;161:18;162:11;164:15,17;165:4,4,10;167:2;169:2,23;

170:7,8,9,21;193:8;237:16
5,000 (1)
129:17
5,600 (1)
127:2
5,666 (1)
127:1
5.8 (4)
41:7,13,22;223:14
5:00 (3)
96:18;97:18;255:10
5:03 (1)
256:21
50 (4)
29:14;92:7;165:14;190:17
50,000 (1)
152:13
57 (3)
55:5,6;57:1
57,000 (1)
218:7

6

6 (4)
39:9;44:20;124:10;230:8
6/'8/'12 (15)
126:23,25;127:5,12,17,18,22,25;128:12,19,20;129:6,14;130:12;230:14
60 (4)
29:14;90:19;92:7;166:8
600 (1)
90:1
618,000 (2)
217:22;218:3
65 (1)
166:8
65,000 (1)
152:14

7

7 (11)
34:19;55:8,12;57:1;103:7;124:10,13;230:8;232:19;234:24;237:16
7:00 (1)
16:20
7:30 (1)
16:20
700,000 (2)
184:23;185:5
73,000 (1)
101:8
75 (5)
31:3,5;82:18;138:10;166:10
75,000 (18)
184:16,16;185:1,6,16;190:8,11,15,16,18,22,25;191:4;204:25;209:16,20;210:23;211:12
75,200 (4)
35:9;74:25;189:2,14
75th (11)
164:22,23;165:11;166:7,12,12,13;170:7,10;173:5;243:5
76,000 (1)
74:14
781 (1)
162:8
7-ish (1)
44:20

8

8 (1)
71:17
80 (2)
67:21;166:10
800 (1)
67:24
86 (1)
158:17

9

9 (2)
84:10,15
9,000-some (1)
207:3
9:00 (2)
255:22;256:19
90,000 (1)
223:9
90s (1)
187:8

BEFORE THE DEPARTMENT OF WATER RESOURCES

OF THE STATE OF IDAHO

IN THE MATTER OF DISTRIBUTION OF	**) DOCKET NO.**
WATER TO VARIOUS WATER RIGHTS	**) CM-DC-2010-001**
HELD BY OR FOR THE BENEFIT OF A&B	**)**
IRRIGATION DISTRICT, AMERICAN	**)**
FALLS RESERVOIR DISTRICT #2,	**)**
BURLEY IRRIGATION DISTRICT,	**)**
MILNER IRRIGATION DISTRICT,	**)**
MINIDOKA IRRIGATION DISTRICT,	**)**
NORTH SIDE CANAL COMPANY, AND	**)**
TWIN FALLS CANAL COMPANY	**)**
_____	**)**

BEFORE

HEARING OFFICER: GARY SPACKMAN

VOLUME III

Date: June 8, 2023, 9:02 a.m.

Location: Idaho Department of Water Resources
322 East Front Street, 6th Floor

REPORTED BY:

ANDREA L. CHECK, CSR No. 748, RPR, CRR

Notary Public

A P P E A R A N C E S

For the Idaho Department of Water Resources:
Office of the Attorney General
Idaho Department of Water Resources
BY MR. PETER A. WOOD, ESQ.
322 East Front Street, Suite 648
Boise, Idaho 83720-0098
pete.wood@idwr.idaho.gov

For the City of Pocatello:
Somach Simmons & Dunn, P.C.
BY MS. SARAH A. KLAHN, ESQ.
& MR. MAXIMILIAN C. BRICKER, ESQ.
1155 Canyon Boulevard, Suite 110
Boulder, Colorado 80302
sklahn@somachlaw.com

For the Cities of Bliss, Burley, Carey, Declo, Dietrich, Gooding, Hazelton, Heyburn, Jerome, Paul, Richfield, Rupert, Shoshone, and Wendell:
McHugh Bromley, PLLC
BY MR. CHRIS M. BROMLEY, ESQ.
& MS. CANDICE M. McHUGH, ESQ.
380 South 4th Street, Suite 103
Boise, Idaho 83702
cmchugh@mchughbromley.com

A P P E A R A N C E S (Continued)

For the Surface Water Coalition, Twin Falls Canal Company, North Side Canal Company, and Milner Irrigation District, A&B, Burley Irrigation District:

Marten Law
BY MR. JOHN K. SIMPSON, ESQ.
& MR. TRAVIS L. THOMPSON, ESQ.
101 South Capitol Boulevard, Suite 305
Boise, Idaho 83702
jsimpson@martenlaw.com
tthompson@martenlaw.com

For the Minidoka Irrigation District, AFRD#2:

Fletcher Law Office
BY MR. W. KENT FLETCHER, ESQ.
1200 Overland Avenue
Burley, Idaho 83318-0248
wkf@pmt.org

For the City of Idaho Falls:

Holden, Kidwell, Hahn & Crapo
BY MR. ROBERT L. HARRIS, ESQ.
1000 Riverwalk Drive, Suite 200
P.O. Box 50130
Idaho Falls, ID 83405
rharris@holdenlegal.com

A P P E A R A N C E S (Continued)

For Idaho Ground Water Appropriators, Inc.:
Racine Olson, PLLP
BY MR. THOMAS J. BUDGE, ESQ.
& MS. ELISHEVA M. PATTERSON, ESQ.
201 East Center Street
Pocatello, Idaho 83201
tj@racineolson.com
elisheva@racineolson.com

For Madison Ground Water District, Henry's Fork Ground Water District, Jefferson Clark Ground Water District:
Rigby, Andrus & Rigby Law, PLLC
BY MR. JERRY R. RIGBY, ESQ.
25 North 2nd East
Rexburg, Idaho 83440
jrigby@rex-law.com

For Bonneville-Jefferson Ground Water District:
Olsen Taggart, PLLC
BY MR. SKYLER C. JOHNS, ESQ.
P.O. Box 3005
Idaho Falls, Idaho 83403
sjohns@olsentaggart.com

A P P E A R A N C E S (Continued)

For Bingham Ground Water District:

Dylan Anderson Law
BY MR. DYLAN K. ANDERSON, ESQ.
P.O. Box 35
Rexburg, Idaho 83440
dylan@dylanandersonlaw.com

I N D E X

W I T N E S S E S

TESTIMONY OF SOPHIA SIGSTEDT	PAGE
Direct Examination by Ms. Patterson	11
Direct Examination by Ms. McHugh	87
Cross-Examination by Mr. Simpson	89
Cross-Examination by Mr. Fletcher	112
Cross-Examination by Ms. Patterson	117
Examination by the Hearing Officer	119
TESTIMONY OF RICHARD LYNN CARLQUIST	
Direct Examination by Mr. Budge	122
Cross-Examination by Mr. Fletcher	132
Cross-Examination by Mr. Simpson	140
Redirect Examination by Mr. Budge	144
TESTIMONY OF BRYCE CONTOR	
Direct Examination by Mr. Johns	150
Cross-Examination by Mr. Harris	207
Cross-Examination by Mr. Thompson	211
Redirect Examination by Mr. Johns	227

I N D E X

W I T N E S S E S (Continued)

TESTIMONY OF ANTHONY OLENICHAK

Direct Examination by Mr. Harris 228

Direct Examination by Mr. Budge 237

Cross-Examination by Mr. Thompson 244

Cross-Examination by Mr. Fletcher 253

Cross-Examination by Ms. McHugh 258

Redirect Examination by Mr. Harris 261

Recross-Examination by Mr. Fletcher 263

INDEX

EXHIBITS

NO.		MARKED	RECEIVED
SWC			
8	-	246	252
IDAHO FALLS, POCATELLO, AND COALITION OF CITIES			
366	-	227	236
BONNEVILLE-JEFFERSON GROUND WATER DISTRICT			
500	-	***	206
IGWA			
829	-	***	149
837	-	***	87

P R O C E E D I N G S

HEARING OFFICER: Okay. It's 9:00 a.m. June 8th, and we're ready to start.

Are we on the record, Andrea?

COURT REPORTER: Yes.

HEARING OFFICER: Microphones are on.

Sarah, can you hear us?

Sarah is there, her image is there, anyways. Maybe she just logged in.

Okay. Do we have Candice McHugh today?

MS. KLAHN: She will join us later. She's at a meeting with one of her clients getting ready for the testimony tomorrow.

HEARING OFFICER: All right, good. Are there any preliminary matters that need to be addressed this morning? If not, I think the witness that's --

MR. WOOD: Should we see if these guys can hear us?

HEARING OFFICER: Yeah. Is Garrick Baxter on?

MR. BAXTER: I'm here, Director.

HEARING OFFICER: You can hear us?

MR. BAXTER: Yes, we can hear you fine.

HEARING OFFICER: Great. All right. Thanks.

I think the next witness is Sophia Sigstedt;

is that correct?

MS. PATTERSON: That is correct, Director.

HEARING OFFICER: And who will be examining?

MS. PATTERSON: Elisheva Patterson on behalf of IGWA will be.

HEARING OFFICER: Good. Ms. Patterson, if you will come forward, please, and find one of the microphones.

And, Sophia, I see that you are online and participating remotely.

THE WITNESS: Yes, thank you.

HEARING OFFICER: So I hope this examination can proceed in a way that's meaningful.

Okay. I guess I need to swear you in from a distance, Sophia, so if you'll raise your right hand.

SOPHIA SIGSTEDT, PH-GW,

called by IGWA having been first duly sworn to tell the truth relating to said cause, testified remotely as follows:

HEARING OFFICER: Thank you.

All right. Ms. Patterson.

MS. PATTERSON: Thank you, Director.

///

DIRECT EXAMINATION

QUESTIONS BY MS. PATTERSON:

Q. Good morning, Ms. Sigstedt. May I call you "Sophia" today?

A. Yes, that's fine.

Q. Thank you.

Can you please give the court your name and your business address.

A. Oh, gosh. Yes, my name is Sophia Sigstedt. And the business address is -- sorry, just give me a second.

Q. Just the business is fine.

A. Okay. Lynker in Boulder, Colorado.

Q. Thank you.

And, quickly, can you tell me what your educational background is.

A. Yes. I have a bachelor's degree in environmental science from the New Mexico Institute of Mining and Technology and a master's degree in hydrology, also from New Mexico Institute of Mining and Technology.

Q. And how long have you been with Lynker?

A. I've been with Lynker since 2015, so about eight years. But I've been consulting since 2010, so a little over ten years.

Q. And how long have you been familiar with the -- this project, the Eastern Snake Plain Aquifer?

A. I started working for IGWA around 2012, 2013, so about ten years I've been working on the Eastern Snake Plain Aquifer.

Q. And what type of work do you do for IGWA?

A. I started with IGWA during the Rangen litigation. So I did a lot of modeling, water right support related to that matter. I've done some witness testimony also related to water right transfer in a mitigation matter for the Rangen case. I've done a lot of groundwater modeling, looking at IGWA's various mitigation activities around CREP, recharge, water conservation, modeling those activities as part of a mitigation plan. I've done modeling for settlement agreements around water conservation. For IGWA, I participate on a number of technical working groups like the --

Q. Yes, thank you.

So you've worked since 2012 -- was that the date? -- 2012, 2013 on -- with IGWA?

A. Yes, that's right.

Q. So you're familiar with this project?

A. Yes.

Q. You mentioned briefly that you work on

other -- or not other consulting projects -- strike that, please.

Can you tell me about the other committees that you mentioned. Is there an aquifer modeling committee that you are on and participate on?

A. Yes. So I'm a member of the Eastern Snake Plain Hydrologic Modeling Committee, which does technical advisory and oversight of Eastern Snake Plain hydrologic model or ESPAM. I also participate in the Big Lost Modeling Technical Advisory Committee.

Q. Okay. Thank you. I'm going to move to what you did on this case.

What were you asked to do here in preparation for this hearing?

A. I was asked to review the Fifth Methodology Order, the April As-Applied Order, and the various expert reports that were submitted in this matter.

Q. Thank you.

As a part of this hearing, did you also participate in technical working groups held by the Department staff in 2022?

A. Yes. I was part of the -- all of the meetings for the 2022 technical working group, and I was also part of the 2015 technical working group in this matter.

Q. Thank you.

And did you submit comments to the Department on each of the 2015 technical working group and the 2022 technical working group?

A. Yes, I did.

Q. Did you submit an expert report in this case?

A. Yes, I did.

Q. And we have identified that as Exhibit 837.

Do you have a copy of that with you?

A. I do.

Q. Wonderful. So we will be going over your expert report today.

We have also discussed your written comments that you made to the staff in 2015. Those are identified as Exhibit 103. We will be referring to those during your testimony today.

And then your 2022 comments are identified as Exhibit 916.

A. I have all of those.

Q. And you have copies of those available to you?

A. Yes.

Q. Thank you.

On this expert report and on your analysis of the Fifth Methodology Order and the As-Applied Order, were you able to perform all of the work you wanted to do?

A. No, there is a number of things that -- sort of outlined throughout the report that I didn't have time to accomplish. And I think I submitted some other documents to the court related to kind of further analysis around irrigated acres. I would have liked to have done some modeling to evaluate As-Applied Order models that's detailed in the report. I think reasonable carryover is something that I didn't have very much time to analyze in this report; that's something that I would have liked to have spent more time on. Project efficiencies --

Q. It's kind of hard for you to see me, but I'll try to interrupt you if -- we will address, you know, these matters in more detail as we go through your report, but suffice it to say there were more things that you would have liked to do if you had time in assessing the Fifth Methodology Order and the As-Applied Order?

A. Yes. There are a huge number of components to this methodology, and that was a very compressed time frame to put together this report and analysis.

Q. Okay. Thank you.

And were there other matters that IGWA had asked you to work on that, you know, this analysis pulled you off of?

A. Yes. We're doing -- I'm doing some workaround looking at how -- approaches to a groundwater management plan, I'm working on recharge analysis, several things that could have been done -- that should have been done in this time.

Q. Okay. Thank you.

Let's turn to your report now and discuss what you mentioned, the irrigated acreage issue. And can we look at Table 2-1, which is a summary of the SWC irrigated acres 2015, TWG.

A. Okay.

HEARING OFFICER: So, Ms. Patterson, this is Exhibit 837 in the common exhibits?

MS. PATTERSON: This would be under IGWA's exhibits.

MR. WOOD: What number again?

MS. PATTERSON: 837. It should be the last binder.

MR. WOOD: 837?

MR. BUDGE: Director, can we go off the record just for a moment just to address a logistical matter?

HEARING OFFICER: Yes.

(Break taken.)

HEARING OFFICER: Back on the record. We're recording again. Microphones are on.

Ms. Patterson?

MS. PATTERSON: Thank you.

Q. (BY MS. PATTERSON) Sophia, can you see me a little better now?

A. Yes, thank you.

Q. So I previously asked you to turn to your report, which is Exhibit 837, and then on page 8, there is a Table 2-1.

Can you please tell us again what the 2015 TWG refers to?

A. Yes. So in 2015, I think, there was an order that directed Department staff to convene a technical working group around a number of issues. One of the issues that was discussed was improvement to the reasonable in-season demand. And part of that was looking at irrigated acres.

This table that you're referring to is basically a summary of irrigated acres presented to the technical working group related to their reasonable in-season demand calculation.

Q. Okay. And then in your report, two paragraphs above the second sentence, it reads: "It was my understanding that in 2015 that these would be the irrigated acres used in the Methodology Order. However, my recent review of the Department's RISD calculation

spreadsheet indicates that these acres were only applied to calculations 2000 to 2014."

Can you explain that comment for us?

A. So I'm referring to the very last column in the Table 2.1 that you referred to that's labeled, and this is the Department staff's labeling, "2013 Reasonable In-Season Demand." So in that column, there's sort of a conglomeration of the different irrigated acres presented in the table where they're either taking what's from the partial decree irrigated acres, or it seems like they're using the 2005-2007 SPF acres, which I think have been mentioned in testimony represented in previous proceedings.

And so it was my understanding that the last -- the acres in that last column were being used in the reasonable in-season demand. They provided a spreadsheet of the reasonable in-season demand calculation in 2015, and these were the irrigated acres used in the calculation sheet at that time.

When I referred to they were only used through 2014 is that for this proceeding, we were given an updated spreadsheet, something like that reasonable in-season demand through 2022, and that includes a hindcast, basically, from -- you know, the order wasn't implemented until I think 2010, but that includes a

hindcast of reasonable in-season calculations starting in 2000. And what I see in that sheet was that these irrigated acres in this column were used in the reasonable in-season demand from 2000 to 2014.

Q. So you identified some of the columns here. Am I to understand the 2013 RISD column of -- those were used in the hindcast, which means that they were used in the As-Applied Order to calculate RISD in 2000 to 2014?

A. Like I said, I think the As-Applied Order really only goes through 2010, but, yes, I think these were the irrigated acres used in the calculation during that time.

Q. Okay. And then you mentioned, you know, that second column from the right, "2005-2007 SPF."

Do I understand -- is that the Spronk engineering inputs?

A. Yes.

Q. And so, for example, Burley, it looks like that's 44,715, and then in column -- on the far left, that same number is used for the 2013 RISD?

A. Correct.

Q. And similar for Minidoka and Twin Falls Canal Company?

A. That's correct.

Q. Thank you.

Let's move next to Table 2-2, which is on page 9. Can you explain to me what this is?

A. Yes. So this is the table extracted directly out of the reasonable in-season demand calculation sheet. You can see this in both the version provided to the technical working group dated 2014, and you can see this same table in the reasonable in-season demand calculation sheet provided to the technical working group in 2022 -- or it was -- yeah, 2022.

And, essentially, you can see that this is -- these are the data cells used for irrigated acres in the reasonable in-season demand calculation, like I said, 2000 through 2014.

Q. And what is significant about the Twin Falls Canal Company acreage?

A. So you can see, like the table that we referred to previously, they're implementing the SPF, the Spronk water irrigated acre numbers there. They're referencing an exhibit I think that was used in the proceeding to, basically, accept these acres to be used in the reasonable in-season demand calculation.

Q. Thank you.

Did the Department staff tell the 2015 technical working group that they were planning to change the acreage that was used to calculate RISD that

was shown in Table 2-1?

A. I don't recall that, and I went through the staff recommendations which were very detailed in terms of what they were recommending to change, and there was nothing about changing the number of irrigated acres that they were going to be applying in the reasonable in-season demand calculation.

Q. Thank you.

Let's go to that memo, which is actually an attachment to your report, but it is also Exhibit 103. If we want to stay on the report, we can just look at page 50.

Sophia, do you have in front of you that staff report that is from Liz Cresto and Matt Anders to Gary Spackman dated March 16th, 2015?

A. I do.

Q. And do you recognize this?

A. Yes.

Q. Can you explain to me what this is?

A. Yeah. So I think at the conclusion of the series of technical working group meetings in 2015, the staff was, basically, describing the recommendations that they were going to have if they were recommending to have implemented in the methodology. And then they also describe, I think, pieces of improvements to

reasonable in-season demand and others that they didn't have time to, basically, do analysis and address to make a recommendation on.

Q. Thank you. And then if we turn to page 55 of your report, which, again, is -- we're still looking at that memo from Liz Cresto. It says down at the bottom that -- the last paragraph summarizes the work on the mid-season forecast demand.

It reads: "With the limited time frame the committee was given, we were unable to conclude an analysis of methods to improve RISD forecasts. Because this analysis was not yet complete, we cannot currently recommend changes to the current methodology regarding this issue."

Do you recall why there was a limited time frame?

A. I do not, but I definitely do remember the staff talking about being under a compressed time frame during the period that they had to do the analysis.

Q. Do you know whether the technical working group or Department staff has completed this analysis since 2015?

A. I think the things that she lays out here and that I recall from the presentations to the technical working group were, she was looking at alternative

possibilities for basically forecasting the remainder of the irrigation season and the reasonable in-season demand calculation, so opposes the current methodology that uses the baseline year to come up with volumes for the months that haven't occurred. She was also looking at supplemental groundwater use and reevaluating the project efficiency methods.

To my knowledge, none of that analysis was carried on past this point or further.

Q. Thank you.

If you go down to page 56, I believe that's where supplemental groundwater use is discussed, so under Section 4, paragraph 2, sub (b), it says: "Supplemental groundwater use. There was insufficient time for the committee to evaluate this subject."

Does that match what you recall?

A. Yes.

HEARING OFFICER: Ms. Sigstedt, could you tell me which exhibit that you are referring to at the present time?

THE WITNESS: I'm looking at the last page of the 2015 Department staff recommendations.

HEARING OFFICER: So, Ms. Patterson, I'm sorry, that would be 103?

MS. PATTERSON: So it is contained in 103. If

you want to refer to it there, it would be the last page of that one. But it is also an attachment to Ms. Sigstedt's expert report. And if you're looking at the expert report, which is 837, it will be on page 56.

HEARING OFFICER: Okay. I now am on page 56 of Exhibit 837. Okay. Thank you.

MR. WOOD: I don't think that's correct.

MR. FLETCHER: It says: "Future committee meetings."

HEARING OFFICER: Yeah, it's titled, "Future Committee Meetings," Section 4.

MR. WOOD: Oh, that's right.

MS. PATTERSON: Yeah, that's right.

MR. WOOD: Okay. That's fine. Sorry.

HEARING OFFICER: Go ahead.

MS. PATTERSON: Sorry, there's a lot of paper.

MR. WOOD: Yeah.

Q. (BY MS. PATTERSON) Sorry, I'll just go back.

So as you recognized or just testified about before, the technical working group in 2015 did not have time to address the supplemental groundwater use, and is that reflected in the report on page 56?

A. That's right. And you can see right above that, the Department staff is also recommending that they would have liked to continue this work in future

meetings. I think they recommend something like one meeting a year or something. And that -- that has not taken place. I don't think that recommendation was taken up.

Q. Thank you.

Section D also identifies future work. Irrigated acres, it says: "Significant discussion focused on this topic. And it was generally agreed that the processing for determining irrigated acres for SWC members could not be improved."

Do you recall that discussion?

A. Yes. I think discussion around irrigated acres was -- had to do with the submittals by the Surface Water Coalition, whether they were updated and whether the Department had a process in place to, basically, evaluate what the Surface Water Coalition submitted.

Q. Thank you.

Let's move on to page 66 of your report, which are your comments in 2015 in response to the Liz Cresto report.

Is that correct?

A. I'm sorry, I have a different page number. Okay.

Q. So can you just describe this document?

HEARING OFFICER: So what document are we looking at now?

MS. PATTERSON: If you stay on the current exhibit that you are on, 837, and if you go to page 66.

HEARING OFFICER: Okay.

THE WITNESS: So following the recommendation comments from Department staff in 2015, they gave an opportunity to the technical working group members to provide their own comments that would be attached to their comments, which is what you see. These are my comments related to what they recommended.

Q. (BY MS. PATTERSON) And just so we're clear that we're all looking at the same document, is this the one dated March 16th, 2015?

A. That's what I'm looking at.

Q. Perfect. Okay. On page 68, the last two paragraphs refer to "irrigated acres."

Are these comments referred to in your current report?

A. Yes.

Q. Can you explain to the Court what your comments are here?

A. So what we heard from the technical working group on irrigated acres was that there was not a process in place for the Department to basically

evaluate a submittal, aside from overlapping -- removing overlapping acres, I think, from those shapefiles.

So my comments here have to do with recommending that they're -- they do put in a review process around irrigated acres submitted that includes identifying hardened acres using either aerial imagery or remote sensing data, which was presented as being available to the Department to use for this type of analysis.

So I lay out kind of the things that they should -- a process around things that should be removed, like roads and surfaces, things like that. And then I also have a comment here that I, essentially, disagree with using the 5 percent standard as the Surface Water Coalition's being able to, essentially, say that as long as they haven't changed their acreage within 5 percent -- this has to do with something we heard, I think in testimony earlier -- that for a very large irrigation district like Twin Falls Canal Company, 5 percent of that irrigated acres can be something like 10,000 acres and that can, you know, add up to some tens of thousands of acre-feet in terms of crop water need.

Q. Potentially erroneous crop water need?

A. Exactly. An erroneous calculation of crop water need that would fall into the demand shortfall

calculation.

Q. Do you know if the Department has done anything to improve the process?

A. No. I think based on the information that we represented in the 2022 technical working group, not only have they not implemented their own review process, for whatever reason, it seems like they have reverted back to using more outdated irrigated acres than were presented to us in this 2015 technical working group, which took into account, basically, the nonirrigated acres that had previously been identified and presented to the Court for various irrigation entities.

Q. Okay. Thank you.

Let's go back to the body of your report. So we're still on Exhibit 837, but we'll be going to page 10. And we're looking at Table 2-3, Summary of SWC Irrigated Acres 2022, TWG.

Can you just explain again what the 2022 TWG is?

A. So again, by order, the Department staff were directed to convene a technical working group. This is the first one since that 2015 technical working group. There was a series of meetings held as part of meetings around looking at the implementation of what's called near real-time METRIC data, and they presented

information on irrigated acres.

This table is a summary of the various datasets for irrigated acres that were presented to the technical working group committee in 2022.

Q. Okay. So this came from a presentation that was given by the Department in the 2022 technical working group?

A. Correct.

Q. Thank you. So what does this show, this table?

A. So this shows -- it starts with a column called "Shapefile Acres." These are either from the permitted place of use, PPU, with a date; acres recorded; or sometimes there's a shapefile that has been submitted by Surface Water Coalition following that date, so it has -- that would be designated by SWC with the date that that shapefile was committed and the associated acres. That's the first column.

The second column, and these are the Department's labeling, is "If Removed Non-irrigated Acres Using the 2011 Irrigated Lands Dataset." So these report the acres for the districts from using the Departments irrigated land dataset.

The same thing is in the next column but is the updated irrigated lands for 2017.

And then, like I said, this presentation, I think, was focused around the implementation of near real-time METRIC, and so they have a column labeled "Near Real-Time METRIC Processing Acres" that was done in 2021.

And then the last column is, essentially, the acres that are used in the Methodology Order. And like I said, I reviewed the reasonable in-season demand calculation sheet for the Methodology Order and following -- starting in 2015, the very last column here, are the acres used in every year for the reasonable in-season demand calculation.

Q. Thank you. If we go to page 11 of your report, the first paragraph has a sentence that reads: "Every technical analysis of the irrigated acres consistently shows that Twin Falls Canal Company is irrigated approximately 15,000 acres less than the" 19 -- or "194,732 acre figure that Twin Falls Canal Company reports to IDWR as being irrigated."

And then there's references to the SPF report from 2008 and the IDWR irrigated lands dataset in 2011 and 2017, and then the NRT METRIC data for 2021.

Can you explain to me, you know, how those different references helped you form that conclusion?

A. I mean, you can see it in the table we were

just referring to, Table 2-3. Each of those datasets that is -- has, basically, an actual analysis. What the irrigated lands, the actual irrigated lands are at that time shows that it's about 15,000 acre-feet less than the irrigated acres that's being used for Twin Falls.

You know, this is confusing, because I think in the same presentation, Matt Anders makes very clear that in the Department methodology nonirrigated acres are not supposed to be included in the reasonable in-season demand calculation, and, essentially, they're showing consistently data that shows that those nonirrigated acres are being used.

Q. Thank you. Can you explain to us the IDWR irrigated lands dataset, as you understand it?

A. Yes. As I understand it, this was something that was, I think, originally commissioned for Eastern Snake Plain Hydrologic -- or at the direction, maybe, at the Eastern Snake Plain Hydrologic Modeling Committee. They used this dataset in the calibration of the model, and the year that it is available, they use that as the irrigated acres, then they apply whatever method they're using to calculate ET, or evapotranspiration, to come up with a consumptive use volume associated with those acres to be used in the model and the model calibration.

Q. So just to confirm, this irrigated lands

dataset, this was used in the model?

A. Correct. It's -- yep -- whatever years it's available, it's used for those years until -- starting in that year until the next most updated irrigated lands dataset comes available.

And I think I list in my report there, I saw, basically, some Department information, like a story map or something, talking about these irrigated lands dataset, and it looks like starting in, basically, 2008, they've developed it for every year through 2017.

Q. Thank you.

On page 12, there's a figure labeled "2-1." Can you explain this figure just briefly?

A. So this comes from a 2006 document about how the irrigated lands dataset is created. I found this in background material presented to the technical working group in 2015, so I think it was made available to us then in terms of understanding how the irrigated lands dataset worked.

And, essentially, what you can see is they start with remote sensing data of irrigated lands, which is kind of the green box without any delineation s, and they overlay that with a very detailed -- the most detailed polygon area that they can find. It's called the CLU, and it's, basically, designed to be the

smallest boundary that they can. So individual fields owned by individual owners, just, basically, the most discretized polygon acres that they can associate with the various land designations.

COURT REPORTER: Ms. Sigstedt, hold on because I missed a word.

(Record read by reporter.)

THE WITNESS: I think "discretized" is the word I used.

COURT REPORTER: Okay. Thank you.

THE WITNESS: So they use the -- they use the Landsat image to then assign those polygons as either irrigated or nonirrigated. And then they take that classification, and they mask it with, basically, aerial imagery to identify where the developed acres are.

And we heard testimony earlier that this -- the IDWR irrigated lands dataset is basically classified into three classes that includes irrigated, semi-irrigated, and nonirrigated. And so they use the aerial imagery to identify the semi-irrigated acres, which in -- ultimately, this all resulted in the last image that you see on the bottom right where the irrigated acres are shown in green, the semi-irrigated acres are shown in gray, and the nonirrigated acres are shown in tan.

Q. (BY MS. PATTERSON) Thank you.

And you said that this dataset is available -- or has been used by the Department since 2008 through present, or they at least have the dataset.

Can you clarify what that comment was?

A. I think they started this dataset around 2006 -- I'm not sure exactly when they started -- and they did some prior years like, maybe, 1986, 1996, 2000 [sic]. But my comment was that, at least based on the information -- I haven't checked the archived data to verify this, but based on information from the Department, it looked like starting in 2008 this dataset is available every year through 2017.

And they continually update it every year for the model. Like right now, they're estimating that the 2021 dataset will come out next year, I think. And it just takes them a while to process. It's a very detailed dataset that is well done, and so it takes them a while to process it.

Q. Thank you. The next section of your report discusses IDWR METRIC dataset.

Can you explain your understanding of this?

A. Yes. So, also, I think for the ESPAM model development, they started working with -- I think the University of Idaho, basically, under a grant to come up

with an alternative method to using the ET data just measured at point sources from weather stations to coming up with mapped evapotranspiration data across the entire Snake Plain that they could use for their consumptive use in the model. And so, again, they went back for -- they have some years like 1986, 1996, 2006, but they started developing, as often as they could, a METRIC dataset to be used in the model for ET.

Q. Thank you.

And so Figure 2-2, on page 13, is that an example of the METRIC ET?

A. Yes. So here, you can see the model boundary on the left figure, and then the -- where that METRIC data covers in terms of just the images that come out from the METRIC analysis. And then there's kind of a zoomed-in picture to show you how detailed this METRIC is in terms of they can apply it on a field-by-field basis for coming up with an evapotranspiration rate.

Q. Thank you.

And then on page 13, you have a section on your conclusions. Can you just briefly explain your conclusions based off of all these different technical working groups and the work that you've done?

A. Yeah. So I think based on the information that I understand that the Department has available to

them, they certainly have the capability to be updating the irrigated lands that are used in the methodology to be consistent with only applying nonirrigated -- or to not apply nonirrigated acres and to only be using irrigated acres. I think that the -- whatever is the most up-to-date IDWR Landsat at a minimum should be used to evaluate what the shapefiles that the Surface Water Coalition submits in terms of irrigated acres.

I understand from the Department staff testimony that they would like that to be available every single year. I think that there are a number of components in the methodology that aren't available in real time, the crop links which is also used in the reasonable in-season demand isn't, and so I think using whatever is the most up-to-date dataset makes sense.

I think if they wanted to have the most real-time picture, it seems like they should be able to use the METRIC information that is -- potentially is available to them in-season, and they could use that to identify within the information that they already have what is being irrigated and what is not being irrigated.

Q. Okay. Thank you. Let's move on to another component of the reasonable in-season demand.

Can you talk about the baseline year and what the selection criteria are, briefly.

A. Yes. So the baseline years is, essentially, come up with a forecasted demand for the Surface Water Coalition entities that can be used in April before the season starts. It's meant to sort of balance -- be a balance between providing adequate protection for the senior surface water users without creating unnecessary -- you know, creating a level of protection against unnecessary curtailment of the juniors. There is a series of baseline criteria, and these are meant to account for three factors that are basically climate, water supply, and the irrigation practice.

Q. And are there specific criteria, like within the climate factor, for example, that the Department considers?

A. Yes. So I think in my expert report, I show the specific criteria being used for the baseline year, and, essentially, to capture irrigation practices, they only consider years post 2000 to make sure that current irrigation practices are only considered in the averages.

In terms of water demand or, you know, also related to irrigation practices, they look at what the total Surface Water Coalition diversions are. They also look at what the supply is in terms of the highest natural flow and then the storage allocations.

For the climate component, they look at what the evapotranspiration is. They look at what the growing degree days are, so, essentially, making sure that they're evaluating a long season. And they look at what the precipitation would be for the irrigation season.

Q. And then in your report, you have Figures 2-3 to 2-7.

Are these figures pulled from the methodology report?

A. That's right. And these figures show all of those individual baseline criteria components, and then they show what the average over the period is for these components so that you can see that for the -- so that you can see that they're meeting the baseline criteria in terms of whether they're supposed to be above or below average.

Q. Going to page 17 of your report. Can you explain how the baseline year has evolved over the different methodology orders?

A. Sure. So by my review, it seems like the First Methodology Order laid out the first baseline year to be used, and they, essentially, were using a period of record from 2000 to 2008. Based on the selection criteria, there's a statement in there that says, "'from

a standpoint of total annual SWC diversions, 2006 is an appropriate baseline year with 97 percent of 2000 to 2008 total surface water diversions.'"

That's a direct quote from the First Methodology Order, but the Director found that it would also be appropriate to use the values of 2006 and 2008, so an average of those values, to arrive at the baseline year. And the reasoning there was that it more strongly fits the criteria for all of the members. And in the '06 and '08 the average amounts to 100 percent of the Surface Water Coalition's diversions over that period of time.

If we move on to the Third Amended Final Order, which was the next update to the baseline year, the period of record that they're considering is 2000 to 2014. And the reason they needed to update the baseline year was that the previous average being used no longer met the baseline year criteria.

In that year, they had -- they considered 2012 as the baseline year. They decided that they did not think that was an appropriate baseline year because it was very extreme in terms of the average over some of the baseline year criteria. Ultimately, they chose the average, '06, '08, '12 for the baseline year criteria to establish the baseline year in that methodology. That's

101 percent of the total Surface Water Coalition diversions.

And then for the Fifth Methodology, which is the next update to the baseline year, they again had an extended period of record. So they're looking at 2000 to 2021 to evaluate those baseline year criterias.

The Department considered using 2018 or 2020 based on the review -- based on the information presented to us in the 2022 technical working group committee. They selected 2018 as the baseline year, and that's 104 percent of the Surface Water Coalition total diversion entities.

And I guess one thing that I note in terms of how this evolution played out, is that I think the difference between 104 percent and 1 percent of the baseline year, in terms of the bias it creates, is, essentially, looking at the difference between 32,000 acre-feet or 120,000 acre-feet, respectively, in terms of protection for the senior surface water user in terms of just sort of starting with how much demand you want to start with in the evaluation.

And I think that that's a significant shift from the previous baseline years that were all around that 100 to 101 percent. And I think it's informative that in the Third Methodology Order when they chose '06,

'12, '08 as the baseline year at 101 percent, they could have chosen -- I'm just looking for it here in my notes.

Q. I think it was the '08-'12 average?

A. Yes. They could have chosen the '08-'12 average, which would have -- instead of being 101 percent of the surface water diversions at that time, that would have been 104 percent of the diversions at this time -- at that time. And they chose not to do that. I think they chose a year closer to the 100 percent. They chose the 101 percent.

And I think that's because there's no need to shift the baseline year to that higher percentage because it's the accumulation of all the baseline year criteria, themselves, that ensures that there's above-average supply so that they can divert as much as they want. It ensures that it's a hot and very long growing season and in terms that there's minimal precipitation. And then on top of that, in terms of the demand shortfall, you already have a reduced forecast supply based on conservatism that they had in that.

So all of that, arguably, amounts to, you know, a very protective year in terms of what the senior needs to balance out protection for them versus curtailment of the junior.

Q. Thank you.

And just to summarize a couple of points, the Department allowed averaging to create kind of a synthetic baseline year in the past; is that correct?

A. Yes. In all of the previous orders, an average was used to, basically, get as close as they could to that 100 percent.

Q. Okay. Thank you.

Let's go now to your conclusions, which, you know, if you've already kind of testified about some of your conclusions, just please address on page 18 of your report if there's anything else that you kind of concluded from your analysis on the baseline year.

A. Yeah. So I think, you know, one thing you can look at, Twin Falls in particular, and look at choosing 2018 as the baseline year, which has 106 percent of the average Twin Falls, TFC, diversions, and that creates a bias in their favor of starting with 60,000 acre-feet. So that's almost the entire demand shortfall that was calculated this year. And I think if you take into account in addition what the methodology does to reduce the supply, what we can see in a year like this is that the entire demand shortfall is really based on just the conservatism in this methodology.

So I think it's important that that conservatism be balanced in some way when we talk about

60,000 acre-feet of shortfall being just the conservatism, and we think about the new method of the methodology, where the transient model is employed, we're talking about already a very senior curtailment date.

If we consider the curve that Jennifer Sukow presented in terms of looking at demand shortfall under the transient simulation and the -- what it generates for shortfall under the transient simulation, a 60,000 acre-foot demand shortfall basically starts you in around a 1961 curtailment date with over 500,000 acre-feet of groundwater curtailed. And so I don't really see the balance there for protection against curtailment for the junior.

Q. I want to direct you to page 20 of your report. Up at the top of that first paragraph, you state: "There were unique hydrologic circumstances in 2018 that I don't believe represent the typical dry year."

Can you explain that a little bit?

A. So in addition to just shifting the total demand for the Surface Water Coalition, the thing they're pointing -- when you look at 2018, I think there was a particularly good water supply outlook for that year, and there was a lot of recharge done across the

Eastern Snake Plain Aquifer in that year. And it also may have just lapsed water operations because the water supply was predicted to be so good, and it didn't need to be constrained.

And so a couple of things that I looked into was whether all the recharge water was accounted for in 2018. And I don't know if we're going to get into this, it might be later in my report, but what I see is that I don't think that they have -- that the Department's water allocation has accounted for all the recharge that needed to be subtracted out of 2018 as a baseline year.

And then the other concern I have with 2018 as a baseline year is if we look at the figures for the baseline year criteria, what we see is that it's particularly low in terms of the irrigation season precipitation. It's the only year in the entire record that doesn't have any July and September precipitation, and its total precipitation is, basically, at one standard deviation away from the average.

And when I look at previous orders on selecting the baseline year, it seems like they're choosing an average to get all of those baseline criteria closer to average so that, you know, an outlier-type year is not included as a baseline on its own.

Q. Thank you.

And are some of those things you just described, you know, about precipitation, are those identified in Table 2-4 on page 19?

A. No -- well, yes. Yeah. You can see in Table 2-4, what I'm laying out here are, essentially, the numbers for the different baseline years considered in this Fifth Methodology Order based on the technical working group meeting. So that was 2020, 2018, and they're comparing it to the average of the 2000-to-2021 period. And so, yes, you can see that precipitation is particularly low compared to the average there.

And what I'm proposing in this table is that I think the Department could have considered an average for the baseline year criteria in the Fifth Methodology Order, so I've included the average of '06 and 2018 to show that that also meets all of the baseline year criteria when you look at it compared to this current period of record, but it's much -- but it's more reasonable in terms of just being 101 percent of average for total Surface Water Coalition diversions more consistent with what's been chosen in previous orders.

Q. Okay. Thank you.

And in your January 16th, 2023, comments to the technical working group, did you raise these issues?

A. Yes, I did.

Q. Thank you. Let's move next to forecast supply.

What issues were identified at the 2015 technical working group meeting? Again, just briefly.

A. So I think, specifically, one of the reasons -- and it was definitely something that the Department put the most, it seemed like, time and analysis into -- was that the April forecast supply model for Twin Falls Canal Company needed to be improved. And so they looked at, basically, ways that they can improve that model. Just because of the way that they did the analysis, they evaluated the forecast supply models for all of the different Surface Water Coalition entities, and in the end they made a recommendation to change several of them.

Q. Thank you. And then Table 2-5 on page 22, can you just describe what that table shows.

A. So this is a list of all the different predictors that the 2015 technical working group considered at that time to improve the forecast supply models, and then you can see in bold, in this table, are the ones that actually got selected to be used in the forecast supply models.

And so I think in total here, we're looking

at -- almost 30 different predictors that would be --

HEARING OFFICER: Just a moment. Just a moment. We lost the audio. We need to back up.

Q. (BY MS. PATTERSON) Sophia, were you counting out, or were you trying to say something when you were doing that?

A. No. I'm sorry. That was just me counting in my head. I'm sorry about that.

So I was just saying that, essentially, they tested about 30 predictors to see which ones applied and how they can improve the models at those times.

Q. And you were looking at Table 2-5 and just counting out the different predictors that they considered in 2015?

A. Just roughly, yes.

Q. Roughly, yeah. Thank you.

Moving on to the 2022 technical working group, what was the regression models discussed there?

A. So we saw a presentation that basically showed the Department's evaluation where -- you know, since these models were developed in 2014, they're able to look at how the regressions compare as they add new -- as they add each new year of data so they can show us over the years how the regression models have performed.

And so that -- you know, that's one of the

analyses that they -- that's kind of the main analysis that they showed us for the 2022 technical working group.

Q. Let's go to Table 2-6 which is on page 22. What does this table show?

A. So this is the table that I've created to, basically, summarize -- from my understanding, it looked like they did try and see if they could make improvements to the forecast models. But this effort seemed like it was done not in the same manner as the 2015 technical working group, which had a really thorough and kind of prescribed approach to how -- to the predictors that they did.

It seemed like here they, basically, tested three new predictors. So the table that I'm showing are, in bold, the predictors that are already used in the model. And in this technical working group, they tested a couple wells and then, basically, the introduction of the Sentinel Well Index to see if those improved the forecast models; and they found that they did not, and so there was no recommendation to change the forecast models.

Q. Okay. And then in your section on current forecast supply predictor variables, can you explain your concerns that you have presently?

A. Yeah. So I think these are concerns that the Department had as well. It was part of their presentation to us. And that's that they, basically, showed us that for Twin Falls Canal Company in particular, what they see is that the R-squared value has been degrading over time to the point where -- and the R-squared value is, basically -- you know, it explains the predictive power for accuracy of the model, so the percent of variabilities that's explained by your forecast model.

And so it -- they see it degrading about 10 percent, and they see it consistently degrading every single year that it's input. And so I think that's a concern.

And I think we heard testimony that the concern is, potentially, that that model includes Box Canyon as a predictor. They talked about the shift that's observed in Box Canyon. I think that's a concern. When you look at just the water year summary for Box Canyon, it also talks about it can be influenced by irrigation return flows from Rimrock.

And then I have a concern for Box Canyon as a predictor just because physically Box Canyon discharges from a completely different reach of the Eastern Snake Plain Aquifer, and, actually, when you look at kind of

historical discharge from the Kimberly to King Hill, which is the reach that Box Canyon discharges to, compared to the near Blackfoot to Minidoka reach, they have different responses to, basically, changes in the Eastern Snake Plain Aquifer over time.

And so to me, just logically, it's a questionable predictor, and it's probably just correlated with something else, and that's why it doesn't perform very well in the model.

Q. Do you recall the testimony from Matt Anders where he discussed the Department's decision to -- and I don't have the exact quote -- but just monitor and reassess the Box Canyon data in the future?

Do you agree with his statement?

A. Yes. I think they should be concerned about using Box Canyon as a predictor. And I think not -- I think that there's a really good reason for them to do a comprehensive review of how the forecast supply models are done, similar to what was done in 2015 with casting a wide net of predictors that are more pertinent to the near Blackfoot to Minidoka reach, and that just wasn't performed. And I mentioned this at the beginning of my testimony, I think that this should be performed to see if there is a better predictor for the forecast supply models, particularly the Twin Falls, given the

degradation.

Q. Matt Anders also said that, you know, there's a chance that the Box Canyon R2 could stabilize or perhaps improve in the future.

In your experience, do you think that's likely?

A. I mean, they have not seen it improve from one year to the next in any year that they've employed it; so just based on the record, I think that that's unlikely. It seems like it's more likely to further degrade.

Q. Thank you.

And then you mentioned also in your report a well, 05S31E27ABA1. I think -- you can just refer to that as ABA1.

What was your issue with that?

A. You know, this is just something that I have from experience because this is one of the sentinel wells. It's something that -- you know, there's a technical working group around the sentinel wells to evaluate whether they're a good representation. I think we've sort of flagged this well as it's not really necessarily, being representative of aquifer conditions and that it's probably more representative of sort of surface water irrigation practices or maybe American

Falls Reservoir levels than it is kind of regional or even local aquifer conditions. And so I know that this well -- and I didn't have much time to evaluate the July forecast model, but this well is used in some of those July forecast models. And so it just catches my eye in terms of, you know, that should probably be reevaluated as well.

Q. Thank you.

And do you have any other recommendations on improving natural flow models that you haven't already discussed?

A. I think just in addition to doing a more comprehensive and really more objective approach to the forecast supply models, like a stepwise linear regression that has the very specific criteria that, basically, establishes the significance of including or omitting variables, and these are just standard methods that can be applied, I think that should have been done.

And then the other thing that I've mentioned in both my 2015 and 2022 comments is the idea that, at least from my perspective, it seems like we have a good forecast supply that comes out of the joint forecast for Heise. And I don't quite understand why we can't use forecast supply from there to kind of develop an allocation model that, basically, takes the water rights

administration in this reach into account to determine what is available to the individual surface water entities without coming up -- you know, which would avoid having developed our own forecast supply models that are forecasting administration effects, which I think is difficult.

Q. Okay. Thank you. Let's move on to reasonable carryover.

Can you explain briefly what that term means?

A. Yes. So reasonable carryover, it's basically to establish the carryover needs of the various Surface Water Coalition entities for the next surface water -- for the next irrigation season. And so the way that they calculate that in the methodology is the baseline year demand minus the projected supply, and so they use -- for projected supply, they use an average of historical supply -- which, again, they're choosing a below average. I think they use maybe '04, '06, and they didn't change that in this methodology.

But something that was brought to the attention of the technical working group really late in the process, and there really wasn't any analysis around, was that the baseline year selected as 2018, because it has such higher demands for the Surface Water Coalition entities, it really changes -- it changes that

calculation as a reasonable carryover in terms of there being, more often, shortfalls determined for the reasonable carryover.

Q. And are some of your concerns reflected in Table 2-7; or can you explain Table 2-7, which is on page 25?

A. This just shows the difference in choosing the baseline year and the change of the baseline year in the Fourth to the Fifth. And so you can see that, for some entities, we're only talking about a 4,000-foot increase, but some of them, the change is like -- if you look at AFRD2 there, you go from is 11,500 feet in the Fourth Methodology Order to 93,000 acre-feet in the Fifth.

Or similarly, if you look at North Side Canal Company, in the Fourth Methodology Order, their carryover needs were 65,000 acre-feet, and in the Fifth they're, you know, over 110,000 acre-feet.

Twin Falls Canal Company went from 25,000 acre-feet to over 85,000 acre-feet.

And there really wasn't any analysis presented to the technical working group around whether there was a need for these massive increases to carryover needs. Like, historically, can you show that the carryover has been insufficient, you know, to these levels for those

entities.

Q. Thank you. Let's move on to your section on compounding bias.

You state: [As read] "The Fifth Methodology Order leads to curtailment of every junior right on the ESPA in most years even though TFCC records demonstrate that it is short of water only occasionally."

Can you explain that statement?

A. Yeah. So to explain that statement, we need to look at Table 2-8.

Q. Okay. And that is on page 26.

A. Okay. So this table was based off of, essentially, a hindcast analysis that Department staff put together where they were showing the difference from the period of 2000 to 2022 between using a baseline year -- the previous baseline year and then the update to using 2018 as the baseline year.

And so in this table, what I've pulled out is the April baseline year shortfall is, essentially, the second column here after the year in this table. And then from that shortfall, that would be determined from the Department's analysis using 2018 as the baseline year. I've used -- Jennifer Sukow provided a series of ESPAM model datasets that were used to generate the figure that we've been over in previous testimony that

basically shows -- she created a curve that showed various curtailment dates under the transient ESPAM model and the associated shortfall.

And so I took those model files and, basically, tried to find the curtailment date that she had run that produced a benefit to the near Blackfoot to Minidoka reach that most closely approximates the April baseline shortfall using 2018.

And so the comment that you specifically mentioned, I'm basically highlighting every year that the shortfall determination is over 97,000 acre-feet, which means whenever there is a shortfall above that, it's a full curtailment to the 1900 curtailment date, and that's 941,000 acre-feet of junior groundwater acres curtailed. And so when you look at the hindcast of these 23 years, 16 of the years result in complete curtailment to that 1900 date.

And then in the very last column, from some information provided by Twin Falls Canal Company, I think related to their deposition, there was, basically, a record of what their diversion rates were -- I think maybe starting in the '90s. And, basically, I just -- in the column for each year, I included every diversion rate, and I am highlighting, basically, years that have a diversion rate that is less than five-eighths.

And there's only 4 years out of the 16 years that have shown that they've diverted less than the full diversion of five-eighths versus the 16 years that, you know, 900 -- over 940,000 acre -- junior groundwater acres are curtailed. And so this just kind of demonstrates what I was discussing in the selection of the baseline year; that when you shift 2018 as the baseline year at the higher percent of SWC diversion, there's really no balance in terms of any protection against unnecessary curtailment of the juniors.

Q. Okay. Thank you.

Let's go next to the impact that nonirrigated acres has when it's included in the RISD November actual demand shortfall calculation.

On page 27, there is Table 2-9. Can you explain that?

A. So, again, I am pulling some data from the hindcast analysis that the Department did where, in addition to presenting information from 2000 to 2022 for the April demand shortfall, they included the November reasonable in-season demand for shortfall. So in November, the baseline year is no longer a component, and the shortfall is completely determined based on the reasonable in-season demand calculation.

And all I'm doing here is, basically, instead

of using the acres that the Department is using in the Methodology Order, I'm just using the acres -- and I've only done this for -- oh, no, I did all of them -- so I'm only updating the acres for Twin Falls Canal Company, which is the one we have very consistent evidence that it's nonirrigated acres.

And so for Twin Falls Canal Company, I'm, basically, updating the acres used in the reasonable in-season demand calculation sheet to be whatever the most recent irrigated lands dataset is; or for 2021 and 2022, I'm using what the Department reported in terms of 2021 near real-time METRIC acres. And I'm just showing the difference in the shortfall that you calculate by using those more accurate acres for Twin Falls Canal Company.

Q. Okay. Thank you.

Moving to your next section, you've got a Table 2-10. Can you explain this table and how it relates to bias in April and July?

A. Sorry, that actually should be -- that's a typo. This really just refers to April.

Q. Oh, okay.

A. The April forecast. Sorry, that's my mistake.

But in the April forecast, the -- so in April, the shortfall is the baseline year -- is the forecast

supply minus the baseline year demand, and so -- and the forecast supply comes out of the forecast supply models. And those forecast supply model predictions are each reduced as a measure of bias or, essentially, in favor of the senior. They're reduced by one standard deviation. So we don't use the forecast supply that we actually predict; we use less than that.

And so what I'm tabulating here is basically what one standard deviation is for each of the Surface Water Coalition entities in terms of their forecast supply models. And so just off the top of those, you know, again, we focus on Twin Falls where we're reducing, just to be protective, another 50,000 acre-feet.

So maybe these are all reasonable, but they -- individually, it's just important to remember that if we're adding a bias in terms of the demand by choosing a higher baseline year of 60,000 acre-feet, we also have to remember that we're reducing the supply by another 50 -- you know, 50,000. So we're sort of starting with over 100,000 acre-feet of, you know, potential shortfall depending on the year just based on that.

Q. Okay. Thank you.

And then your next section bias in the 2018 baseline year for reasonable carryover, is there

anything new that you need to address here?

A. No. Like I said -- I mean, I didn't do -- I didn't -- I wasn't able to do an analysis of, essentially, a hindcast that would show the difference in curtailment date from -- which is also calculated at the time that there's a shortfall to the reasonable carryover. So I don't have that information.

But what I do have is, essentially, information that was presented to the technical working group that I'm showing in Figure 10 that, basically, just shows how this bias will create shortfall in so many more years in the Fifth Methodology Order compared to the Fourth.

So I'm showing the information from Twin Falls Canal Company, and in the columns labeled either the Fourth Amended Methodology Order or the Fifth Amended Methodology Order, I'm, essentially, highlighting years. And this isn't me; this is information from Matt Anders that he presented to us. It highlights years where a reasonable carryover shortfall would have been calculated.

And you can see that over the period using the Fourth, there was only three years where a carryover shortfall would have been determined, and these are mostly in very dry or dry years.

And then you see with the shift in the baseline year that to 2018 that occurs in the Fifth, we're now looking at, you know, most of the record is going to have a shortfall, and these are going to occur in even average or above-average years.

Q. Thank you.

And then just to close out the section, are there any other sources of bias in the methodology?

A. So I touched on it a little bit that when I reviewed 2018, and I looked at the Department's spreadsheet for, essentially, their adjustment, where they take into account either wheeled water or recharge that has occurred -- and I only did this for 2018, but I think it could be done for other years, and it could, potentially, lower total Surface Water Coalition diversions that we're using in the baseline year. So that's a concern of mine.

But just reviewing 2018, I can see in the spreadsheet that there's, basically, a note -- I think it's for AFRD2 -- that it was reported that either 5,000 or 10,000 acre-feet was recharged, and the Department has only accounted for, in their calculation, 5,000 acre-feet.

And then, additionally, based on the settlement agreement reporting that is submitted by IGWA

to the Surface Water Coalition, it looks to me like there is another 4,000 acre-feet of recharge that occurred in 2018 on the North Side Canal Company that's not included, and so that's about 9,000 -- that's, potentially, 9,000 acre-feet of -- you know, in my opinion, I think just error, but maybe bias in -- in the baseline year that will occur every year -- you know, that it's part of the baseline year, so that will always be there.

And then another -- I think this has been testified to. You know, another just consistent source of bias is that the supplemental groundwater acres as either a reduction in acres or a source of supply is not being taken into account. We don't know what level, I guess, that occurs, but we know it does occur, so that's just consistently in there.

And then I think --

Q. Oh, please continue. Sorry.

A. You know, I think this has maybe been discussed as well, but I think just another source of potential bias in the way the baseline criteria are laid out is that increasing diversions by the Surface Water Coalition entities just, ultimately, result in increasingly higher baseline-year criteria to meet and, ultimately, a higher baseline year determined.

And so there's not really incentive to be efficient with Surface Water Coalition diversions. There's actually, seemingly, just based on the methodology, there's incentive to keep your diversion as high as you can because it ensures that in the future more and more water comes.

Q. Thank you.

One last question: Did you raise the issue of the supplemental groundwater with the Department in the past?

A. Yes. Those were in my comments in 2015, and they were in my comments in 2022.

And I think, you know, from my experience, which has a lot to do with the ESPAM model, I know that we do account for mixed source lands in the ESPAM model and that there is a dataset available. And I saw some notes from Matt Anders that looked like they were prepared for the 2015 technical working group that looked like -- it seemed like he was considering that that dataset from the ESPAM model for mixed source lands could be used in the Methodology Order.

And so it's not clear to me why that can't be advanced or, you know, why we can estimate it in the groundwater model, but we can't in the Methodology Order.

Q. Okay. Thank you.

MS. PATTERSON: Director, we've got one last section of the report to go through, so I think we're about two-thirds of the way done.

HEARING OFFICER: Let's break.

MS. PATTERSON: Okay.

HEARING OFFICER: Let's break for 15 minutes, come back at a quarter to the hour.

(Break taken.)

HEARING OFFICER: Are we back on the record?

COURT REPORTER: Yes.

HEARING OFFICER: Thank you. Mics are on.

Ms. Patterson.

MS. PATTERSON: Thank you.

Q. (BY MS. PATTERSON) Sophia, before we move on to your section on the ESPAM model, I just want to do one item of cleanup.

When we were discussing the irrigated acres, there was a quote from your report that said the "irrigated acres consistently shows that TFCC is irrigating approximately 15,000 acres less than the 194,732" number.

You may have misspoke and said in some of your testimony that it was 15,000 acre-feet. I just want to confirm, did you mean it's 15,000 acres?

A. Yes. Acres.
Q. Thank you.
Moving back to your report on page 30, you have a section called, "Simulation of Curtailment of Junior Groundwater Rights Using the ESPAM Model."
Can you please explain some of the background.
A. The ESPAM model is used in the As-Applied Order to determine the curtailment date that comes up with the -- that meets the demand shortfall obligation. In this section on background, I'm describing the development of the ESPAM model and, essentially, that it's done under the -- it's the Department's model and done under the advisory of what's called the Eastern Snake Plain Hydrological Modeling Committee.
Q. And you said before that you participate in this group, the committee?
A. That's correct.
Q. And so you're quite familiar with the model?
A. Yes. I've been, I think, part of that committee in working with the model for over ten years.
Q. Can you explain a little bit about the model structure?
A. Yeah. So I think in terms of the testimony I'm going to give today, what's important about the model structure is that it's a single layer throughout

the entire model. It's a single-layer model, and it's defined with homogenous isotropic properties, which means that it, basically, doesn't differentiate between horizontal and vertical hydrologic conductivity, which relates to how quickly or easily water moves through the aquifer system.

Q. And then tell us a little bit about the calibration process.

A. Sure. So when you develop a model, you build the structure and you build the boundary conditions that you think best represent reality in a simplified version in the model, and the model is calibrated, basically, over a historical period where you've developed various sets of model input data, like groundwater consumptive use or tributary inflow, and then the model is, basically, calibrated over that historical period. And it's calibrated based on trying to get the best match to historical observations of what are called "model targets."

And those historical observations are typically, things like water levels in the aquifer and reach -- basically, reach gains or spring level -- spring discharge data, so you're -- in calibration you're trying to get the best fit with those historical observations.

With the ESPAM model, they used an automated calibration tool that's called PEST. And the way that PEST works is that the modeler, basically, gets to assign PEST a certain set of parameters that it's allowed to adjust up or down based on ranges that the modeler gives it.

I think in terms of my testimony that I'm going to give today, it's important to understand that the parameters that PEST is allowed to adjust in its model calibration process is aquifer properties like the transmissivity and the storage of the aquifer, and then it's also allowed to adjust water budget components like tributary underflow values and nonirrigated land recharge.

Q. Thank you.

And you've got a section on model uncertainty. Why did you feel it important to discuss this?

A. Yeah. So, you know, all models inherently have model uncertainty. Because of what I said, they're basically a simplification. There's model uncertainty around the target observation that we put in, so when we're trying to get it to match the reach gain, like the near Blackfoot to Minidoka reach, that's subject to just error, like in the observation in the target data, like reach gain error around the gage measurement. But it's

also subject to, essentially, errors that are caused by uncertainty that we have in the water budget components or the aquifer properties themselves.

And so we have uncertainty around, like I said, the aquifer properties in some of those model budget components, and that's why we allow PEST in the calibration process to adjust those. So that's one type of model uncertainty around water budget components.

And then there's another type of model uncertainty that just has to do with how the model is built conceptually and how well that conceptual model matches the reality.

And I think when we look at, basically, the hydrologic controls on the discharge, the near Blackfoot to Minidoka reach, which is the particular prediction that we're using ESPAM for in this surface water delivery call, there's significant limitations in the conceptual model of the ESPAM in that reach.

Q. And you note in your report on page 32 that no amount of data improvement resampling or recalibration can correct errors stemming from incorrect or simply incomplete model conceptualization.

In the Blackfoot to Minidoka reach, are those sort of what you're talking about where there's just some things built in that you're not going to be able to

calibrate around?

A. That's right.

So, you know, PEST is going to do its best to match the model results with the targets no matter how we build the model. And so if you build the model wrong in that area, it's going to match the observation, as well, in terms of the calibration process, but it's not going to match them for the right reasons because it's not built the right way. And I think that's, essentially, the point there.

Q. Thank you.

And under 3.4.2 of your report, you talk about the Blackfoot to Minidoka reach.

Can you explain kind of what you would want to see in the model to address this issue?

A. Sure. So what I'm referring to a lot in this section -- I'm referencing a report that was done in 2008 by Ralston -- I think -- Engineering Services, and it was done for the Department, prepared for the Department. And it's, essentially, a look at how the model -- and they're evaluating ESPAM1.1, I think, based on the date there, but these same conceptualizations, the same in this area in ESPAM2.2, so it all applies.

But it's, essentially, a critique of how the model is built in that area, because they lay out

geologic -- the hydrogeologic framework that shows that the model actually is -- or the aquifer is very -- has multiple aquifer layers and what are called aquatards or impermeable layers within the aquifer that are, essentially, the main controls on what's dictating the discharge in the near Blackfoot to Minidoka reach.

And because the ESPAM model is a single-layer model that doesn't have the vertical hydraulic connectivity represented, it's not able to re-create the flow conditions in terms of the major controls, which it's laid out through the -- based on the geology there, we know that there are significant vertical flow components that lead to the discharge in the near Blackfoot to Minidoka reach.

Q. And on page 33, you have Figure 3-1 and 3-2. Are those figures from the Ralston report?

A. Yes. So these are excerpts from that report that are taken from previous hydrogeologic investigation. And, essentially, what I'm trying to illustrate in 3-1, this shows, basically, the interlayered nature the interfingering of the aquifer system, which is shown in kind of the darker vertical line stippled -- or dashed area, and then the impermeable layers that are shown as kind of the stippled lighter areas in that figure.

And so what happens -- and I think it's, basically, what is controlling the discharge to the near Blackfoot to Minidoka reach -- is that the main aquifer system, basically, encounters these very impermeable layers in the vicinity of the American Falls reach, and that forces -- because they can't move through these impermeable layers, it forces the water to discharge to that reach, but it's going to be discharging vertically, basically, through these interconnected hydrologic aquifers.

Q. Okay. Thank you.

So if I understand, that section relates to kind of the framework of the model and, you know, issues that might be there?

Can you explain 3 -- 3.4.3 section on page 34 of your report?

A. Yeah. So what we just went over were, essentially, the aspects of the conceptual model uncertainty. What this section talks about is uncertainty around our input parameters, and so what I'm referring to in this particular section is the aquifer properties.

And so the aquifer properties are transmissivity and storage, and those two combine to, basically, control how quickly or slowly water will move

through a system. So if we think about the curtailment simulation for the Methodology Order, it's, essentially -- controls how a reduction in groundwater pumping in one area will propagate to the near Blackfoot to Minidoka reach will be based on those aquifer properties, and we have uncertainty in those aquifer properties.

And so they're something that are adjusted during model calibration, and so we'll get -- these will change as new -- as each new version of the model comes out. And so that's, more or less, what I'm describing, kind of the evolution of these properties with the versions of the model.

Q. So why don't you, then, explain your next section, which compares ESPAM1.1 to 2.2?

A. So are we looking at, like, Figure 3-3?

Q. Yes. And that is on page 36.

A. So here in this figure, I'm, basically, showing -- I know you can't read these figures -- and so I'm showing the distribution of one of those terms, "transmissivity," so sort of the resistance to which water can move through the system. What I'm showing for each version of the model is the mean transmissivity, and so you can see how these values from ESPAM1.1 to 2.1 -- and then change.

I've got -- on the left side of this figure, I'm describing the ESPAM2.2 model that was proposed to the Eastern Snake Plain Hydrologic Modeling Committee in January of 2020, and then I'm also showing, above that, the actual version of ESPAM2.2 that was accepted, which was proposed in September of 2020.

And what I'm going through -- the reason I'm going through this evolution in this section is that when the version that was proposed in January was presented to the Eastern Snake Plain Hydrologic Modeling Committee, I did a review of the model, basically, looking at how the calibration -- how the calibration had turned out. And then, as I've mentioned prior in testimony, I do a lot of analysis for my clients, IGWA, around using the model.

And so I ran the model -- I ran some of those basic analyses that I do all the time with the new version of the model, and I was seeing really, really drastic changes in terms of what it was predicting for water levels, like at the sentinel wells, for example, or what it was predicting in terms of what responses to recharge activities were going to be.

And so in January, I raised those concerns to the committee saying that, essentially, the changes that we were seeing -- that I was seeing in the model -- I

think were hard to explain based on the structural changes that we made to the model. And I just -- I had concerns about -- particularly, one of the main inputs that we had changed to the model was one of the water budget components.

It was, essentially, introducing the METRIC data to calculate consumptive use. And I thought that that was probably a likely change for -- you know, I thought that that input and, then, how the model dealt with that input, in terms of its calibration, was kind of -- was a likely change for what we were seeing in terms of such widespread differences in aquifer transmissivity.

And then particularly if we go to the next figure, that shows the same thing for storage in terms of the evolution between the models and the storage values average across, there again, changing very drastically. And that's really, really changing the type of model predictions that we're getting.

So I just raised this concern to the committee; that I thought before we release this version of the model, there was some things that I thought we should analyze, to check out to make sure that we were comfortable with what was resulting from the calibration.

Q. Okay. When you said "the next figure," are you referring to Figure 3-4 on page 37?

A. Yes. So this shows the storage, which, ultimately, I think, was probably one of the main drivers for the differences that we are seeing in predictions in terms of water levels and responses for reach gains -- through reach gains.

Q. Moving to the next page, 38, you have Figure 3-5.

Can you explain this chart?

A. Yeah, so in this chart, I think you should focus on the yellow lines in this figure. And, essentially, this is a really standard analysis that the Department does with any version of the model that they release, and it shows a curtailment response. In this case, we're looking at curtailment of groundwater rights junior to 1961.

And the dashed yellow line shows the response to the near Blackfoot to Neeley reach using version ESPAM2.1, and the solid line shows the predicted response to that reach using ESPAM -- the accepted version of ESPAM2.2.

Q. And what does this difference mean?

A. So these are -- it's just a difference in what it predicts under the different model version. And I

think it's about a 20 percent difference in terms of what they predict. And the difference in the prediction has to do with, essentially, what I was talking about, how those aquifer parameters influence the timing of responses from a reduction in groundwater and how that moves to the reach.

Q. And then can you explain Figure 3-6?

A. This compares, again, the ESPAM2.2 and ESPAM2.1, what the steady state response function is, so the percentage of water from each model cell that would result in -- essentially, if you stressed any one of these model cells, the percentage of that stress that would impact the near Blackfoot to Neeley reach under steady state conditions.

And so, again, just the difference in the distribution of these shows the difference in the timing and -- that results from changing to this new version of the model.

Q. You discuss, on page 39, the ESPAM water budget component uncertainty and the current model.

Can you just go through that and explain some of the uncertainties?

A. Yes. So this was related to the concern that I brought up to the committee in January of 2020 when they proposed their first, potentially, version of

ESPAM2.2. And the differences I saw is basically what I reviewed from calibration -- from the calibration results where I had mentioned that PEST, the tool, is allowed to adjust water budget components up or down to better match the observed targets.

And if we turn to -- you're looking at Figure 3-7; is that what you're looking at?

Q. Yes, on page 40.

A. Yes. So when you look at Figure 3-7, the initial estimate for -- what I'm showing on the left there is the initial estimate for the volume of annual recharge -- natural recharge to the reach. And what we see -- precalibration is the blue line, and postcalibration is the orange line.

And what we see is that PEST is trying -- so that it's able to match the observation, it's increasing the amount of natural recharge components across the ESPAM model pretty significantly. And I've put a couple of those components on the right side of the graph where the lines represent the same thing.

Blue is precalibration and orange is postcalibration, and we're looking at tributary underflow, and then we're looking at recharge on nonirrigated lands. And so what we see is that for the model to be able to calibrate, it's having to increase

the amount of tributary underflow or nonirrigated land recharge to compensate for that.

And what we saw -- what we saw in the storage is that we also saw the model had to significantly increase its aquifer storage values.

And all of these things combined tell me that it seems like PEST it trying to adjust for the fact that we're taking too much water out of it. It's working really hard in calibration to get more water into the model wherever it can, either by increasing the aquifer's storage or by increasing these water budget components.

And so I had questioned to the committee -- because I was part of --

COURT REPORTER: I'm sorry, Ms. Sigstedt, I think I missed a little bit. "And so I had questioned to the committee"?

THE WITNESS: I questioned to the committee the use of the METRIC processing that we were using.

Q. (BY MS. PATTERSON) Okay. Go ahead and continue from there.

A. And the reason that I questioned the METRIC processing was because I was part of a technical working group that discussed how the METRIC data would be processed, and I remembered that they were choosing,

basically, whether to apply a buffer or sort of an increase in the area around the actual field irrigated area to -- they were trying to decide what buffer area they would use to process the METRIC data.

And I remembered in that committee that there wasn't really a well-justified reason for the buffer that they ultimately decided that -- they were considering like two or three different buffer areas, and, ultimately, they just chose the largest one which had resulted in the largest estimate of ET. And I was concerned that maybe it was that processing that was creating us to overestimate the METRIC application in ESPAM that results in one of the largest model components, which is the groundwater consumptive use component of the water budget.

And so in my recommendations to the committee in 2020 when they proposed this model was that they do a sensitivity analysis around that processing and just either try and verify the processing they were using by looking at, you know, a field verification or something like that or, like, an on-the-ground verification of the number that they were using or just test the model to the sensitivity of using -- of processing the data some of the other ways that they proposed and see if one of those helped with this calibration or how much it

influenced the calibration.

Q. So was the idea trying different methods, running through and seeing kind of what the parameters look like on Figure 7.3, and seeing if those improve with different runs?

Was that the sensitivity you were requesting?

A. Exactly, just seeing how it changed. So if we tried some of the other processing methods, would the -- would this preimposed calibration of, you know, the tributary underflow or the -- the nonirrigated lands recharge, would PEST seem to adjust those less.

And then on the -- like I said, the storage value, the change in the aquifer storage value, was something I was really concerned with, mainly because in calibration, we have a preferred value for that storage. It's something around.205. And you can see that, if you look at the evolution of that figure, each version of ESPAM2.2 is moving further away from that. And so to see if our -- the change in the storage wasn't as drastic testing the sensitivity to that under the different processing method.

Q. Thank you.

Can we move to page 41, Figure 3.8, and can you explain to me what this addresses.

A. So ultimately, the Department chose not to

take the recommendation that I gave in January to test those parameters, and they did do some -- I think they extended the model calibration period, which was another recommendation I made, before they proposed another version of this model of this ESPAM2.2 model in September, and in September they asked for the committee to, basically, have a vote to accept that model. That was, ultimately, the version that was adopted as ESPAM2.2.

Following that meeting, the Department asked for recommendations from the committee about future improvements to ESPAM, we just start working on the next version of the model immediately. In those recommendations to the committee, I again brought up this issue that I discussed around, you know, some kind of verification of the METRIC processing.

Ultimately, the Department did do that, and when they looked at sort of a preliminary field investigation of the processing and then they also compared their METRIC processing to some open source metric.

So the in-field investigation looked at using the diversion data compared to the METRIC processing, kind of a field-by-field basis, and then they also compared their METRIC processing method to just some

open source ET data. There's a couple of different sources they could see. And what they consistently saw was that their method produced a much higher ET rate than any of the open source data or the comparison to the diversion data.

And so they consulted with ET -- or more like METRIC specialists or experts -- and they, basically, reviewed the processing method the Department was using, and they did say that it should be -- that that was probably not the correct way to do it and that they had a different recommendation for how that processing should be done. And then the Department has basically done an initially recalibration using an alternative processing of the METRIC data, and that's what I'm showing in Figure 3-8.

So on the right side of this figure is the current ESPAM model for those same aquifer properties we were looking at, transmissivity and aquifer storage; and then on the left is the preliminary recalibration of the model. And so, you know, particularly for storage, what you see is that the value is going down, you know, is a lower -- closer to that preferred value of .05 that we have.

And then if we move on to the next figure, which is 3-9, I've highlighted -- or this is really,

actually, Jennifer's figure, where she's highlighted some of these water budget components that I touched on.

So we've got the ESPAM2.2 value shown in green for the water budget component, and then we have the precalibration refined METRIC processing value shown in gray. And then we have the postcalibrated with the new processing method shown in blue.

And so what you see is that this eliminates that concern that I highlighted earlier where when you compare the gray bar to the blue bar, which is precalibration versus postcalibration, we see that the -- that FS isn't having to adjust those model parameters anymore. Precalibration and postcalibration, the values are pretty similar.

But also what we see is that there's a huge difference in some of these components. Like, I think, nonirrigated recharge and tributary underflow, we're looking at like 300,000 acre-feet differences between ESPAM2.2 and this preliminary calibration model; and for groundwater CIR, we're looking at a difference of like 600,000 acre-feet.

So what this highlight s for me and the reason that I'm bringing it up here is that we just have significant uncertainty in these model -- these water budget components right now in the model, and it's

leading to significant uncertainty because of the way the model is calibrated, and it's able to adjust both water budget and aquifer parameters. At the same time, it's leading to significant uncertainty in the water budget -- I mean, in the aquifer parameters.

And, you know, this preliminary calibration, the storage value that we see, is getting a little closer to, you know -- a little closer to what was in 2.1. And so when I showed you, before, the response from curtailment, the difference between 2.2 and 2.1, we're, again, going to see a shift whenever the next version of the model is released, which, you know, won't be for years, probably. But it will again change that prediction. And we sort of already know at this point that it's wrong.

Q. Thank you.

Let's move next to Section 3.4.4, and if you can just explain this section and the Table 3-1.

A. Yeah, so this is just a section that kind of describes some of my conclusions, again just kind of relating the fact that we have this aquifer uncertainty and that it -- I mean, that we have this model uncertainty -- and that it directly affects the prediction that we're making at this near Blackfoot to Minidoka reach for the methodology.

The table is an analysis that was done by Jaxon Higgs, who couldn't be here to testify, so I went over the analysis with him, and I'm going to testify on it today.

And, essentially, what it lays out is -- it takes the model files that the Department produced as background data for the current curtailment date for this April As-Applied Order, and it splits it into -- it splits it geographically by groundwater district to see how each district's reduction in pumping affects the near Blackfoot to Minidoka reach.

And so if I just go through the columns, we've got the first column is just IGWA's proportionate share broken down by districts that comes from that curtailment.

And then if we move to the column that is the transient May-through-September impact, that's, basically, by district what impact comes -- you know, what will show up within that first season from the curtailment for each district. And then the next column shows the curtailment volume, so the amount of acre-feet curtailed within each district. And then the next column is basically the ratio of those two.

And so what we see is that the response from each groundwater district, because of its distance or

hydrologic connection to this reach, is really variable in terms of the type of benefit that we get for how you curtail to near Blackfoot to Minidoka reach gain.

And, you know, particularly if we go to some of these districts at the bottom and we look at, like, Jefferson Clark, Magic Valley, North Snake, we see -- and then, you know, we can see that the response to what they get at the reach is extremely low compared to what they have to curtail.

And so, again, moving through this column, there's the next column that, basically, tabulates by district the number of acres that are curtailed. And so we can see, just kind of adding up some of those bottom districts with the lowest response, we're talking about in the vicinity of 300-, 400,000 acres that are curtailed that have almost no in-season benefit to the near Blackfoot to Minidoka reach.

And I think that those are probably my main conclusions from this.

Q. Thank you.

A. I guess -- actually, I guess it is also interesting to look at the next two columns, which is percent of acres curtailed, and you can just -- again, just illustrates for a year like this, using the transient model -- for a lot of these districts, you're

talking about, you know, 70 to 97 percent of the groundwater acres in those districts are curtailed under this type of curtailment date.

Q. Thank you.

The last section is your summary of conclusions. I think we can go without you reading these on the record, and I will just move to admit Exhibit 837.

HEARING OFFICER: Any objection from the parties?

Hearing no objection, the document marked as Exhibit 837 is received into evidence.

(Exhibit 837 received.)

MS. PATTERSON: And that will be -- I'm done.

HEARING OFFICER: Any further questions of Ms. Sigstedt from the groundwater users group?

MS. McHUGH: I have questions.

HEARING OFFICER: Ms. McHugh?

MS. McHUGH: Should I sit there?

HEARING OFFICER: You're welcome to sit here.

DIRECT EXAMINATION

QUESTIONS BY MS. McHUGH:

Q. Good morning, Sophia. I just had -- I wanted to make sure I understood your testimony correctly

relevant -- I think it's to Exhibit 826. It's a table where you did a hindcast. It's Table 2-8, the hindcast of what the impact is for using 2018 as a baseline year.

A. Okay.

Q. And I just wanted to ask you about -- just make sure I understood your testimony about what you would expect going forward now using the 2018 baseline year.

A. I think we can expect that in most years, the aquifer is going to be curtailed to pretty much -- potentially, it's -- all of the junior groundwater acres are going to be curtailed more than half of the time, 60 percent of the time if we just use the hindcast.

And then using -- also looking at the hindcast, we can see that there's only four years out of this 20-year period where less than 300,000 acre-feet of junior groundwater acres are curtailed. So I think, you know, almost every year you're going to see more or at least 300,000 acre-feet of junior groundwater pumper acres curtailed using the 2018 as the baseline year.

Q. And when you say -- when you mean "curtail," you're meaning that in the analysis for the As-Applied Order in April, there will be a forecast of shortage to at least one member of the Surface Water Coalition; and what I understood you to say over -- in at least

66 percent of the years going forward?
A. I think 60 percent of the years.
Q. Okay.
MS. McHUGH: That's all I wanted to ask. Thank you.
HEARING OFFICER: Okay. Other questions from the groundwater group?
All right. Cross-examination.
Mr. Simpson.
MR. SIMPSON: Yes. If we could go off the record for a moment. I can move all my stuff up there and get organized.
HEARING OFFICER: Yes. Okay. Let's go off the record.
(Break taken.)
HEARING OFFICER: Let's go back on the record, Andrea. We're recording.
Thank you, Mr. Simpson. You may examine Ms. Sigstedt.

CROSS-EXAMINATION

QUESTIONS BY MR. SIMPSON:
Q. Ms. Sigstedt, good morning. My name is John Simpson. I'm one of the attorneys for A&B Irrigation District, et al., and I'll be cross-examining you this

morning.

Is it okay if I call you "Sophia"?

A. Yes, that's fine.

Q. Thank you. So, Sophia, from your direct testimony this morning, you've been working on these issues on conjunctive management on the ESPA for well over ten years; is that correct?

A. I think, yeah, over ten years.

Q. Okay. And during that time, you've been retained by IGWA specifically for those efforts?

A. That's correct.

Q. And you mentioned in your direct testimony that in approximately 2012, around the time you started working for IGWA, you worked on the modeling in the Rangen case.

Do you recall that testimony?

A. Yes.

Q. And in that case, did you use the ESPA model as a part of your tasks that you performed on behalf of IGWA?

A. Yes.

Q. Okay. And did you use that ESPA model in the version that was then present because it was the best science that was available for your efforts?

A. I think so.

Q. Okay. If it was the best science available at that time, would you agree that it's the best science available today to estimate or predict the responses of the aquifer to stresses such as groundwater pumping?

A. I do.

Q. And that would include stresses in every reach of the Snake River, including the near Blackfoot to Minidoka reach?

A. Yes.

Q. And in using the model, have you used it in both the steady state and the transient version?

A. Yes.

Q. And in your opinion, is the transient version of the model and running of the model the best predictor of what would need to be accomplished on the aquifer to deliver water into the Blackfoot to Neeley reach -- or excuse me -- the Blackfoot to Minidoka reach?

A. Over what time period?

Q. In the -- in the present irrigation season.

A. I think it's the only version that can predict in the present year of irrigation season.

Q. So if we're attempting to use the model to identify what actions need to be taken on the ESPA to deliver a volume of water into the Blackfoot to Minidoka reach during the irrigation season, the transient model

would be the only version to use; is that correct?

A. That's correct.

Q. During your direct testimony, Sophia, you discussed the efforts in early 2015 by the technical work group.

Do you recall that testimony?

A. For the Surface Water Coalition technical working group?

Q. Yes.

A. Yes.

Q. And in looking at the comments that were provided by you on behalf of IGWA and then the recommendations made by Department staff to the Director as a result of those efforts, do you recall the time frame under which those comments were made?

A. I think you would look at the dates of the memos. I think mine were in March.

Q. Right. And so, I mean, you testified that there was a limitation of time -- a limitation of time at that point that limited the number of issues to be discussed or recommendations to be made.

Do you recall that testimony?

A. That was in the Department's conclusions and their recommendations.

Q. And do you believe that limitation was in

reference to the work that was completed in March of 2015 relative to the irrigation season that was then pending?

A. I don't know.

Q. You testified earlier today regarding the -- on page -- I believe it's on page 10 of your report Table 2-3, if you'd turn to that, please.

And this is a summary of the SWC irrigated acres, the 2022 technical work group, is it not?

A. That's correct.

Q. And you described earlier the various columns and the basis for the various columns, that is either the shapefiles or the irrigated lands datasets that were generated by the Department; is that correct?

A. That's correct.

Q. And would you agree that for the irrigated lands dataset, the 2011 or the 2017 or the METRIC processing acres 2021, that those are just a snapshot in time?

A. Yes.

Q. So at that particular point in time, whatever's identified with respect to those datasets, the number of irrigated acres identified would be relevant, but you can't, necessarily, draw conclusions as to what's happening before or after that particular

snapshot; is that correct?

A. I think that there's evidence that they don't change that much between them, if you look at what I focused on here for Twin Falls Canal Company between 2017 -- or 2011 and 2017. And I think that that's the reason that, for example, in the modeling for, you know, years that we don't have the intervening data, we just use whatever the most recent data is because we have some confidence that the level of difference is not going to be that great.

Q. But, for example, between 2011 and 2017, you don't have an irrigated lands dataset for 2013, do you?

A. I actually think there is, potentially, irrigated lands datasets for every year in between this, based on the information that I saw on a Department information page. But I haven't verified those in the archive, but I think there are additional years to what's shown here.

Q. So for 2013, for example, what irrigated land figure would you utilize? Would you use an unknown number that you haven't calculated for 2013, or would you use the shapefile acres for SWC members and specifically for Twin Falls?

A. I think that the change that you see -- I think that they should be updated relative to each

other. So in my opinion, in 2013, the shapefile that was submitted by SWC should have been verified against the 2011 irrigated lands dataset as well as against the acres identified in the SPF report that were accepted previously in the methodology to confirm that either those acres were still nonirrigated or that they had somehow changed to be irrigated.

Q. But would you agree that, in 2013, the best information available to the Department was the SWC shapefile for Twin Falls Canal Company?

A. No. Because the Department really made it clear that they don't verify the acres that are submitted from the Surface Water Coalition entities to identify nonirrigated acres, and those efforts to identify nonirrigated acres are done in other datasets.

Q. So within the irrigated lands dataset, can you explain to me what the difference is between semi-irrigated and irrigated lands?

A. Semi-irrigated is a classification that, like, a subdivision or a developed area would be classified into. And irrigated are, you know, purely irrigation lands like an agricultural field.

Q. And do you know the time of the year that the irrigated lands dataset was generated, for example, in the spring or in the midsummer? Late fall?

A. I think that they use, you know, a variety of different sources that probably all -- they use satellite imagery, they use aerial imagery, so the dates on all of those are going to vary.

Q. So would you agree that, depending upon the date of a photograph of -- showing irrigated acres, if it was in the early spring, that later in the spring or later in the summer that those particular lines might be irrigated if they previously were shown as not irrigated?

A. I think the point of generating the irrigated lands dataset is specifically to characterize irrigated acres for the consumptive use calculation used in the model. So I think their, you know -- their method is based around trying to capture that as best they can. I don't know the dates or how they make sure that that is true.

Q. So now turning to your testimony on the baseline year, is it fair to say that your -- the issue you draw with utilizing the base year 2018 as the new baseline year under the Fifth Methodology Order was that it was above the average for looking at all years?

A. I think relative to previous baseline years that have been selected in previous orders, it's a higher percentage than have been selected previously.

And my testimony is that it is possible to select something that's more consistent with the baseline year that has been adopted in previous methodologies.

Q. So more consistent with being closer to the average as opposed to more conservative in terms of baseline year demand?

A. Yes, more consistent with the previous percent of average.

Q. So do you have an understanding of why the Department picks a baseline year that's above average?

A. They're trying to give the senior adequate protection.

Q. Protection against what?

A. I think protection that they're going to have the supplies that they need to meet demands in the next coming season.

Q. And do you know why they, the Department or the -- in the Methodology Order -- identify an above-average year as opposed to a below-average year? Is it because of a court determination that requires that?

Do you have a general understanding?

A. I have seen, I think, that language that you're referring to.

Q. You've reviewed that language?

A. I've seen it before. I think it was in one of your expert reports.

Q. Okay. With respect to the baseline year and your testimony regarding looking at 2018 as a baseline year, do you recall your testimony regarding above-average years and the potential for lax operations -- I wrote it down; you used that phrase "lax operations" -- by project managers in terms of delivering water?

Do you recall that testimony?

A. Yes. I think that I was referring to water supply outlooks in 2018 based on the snowpack that occurred in that year. People had confidence, I think, at that time that it wasn't going to be a constrained water supply year, that there would be recharge opportunity.

COURT REPORTER: I'm sorry, can you repeat that last part again.

THE WITNESS: That there would be recharge opportunity.

COURT REPORTER: Thank you.

Q. (BY MR. SIMPSON) How does recharge opportunity relate to project managers delivering their water supply?

A. I don't know that they do.

Q. So I took what you said when you said "lax operations" for the projects, that managers weren't as careful when they deliver water in a year like 2018.

Would that be a correct conclusion?

A. I think I'm just saying that that's possible. I know that I think -- or I think that it's easier to run operations with higher volumes through the system, and if you know that it's not going to be constrained, maybe you would want to have your operations be easier. But I don't know that.

Q. You don't have any evidence that shows that; is that correct?

A. That's correct.

Q. So in your testimony we discussed -- -- strike that.

You discussed the issue of reasonable carryover and how a modification in the baseline year resulted in a change in reasonable carryover for SWC members.

Do you recall that testimony?

A. Yes.

Q. And that that change increased the carryover figures for many of the SWC members; correct?

A. Correct.

Q. Do you have an understanding with respect to

the methodology and the identification of reasonable carryover and what the purpose of reasonable carryover is?

A. I identified that in my report as something that I would like to have given more consideration if I had more time. It's something that I am less familiar with at this time in terms of what all of the considerations around reasonable carryover are, and it's something that was not presented to the technical working group in 2022.

Q. So with respect to the purpose of reasonable carryover, you don't have a clear understanding of why it's identified in the methodology?

A. I mean, I think it's to protect that you have adequate supplies for the next irrigation season. That's the purpose of your reservoirs, are to carry over supplies when you need them.

Q. So the purpose of that carryover figure is to protect the SWC members and to ensure that they have an adequate water supply for the following year?

A. That's my understanding.

Q. And in the context of your testimony regarding bias being built into the reasonable carryover, how does that bias impact the reasonable carryover figure?

A. In my report and in my testimony, I think I'm

being specific to how the selection of the baseline year is affecting reasonable carryover. And so it's kind of just related to the fact that I think, compared to previous baseline year determinations in previous orders, 2018 is a further bias in terms of how it predicts demand needs.

Q. Sophia, with respect to the Methodology Order, would you agree that the purpose of that Methodology Order is to ensure that the injured party receives water when they need it?

A. I think that is a fair statement.

Q. When you were testifying as to forecast supply, you identified some concerns regarding the continued use of Box Canyon as part of the forecasted supply determination in the As-Applied Order for April.

Do you recall that testimony?

A. Yes.

Q. So earlier, Sophia, you testified that you had been involved in the Rangen call, so you have a general understanding of the ESPA and ongoing efforts on the ESPA regarding recharge efforts and other efforts throughout that area?

A. I think so.

Q. So do you have a general understanding that a number of the Water Resource Board's activities with

respect to managed recharge are occurring in the lower valley, that is, diversions occurring below American Falls?

A. I would say most of the Board's recharge is in the lower valley.

Q. And with respect to that recharge that's occurring in the lower valley, do you have an understanding that most of the benefits from that recharge have propagated into the reaches below Milner?

A. I think that that is true.

Q. And could that -- those efforts by the Board influencing the Box Canyon and the issue that you raise with respect to the R-squared values associated with Box Canyon as a reasonable forecast tool?

A. I think that those recharge efforts influence the discharge at Box Canyon.

Q. So if those recharge efforts were leading to the overprediction of the discharge from Box Canyon, could that have an impact on the forecasted supply in April for SWC members?

A. It would be a matter of looking at the timing of that, the timing of when they -- what discharge measurement timing is on the predictor versus the response timing of that recharge to that spring.

Q. And so if you've identified concerns about the

R-squared relationship at Box Canyon and the use of Box Canyon as a part of the forecasted water supply, until a change is made, how would you respond to this uncertainty?

A. I think the Department has responded to that uncertainty, and that's, you know, one of the reasons that they take the standard deviation below in favor of the Surface Water Coalition. They -- any uncertainty they have taken there, that's how they address it.

Q. So with those additional questions that you've raised or uncertainty that you've raised with respect to Box Canyon, would you agree that taking a conservative approach is warranted?

A. I think that's the Department's discretion in terms of how they want to take that approach, and they've chosen a wide margin on how much conservatism or bias that they want to -- that they've applied there. So it's, in my opinion, one standard deviation is very significant in terms of the reduction.

Q. Sophia, if you could turn to page 34 of your report.

A. Would you mind giving me a section header?

Q. Yeah. On page 34 of your report. At the top of that page, you discuss -- or state that: [As read] "the ESPAM transmissivity does not fit the

hydrogeological characteristics of the near Blackfoot to Minidoka reach region."

Do you see that at the top of the page?

A. Is that the paragraph right above Section 3.4.3?

Q. It is.

A. Yeah.

Q. So can you explain to me why that transmissivity does not fit?

A. Sure. So if we look at the Figure 33 -- 3-3 -- and this was something that was criticized or brought to the Department's attention in the Ralston report that was prepared for them, which I think would have been referring to ESPAM1.1, based on the date of that, but I think you can see it has persisted in all of these.

And, essentially, it's that if you just look at where the American Falls Reservoir is positioned in terms of the transmissivity, it's in a pretty high -- so the transmissivity values on these, the darker color, the higher the transmissivity is.

And so you can see that in all of these models kind of in the vicinity of that American Falls reach, it's of those higher transmissivity colors, and the geology, basically, the presence of these interfingering

impermeable units would specify that you should have lower transmissivity in that American Falls area and to the southwest.

And that's, you know, a function of what causes the discharge to that near Blackfoot to Neeley reach to come up before the reservoir. Basically, all the springs are kind of -- to the -- to the east.

Q. And is part of your opinion based upon the fact that we have a single-layer model instead of a multilayer model?

A. Yes. I mean, that's separate from just the comment on the transmissivity. But perhaps the inappropriate -- perhaps that if the model had the multiple layers that it should in that area, the transmissivity would work itself out.

Q. Is it ever appropriate to represent a multilayer geologic system with a single-layer groundwater model?

A. In my professional career, and I've built a lot of models, I've never built a single-layer model, even when I'm doing -- representing an alluvial aquifer system on a short reach of river. Because I was taught that even in just an alluvial environment, the vertical hydraulic conductivity is less than the horizontal hydraulic conductivity, I will have multiple layers so

that I can represent that anisotropy.

Q. Do you know why ESPAM uses a single layer?

A. I've heard the Department talk about maybe they don't have the data to support multiple layers. But, you know, in my review of just kind of the information that's available out there, there's some hydrogeologic studies done for the RASA project, which is Regional Aquifer-System -- I can't remember exactly. But back in the '90s, they had, you know, I think a four-layer model of the Eastern Snake Plain. So it's really at the modeler's discretion.

Q. And is that an issue you bring up in the modeling committee that you're a part of?

A. Yes.

Q. Does the MODFLOW river package allow for the representation of low permeability impacts of fine grain sediments in the area in the Black- -- near Blackfoot to Minidoka area?

A. MODFLOW is capable of representing multiple layers, and you can parameterize those to represent those impermeable characteristics.

In particular, ESPAM2.2 moved to a version of MODFLOW that's called MODFLOW USG, which stands for unstructured grain. And it's very -- it's very flexible, in that it allows you to put in layers in just

certain parts of the aquifer. It doesn't have to be across the whole region.

Q. Right. So the river package can control the interactions of the river and the reservoir?

A. Yes. The river package has a conductance value that, exactly that, is very controlling in terms of how it interacts with the groundwater -- the regional groundwater levels.

Q. So with respect to the near Blackfoot to Minidoka reach, is this how the interactions with respect to reach gains are represented in that area?

A. I mean, the boundary conditions as they're -- as they exist in MODFLOW are implemented throughout the model and including this reach.

Q. Sophia, in your testimony you discussed confidence in ESPAM2.2 predictions in the near Blackfoot to Minidoka reach gain, and you make comparisons between ESPAM2.1 and 2.2 --

A. Yes.

Q. -- I believe specifically stating that those differences in reach gain predictions indicate uncertainty in the model.

Is that your testimony?

A. Yes. I think they're a reflection of uncertainty that we have in aquifer parameters and water

budget components.

Q. But aren't those differences due primarily to improvements in 2.2 from 2.1 that more accurately calculate reach gains?

A. I think that there are localized improvements that were done in ESPAM2.2, so I think that's true. But I don't think that -- I don't think that that is -- I think it's separate from just kind of general model uncertainty that we have in prediction from these other components; like model -- like conceptual uncertainty and input parameter uncertainty, they still exist.

Q. Would you agree that we're going to always have some level of uncertainty when we're dealing with a model?

A. I agree with that. What I'm highlighting in my report here is very specific issues around water budget components for consumptive use and a known problem that will impact the response to this reach in a similar fashion that was, you know, a change that we saw from 2.1 to 2.2.

Q. So do you have a recommendation for a better way to estimate near Blackfoot to Minidoka reach gains?

A. I think my recommendation, which is, you know, something that the Department puts in their calibration report, is that because we have this model uncertainty,

that uncertainty should be taken into account when using it in water resource applications and administration.

And so I think in my report I'm advocating to consider a trim line as a potential -- a potential to just recognize that there is uncertainty in some of the -- in the prediction that we're making.

Q. So you've used this term "trim line." What's your definition of a trim line?

A. I think in applications that I'm familiar with, it's often based on a response to the reach or a feature. Like, I think in Rangen, they used the Great Rift where the response beyond that feature they have less certainty in.

Q. So with respect to the application of a trim line, do you think that junior groundwater pumpers are responsible for mitigating their impacts to senior surface water rights?

MS. PATTERSON: Object. Objection. This is outside the scope of her report, and it calls for --

HEARING OFFICER: Am I hearing an objection?

MS. PATTERSON: Yes. Objection. Sorry.

HEARING OFFICER: You'll need to speak up loudly, I think.

MS. PATTERSON: It's outside the scope of her report, and it calls for a legal conclusion.

MR. SIMPSON: Well, Mr. Director, she's testifying as to her perspective or her testimony regarding the application of a trim line, and that's what my question was based upon.

HEARING OFFICER: Overruled.

Answer the question, please, Ms. Sigstedt.

THE WITNESS: Can you repeat the question.

Q. (BY MR. SIMPSON) You testified a few moments ago about the application of a trim line, and my question that I asked you was: Do you believe that junior groundwater pumpers are responsible for mitigating their impacts to senior surface water rights?

A. I think that water users are, you know, ruled by state administration's rules.

Q. So if it's determined that junior groundwater pumping is impacting a senior surface water right, then they would have the obligation to mitigate for that impact?

A. I mean, however that's determined. Like I said, a trim line has been used with the ESPAM model in previous rulings and, you know, however that's applied or not applied is what the obligation is.

MR. SIMPSON: That's all the questions I have.

HEARING OFFICER: Did you have further cross-examination, Mr. Fletcher?

MR. FLETCHER: Yes, I have just two lines of TJ's version of 30 minutes from yesterday, if that's okay, unless you want to break right now.

HEARING OFFICER: What does everybody want to do? I'm sure we'll have some redirect.

MS. PATTERSON: We will have some redirect, but we're happy to have Kent do this questioning.

HEARING OFFICER: I just wonder whether we can get through Ms. Sigstedt before lunch. My guess is we will end up with a late lunch.

Let's break right now and come back a quarter after and you may ask your questions then, Mr. Fletcher.

So let's break for lunch and come back in an hour, at a quarter after 1:00. Thank you.

(Break taken.)

HEARING OFFICER: We're recording again after the lunch recess.

Mr. Fletcher, you may cross-examine Ms. Sigstedt.

MR. FLETCHER: Ms. Sigstedt, are you on the phone?

HEARING OFFICER: Perhaps she's not.

MR. FLETCHER: Unless the name's changed.

THE WITNESS: Can you hear me? Can you hear me?

MR. FLETCHER: There you are.

HEARING OFFICER: There you are.

CROSS-EXAMINATION

QUESTIONS BY MR. FLETCHER:

Q. Good afternoon. My name is Kent Fletcher. I represent Minidoka Irrigation District and American Falls Reservoir District 2, and I just have two areas I'd like to ask you a few questions concerning.

And the first one is, in this proceeding, there's been a lot of discussion about the number of acres of the SWC members and how they're calculated and that, as I understand your report, you believe the number of acres in the methodology are overstated for Twin Falls Canal Company; isn't that correct?

A. That's correct.

Q. But one thing that hasn't been discussed at all is if the number of acres are changed, don't other changes have to be made to the methodology?

How does the change in the number of acres affect the methodology?

A. It's used in the calculation of crop water need.

Q. Where else is it used?

A. That's the main thing that I can think about.

Q. Is it used in the determination of project efficiency?

A. I think project efficiency is calculated using crop water need and the diversions, so I think the change to crop water need affects the project efficiency calculation.

Q. And the crop water need is based upon acreage, correct, to some degree?

A. Correct.

Q. So if you went back -- if you change the number of acres, you'd have to recalculate the efficiency of the entity; correct?

A. So in my report, I'm changing the value of the acres using the Department's reasonable in-season demand sheet. And I believe I can see it changing the calculation of the project efficiency in there. So in the example I provide, I think that is taken care of, unless I'm missing something.

Q. Well, you said that the use of a different -- of the higher acres number creates what you referred to as an erroneous shortfall; correct?

A. Correct.

Q. But if you adjusted efficiency to take into account the adjustment in acres and the same amount of water was diverted, the shortfall would be the same;

isn't that correct?

A. I mean, it doesn't seem so. I do see the project efficiencies go down when I change the irrigated acres, but I'm still calculating a difference in the shortfall.

Q. How much would it adjust the shortfall?

A. We can look at my table. So if you look at page 27 of Exhibit 387, I have recalculated the shortfall changing the irrigated acres for Twin Falls Canal Company in the reasonable in-season demand calculation sheet, which, like I said, it seems to be changing the project efficiency. And those are the shortfalls, the difference.

Q. Did you recalculate the efficiency as part of that?

A. Like I said, to me, they seem to be updating in the sheet as a function of the crop water need, so I do see a change in the project efficiency.

Q. So that was really the point I was trying to make. It is true that if you do redo the acres, you have to adjust the project efficiency as well as the crop water need; correct?

A. That's how the calculation sheet works, to my understanding.

Q. The other area I would like to go into dealt

with the transient versus steady state analysis. I'm a little unclear on what your opinion is concerning the use of the steady state.

I believe your testimony when Mr. Simpson was questioning you was that the transient model run was the only way to determine how much water would be available in the reach during the year of need. Wasn't that correct?

Isn't that your testimony?

A. If you're trying to determine the amount of water May through September of the current year, the transient model is the only model that can give you that answer.

Q. So if your goal is to furnish the amount of shortage to the injured party during that year, you have to use the transient model; correct?

A. That's the way to get that model output.

Q. And if you use the steady state model run to do the same calculation, the injured party would only receive about 15 percent of the shortfall in that year; isn't that correct?

A. I think it varies by curtailment date in terms of the percentage.

Q. Well, you reviewed Jennifer Sukow's information; correct?

A. Correct.
Q. And do you remember the information that she provided? I think it said that either 15 percent or 9 to 15 percent appears in the year of curtailment?
A. Yes, that range is what I'm referring to --
Q. Okay.
A. -- that the --
COURT REPORTER: Ms. Sigstedt, I'm sorry. I missed some of that again. I got, "Yes, that range is what I'm referring to"?
THE WITNESS: I think that that range was developed based on analyzing different curtailment dates and looking at the comparison of the transient -- the in-season to the steady state response.
Q. (BY MR. FLETCHER) Do you believe that the goal of the methodology should be to protect seniors from injury caused by junior diversions?
A. I think that that sounds correct.
Q. And do you agree that if injury is determined, the shortfall should be supplied in time, location, and amount that season?
A. To me, that seems like, potentially, a policy decision. I don't know if it's a technical question.
Q. So you don't have an opinion on that?
A. My opinion is that it's a policy decision.

MR. FLETCHER: Thank you.

I don't have any further questions.

HEARING OFFICER: Okay. Thank you, Mr. Fletcher.

Redirect, Ms. Patterson?

MS. PATTERSON: Yes. Just a moment.

HEARING OFFICER: Do you want to go off the record?

MS. PATTERSON: No. I'll be short.

REDIRECT EXAMINATION

QUESTIONS BY MS. PATTERSON:

Q. Hi, Sophia. Before lunch, you were asked by Mr. Simpson whether or not you were saying the model should be used given the uncertainty, and I think you replied that it's what we have, and so, yes, it should be used.

I just want to clarify, are you saying that it can be used but you need to account for the uncertainty?

A. That's correct.

Q. And then there was questions about irrigated acres and whether or not in 2013 the Department should have used the self-reported numbers.

You commented that, no, that one shouldn't be used because it hasn't been verified; is that correct?

A. That's correct.

Q. Could you envision a process such as the Department using the most recent data available for irrigated acres, such as the Landsat data that they use in the model, and then the districts, if they find an error with that, could produce that -- produce that evidence to the Department if they want to contend that the data, the Landsat data excludes irrigated or semi-irrigated acres?

A. Yes, I think that makes sense, and I also think that in the application of those acres, there is the semi-irrigated acres category that I think is just being treated as irrigated acres. I think, similarly, you can make a determination of the percent of the semi-irrigated acres that are nonirrigated.

Q. Thank you.

That brings me to my last question which is, again, related to the Landsat data. That includes irrigated, semi-irrigated, and nonirrigated acres; is that correct?

A. That's correct.

Q. And if we look at --

A. The irrigated lands dataset is the one that has those classifications.

Q. Thank you, the irrigated lands dataset.

Going to Table 2-3, where it discusses the different ways to calculate irrigated acres, in that chart do you know whether that -- those numbers include both irrigated acres and semi-irrigated, or is it only counting irrigated?

A. I'm pretty sure, from the testimony that we heard from Matt, it is including the semi-irrigated.

Q. Okay. That is what I recall as well. Thank you.

MS. PATTERSON: That's all.

HEARING OFFICER: Recross, Mr. Simpson?

MR. SIMPSON: No.

HEARING OFFICER: Mr. Fletcher?

MR. FLETCHER: No.

HEARING OFFICER: I just have one question for Ms. Sigstedt.

EXAMINATION

QUESTIONS BY THE HEARING OFFICER:

Q. Ms. Sigstedt, I am looking at page 23 under Section 2.2.2, and the beginning of the second paragraph, it says: "The first is that Box Canyon spring flows are representative of groundwater discharge to the near Blackfoot to Minidoka reach."

Is that your testimony?

A. No, that looks like a typo. It should be "are not representative."

Q. Okay. And it may be just in the context of that statement, because in the previous paragraph it says: "I have additional concerns about two of the predictions," but then, again, it very clearly states that they are representative, and you're saying that it should say "is not"; is that correct?

A. That's correct.

Q. Okay.

A. I also noticed a typo on the curtailment date under the figure -- under the last figure also. So I think there could be some minor corrections.

Q. Under what figure?

Well, if you don't recall, maybe you can correct it through your counsel. I just noticed this particular sentence and thought it was not consistent with your testimony, and I wanted to ensure that at least the document reflected and was consistent with your testimony.

A. I really appreciate that.

And the other one is Figure 10. 3-10 has a typo in the curtailment date.

MS. PATTERSON: Counsel will see to it that those changes are updated and it's submitted to the

Department.

HEARING OFFICER: You'll have to speak up, Ms. Patterson.

MS. PATTERSON: Counsel will work with Sophia to make sure those corrections are accounted for and submitted to the parties in the Department.

HEARING OFFICER: Okay.

All right. Thank you, Ms. Sigstedt.

THE WITNESS: Thank you.

HEARING OFFICER: The next witness I have in my list is Jaxon Higgs. He is not here, I assume, and doesn't have connections in some remote location in Mexico, Mr. Budge?

MR. BUDGE: That's correct.

HEARING OFFICER: So we don't anticipate hearing from Mr. Higgs.

MR. BUDGE: No.

HEARING OFFICER: And the next witness I show is Bryce Contor.

MR. BUDGE: I think we're going to put Lynn Carlquist on next.

HEARING OFFICER: Okay. Mr. Carlquist, if you'll come forward, please.

THE WITNESS: Right here.

HEARING OFFICER: We'll switch back to our

regular configuration which you have not observed.

Will you raise your right hand, please.

RICHARD LYNN CARLQUIST,

called by IGWA, having been first duly sworn to tell the truth relating to said cause, testified as follows:

HEARING OFFICER: Thank you. This chair may feel comfortable to you, given your long history.

THE WITNESS: Not our first go-round.

HEARING OFFICER: Okay. Mr. Budge.

DIRECT EXAMINATION

QUESTIONS BY MR. BUDGE:

Q. Thank you.

Lynn, thank you for being here today. Just to begin, will you please state your name and address for the record.

A. Richard Lynn Carlquist, 1092 South 2500 East, Hazelton, Idaho 83335.

Q. You're here to testify today, Lynn, on behalf of Idaho Ground Water Appropriators?

A. Yes.

Q. What's your current position with IGWA?

A. I am the co-chair of IGWA organization,

serving with Stephanie Mickelsen as the other co-chair.

Q. How long have you been involved with IGWA?

A. Since the mid-2000s. 2005 our groundwater district joined.

Q. And can you identify who IGWA's groundwater district members are?

A. Yeah, if I look them up, I could go -- try and go through them, but there's nine districts and one irrigation district that is members of IGWA.

Q. I'll make it easy for you, Lynn. I'll just go through them and then have you confirm.

There is North Snake Groundwater District, Carey Valley Groundwater District, Magic Valley Ground Water District, Aberdeen-American Falls Groundwater District, Bingham Groundwater District, Jefferson Clark Groundwater District, Henry's Fork Groundwater District, and Madison Groundwater District.

Does that sound right?

A. That sounds right. I think that's all of them.

Q. And Southwest Irrigation District is also a member of IGWA?

A. Yes.

Q. I understand you are a member, personally, of North Snake Groundwater District?

A. That's correct.
Q. How long have you been a member of that district?
A. Since its inception.
Q. Do you serve as a director of that district?
A. Yes.
Q. And as the chairman?
A. Yes.
Q. How long have you been the chairman?
A. Ten years.
Q. Where is North Snake Groundwater District located?
A. It's located in Jerome County, Gooding County, and Blaine -- or Shoshone County.
Q. And it represents groundwater irrigators in that area?
A. Yes.
Q. Are there also nonirrigator members of the district?
A. Yes.
Q. Just describe some of the nonirrigation uses that are in the district.
A. Some of the cheese-processing plants are some of the bigger users of water. Amalgamated Sugar has some use of water. Other cities, municipalities have

water rights that belong to our district.

Q. And I understand there's a lot of dairy operators in your district as well?

A. There are a lot.

Q. How many acres, approximately, are irrigated by members of your district?

A. There's a little over 200,000, 202,000 acres, irrigated acres in our district -- or 102,000 irrigated acres in our district.

Q. Okay. And, generally, what types of crops are grown in your district?

A. Well, the big crops now are alfalfa, corn. There are still potatoes, sugar beets, beans, small grains. Some specialty crops are grown, some seed crops.

Q. And how much water do patrons of your district divert on a per-acre basis typically?

A. The diversion now, we average about -- from our -- the groundwater is 2.2 acre-feet a year.

Q. And I understand that your district limits how much groundwater the patrons are permitted to divert?

A. Yes.

When the Surface Water Coalition plan was formulated and put into place, each groundwater district was given an amount of reduction that belonged to their

district; and we set up a system whereby a set of priorities each individual water right was given a set amount that they could divert.

Q. And that's 2.2 acre-feet in your district?

A. The priorities range from 2.4 to 2. And we average, roughly, that 2.2 right now.

Q. Okay. So more senior rights in your district are allotted a higher volume than more junior rights?

A. That's correct.

Q. And your district sends out to each patron the volume of water it's allowed to use, and they're responsible to stay within that amount?

A. Yes.

Q. Are you aware of other groundwater districts also imposing diversion limits on their members?

A. Yes.

Q. Compared to other groundwater districts, are North Snake's diversion limits higher or lower than others?

A. Generally higher.

Q. The other districts have lower diversion limits than your district?

A. Yes.

Q. I understand you, personally, own groundwater rights in the district?

A. Yes.
Q. And you also own surface water rights?
A. Yes.
Q. Where does your surface water come from?
A. I have surface water rights with A&B Irrigation District, North Side Canal.
Q. Does A&B Irrigation District regulate how much water you can divert under your surface water rights?
A. Yes.
Q. How does that work?
A. We're given so many acre-feet a year that we can pump. If we go beyond that, then we get charged a surcharge for the additional acre-feet that we pump.
Q. Okay. Does North Side Canal Company regulate how much surface water you can divert?
A. Their water right is based on a diversion rate, not a consumptive amount.
Q. So you're just able to divert your rate all season long?
A. Yes, if you want to, you can.
Q. Okay. Let me ask you some questions about the Fifth Methodology Order that was issued April 21st of this year.
Lynn, are you aware that among other changes to the Fifth Methodology Order, the Director changed

from a steady state to a transient state application of the ESPA model?

A. Yes, I'm aware of that.

Q. Did you know what effect a transient state would have on curtailments?

A. Well, we talked about it a lot. We didn't know exactly the impact that it would have, but we knew it would be a major change from the steady state analysis that had been done. And we thought for sure, based on where our groundwater district is, there would be less of an impact; but, in fact, you know, it -- the curtailment for our district is about the same as everybody else.

Q. You're aware that also in April this year the Director issued what we call an As-Applied Order that sets a curtailment date of December 30th, 1953?

A. Yes.

Q. Did you anticipate a curtailment happening this year?

A. No.

Q. Why not?

A. With the larger than average snowpack that we had and what we'd had in previous years, we did not anticipate that there would be a curtailment order issued.

Q. So it came as a surprise to members of your district when the curtailment was issued?
A. Yes.
Q. And have your patrons complained about that revelation?
A. Complained? They've asked questions. They want to know why and what they can do and what the impact will be.
Q. Your patrons also weren't anticipating a curtailment this year?
A. I don't think so.
Q. Lynn, let me have you turn, in one of those white binders behind you, to Exhibit 829.
Do you recognize that document, Lynn?
A. Yes, I've seen this.
MR. BUDGE: And just for the record, I'll represent that Exhibit 829 is a duplication of Figure 3-1 in the expert report of Sophia Sigstedt, which has been admitted into evidence as Exhibit 837.
Q. (BY MR. BUDGE) Lynn, you mentioned that you've seen this before. What do you understand this exhibit shows?
A. Well, in the left portion of the exhibit, it shows IGWA's -- IDWR's percentage of IGWA's proportionate share, and that was based more on a type

of steady state type of analysis, is my understanding.

And the midsection shows the impact of water that would be made available under curtailment based on the transient state analysis.

Q. So if we look at the row for North Snake, that's North Snake Groundwater District; correct?

A. Yes. We're on the very bottom.

Q. If we look at the middle section of that spreadsheet, it shows that the curtailment would eliminate beneficial use of 217,151 acre-feet.

Do you see that?

A. Yes.

Q. Do you understand that to be the curtailment within your district?

A. Based on the December 30th, 1953, date?

Q. Correct. And then the model benefit to the Coalition from May to September would be 0.06 acre-feet?

A. Yes.

Q. Did that come as a surprise to you?

A. Yes. It's much lower than I thought it would have been.

Q. And does this change how North Snake handles groundwater management for its patrons going forward?

A. Well, it probably will. I've had patrons call, and, of course, they have rights junior to 1953.

And if you look over further, it shows that 88,000 acres are junior to that, so they're concerned "Are we going to be curtailed?" And I -- under the way we used to mitigate for an order, was supplying wet water prior to the Surface Water Coalition call -- or agreement that we entered into. And I told them we will be able to supply the necessary water to meet our obligation under this curtailment order.

Q. Which would be a very small fraction?

A. A very small -- less than 1 acre-foot.

Q. Have your patrons continued to conserve water this year -- or I should rephrase that.

Has your district continued to send out the diversion reduction obligations this year like you've done in the past?

A. We have. And at our annual meeting, I told them that we were going to do that, and we asked if everyone was okay with that, that was at the meeting, and they said yes. And we will continue to do our reductions that we've been doing in the past under the Surface Water Coalition Act.

Q. Okay. And that's intended to stabilize the aquifer in your area?

A. That's what our intent is.

Q. It's not, necessarily, a representation of

your obligations under the -- this table that we've just seen?

A. No.

MR. BUDGE: No further questions.

HEARING OFFICER: Okay. Cross-examination? Mr. Simpson or Fletcher?

CROSS-EXAMINATION

QUESTIONS BY MR. FLETCHER:

Q. Hi, Mr. Carlquist. How are you doing?

A. Oh, pretty good.

Q. I'm Kent Fletcher, as you know. We've dealt with each other for many years. And on behalf of our clients, I'd like to thank your district for the actions you've taken over the years pursuant to our plan.

I -- first of all, you mentioned briefly some of the operations for your district. You heard the testimony of Jay Barlogi yesterday -- were you sitting in on that?

A. I was not, I didn't hear it.

Q. I'll represent to you that he said that Twin Falls Canal Company employs -- his written testimony states that the Twin Falls Canal Company employs somewhere around 65 employees, 24 ditch riders to monitor water deliveries. And that's for somewhere

between 180-, 195,000 acres, whatever number is determined. You said you had about 100,000 acres of groundwater that you manage in your groundwater district; correct?

A. I would say we don't manage it, but we have initiated programs for the members of our district who have those groundwater rights. We don't own any groundwater rights as a groundwater district, and I wouldn't say that we manage it, but we give them plans and operations that will help meet the obligations that come because of water calls.

Q. Does your district monitor in-season diversions of groundwater?

A. No.

Q. Does your district take any action against groundwater users who overdivert the allocation you talked about?

A. We do.

Q. And what do you do?

A. We have gone to the program where they are required to pay $100 per acre-foot. There is actually an averaging system that is set up, that Jaxon Higgs helped us put into place, where they can make up in a following year for overages in a previous year. But if after a three-year period of time they don't make it up,

then they have to pay the difference in acre-feet, $100 per acre-foot.

Q. And the only reporting concerning the diversions that take place in your district occurs after the season has ended; is that correct?

A. That's correct.

Q. I was a little confused about your actions.

Is your district -- you mentioned the 2015 agreement a few times. Is your district still honoring the 2015 mitigation plan and the order that was entered pursuant to that?

MR. BUDGE: Objection. Beyond the scope of this proceeding.

HEARING OFFICER: I don't -- I don't think so. He testified about the actions that were taken by North Snake. This is clarification.

MR. FLETCHER: Right.

HEARING OFFICER: Overruled.

MR. BUDGE: Objection. Calls for a legal conclusion.

HEARING OFFICER: Overruled again.

MR. BUDGE: Mr. Director, can I inquire of the witness in aid of objection?

HEARING OFFICER: Sure.

MR. BUDGE: And I'll just stand here.

Mr. Carlquist, do you understand that the dispute has arisen between IGWA and the Surface Water Coalition over the terms of the 2015 settlement agreement?

THE WITNESS: Now, say that again.

MR. BUDGE: Do you understand that a dispute has arisen between IGWA and the Surface Water Coalition over the terms of the 2015 settlement agreement?

THE WITNESS: Yes.

MR. BUDGE: Do you understand that dispute is presently on appeal?

THE WITNESS: Yes.

MR. BUDGE: That dispute has not finally been resolved?

THE WITNESS: That's my understanding.

MR. BUDGE: And your understanding of the terms of that agreement are different than the Surface Water Coalition's understanding of the terms of that agreement?

THE WITNESS: That has been the case.

MR. BUDGE: Mr. Director, Mr. Fletcher is asking the witness to testify as to whether he's in compliance with the agreement. The witness can't do that, given that the terms of the agreement have not fully been adjudicated.

HEARING OFFICER: Mr. Carlquist can testify about whether he believes he's complying or not. Overruled.

Mr. Fletcher.

MR. FLETCHER: Let me reask the question because that wasn't my question, and I'm not looking for past breaches or these issues that Mr. Budge is talking about.

Q. (BY MR. FLETCHER) What I'm talking about is this year, 2023, is your district planning on attempting to comply with the 2015 settlement agreement and the order that was entered?

A. That had been the case that we were going to try and do. What was frustrating was the fact that we found out that even if we do it, if other members of the IGWA don't comply, then we're also out of compliance, so we don't know where we're going to go.

Q. So that's your understanding is that your district could comply, but if your -- if other districts don't, then all of you will be out of compliance?

A. That's my understanding.

Q. So you're not sure if you're going to attempt to comply with that yet, as I understand it?

A. At our annual meeting, I made the suggestion to the members of our district that we would still do

our share of compliance of that agreement, and our plan was to do that; but if doing that will not bring us any satisfaction, then I'm not sure what direction we'll go now.

Q. I understand that.

Is it your belief that if you do comply with the mitigation plan and are found to be in compliance with the mitigation plan, that your district then would have safe harbor?

A. No. My understanding is we will not.

Q. No, I say if you were in compliance with the mitigation plan, if you believed you were, and if the Director found you were in compliance with the mitigation plan, your district, then you would have safe harbor?

A. I don't know that we would. I don't think anyone's told us that we can do it individually and receive safe harbor.

Q. If you did have -- if you were found to be complying with the mitigation plan and order that is in place now, you would have safe harbor?

MR. BUDGE: Objection. Director, I'm going to renew my objection. This case is involving the Fifth Methodology Order and the As-Applied Order. We have a separate proceeding involving the mitigation plan past

compliance and mitigation compliance for 2023, and I don't think it's appropriate in this proceeding for Mr. Fletcher to ask the questions that he would like to have answers to in other proceedings.

HEARING OFFICER: And, Mr. Budge, your direct examination opened up this particular subject. Mr. Fletcher is exploring it. Overruled.

Q. (BY MR. FLETCHER) Do you remember my question?

A. Do it again.

Q. All right. If you were found to be in compliance with the mitigation plan this year, then the mitigation plan states you would have safe harbor; correct?

A. Well, the agreement says we would have safe harbor, but my understanding is from decisions that have come from the Department, from the Director, is the fact that if everyone is not in compliance, then no one is going to be in compliance.

Q. And if you had safe harbor, then none of your irrigators would be subject to curtailment regardless of what the curtailment date is; correct?

A. That's correct.

Q. You brought up this table -- or your counsel brought up this table that Jaxon Higgs prepared. I

think you still have it in front of you; is that correct?

A. I do.

Q. I was a little unclear about your testimony on that. It does show that in a one-year transient state analysis that North Snake would have to contribute a very small amount of water?

A. Yes.

Q. Is that correct?

A. That's correct.

Q. Are you -- is it your position as president of IGWA that those who contribute more to the shortage this year should mitigate for that, and those who contribute less mitigate their share?

A. That decision has not been made by IGWA.

Q. Is that your position as the president of your groundwater district?

A. No, it's not.

Q. What is your position concerning a mitigation requirement for this year?

A. We, as a group of groundwater districts, would have to get together and determine how any obligation would be shared. And that hasn't been done yet.

Q. So it has not been done yet?

A. No.

MR. FLETCHER: That's all the questions I have. Thank you, Mr. Carlquist.

HEARING OFFICER: Any further cross?

Mr. Simpson?

CROSS-EXAMINATION

QUESTIONS BY MR. SIMPSON:

Q. Lynn, good afternoon. John Simpson representing A&B, et al. Good to see you again. I just had a couple follow-ups to your direct testimony.

First, you indicated on direct that you thought since it was a good snowpack, that there wouldn't be a curtailment this year; is that fair?

A. That would be -- that was my thought, that the snowpacks were large enough, you know, and, of course, I was surprised when I understood that the -- those who measure said that possibly the system would not totally fill, even with the snowpack that we had, because there were certain areas, Jackson Lake area, for example, didn't have quite the snow that other areas did.

Q. Yeah. And given that you receive North Side Canal Company water; correct?

A. Yes.

Q. As the reservoir system declines in its carryover, that, obviously, means you need a better

snowpack in order to fill the reservoirs; correct?
A. Yes.
Q. And so that's part of the reason why --
A. It also depends on how the water comes off of that system up there to fill the reservoir.
Q. You bet. Understand that.
So in your experience, even if you have a good snowpack, it doesn't necessarily ensure that surface water users have a full water supply; is that fair?
A. You can't guarantee it, but it's certainly a better chance, we thought, that they would have a full water supply on a year like this.
Q. And so with respect to your groundwater rights and your pumps and where those pumps are on the North Snake groundwater system, what have you observed in terms of your groundwater levels over the last couple years?
A. In the last couple years, they've gone back down. In the prior 10 or 12 years, they've come up fairly dramatically. And then the last two years, they've declined a little bit again.
Q. When you say "a little bit," 10 feet? 15 feet?
A. 3 feet.
Q. So in those prior years since 2015, what kind

of increase did you see?

A. We went up almost 12 feet. And that's the first time they've gone up since the '80s.

Q. So you saw about a 25 percent decline over the last couple years?

A. Yes.

Q. So when you were asked on direct testimony that you're anticipating to continue your reductions in order to stabilize the aquifer -- do you recall that testimony?

A. Yes.

Q. So when you --

A. When we -- we, as a board of North Snake Groundwater District, have made that determination, and we have expressed that desire to the members of our district and received their --

Q. Approval?

A. -- "yea" that they would be fine with that.

Q. So when you talk about stabilizing, what does that mean to you in terms of your North Snake members in the district?

A. Our idea is that we will not see further declines going down. Not that we'll recover it to a particular level, but they will not continue to decline.

Q. Not continue the declines that we've seen in

the last couple years?
A. No. Decline in the last 20 years.
Q. Then looking at this table that Jaxon Higgs put together that you have in front of you, you indicated that the first couple columns were a steady state calculation?
A. That was my understanding, that we requested from the Department that they give us -- the allocation of the amount of this order would be for the districts. And my understanding was that the numbers that are there in the first columns, like, for example, North Snake would be 3,262 acre-feet, was done on some -- whether it's a modified steady state analysis or what, but it wasn't done on the straight transient analysis.
Q. So is it fair to say that, in the first column where it says 5.1 percent, that's -- North Snake's obligation under a steady state modeling was 5.1 percent?
A. That's my understanding.
Q. So that would be 5.1 percent of the obligation that would be owed to the Surface Water Coalition?
A. Yes.
Q. Under a steady state analysis, to be fair?
A. Yes.
Q. And with respect to your -- not "your," but

the North Snake groundwater rights within the groundwater district, have most, if not all, of those groundwater rights been in place for -- since 1993, the date of the moratorium; do you know?

A. Most, I would say, most have been in place since then.

Q. A very high percentage?

A. Yes, a high percentage.

MR. SIMPSON: That's all the questions I have. Thank you.

HEARING OFFICER: Okay. Mr. Budge, redirect.

REDIRECT EXAMINATION

QUESTIONS BY MR. BUDGE:

Q. Yeah, just a few follow-up questions, Lynn.

Mr. Simpson was asking you some questions about the snowpack this last winter?

A. [Witness nods head.]

Q. And you understand it was well above average snowpack this winter in the Upper Snake River Basin?

A. Well, it was above average. Now, well above average, I'm not sure what that number means, but at times we were up close to 150 percent of average. And in certain parts of it, it was above that.

Q. And in years past when we had that much snow

in the mountains, there would not have been a curtailment under the Methodology Order; correct?

A. Not that I remember.

Q. Okay. And do you understand that under the Fourth Methodology Order, there would not have been a curtailment this year?

A. I don't know that for sure.

Q. Okay. But you did understand or did assume that with as much snow as we've got, you did not expect a curtailment coming this year?

A. I did not expect a curtailment coming this year.

Q. Let me ask you a few questions about that table in front of you, which is Exhibit 829, the table that Jaxon Higgs prepared.

Mr. Fletcher asked you some questions about how mitigation obligations are apportioned among the groundwater districts under the 2015 settlement agreement.

Do you recall that?

A. Yes.

Q. You understand that the terms of that agreement do not specify how that 240,000-acre-foot obligation is apportioned among the districts?

MR. FLETCHER: Director, I'm going to object

simply because I didn't ask that question, but I don't mind this line of inquiry. I mean, I don't know how to do that. That was not my question to Mr. Carlquist.

MR. BUDGE: I'll accept the withdrawal of objection.

MR. FLETCHER: I'm objecting to the fact that I asked about that. I did not.

HEARING OFFICER: All right.

MR. FLETCHER: It misstates the foundation for the question.

HEARING OFFICER: All right. So, Mr. Carlquist, if you remember the question, you may answer. Otherwise, Mr. Budge, please restate the question.

THE WITNESS: Well, I think I remember, but go ahead and restate it.

Q. (BY MR. BUDGE) Do you recall Mr. Fletcher discussing with you for a moment the 2015 settlement agreement between IGWA and the Surface Water Coalition?

A. Broadly, I guess, yeah.

Q. And he was asking if your district's planning to comply with that this year?

A. Yes.

Q. You understand that one of the terms of that agreement is that the groundwater districts

collectively -- or the groundwater users collectively will conserve 240,000 acre-feet of water?

A. Yes.

Q. And you understand that the agreement does not specify how much conservation each individual groundwater district has to achieve?

A. I don't think the agreement says that, but the groundwater districts apportion their share of the 240,000 acre-feet based on their share of pumping, their historical baseline pumping that they had had the previous five years.

Q. And that apportionment was an agreement that the groundwater districts struck among themselves after the 2015 settlement agreement was signed?

A. Yes.

Q. And you understand the Director recently changed or interpreted the terms of that agreement in a way that would collectively require the groundwater districts to conserve more water than they had historically?

A. More than we have historically, yes. When the allocation -- when we did the allocation among the groundwater districts, we assumed that everyone who pumps water would have some share of that 240,000 acre-feet. So the districts that were -- signed

the agreement -- the six districts that signed the agreement, allocated 202,000 of the 240,000 acre-feet.

Q. 205,000?

A. Yeah, it was 202 or 205, yeah.

Q. And now that the Director's come out with the new transient state model application, does that change your thinking on how the 240 should be allocated?

A. Well, that's possible. We'll have to negotiate like we did before with the groundwater districts, but our district has decided that we are going to maintain our reduction proportion that we've had in the past, which is based on the 205, not the 240. That's what -- that's the allocation that we send out. Pumping allocation to the members of our district is based on our share of the 205,000 acre-feet.

Q. Yeah. Is it fair to say that the information in that table that shows the transient state impacts, that the districts have discussed how to reallocate the 240 and not been able to reach an agreement?

A. No. No agreement has been reached.

MR. BUDGE: The last thing I would do, Director, and this is just really for clarity of the record, is, I've been referring to Exhibit 829, which is that table from an excerpt from Exhibit 837. I would move that we admit that as a separate of exhibit just

for ease of reference in the record.

HEARING OFFICER: Any objection?

MR. FLETCHER: We have no objection. It was already admitted as part of Sophia's expert report.

HEARING OFFICER: The document, then, that has been marked as Exhibit 829 is received into evidence.

(Exhibit 829 received.)

MR. BUDGE: Thank you, Lynn.

HEARING OFFICER: Any further cross-examination?

MR. FLETCHER: I don't have anything further.

MR. SIMPSON: No.

HEARING OFFICER: Thank you, Mr. Carlquist.

Now, my list of witnesses, I don't know where to go. Please direct me.

MR. JOHNS: I think we're going to have Bryce Contor go up next, if that's permissible.

HEARING OFFICER: All right. Mr. Contor, if you'll come forward, please.

MR. JOHNS: Do you care if I --

HEARING OFFICER: You can sit or stand if you want.

Will you raise your right hand.

///

///

BRYCE CONTOR,

called by Bonneville-Jefferson Ground Water District, having been first duly sworn to tell the truth relating to said cause, testified as follows:

HEARING OFFICER: Thank you. Please be seated.

Mr. Johns?

DIRECT EXAMINATION

QUESTIONS BY MR. JOHNS:

Q. Good afternoon, Mr. Contor. For the record, my name is Skyler Johns, and I represent Bonneville-Jefferson Ground Water District in this matter.

Can you please state your name and spell it for the record.

A. Bryce Contor, B-r-y-c-e, C-o-n-t-o-r.

Q. And just to check, are you okay if I call you Bryce?

A. Yes, sir.

Q. Perfect. The parties have stipulated to your qualifications as an expert; however, would you just briefly describe your educational background for us?

A. I've got an associate degree in farm crops

management. I've got a bachelor's degree in agricultural economics, a master's degree in hydrology from the University of Idaho.

Q. Can you, please, also describe your work history on water issues.

A. Yeah. So I farmed, I irrigated with groundwater and surface water, I served on the canal board. As a member of the canal board, I prepared the -- our little tiny canal company's adjudication claims.

I later went to work for Idaho Department of Water Resources, first measuring discharge wells in the Magic Valley and then in the Mud Lake area and also west of Idaho Falls.

After that I worked for Idaho Department of Water Resources making adjudication recommendations in the Snake River Basin Adjudication.

I went to work as a hydrologist for the University of Idaho doing the water budgets for the ESPAM models from 2001 through about 2010. During that time, I did subcontract work under Water District 1 doing field examinations for Snake River Basin Adjudication claims.

And then in 2010, I transitioned to the private sector. I've done water rights work, landfill

work, flow measurement work, all related to water resources.

Q. Okay. And are you still in the private sector?

A. Yes.

Q. Who's your employer?

A. Rocky Mountain Environmental Associates is the company. In this matter, Rocky Mountain is employed by the Bonneville-Jefferson Ground Water District.

Q. And what's your current occupation or title?

A. My occupation is a hydrologist. My title is principal hydrologist.

Q. Have you ever previously been identified as a witness in an IDWR proceeding?

A. Yes.

Q. About how many proceedings have you been a part of?

A. Probably eight or ten, including both water right matters and some, you know, private district court things that related to water but not before IDWR, and I haven't parsed it out.

Q. For the record, were you invited to participate in what's been referred to as the 2022 technical working group for this matter?

A. I was not.

Q. Okay. So you're coming in fresh and having to review some of this information?
A. Yes.
Q. You had already stated you're here representing Bonneville-Jefferson Ground Water District; correct?
A. Yes.
Q. Were you asked to create an expert report for this proceeding on their behalf?
A. Yes.
Q. Okay. And has that report been provided?
A. Yes.
Q. Will you please turn to Exhibit 500.
Yeah, there should be three copies.
COURT REPORTER: And if you can guys can slow down a little bit, please.
MR. JOHNS: I thought I was going slow. I'll try.
THE WITNESS: We're trying to go slow in an expedited manner.
MR. JOHNS: Being concise in an expedited matter.
Q. (BY MR. JOHNS) Could you please identify the document that's in front of you.
A. It's my expert report. It has a long title,

but it's my report.

Q. Okay. And can you please identify what you were asked to do in this report.

A. So I was asked to do just four things, kind of a subset of all of the issues:

I was asked to look at the technical arguments made by the Department to justify the change to a transient modeling.

I was asked to review the purposes of the ESPAM models and technical opinions regarding the use of those models.

I was asked to talk about the possible application of source water fractions to address the supplemental water question.

And then I was asked to talk about logical consistency in the use of transient modeling and in the use of steady state modeling.

Q. Okay. So did you review the Fifth Methodology Order -- and I believe that is marked as Exhibit 300 -- and then the 2023 As-Applied Order, which I believe that's -- did you review those documents?

A. So I did a cursory review of the entire document, and then I focused on the parts relating just to these issues.

Q. What information did you look at in

preparation for this report?

A. I looked at old documents that I had prepared when I worked at Idaho Water Resources Research Institute. I looked at additional information prepared by others from the IDWR website related to the ESPAM modeling. I looked at some prior orders in this matter. We can look back here. Those are the primary ones that I relied on. I looked at a document that I had prepared in a Rangen proceeding.

Q. And is the information pertaining to those documents provided in your report or cited in your report?

A. It is.

Q. Will you please generally describe the conclusions in your report.

A. So I'd like to just quickly go to -- I think it's page 30.

Q. Okay.

A. So the first two opinions -- and I wish I had numbered these -- were regarding the factual reasons given in the Fifth Order. And my conclusion was that those reasons are not factually correct; and that, therefore, I don't know what the actual reasoning was, and I cannot evaluate the actual reasoning.

The next point, the third conclusion is that

the use of ESPAM modeling is technically defensible when the use of the model is tempered both by the knowledge of the ratio of the relief provided and the burden to generate that relief and the precision of the model for the question being answered.

The next two are the response to the question about supplemental groundwater, and it's, essentially, the same thing. The argument's presented in the order I found not to be factually correct, and so I can't speak to the actual reasoning for that decision.

And then the last three talk about the -- well, let's see -- no, the next one talks about the effect. I talk about the multiplier effect of the consequence of ignoring the supplemental use.

The last two, then, talk about the consistency between the time frame of the modeling, the question being asked, and essentially there's two conclusions. One is that if you calculate the obligation one way and partition it another, then you could -- it can result in a party being responsible for more mitigation than their curtailment could have possibly generated.

And then the last one I think is probably the most important, is that technical methods exist to make a technically coherent alignment between the problem that's trying to be solved and the tools that are

available to address the problem.

Q. And the reasons justifying those conclusions are provided in your report; correct?

A. They are. And -- yes.

Q. And you and I had spoke earlier. Have you identified any mistakes or corrections that we need to make on the record that you located in your report after it was submitted?

A. Yeah. I -- the most important one is on page 29, I think. I refer to a figure -- the second full paragraph on page 29 -- "visual inspection of figure R16," I did not get that figure into the report, but it is presented as Exhibit 511. And I'm sure there are some typos that I've not yet captured.

Q. Okay. Just in general, were you able to perform all the work that you wanted to perform in this report?

A. No.

Q. Can you identify just some general technical subject matters that you would have liked to have gotten into?

A. Well, certainly, I would have liked to have reviewed the things that Mr. Sullivan and Ms. Sigstedt reviewed that I didn't even address. But within the topics that were assigned to me, I would like to have

further explored the implications of transient modeling of ESPAM2.2 in regard to this question of assigning responsibility and in regard to the question of the logical consistency between transient and steady state.

I tried to do some exploration for the second purpose, which was to generate a technical opinion regarding the use of the model. I would have liked to have further explored work that's been done by others and some original work regarding anticipated precision and uncertainty of the ESPAM2.2 model.

Q. And was that work not performed due to time constraints?

A. That's correct.

Q. Would it have improved your analysis in reviewing the Fifth Amended Methodology Order and preparing for this hearing?

A. It certainly would have made me -- made my analysis more solid, more coherent, given me more opportunity to be sure that I had not missed something in the analysis. It may also have enabled me to generate additional insights that might have been useful.

Q. I want to talk briefly about your involvement with the ESPAM modeling and your experience at IWRRI.

Can you please describe what work you

performed related to ESPAM while you worked at IWRRI?

A. So while I was at IWRRI, my assignment and the reason I was hired was to be responsible for the water budget input to the model, and so that is all of the -- we call them "goes ins" and "goes outs," all the sources of water and all of the sources of withdrawals from the aquifer with the exception of the interaction of the Snake River.

While I was there, I also generated scenarios using the model after it was -- after the model was developed, first, to the ESPAM1.1 and 1.1 and then to some extent with the ESPAM2.0 model.

The other thing that I did was I ended up having a substantial role in providing transparency through presentations to the Eastern Snake Hydrologic Modeling Committee and in writing design documents.

Q. And did you make presentations to the Department regarding the ESPAM model?

A. I did to the extent that the Department personnel were involved in the ESHMC modeling committee.

Q. And was a report generated for that or some sort of a document generated?

A. So there were many documents. I think the one that I referred to in this report was a specific report. IWRRI was asked, and I was tasked to be the lead on

assessing what would be the implications of using the ESPAM model, and this was initially the ESPAM1.0 model, in assessing the effects of curtailment of groundwater rights.

Q. Did your analysis include an analysis of transient modeling?

A. It did.

Q. And to your knowledge, has that information changed over time, at least the findings with regard to transient modeling?

A. So qualitatively, nothing has changed. And a good part of my report wades through individual findings that were in that 2006 document. But -- you know, but the nutshell is, there's nothing known now about transient modeling that was not known then. Different versions of the model produced different results, and so those have changed, but qualitatively, nothing has changed.

Q. And you've been present -- just for the record -- you've been present this -- since Tuesday when this hearing began and listened to the testimony that's been presented by the witnesses?

A. Yes. You know, I've stepped out a time or two, but I've been here the whole time.

Q. And so I think that this -- I want -- again, I

want to be concise. I think that some of the arguments on this have already been presented, but do you agree with the statement that the technical justifications for moving from -- or do you agree with the Department's technical justifications for IDWR moving from steady state to transient as they're presented in the Fifth Methodology Order?

A. I do not.

Q. And do you agree that with -- I believe it was with Ms. Sukow -- I don't want to mischaracterize her testimony, but I think she said that the decision was not technical to move from the steady state or to transient; is that correct? Or is that your recollection of her testimony?

A. That sounds about like what she said. So if there were technical reasons, number one, they have not been revealed, to my knowledge; and number two, I can't think of any technical reasons.

Q. Well, I won't belabor that point, but have the reasons -- or have your reasons for your conclusion with regard to the technical justifications for transient been provided in your report?

A. Yes.

Q. Okay. Is there anything else that you'd like to add on the technical justifications for transient?

A. I think just qualitatively that either steady state or transient could be, technically, justifiable if the entire package were considered, if all the implications of either type of modeling were considered.

Q. And I think we're going to talk about a couple of those. We'll dig into them. So we'll move on to -- let's grab -- I think it's Exhibit -- the Fifth Methodology Order, is that Exhibit --

MR. WOOD: 300.

MR. JOHNS: 300?

MR. WOOD: Yeah.

MR. JOHNS: If we could grab a copy of that.

THE WITNESS: Here we go.

MR. WOOD: Did you find it?

THE WITNESS: I did. At least it has the right number on the cover. Okay, yes.

Q. (BY MR. JOHNS) Could you turn to page 30 of the Fifth Methodology Order.

A. Page 30?

Q. Yeah. And could you read Finding of Fact 83, please.

A. "Merriam-Webster's Dictionary defines steady-state as, 'a state or condition of a system or process that does not change in time.'" And then there's a citation.

"A steady-state ESPAM simulation can only model increases in aquifer discharge to the Snake River resulting from continuous curtailments of an identical magnitude and location until the impacts of curtailment are fully realized. For example, a steady-state analysis of the curtailment of 1,000 acres, assumes that irrigation of the same 1,000 acres is curtailed every year at the same rate of consumptive use until the impacts of that curtailment reach a steady state or no longer change from year to year."

Q. What's your professional reaction to Finding of Fact 83?

A. It's twofold. First, there's some embarrassment that I may have precipitated this line of thinking in my 2006 report. And then second, it's not technically correct.

Q. How so?

A. So steady state can be used to describe a cubic-feet-per-second effect, or it can be used to describe an acre-foot effect. And in the 2006 report, I did use steady state on a cfs basis, and there are ways of construing that that would make this statement true in that context. But in the context of a curtailment, it's an acre-foot basis.

And I think, if you were to -- you know, so

1,000 acres, so that's 2,000 acre-feet per year. If you curtail 2,000 acre-feet per year for an infinite period of time, the accrual to the Snake River would be infinite, and that's not what a steady state model would show you. A steady state model would show you that if you curtailed 2,000 acre-feet, it would show you that 2,000 acre-feet were expressed at various points on the river, and it would estimate where those points were.

Q. What would you include in the definition to make it more accurate?

A. So may I refer back to Exhibit 500?

Q. Yes.

A. Towards the end, I edited it. And if you find the page before I do --

Q. I believe page 12, page 12, Exhibit 500.

A. Are you ready for me?

Q. Let the --

A. Yeah.

Q. -- folks get there.

Go ahead.

A. So I won't read all of this struck material; I'll only read what I retained and what I added.

"Merriam-Webster's Dictionary defines steady-state as 'a state or condition of a system or process that does not change in time.'" And then some

citations.

"A steady-state ESPAM simulation based on input values of acre-feet of curtailment can only indicate total acre-feet of accrual to modeled reaches of the Snake River and tributary springs resulting after the effects of curtailment have been fully realized.

"For example, a steady-state analysis of the curtailment of 1,000 acre-feet would indicate where the 1,000 acre-feet of accrual eventually would be expressed but would not describe the timing of arrival of accruals."

Q. So in your opinion, the definition of steady state, as it appears in the Fifth Methodology, is technically incorrect?

A. As applied to acre-feet, it is technically incorrect.

Q. Can you please turn to page 11 of your report. And I'm looking at Figure R7.

Do you see that?

A. Yes.

Q. Can you explain what Figure R7 shows?

A. Figure R7 is from that 2006 product that we produced for IDWR, and each line represents the transient effects of an ongoing curtailment activity corresponding to the priority date there in the legend.

And the little symbols that are there on the very right represent the equivalent steady state result from that same curtailment date. And what it shows is that over time, the transient modeling does approach the steady state result.

And this figure doesn't show it, but the fact is that if you could run transient out to eternity, then it would exactly equal the steady state result.

Q. So could you explain how transient and steady state are being used in the Methodology Order?

A. So the order itself, as I read it, specifies that transient will be used to determine a priority cutoff date. I didn't find it. And again, I was time-constrained. I didn't find in the Methodology Order a specification of how steady state would be used, but in the As-Applied, I found that it was used to assign responsibility specifically between the parties that have mitigation plans and those who do not.

Q. What about steady state?

A. So I'm sorry, if I misspoke, in the As-Applied, that's how steady state was used.

Q. Okay. And transient is for calculating the priority date?

A. So in the Fifth Order and then the As-Applied, transient was used to calculate the priority date, and

then steady state was used to assign responsibility, as I read those.

Q. Responsibility for mitigation?

A. I believe that was -- yes, I believe it was responsibility for mitigation.

Q. In your opinion, are the different uses of steady state and transient in the Fifth Methodology Order technically defensible?

A. They aren't, both because in neither case is the entire picture considered, but also because they fundamentally speak to different goals or processes. So the transient, you know, just by the nature of it, would be an appropriate tool if you were considering short-term effects. Transient -- or steady state, by the nature of it, would be appropriate if you're trying to consider long-term cumulative effects.

It appears that the Fifth Methodology Order is focused on short-term effects, and, yet, the As Applied still used a tool more appropriate for long-term effects. And, you know, either the goal is this or it's this, and they're not the same thing.

Q. In your review of the Fifth Methodology Order, were you able to identify any of the stated goals for steady state or transient?

A. So there was discussion of a goal of transient

to try to achieve in-season. I think there was -- within the season of use there was a five-month period that was the stated goal for transient. I did not find reference to the prior goal for use of steady state.

Q. So is it your opinion that there's kind of conflicting goals that are going on by the way steady state is being used and transient is being used in the Fifth Methodology Order?

A. So in the order itself, only transient is specified. The As-Applied creates the tension because the As-Applied uses both.

Q. So is it fair to say, to be technically correct, you would need to use transient to do both or steady state to do both calculations?

A. That's my opinion, yes.

Q. And that's not how it's being done this year?

A. That's correct.

Q. What's your understanding of the original purpose of the ESPAM tool?

A. So it was originally designed to aid IDWR both in planning and in administrative questions. Although, I think the word used in most of the reports was "management." I think, from having been there, the intent really was administration, even though the word used was "management."

Q. Has that purpose changed over time?
A. Not to my understanding.
I think the tool has been -- when I was debating whether to go work on the tool, an attorney said, "Don't worry. As soon as an appropriate misuse is identified, it will be misused."
But I think that the primary purposes are still the same, to inform planning and also to inform administration.
Q. Okay. In your report you refer to some -- I believe you referred to them as "precautions," where you identified precautions or factors that need to be considered when using the ESPAM when calculating surface water shortfalls.
Could you summarize what some of those precautions or factors may be and why?
A. Yeah. So the question, when you ask is this the best tool or is this an appropriate tool, you have to consider the suitability of the tool for its purpose. And, you know, if all I have in my toolbox is a crescent wrench, that may be the best tool I have, but it's still not useful for all purposes. For instance, it's not good for turning a Phillips-head screw.
So there are two different ways that I approach this question of the appropriateness of using

the model. And one is twice during my tenure within the ESHMC, the Eastern Snake Hydrologic Modeling Committee, the committee has been asked to provide a statement on appropriate uses of the model. Neither time were we able to come to consensus.

The first time we assembled what we called a white paper, which was really an anthology of statements from various members. The second time various members prepared statements, but the anthology wasn't even assembled. And in that process, there were divergent views, but they ranged from use of the ESPAM model for administration is technically indefensible to it can be used and described some narrow circumstances.

The Eastern Idaho Water Rights Coalition gave a more thoughtful -- I don't know if it was more thoughtful, but, certainly, a more lengthy response that talked about matching the precision of the model to the precision of the work -- the results needed and pointed out that the precision of the model depends upon the discretization of the question that's being asked. So that's one set of input to that question.

The other is I just looked at -- every version of the model has been, in its day, the best available science. And I looked at the important result of the model for this proceeding, which is the short-term

prediction of accruals to the near Blackfoot to Neeley -- or maybe it was the near Blackfoot to Minidoka reach -- combined reach.

And what I found is the two subsequent best available sciences in that short time period differed by a factor of more than five. That was one.

And then the other is that since ESPAM2.1, the reports have included an R-squared statistic on the ability of the model to meet short-term targets -- the model and its input data to meet short-term targets for each modeled reach. And what I found is that the ESPAM2.2, for the near Blackfoot to Neeley, the R-squared is .42, which means the model is capable of explaining about 42 percent of the variability observed. From Neeley to Minidoka, the R-squared is less than 0.1, which means that it's less -- it explains less than 1 percent of the variability.

So those -- and if you're going to use the model to predict something that's as important as the water supply for the Surface Water Coalition, to me those are frightening degrees of difference from one best available science to the next, and then within the current best available science, a disappointing ability to perform to the very thing that it's being asked to predict.

Q. And is it fair to say that the problem that it's being asked to predict in the context of this water delivery call is short-term problems, in-season demand problems?

A. That's my understanding.

Q. Does the ESPAM have short-term or is it more of a mid- to long-term response time?

A. So the aquifer itself, unless you're talking about a few locations very near the springs or river, if you're talking about the aquifer as a whole, the groundwater irrigated acres as a whole, the response is medium to long to perhaps very long-term.

Q. To your knowledge, does the Fifth Methodology Order specify minimum precision and accuracy criteria for the use of the ESPAM?

A. I couldn't find it.

Q. Is there a metric available that you could measure ESPAM precision and accuracy that you're aware of?

A. Well, so for this particular prediction, which is the one important in this question, the R-squared would be the useful statistic. There are additional modeling statistics that could be reviewed, but that would be a very useful and convenient one.

Q. Okay. And I believe Matt Anders and

Greg Sullivan, and I believe perhaps Sophia did as well, discussed the R-squared values.

Could you just briefly describe your understanding of the R-squared values and how that's important in evaluating this type of model?

A. Yeah. So, you know, fundamentally the R-squared shows how much of the observed variability can be explained by the model and the data, the equation and the data, the process and the data that are being used to estimate whatever the observed thing is. So it's -- R-squared of 42 means 42 percent of the variability is explainable.

Q. What level of precision and accuracy does the ESPAM2.2 have when using it to determine monthly estimations of the effects of the near Blackfoot to Minidoka reach? And you have already said this.

A. Yeah, so that's basically that 42 percent. It can explain 42 percent of that short-term variability.

Q. Do you believe there's a technical basis to set that minimum tolerance level and provide some criteria for that?

A. There are. And I have not explored them exhaustively, but, you know, for different types of data there are different typical thresholds. I would think a .5 would be useful in this, which is lower than the

R-squared for the Twin Falls regression that everyone seems to be concerned about. But I still think in the modeling context that could be a useful criteria.

Q. Do you believe it's a policy question of whether to set that, or is there technical -- is there a technical basis that would inform that policy decision?

A. So it is a policy decision. And, you know, ideally, you would make the decision based upon the gravity of the prediction being made and then you would look to see if the candidate tools are capable of meeting that. I think it would be tempting to do it the other way, "Well, we want to use this tool. Let's set our criterion so this tool passes." I don't like that kind of science.

Q. What kind of technical work could inform the policy decision establishing minimum criteria?

A. So a broader exploration of typical model precision -- you know, again, the technical work, the gravity of this situation -- of this prediction in terms of whether or not the calculated relief will take care of what the Surface Water Coalition needs, the gravity of the much larger effort that has to be made by groundwater users to provide that relief, those together could inform on the one hand what's attainable, on the other hand what would be necessary to justify and to

support the gravity of the decision being made.

Q. I think you touched on or you at least addressed the best available science standard. My question, I guess in follow-up to that, is the best available science standard as you understand it within your range of scientific tolerance, so to speak?

A. Help me understand. I'm not tracking what you're trying to ask.

Q. So is best available science in your work, if you were to make a recommendation as a scientist, is that good enough for you? I think you touched on this.

A. Oh, okay. No, it's not. I think that two things are required: It has to be the best available, and it has to be good enough to address the question at hand, both in its ability to provide an answer and in the gravity of the -- you know, if someone asks me what do you think about "X," I'm really comfortable, and it's just casual conversation shooting from the hip. But if someone's livelihood depends on it, if I get this answer wrong, they won't have enough water to irrigate with. I'm not comfortable shooting from the hip. And that's the kind of process, thought process, I would go through.

The other thing that's important is that paper from Roger Warner, Eastern Idaho Water Rights Coalition,

that I referred to, points out that the precision of the model depends upon the kinds of questions that are being asked. And if you've got a model that cannot answer a very specific question, if you can reformulate the question more broadly, and if that means reformulating the policy or the action that that is informing more broadly, then you can greatly improve your confidence that your results are meaningful and will provide the needed relief.

Q. And I want to talk about that with you, Bryce, because, again, we've identified there's some issues with, you know, the criterion and that.

But can you provide any suggestions on how to improve, I guess it would be, the R-squared value of the ESPAM, things that the Department should look at?

A. Yeah. So Sophia talked about many of her recommendations that have been made in the Eastern Snake Hydrologic Modeling Committee. And, you know, the bottom line is that to get the R-squared value better, the model has to get better. And I agree completely with Ms. Sigstedt that we've put as much lipstick on this single-layer pig as this single-layer pig can wear, and we need to make an advance in our structural representation in our conceptual model before we're going to get to meaningful improvement.

The other thing that Ms. Sigstedt said that I think is very important is that you can overfit a model, and some of that 42 percent of variability that the statistic says the model is able to predict, as Ms. Sigstedt said, it may be getting the right answer for the wrong reason, and it can only get that answer when it's spoon-fed the data that were used to build it. And if you want independent data to actually make a prediction, that 42 percent number may be an overestimate.

But either way, there's ongoing technical work that can be done, it is being done, IDWR is striving hard, and I think there are things that can be done to improve it.

Q. Just briefly, can you explain in your report, you refer to ratios of relief to cost. You touched on this, but can you just kind of summarize that again what you mean by ratios of relief to cost?

A. Yeah. And so I'm not talking about an economic valuation. We've heard that that's not appropriate. But it's clear from a lay reading of not only the conjunctive management rules but the order itself that there is a need to maximize the use of the state's water resources and that there is a need to secure the maximum benefit to the state from its

resources.

And so as a ratio of beneficial use -- for instance, if you had 1 acre that was mischaracterized as being irrigated by surface water, and so you have calculated a shortfall to supply that acre, and in reality that acre didn't need any surface water because it was applied by groundwater, that acre requires -- we've heard 5.8. For simple math, I'll round it to 5 acre-feet of water. We're going to go out on the plain somewhere and curtail groundwater to supply that 5 acre-feet.

But even if we could be 100 percent, if we could have a pipe from the groundwater user to that acre because groundwater users, as Mr. Carlquist testified, divert so much less, now we're going to have to have 2 or 3 acres of groundwater beneficial use to be curtailed to supply this 1 acre of beneficial use that's not needed.

Now we add in the fact that where you are on the plain, only a fraction of your -- of the groundwater pumping that's curtailed or foregone will actually accrue to that reach. On average, across the plain, now you've doubled that 3 acres to 6. There's some place s where you go -- it's an incredibly large number because there's such small effect.

Now, if you add in the fact that now we insist that this entire benefit accrue in this narrow period of time, to get that one -- you know, to get the effect of those 6 acres, we have to curtail ten times as many. So now we're -- we've -- because we've been unable to identify this 1 acre that actually has no need, we've erroneously removed 60 acres of beneficial use.

That's the multiplier effect that I'm talking about, and it applies to any imprecision that causes the calculated shortfall to be larger than the Surface Water Coalition's actual need.

Q. Okay. And did you have time to look into some specific things or adjustments that could be made in the model that could account for or address that issue of ratios of relief to cost?

A. So I did not. Except that conceptually the model can refine what that ratio is, but the ratio exists because of the physical characteristics of the aquifer. It's really independent of modeling. Modeling is only a tool used to estimate the magnitude of that effect.

Q. So it's something you weren't able to get into, but if I under your testimony, the ESPAM is capable of performing such analysis -- or you're capable of --

A. So the aquifer actually causes the effect. The model, within its limits of precision, can estimate those effects.

Is that -- did I answer the right question?

Q. I think that's the answer to the question I meant to ask you.

A. Okay.

Q. I want to talk to you about supplemental water use, and I believe Greg has discussed this, Sophia. I mean, it's been, you know, discussed quite a bit, so I'm just going to kind of move around on a couple of questions throughout here.

But could you turn to page 10 of the Fifth Methodology Order. And in the interest of being concise, could you just -- I'll just note that we're looking at page 10, Finding of Fact No. 23.

A. Yes.

Q. Could you just skim that?

A. Yeah, so -- okay.

So what I read is that there are areas of supplemental groundwater supply. It is allowable to consider that but that the information available to the Department is not sufficient to make that determination.

That's what I read there.

Q. Okay. So is it fair to say that the Fifth

Methodology Order didn't consider supplemental irrigation?

A. Only to the extent to acknowledge that it could be, but did not actually do that.

Q. What implications are there by not considering supplemental irrigation?

A. So it's exactly this multiplier effect, that if a piece of ground actually is not irrigated by surface water, then there's no need to provide surface water to support that acre. And if we erroneously try to support that acre, then depending where on the plain that reduction or curtailment has to take place, we're, you know, perhaps, as much as 60 times the reduction of beneficial use for something that actually is not needed.

Q. I believe it was Greg Sullivan who stated that he believes there's a framework where you could consider supplemental groundwater use.

Do you agree with that statement?

A. Yes, very much.

Q. Have you identified in your report any documents or anything that speaks to -- or provides frameworks for supplemental groundwater use?

A. Yes. There's -- I think I made four references. Three of them are to modeling reports that

provide thumbnail sketches. One of them, I think the most important one, is to a design document that I and Paul Pelot prepared. So this --

Q. Just is that the determination of source irrigation water?

A. Yes. Yes. So that would be --

Q. Exhibit 515, I believe, is what that is.

A. Yes. And I don't think I need to refer to it to just tell you in a nutshell.

So in a nutshell, I spent hours and hours and hours over several years wrestling and refining this because that was my job at Eastern Idaho -- at IWRRI was -- and this is an important part of the water budget, of the -- I think others have talked about the general methods, the general data that are available. I think the important thing that I can add from that exhibit -- whatever the number you said --

Q. 515.

A. Okay. -- is that to refine our understanding, for things we could not tell any other way, we developed a statistically valid sampling of 300 points, which is a pretty robust dataset across the plain. And I trained Mr. Pelot, and we funded him, and he went and looked at these points individually. And the point of that is that was not an onerous task. And we did that, you

know, over -- that part of it we did just over part of a summer.

And so there are robust methods that are available, and there are ways to account for the imprecision of those methods that are protective of the senior right. That's the importance of those four documents.

Q. Okay. Could you just describe a technically defensible adjustment relying on those documents that you can make the ESPAM for supplemental groundwater use?

A. So it would certainly be technically defensible to use the W-I-M-S [sic], Water Measurement Information System, data and any groundwater pumping that was indicated by the WMIS data to occur within the Surface Water Coalition on acres that they have identified could immediately be subtracted defensibly.

And the reason for that is, is that any kind of a failure that could occur with the underlying data in the WMIS -- and I know this from being actively involved in the first three years of the program that the groundwater data go into -- any of those failures will cause the groundwater diversion to be underreported, which would cause an overestimate of calculated shortfall. So that's the first part.

The second part is that the methods outlined

in those documents that we don't want to plow through will tell how to identify and confirm the places of use to which those apply.

Q. Are there any other frameworks or methods that are technically defensible that you can provide at this time?

A. For?

Q. For supplemental groundwater.

A. For supplemental.

Those are the only ones that I can think of right this very minute. I don't think there's anything else in my report. If there is, I apologize.

Q. If you were given more time, would you have been able to explore that issue more thoroughly?

A. Yes.

Q. Is that something you wanted to do?

A. It is something I very much wanted to do.

Q. And due to time constraints, were you barred from being able to perform that further analysis?

A. Yes.

Q. Do you think that impacted your testimony at this hearing?

A. It certainly did.

Q. In what way?

A. I was unable to answer the last question.

Q. Do you anticipate if you would have had time to do the analysis, you could have provided additional frameworks that could be considered for supplemental groundwater use --

A. I, certainly, would have been able to explore what other frameworks there are. You know, I don't know whether that exploration would have led to success.

Q. I think you covered that.

I think you touched on this, but just for clarification, what's the implication of neglecting a single acre of supplemental irrigation within the SWC service area under the Fifth Methodology Order?

THE WITNESS: Are you ready?

COURT REPORTER: Yes.

THE WITNESS: Okay. Approximately, at least within the right number of zeros, 60 acres of needless loss of beneficial use from groundwater.

Q. (BY MR. JOHNS) Does the -- well, let me rephrase it this way: Is it difficult to create the adjustment for supplemental irrigation, in your opinion?

A. No.

Q. And is it your opinion that the Department has sufficient information to create that adjustment and it will be technically defensible?

A. Yes.

Q. Does the admission of supplemental water, as we've been discussing from the Fifth Methodology Order, make it less technically defensible?

A. The omission from -- in my mind, yes, it makes the Fifth Methodology Order, as a whole, less defensible.

Q. So its inclusion would make it more --

A. Yes. Inclusion would make it more defensible because there's an important factor that's obtainable -- that's obtainable and reliable and that has not been considered.

Q. Okay. I want to shift gears and talk about, your report identified a couple of consistency issues, and so I just want to shift gears and talk briefly.

Again, I think this issue has been discussed somewhat ad nauseam, so I don't want to belabor it, but there was some discussion about accruals?

A. Yes.

Q. Do you recall those discussions?

A. Yes.

Q. Do you agree the Fifth Methodology Order does not make adjustments for accruals for target and nontarget reaches?

A. Yes, I agree.

Q. What's your professional reaction to that

admission?

A. It's a surprise because it's an inherent and obvious result of the modeling, number one. And number two, though I'm not a policy expert, I understand enough about what's trying to be achieved here that it's surprising that it's not considered in some fashion.

Q. Does it distort the calculation?

A. It distorts the calculation in every year beyond the first.

Q. Okay. You previously stated the Fifth Methodology Order uses steady state to partition the responsibility for mitigation in lieu of curtailment; is that correct?

A. I meant to say that the -- as I read it, the Fifth Order is silent on the partition, but the As-Applied indicates that it was used that way, which itself is a problem. We have an order that does not describe all the methods that are being used, and that causes me heartburn, because I can't address them technically if they're not described.

Q. So it's your opinion that the way the steady state was used in the As-Applied is not specified in the Fifth Methodology Order?

A. I did not find it in the time that I had to look at it.

Q. Okay. And I believe Greg Sullivan may have addressed this, but for the record, is this approach -- well, I think we covered that already, Bryce.

Could you please turn to page 35 and 36 of the Fifth Methodology Order.

A. I am there.

Q. And could you please skim Conclusion of Law No. 21. Once you've done that, do you have a professional reaction to that conclusion?

A. So this is a conclusion regarding a mitigation plan. My response -- my professional response to this is that it seems to articulate the ability, and not only the ability but perhaps a requirement, to use the modeling tools in a coherent -- in a fashion coherent with both the ability of the tools, the modeling tools, and the ability of the administrative instruments that are used to time frames that match the physical capabilities. And I think it's technically possible to do that.

Q. In your opinion, was that done?

A. In my opinion, it was not done.

Q. Can you please discuss any factors that may affect the precision of estimating the expected relief and the timing of which it will be realized.

A. Yeah. So, primarily, it is the ability of the

model itself to accurately estimate. The finer the time scale or the finer the temporal scale, the less precision the model is able to actually achieve. And that's the primary limitation.

The other limitation is physical. It doesn't matter how much I want to get water from Kilgore to someplace on the Snake River, in a certain time frame, the physical characteristics of the aquifer make that impossible.

Q. You've talked somewhat about some technical work that can be performed, but on this point is there any technical work that could be performed to improve the precision in this regard?

A. So the -- addressing the deficiencies that Ms. Sigstedt talked about with the conceptual model, certainly the layering, I have been in the camp that if you don't have data to support something, don't put it in the model. I think that's, in some cases, short-sighted. But the clear response is then the gravity of these matters for the needs of the Surface Water Coalition mean that a prudent investment would be to acquire the data to allow adequate modeling of some of those additional features that are known to exist.

Q. Were you able to perform some modeling? Will you turn over to page 25.

A. You're in Exhibit 500 now?
Q. Exhibit 500, yeah.
A. Yes.
Q. I'm looking through -- you've got Figures R17, the next page Figure R18, and then a series of figures that go through page 28. It appears you were able to do some modeling?
A. So R17 and R18 are reproduced from old work; they have some bearing. R19 through -- yeah, R19 through R21 were new modeling that was done under my direction by Mr. Kindred of Rocky Mountain Environmental.
Q. And can you please explain what the purpose of these figures is and how they relate to the findings in --
(Speaking simultaneously.)
COURT REPORTER: Okay. Wait. "And how they relate to"?
MR. JOHNS: To the findings in your report. Sorry.
THE WITNESS: So these figures compare the two most recent best available science versions. Specifically, they're those models' indication of responses to the near Blackfoot to Minidoka reach. I think in all cases, the solid bar represents the

ESPAM2.1 results as embodied in the ETRAN 3.3 modeling tool provided by IDWR. The cross-hatched results indicate the results from ESPAM2.2 embodied in the ETRAN 3.4 transfer tool. And they show where they are similar and where they are different.

Q. (BY MR. JOHNS) And what conclusions did you draw from running these analyses from generating these charts?

A. I conclude that if the two successive best available science models differ by this much, it gives us some viewpoint -- some view into the window of how precise can these models be.

Figure R19 is the one that I think is most alarming on a percentage basis. So if we're looking at a five-month period, four months is a third of the year. Five months is pretty close to a third of the year. The first in each graph -- the first bar is the indication of that model's estimate of the response in that first -- so in that period of such concern for us.

So here from -- in Figure R19, this Row 75, Column 57, at that location, the new model, you know, just guessing by how tall those bars are, indicates about a third of the relief that the old model did. And if it's important to get relief to the Surface Water Coalition, that degree of imprecision is alarming.

Q. Are there any -- is there any technical work or any adjustments you could recommend that you haven't discussed already that would improve?

A. Not that hasn't already been discussed.

Q. Would you please turn to page 28 of your report?

A. Yes.

Q. And I'll just summarize. In your report, you state that there's a technical analysis that could be performed to inform a policy decision, answering the question: "Is it fair to the SWC to use the model to estimate timing of accruals in the trimester of curtailment when the two most recent best available science models differ by approximately a factor of six"; correct?

A. Yes.

Q. Okay. What technical work could be used to inform this decision?

A. So much of it has been done, but it would be further exploration of these questions of precision of the model. That's the first piece.

The second piece is relating back to this finding of fact 21, that it appears to be -- there could be an ability to adjust the instruments, perhaps adjust the time frame of consideration of the order to match

the ability of the instruments to provide relief to the calculation or definition of the relief required.

Q. Were you able to perform any technical work in this regard to help inform your testimony?

A. Only these limited figures that are shown here in my report.

Q. Okay. Did time constraints prevent you from performing that work?

A. Yes.

Q. Okay. If you had the time, would you have been able to present that at this hearing?

A. I would have, and it would have been much better, because what I presented is not -- it may be spatially representative, but I don't know that it is, and I would have been able to perform analyses that were spatially representative.

Q. Would you mind turning over to page 29 of your report --

MR. JOHNS: And we're nearing the end here, Director. I think I have this, and then I just have a couple points on rebuttal. We can chug along, or we can take a break.

HEARING OFFICER: We probably should break. We've been here two hours. Let's take a 15-minute break. Back at 3:30.

(Break taken.)

HEARING OFFICER: We are recording.

Further questions, Mr. Johns.

MR. JOHNS: Thank you, Mr. Director. If I may, I just have some quick rebuttal I'd like to ask Mr. Contor from prior witnesses.

Q. (BY MR. JOHNS) Bryce, were you present in the room during the testimony of Jay Barlogi?

A. Yes.

Q. Barlogi, I believe it is?

A. Yeah, I think so.

Q. Do you recall a discussion about variations in irrigated acres?

A. Yes.

Q. On a 40-acre-tract basis, how much is a 5 percent change?

A. It's 2 acres.

Q. You have experience in assessing irrigation in the ground without entering the field?

A. I do, starting with my position at the canal company when I was assigned to prepare the adjudication claims.

And then I worked for the seed company, which we haven't talked about. I needed to assess what was going on in each tract around my seed isolations, not

for irrigation purposes, but it's the same process to assess whether they were growing the same crop as my seed isolation.

Then when I was at IWRRI, I did a lot of windshield surveys to verify irrigated lands data, source data, and methodology.

So I -- and then I did a lot of that, as well, when I was making -- doing subcontract field investigation for water right claims in the Snake River Basin Adjudication.

Q. In your experience, is it easy to detect a 2-acre change in a 40-acre tract without entering the ground or going in the field?

A. If you're specifically looking for that and the topography is right, sometimes you can catch that but not on a casual basis. On a casual basis, I think 2 acres of change in a 40-acre tract could occur and you'd never notice it.

HEARING OFFICER: Hello. We have somebody listening in that's not muted, phone number ends in 38. You're interrupting the hearing. Apparently, they're off.

MS. TSCHOHL: I was able to mute them.

HEARING OFFICER: Okay. Thank you, Sarah.

I don't like that kind of interruption, and if

it continues, I may just exclude people. Okay.

MR. JOHNS: Thank you, Mr. Director.

Q. (BY MR. JOHNS) Bryce, you were also present in the room during Ms. Sukow's testimony; correct?

A. Yes.

Q. Do you recall some of her discussion she had about steady state, and -- just generally, do you recall her discussing steady state analysis?

A. Yes.

Q. Is it true that utilizing a steady state will not result in realization of the predictive down shortfall in that irrigation season?

A. So I think there's some confusion. The modeling won't change when the relief arrives. And so whatever method you use to calculate a curtailment date, when that curtailment is instituted, most of the relief will arrive after the irrigation season.

A steady state calculation, because it's time agnostic, will calculate a different number than would a transient; but in either case, only 9 to 15 percent -- I think is approximately correct -- is what actually would arrive. I don't know if that's the question you were asking.

Q. I believe that's the question I was asking.

Bryce, you were also present during the

testimony of Matt Anders; correct?

A. Yes.

Q. Do you recall Matt Anders making an assertion that -- I believe it was not every drain or return flow from Twin Falls Canal Company is accounted for?

A. I do.

Q. Okay. What impact does neglecting these return flows have on the calculated shortfall in the Fifth Methodology?

A. So if an adjustment for returns were to be made and you omitted a return, that return that got omitted would cause the calculated shortfall to be too large. And so if the data are -- the dataset is incomplete, the data are imperfect, the shortcomings all work to the benefit of the Surface Water Coalition so they are conservative.

Q. Do you have any other comments about Mr. Anders' discussion on missing return flow data?

A. Only that they have the same multiplier effect that any other omission would. So if you -- if, because of omitting return flow calculations, the shortfall was an acre-foot too high, out on the plain somewhere, you'd have, you know, approximately 60 acre-feet of beneficial use that would have to be foregone.

Q. How does the omission of this information

affect the technical defensibility of the Fifth Methodology Order?

A. It's the same as the other. There's a relevant bit of technical information that is available that was not considered, and so it undermines the credibility of the document.

Q. Okay. In your opinion, is there a way to calculate credit for the return flows in calculating shortfall?

A. So I'm very familiar with all the work we did in the modeling process to quantify returns. One of the things I would like to have done would be to understand the full calculation of shortfall. I don't understand it well enough to speak to exactly how that would affect that calculation.

Q. During Matt Anders' testimony, do you recall some discussion about irrigated acreage data?

A. Yes.

Q. Do you have any personal knowledge about irrigated lands data that the Department has?

A. Yeah. So every irrigated lands dataset that was created up through when I left IWRRI in 2010 was under my responsibility, and particularly the transition to the methodology that's now used, it was my responsibility to ensure that that method was adequate

for the modeling purposes. And so at the time it was being developed, I was intimately involved in understanding how it worked in independent verification of it, and so I feel quite comfortable with those irrigated lands datasets.

Q. Do you have any opinions as to their sufficiency for determining the irrigated acreage in the Fifth Methodology?

A. Yes. I think that because of the process, I think they're robust datasets, and I wanted to talk a little bit about that process. We've talked about a suite of polygons, the CLU polygons that were used to identify discrete blocks of land that may have a different irrigation characteristic. And those came from the U.S. Department of Agriculture, but they were hand-modified by IDWR to correspond to aerial imagery to, again, improve that ability.

And then there was a scoring process that used multiple remote sensing data sources for multiple dates during the year to score which of these three categories that it fell into.

And then there was an additional hand-verification process. That's part of the reason this process is so costly. It's probably my fault because I raised the issue. We had a spot out in near

where I lived at the time that it just happened that every time the stinking satellite flew, my neighbor had just cut his hay and his field was showing up as nonirrigated when, in fact, it was. And pursuing that led to this additional level of handwork that I think makes it a very robust dataset.

Q. Would it be technically defensible, in your opinion, to use that data, the irrigated lands dataset, to determine the irrigated acres in the Fifth Methodology Order?

A. Not only defensible, I think it's the best available data that could be used.

Q. What more can you say about the ability of IDWR to apply its methodology to the SWC areas?

A. I think that the areas where IDWR has said it's unable to perform a certain analysis, I think there are robust methods to do that, that when there's uncertainty either the uncertainty inherently cuts in favor of the Surface Water Coalition or that an adjustment can be made.

Q. Okay. I want to shift over. And I think this is -- just have a couple questions left, some for Sophia, and then I think just a few conclusory ones, and then we'll be wrapped up here.

You were present for Ms. Sigstedt's testimony

earlier; correct?
A. I was, yes.
Q. Sophia, so I don't mess it up.
A. Yes.
Q. Do you recall her discussion about the R-squared values?
A. Yes.
Q. Okay. I just want to ask you a couple of questions in follow-up to some things she said.
What are the consequences of the degrading R-squared value that Ms. Sigstedt discussed?
A. So the consequence is that the prediction is less reliable, which could cut either way. Either to make the calculated shortfall inadequate to sustain Surface Water Coalition needs or cause the required mitigation or curtailment to be in excess of what was needed.
Q. And do you agree with Ms. Sophia's statement that there are consequences in neglecting Portneuf and Blackfoot and Henry's Fork?
A. I do, but I think she focused on the potential harm to the Surface Water Coalition. I think an important point is that there will be a year when the snowpack is reversed, that the snowpack above Heise is high, and that forecast is robust, but all the other

areas have reduced snowpack. And in that case, omission of those data will result in a calculated shortfall that is too low.

Q. Do you agree -- there was a discussion that Sophia had about the river package. Do you agree that the river package allows proper representation of the communication between the river and the aquifer -- allows proper representation of the communication between the river and the aquifer, given that it is a layered model?

A. So I believe the discussion was relative to her criticism that the model is not yet a multilayer model. And the river package and the parameters that describe the operation of the river package allow the best representation of the communication between the river and the model cell that hosts it at the top of the aquifer. But the river communicates through that cell, both to the bottom of that cell and then to adjacent cells, and the river package cannot overcome the deficiencies of a single-layer model in representing that broader communication.

Q. Have you noticed any themes from the different witnesses that have been talking about the Fifth Methodology Order with regard to criterion for minimum conservatism?

A. So a recurring theme is that if you have multiple components that are each conservative, that that tends to build and build and build on the conservatism. And so one comment that I have related to that is that there are robust mathematical methods to calculate cumulative effects like that in terms of a statistical distribution. They're well known, and they're not difficult to perform.

The second is that, as we talked earlier about criteria, you know, the -- the qualitative criterion is that it should be conservative. Well, eight times the need is conservative, so is 100.00001 percent of the need conservative. If an objective standard of the appropriate level of conservatism were set, then those calculations could be applied to ascertain whether that appropriate level were achieved. Because if the level of conservatism by this hip-shot method is too low, that harms the Surface Water Coalition. If it's too high, that harms the groundwater users. And I don't think anybody wants to do either of those things.

Q. So when you say that "hip-shot" approach, I mean, are you saying currently there's no way to measure or determine whether IDWR data in the Fifth Methodology Order -- or the 2023 As-Applied met any threshold level of conservatism?

A. I don't see that a threshold was identified, nor do I see any evidence that a calculation was performed to see if the appropriate level was achieved.

Q. Okay. What technical issues may arise from not establishing these criteria?

A. So the technical issue is that these levels of conservatism can propagate more rapidly into higher levels than humans are intuitively able to understand. I do some work for groundwater modeling, and there's a threshold for the probability of a false positive occurring in a single year. And sometimes we miss that criterion by a few points, and we say, ah, you know, we're close, we're close.

But if you calculate those out, in that case, by missing that criterion only by a few points, you've almost guaranteed that in the course of 10 or 20 years you will have a false positive, and the regulatory implication of a false positive can be severe.

Q. Were you able to perform any technical work that would inform some policy decisions or some criterion that could be established in this regard prior to this hearing?

A. I started down that road, and I purged that from my report because I didn't have time to do a good enough job to present it, you know, where it may have a

consequence.

Q. Okay. Is it your belief that the -- that that analysis could have informed the Department on things it could do to establish some criterion?

A. Yes.

Q. But you were unable to do that?

A. I was unable.

Q. Time constraints?

A. Time constraints.

Q. Very good.

Is there any other items in your report that you would like to present at this time?

A. Let me just quickly thumb through here. I know that we all have other places we'd rather be.

There is one.

Q. Okay.

A. So there's been discussion about when would the Department have been available to perform analyses on a one-month basis, and there's two sides to that question. When would the model have been capable of performing such analyses. The answer to that question is since 1999. Actually, there's three.

One is when could that have been done with a model that was calculated on at least that time step -- or stress period. And the 1999 model was, the 2005,

2006 models were not. Though they could have been implemented that way, they were not calibrated that way.

The 2013 model was calibrated to one-month stress periods, so that's the answer of when could it have been done. The answer to when would it have been reasonable to do it depends on the criterion of accuracy, which is an administrative decision that can be informed technically that, to my knowledge, has not been made, and so I can't answer that question.

Q. And is that relevant to your discussion about the technical defensibility of moving to transient?

A. Yes. And I think there was some confusion in earlier testimony that may have not been possible until 2021, and the fact is that it's been possible for many years.

MR. JOHNS: At this time I'd like to move to admit Exhibit 500, Bryce's expert report.

HEARING OFFICER: Any objection to the admission of the document marked as Exhibit 500?

Hearing no objection, the document marked as Exhibit 500 is received into evidence.

(Exhibit 500 received.)

MR. JOHNS: Mr. Director, I don't have any further questions at this time. I reserve the right for any redirect.

HEARING OFFICER: Does the groundwater group wish to question Mr. Contor at all?

Mr. Harris?

CROSS-EXAMINATION

QUESTIONS BY MR. HARRIS:

Q. Good afternoon, Bryce. I have just a few questions about one aspect of your testimony here today.

You testified about supplemental groundwater use in the Methodology Order --

A. Yes.

Q. -- do you recall that testimony?

A. Yes.

Q. And as I recall, the Methodology Order doesn't have any supplemental groundwater use in it currently; correct?

A. There's -- the actual process does not consider supplemental groundwater.

Q. But it says that it may consider it?

A. Yes.

Q. And based on your employment with IWRRI, IDWR, and in your private consulting, have you become familiar with GIS programs?

A. Yes.

Q. Could you just describe what those programs

generally entail?

A. So they are computer programs that allow you to display spatial data in its spatial relationship and to produce maps. You can perform analyses. For instance, you could have a spatial representation of evapotranspiration. You could subtract from that a spatial representation of precipitation.

You could find out -- you could -- if IDWR has plotted a point in its data, you could see on a map where that point lies, and you could analyze its inclusion or exclusion or its proximity to any other feature of interest.

Q. And so a GIS shapefile is a polygon that the program creates and then talks to the underlying aerial photo; correct?

A. Yes.

Q. And different shapefiles or polygons or, you know, points, and there's also lines; correct?

A. Correct.

Q. And you're also familiar, through past experience, on how water rights are described?

A. Yes.

Q. And that would include a place of use?

A. Yes.

Q. And in the water right report, it describes it

as the number of acres per quarter quarter; correct?

A. Most do. Some large ones omit that detailed listing.

Q. Right. And so a shapefile -- so, for example, if a water right says there's 30 acres authorized to be irrigated in this 40-acre tract, a shapefile polygon for the place of use would actually depict which 30 of the 40 are authorized; correct?

A. It depends on whether it's a shapefile showing the actual irrigated parcel or if it's showing a permissible place of use. So I've seen water rights where the shapefile draws a boundary, maybe the boundary is 8,000 acres, and then the water right says within this box, you may irrigate 5,000.

Q. Correct. But on a private decreed -- say a groundwater right --

A. Yes.

Q. -- that does not have a permissible place of use, it would depict, in my example, which 30 of the 40 acres --

A. Yes, that's correct.

Q. And so in this case there would be -- if there were groundwater rights within the Twin Falls Canal Company service area, places of use of those water rights would be depicted with shapefiles; correct?

A. Yes.
Q. And would it be difficult, in your view, to do some sort of a clip or an overlap to see where those acres overlap with the, say, 2017 shapefile or any other shapefiles generated by the Department?
A. That would be a very straightforward operation.
Q. In fact, my office did it -- would it surprise you to know it took about an hour to do that?
A. Why so long?
Q. It's not hard to do; right?
A. No.
Q. So at a minimum, you'd have a starting point of which water right places of use overlap with the Twin Falls Canal Company place of use?
A. Yes.
Q. And do you agree that would be a starting point for determining whether there is supplemental irrigation occurring within the Twin Falls Canal Company area?
A. Yes.
MR. HARRIS: I have no further questions. Thank you.
HEARING OFFICER: Other questions from the groundwater group?

Cross-examination for the Surface Water Coalition?

Mr. Thompson?

CROSS-EXAMINATION

QUESTIONS BY MR. THOMPSON:

Q. Good afternoon, Mr. Contor. Travis Thompson for A&B Irrigation District, et al. Just a few questions today, Mr. Contor.

When were you hired by Bonneville-Jefferson Groundwater District?

A. It was probably December or January -- December of 2020 -- well, we've done work for the district in the past, and I don't recall when that was, but I started working in earnest on these issues in December, maybe November of 2022, maybe as late as January of 2023.

Q. And do you know, at least for purposes of the Surface Water Coalition delivery call, did Bonneville-Jefferson Ground Water District use Ms. Sigstedt and Mr. Higgs until that time?

A. I don't know. I know that they have used Mr. Higgs and still do for various functions. I don't know the nature of their relationship with Ms. Sigstedt.

Q. Have they retained any other consultants, to

your knowledge?

A. I think that they have. They're working on some projects unrelated to this that I think they have other folks working on.

Q. Do you know who that is?

A. I don't.

Q. What sort of projects?

A. So one of the project is a --

MR. JOHNS: Objection. I'd like to raise an objection. I think this kind of goes outside the scope of what was presented on direct.

HEARING OFFICER: Well, I think these are preliminary questions about where Mr. Contor has worked and for whom. Those were questions that were asked of him initially. Overruled.

Mr. Thompson.

Q. (BY MR. THOMPSON) I'm just curious. You had a list of four projects that you were tasked to do for this proceeding, and you've referenced they have other consultants, and you're aware of some projects that are being worked on. I'm just curious what those are?

A. So there's a piping project, there is a well design project. I don't think they've hired someone. I made recommendations. My understanding is that Mr. Higgs continues to perform their hydrographer

services. He still performs some analyses for them. Often I will hear somebody did this task, and I don't know whether they did it for Bonneville-Jefferson or if they did it for Idaho Ground Water Appropriators. So that's the extent of my knowledge.

Q. Thank you. Is a diversion volume of 5 acre-feet per acre for a large open canal system in the Snake River Basin reasonable, in your opinion?

A. So it would depend on the system, but it could be.

Q. Is that a common value for canals in Water District 1?

A. I think so.

Q. About 7 acre-feet?

A. I don't think that's unheard of.

Q. How about 10?

A. I don't think that's unheard of.

Q. Are those values reasonable?

A. You know, reasonable depends upon some criterion. And I think -- I haven't been asked to evaluate criteria. You haven't provided me criteria. I think there are criteria under which 10 could be considered reasonable.

Q. And you've testified you're familiar with the groundwater model and its prior versions; is that

correct?
A. Yes.
Q. You worked on water budgets for the model while you were at IWRRI?
A. I did.
Q. And you were -- presented those design documents to the Eastern Snake Plain technical committee; is that correct?
A. Yeah, the ones that I authored, I did.
Q. And you have been using the transfer tool that the Department's created; is that correct?
A. I have been.
Q. And that tool relies upon the model; is that your understanding?
A. Yes.
Q. And that tool looks at impacts to river reaches?
A. Well, so years ago, I was severely chastised for using the word "impact" because it has legal meanings. I would say that that transfer tool estimates effects or accruals.
Q. A response from a change in an aquifer condition resulting to the river, would that be --
A. So if a volume of water is put into the aquifer or removed from the aquifer, the tool estimates

when and where that would be expressed at the river or -- at the parts of the river and springs that are represented in the model.

Q. And has that been an acceptable use of the model?

A. Well, again, it has been accepted -- I've never liked it, but it has been accepted.

Q. And do you use for it for clients in transfer application?

A. I have.

Q. Has that been approved by the Department?

A. Yes.

Q. So you indicate in your report that the 1999 version of the model was created to be, quote, a planning and management tool; is that correct?

A. Yes.

Q. And I think you testified earlier with Mr. Johns that you stated management could be administration?

A. That's my opinion. That's not what was stated in those documents.

Q. So is the term "management" similar to administration?

A. I don't think so. I think they are different, but it's been my experience that, in Idaho, we use the

word "management" when we mean "administration."

Q. And the Department's conjunctive management rules use the word "management"; is that correct?

A. They do.

Q. So would you agree that the Department has used the ESPAM model for conjunctive administration for over a decade?

A. Yes.

Q. Would you agree that Idaho courts have approved the Director's use of the model for that purpose?

A. Yes.

Q. Would you agree that ESPAM2.2, which I think is the most current version of the model, can be used to represent temporary curtailment of groundwater rights?

A. Yes.

Q. And is that what is referred to as the transient use of the model?

A. Yes.

Q. Looking at specific reaches -- and you're familiar with how that model is calibrated to different reaches; is that correct?

A. Yes.

Q. -- would you agree that it's better calibrated to the near Blackfoot to Neeley reach compared to the

Neeley to Minidoka reach?

A. Yes.

Q. Would you agree that in the near Blackfoot to Neeley reach, that contains the majority of the springs and aquifer discharge --

A. Yes.

Q. -- between those two reaches?

So you talked about the R-squared values for those two reaches in that calibration document.

A. Yes.

Q. And it's in your report; is that correct?

A. Yes.

Q. Would you agree that those reaches' calibration values are within the range of values for upriver reaches as well?

A. So I looked at that, and I can't remember the result. I think that the Neeley to Minidoka is amongst the worst, but it's a small discharge. I think that the near Blackfoot to Neeley is neither the best nor the worst, but that may be incorrect. I, again, was constrained by time. I wish I could have done a better job.

Q. Let's turn to your Exhibit 512 when you get a second. It will be page 125.

A. Okay. I need a different book.

Okay. I have 512 here.
Q. I'm looking at page 125 of 190.
A. Oh, it's double-sided. That confuses me. Okay. Here we are.
HEARING OFFICER: Let me find that. And it's page what, 125?
MR. THOMPSON: 125. I think they're Bates-stamped on the bottom.
Q. (BY MR. THOMPSON) Mr. Contor, I believe these pages show the different river reaches -- I'll say above Milner and the different R-squared values assigned for the observed and model results; is that correct?
A. Yeah, starting with page 125 and then continuing for a few pages, yes.
Q. I guess my question was the near Blackfoot to Neeley within those range of values represented by those different reaches?
A. Yeah. And so we can look -- so Ashton to Rexburg is .16, so it's above that; Heise to Shelley is .61, so it's below that; Shelley to near Blackfoot is .21, so it's above that; near Blackfoot to Neeley, 42, as we discussed; Neeley to Minidoka, .0079.
So I -- without the specifics, my representation, I think, was correct that it's neither the best nor the worst. The near Blackfoot to Neeley is

neither the best nor the worst.

Q. And you testified you recommended a .5 R-squared value would be useful; is that correct?

A. That was an initial starting point. The actual determination of the threshold is administrative, but from a technical basis, that's a useful starting point.

Q. And has a certain criteria been evaluated by the modeling committee?

A. Not that I know of.

Q. Is it true they've accepted this model and the R-squared values for these various reaches?

A. So there's a long answer and a short answer. The short answer is that the committee, some of us with some reluctance, agreed to endorse ESPAM2.2 as a replacement for ESPAM2.1, acknowledging -- all of us acknowledging that there are things that we wish we could do better.

Q. So you talked about some comparisons of the two versions and that some versions varied by a factor of 5. Was that just for specific cells?

A. So if you look at the response from one cell to the reach, that was the analysis I performed. I did not have time to perform a regional analysis. But the way the model is configured, adjacent cells will have

similar results, and as you broaden that circle, the variability between the cells increases. But, yes, that was -- I performed that analysis on -- well, I had that analysis performed, and I reviewed it on just a small number of single cells.

Q. So has 2.2 been accepted as a better representation of aquifer changes and river responses?

A. I think it's been accepted that it should be moved forward because it ought to be better. And I think there are people who believe that it is better. In the particular case of near Blackfoot to Neeley, the R-squared value is better. To the extent that that reflects, as Sophia said, answering the -- getting the right result for the right reasons, then it appears to be better.

Q. And that work continues today on the model; is that correct?

A. Yes.

Q. Is it your opinion that a model should only be used when a, quote, ratio of relief to cost is considered?

A. It's my opinion that any tool should be -- when any tool is deployed, the gravity of the use of that tool should be weighed in terms of the precision of that tool. If I'm tapping on the carburetor of a

motorcycle, a crescent wrench is acceptable. If I have the opportunity to touch a million-dollar Ferrari, I would not tap on the carburetor with a crescent wrench.

Q. Is that, essentially, a cost-benefit analysis of what is more efficient?

A. It is a recognition of the principle that benefit -- it's a recognition of the principle that some calculations have tremendous gravity, both for the party seeking relief and the party being required to provide relief. And if you have a tool that doesn't work very good, it's sobering to pull the trigger and wonder where the bullet's going to hit.

Q. What type of gravity are you referring to?

A. I'm talking about the Surface Water Coalition in some years being indicated to be short by, perhaps, a quarter-million acre-feet of water. That's a serious block of water and could have serious consequences to folks needing that water and not receiving it.

Q. So you referenced the -- I guess -- the efficiency or how to use water that using 2 acre-feet may not be as efficient as 1 acre-foot?

Is that --

A. So I didn't mean to say that. I -- do you want a long answer, or do you want a short answer?

Q. Well, I think you have the general idea that,

hey, if we use groundwater more efficiently or for more acres, we shouldn't curtail -- we shouldn't curtail a lot of groundwater to produce less surface water; is that generally correct?

A. That wasn't what I meant to say.

Q. Okay. I must have misunderstood it, then.

So you're not advocating that water users should just abandon surface water systems and go to groundwater; that's not what you're saying?

A. No.

COURT REPORTER: Okay. Wait. Can you repeat your question?

Q. (BY MR. THOMPSON) You are not suggesting that surface water users abandon their surface water supplies and just transition to groundwater?

A. No.

Q. A few questions about supplemental groundwater use you talked about with Mr. Johns.

Your opinion -- your report identifies that measurement of groundwater use today is more reliable than it was in the early 2000s; is that correct?

A. Yes.

Q. And do you know when groundwater pumping data is available during the irrigation season?

A. So my understanding is that an individual

grower or a hydrographer can go to a meter at any time and read it, that it's recorded -- or reported annually, which is very compatible with the transit time of the effects of groundwater pumping.

Q. Could that be made available on a daily basis?

A. I suppose that it could. I suppose that every turnout of the Twin Falls Canal Company could be made available on a minute-by-minute basis. I don't know the purpose, but yes, it could be done.

Q. Weekly? Monthly? Would that be --

A. It could be done.

Q. Are you part of the technical modeling committee?

A. I'm part of the Eastern Snake Hydrologic Modeling Committee. I am not part of the technical working group for the Surface Water Coalition/Idaho Ground Water Appropriators agreement.

Q. And I'll correct my question. I was referring to the Eastern Snake Plain Modeling Committee.

A. Yes, I'm a member of that.

Q. And have there been suggestions in those meetings to update the model with measured pumping data?

A. There have been discussions. I don't know that -- suggestions -- maybe suggestions, but certainly discussions.

Q. Do you know why that hasn't been adopted?
A. I don't know all the reasons.
Q. Would that sort of data make it more reliable?
A. From the context of groundwater modeling, probably not.
Q. Is the priority date of a supplemental well an appropriate consideration?
A. I think so.
Q. Would you agree if that well was subject to a curtailment, that would affect its availability?
A. I think it would, and I think the WMIS data would reflect that.
COURT REPORTER: The what?
THE WITNESS: W-M-I-S. I'm sorry.
Q. (BY MR. THOMPSON) So going back to the ETRAN model, you've used that in your report, and I understand that to be just a comparison between two versions of the model.
You were using two versions of the ETRAN tool; is that correct?
A. That's what I did in the report, yes.
Q. And it provides for transient responses from the aquifer to the river; is that correct?
A. Yes.
Q. And it's true that wells near the river will

have their responses realized sooner than wells located farther away; is that correct?

A. Yes.

Q. That's what your analysis showed?

A. It did show that. That wasn't the purpose for the analysis, but that's one of the implications of the results.

Q. You talked about the Fifth Order and your -- you testified you did not have time to confirm the estimates identified in the Fifth Order relating to the steady state use of the model for the May to September accrual.

Do you recall that?

A. So I think it was the transient model that was used to estimate those accruals, but I did not have time to repeat those runs.

Q. I think there was a 9 to 15 percent number identified by the Department?

A. Yes.

Q. And you could replicate that if you wanted to; is that correct?

A. If I had time, I could.

Q. Do you have any reason to question that modeling run or those results?

A. No.

Q. But it's your opinion that the modeling runs should be consistent both for determining the curtailment date and then for apportioning mitigation responsibility?

A. Yes.

Q. So in looking at the two types of uses of the model, would a steady state curtailment run produce the demand shortfall in the same irrigation season if direct mitigation is not provided?

A. Not if it was as is currently done on a single-event basis. But for many curtailments, neither would a transient analysis.

Q. And that would depend on the location of the well being curtailed?

A. It would depend on the quantity of relief needed by the Surface Water Coalition.

Q. And the Department's order identified a December 30th, 1953, priority date --

A. For this particular shortfall.

MR. THOMPSON: That's all the questions I have. Thank you.

HEARING OFFICER: Further cross-examination?

MR. FLETCHER: I don't have any further.

HEARING OFFICER: Mr. Fletcher? Mr. Simpson? Redirect?

MR. JOHNS: Just briefly.

REDIRECT EXAMINATION

QUESTIONS BY MR. JOHNS:

Q. Bryce, Mr. Thompson asked you if the courts have approved the model, to your knowledge.

Do you remember that question?

A. Yes.

Q. Do you know if the courts have approved the model since its implemented transient analysis, as used in the Fifth Methodology Order?

A. I do not know.

Q. So to your knowledge, that hasn't been approved yet?

A. To my knowledge, it has not. And I do not know if ESPAM2.2 has been tested in the court.

MR. JOHNS: Nothing else. Thanks.

HEARING OFFICER: Okay. I assume, based on the short questions, there's no recross-exam.

Surface Water Coalition?

All right. Thank you, Mr. Contor.

All right. Let's just go off the record for a minute.

(Exhibit 366 marked.)

HEARING OFFICER: Mr. Harris, you may question

Mr. Olenichak.

Pardon me. Oh, I do need to swear him in.

So, Tony, I'll have to rely on your representation that you're standing. Raise your right hand, please.

Is somebody clairvoyant out there?

ANTHONY OLENICHAK,

called by the City of Idaho Falls, having been first duly sworn to tell the truth relating to said cause, testified remotely as follows:

HEARING OFFICER: Thank you. Please be seated, if you're not already.

Mr. Harris?

DIRECT EXAMINATION

QUESTIONS BY MR. HARRIS:

Q. Tony, can you please say and spell your name for the record.

A. Yes. Tony, T-o-n-y, Olenichak, O-l-e-n-i-c-h-a-k.

Q. Could you describe your educational background after high school.

A. I spent two years at the University of

Maryland in their biological science program and four years at Utah State University, where I obtained a master of science degree in watershed science in 1983.

Q. And what is your current occupation?

A. I am both watermaster and program manager for Water District No. 1.

Q. And how long have you held that position?

A. I've been watermaster for the past four years. For the past 17 years, I've been program manager, according to the IDWR employee records.

Q. What does Water District 1 do?

A. Water District 1 measures the natural flow in the river reaches within the district each day and allocates to the various reservoir and diversion and water rights the amounts that they're allocated to their diversions for each day of the irrigation season.

Q. What area of Idaho does Water District 1 cover?

A. It covers the Snake River and its tributaries above Blackfoot in Idaho, in addition to the Snake River main stem diversions from Blackfoot to Milner Dam.

Q. Does Water District 1 track fill of the Upper Snake Reservoir system?

A. Yes, with the exception of the reservoirs in the Blackfoot and Portneuf Basins.

Q. Prior to your election as the watermaster for Water District 1, what positions did you hold within Water District 1?

A. I was program manager from 2006 to 2019, and hydrologist from 1990 to 2005.

Q. Are you familiar with the April joint forecast issued by the United States Bureau of Reclamation and the United States Army Corps of Engineers for the unregulated flow at the Heise Gage?

A. Yes.

Q. Could you briefly describe what the forecast consists of and what data that forecast considers?

A. Well, it's changed over the years. Initially I think it only included the snow water equivalent content at certain snow survey sites upstream from Heise. Now I think it includes other factors, such as soil moisture and precipitation. But it's, essentially, the same as forecasting the unregulated flow that arises upstream from the USGS Heise station.

Q. And Heise is located near the city of Ririe, Idaho; correct?

A. Yes, just upstream from just about all the major diversions in Water District 1 on the Snake River.

Q. And the snowpack that is discussed in that forecast is measured by SNOTEL sites that are maintained

by the NRCS; correct?

A. Yes.

Q. And on the Water District 1 website, you have links to that data; correct?

A. Yes.

Q. Okay. And do you know how those SNOTEL sites measure and account for snowpack?

A. Yeah. They simply weigh the snow that's on top of what they call a "snow pillow," and by measuring the weight of the snow, you can determine the quantity of water in snow.

Q. Tony, I'm going to have you look at a map that I emailed you earlier today. It's the Mountain Snow Water Equivalent map. It's been marked here as Exhibit 366.

For the record, it is actually already in the administrative record. It was contained on page 7 of a motion for continuance that was filed on April 28th, 2023.

Tony, have you seen that sort of document before?

A. Yes. And also what I mostly view as the one that's issued by the NRCS, but they are, essentially, the same. I think the one done by IDWR brings up the snow and the subbasins above Heise also.

Q. So what, generally, does this map depict?
A. Well, it depicts the percentage of the median snowpack in various basins in the Upper Snake River Basin and across Idaho.
Q. And it's also a helpful reference for different basins. What basins directly contribute to the water supply of the Surface Water Coalition entities?
A. All the basins that are tributary to the Snake River above Milner Dam.
Q. And that would include the Henry's Fork (Teton) Basin depicted on that map; is that right?
A. Yes.
Q. And the Snake Basin above Palisades, Willow, Blackfoot, and Portneuf; is that right?
A. Yeah, I think they identify the Snake River above Heise instead of Snake River above Palisades.
Q. Okay. And in looking at this map, does water from the Henry's Fork (Teton) Basin come in below the Heise Gage?
A. Yes.
Q. How about from the Willow Creek drainage?
A. That also comes in below the Heise Gage.
Q. And the same for Blackfoot?
A. Yes.

Q. And finally, the Portneuf?
A. Yes. They're all tributary below the Heise Gage.
Q. And based on this map, as of April 3rd, the snowpack was 124 percent of average in the Henry's Fork (Teton), 120 percent for the Snake above Palisades, 178 percent for Willow Creek, 186 percent for Blackfoot, and 216 percent for the Portneuf; is that correct?
A. Yeah. I don't have the map in front of me, but, yeah, that seems like what I have seen in the past.
Q. And I believe you testified before, but I want to be clear, does the April joint forecast explicitly consider the water supply from the Henry's Fork, Willow, Blackfoot, and Portneuf drainages or does it not consider them?
A. No, the April joint forecast is only for the watershed above the Snake River at the Heise Gage.
Q. Okay. I have just a few more questions.
In your position as the watermaster, what have you observed this year in terms of water supply to the Coalition members as a result of the significantly above-average snowpack and runoff from the lower part of the basin?
A. Yeah, the advantage to the water rights in the Water District 1 from the runoff in those lower

watersheds, that supplies a greater amount of natural flow to those Surface Water Coalition canals that are further down on the -- on our distribution system, so they don't need to draw from the natural flow that arises in the upstream areas above Blackfoot, and so that allows us to store more water to the junior priority reservoirs upstream and -- instead of passing that natural flow down to the senior priority diversions downstream.

Q. So would you say this year that there was an unusually high amount of runoff from those drainages?

A. Yes. The further south you go into the Portneuf, the Blackfoot, and Willow Creek drainages, they had a higher percentage above median values for the April 1st runoff forecast than those areas further upstream above Palisades.

Q. Did that runoff also free up other natural flow rights in the basin?

A. Yes. What it allowed us to do is probably store more water into the reservoir water rights instead of having delivered that natural flow to senior priority irrigation diversions. That was helped not only by the snowpack but also the spring rains that we received over the last couple of months.

Q. Great. I want to ask you just a couple more

questions about storage allocation.

Are you generally familiar with the storage space held by members of the Surface Water Coalition?

A. Yes.

Q. And of the Coalition members, how about the Twin Falls Canal Company?

A. Yes.

Q. Do you know, approximately, how much storage space they have and in which two reservoirs?

A. Yeah. The two reservoirs they have space are in Jackson and American Falls, approximately 250,000 acre-feet.

Q. In the As-Applied Order that is part of what we're discussing today, the Director found material injury to the Twin Falls Canal Company in the amount of 75,200 acre-feet, and of that amount, 13,324 acre-feet was predicted of space that would not fill.

As of today, has all of Twin Falls Canal Company's storage space filled?

A. Yes.

Q. Is it possible that that fill determination could be affected by a flood control spill from Jackson Lake?

A. Yes. In the big runoff years, the Bureau of Reclamation sometimes has to evacuate previously stored

water out of Jackson for flood control, and if it's lost out of the system, that can result in a reduction from a full allocation to the space holders, Twin Falls Canal. But that seems unlikely at this point in time but could change if we get a lot of rain here over the next couple of weeks.

Q. Great.

MR. HARRIS: Director, that's all the questions I have. I would move to admit Exhibit 366 into the administrative record.

HEARING OFFICER: Any objection to the snow water equivalent map marked as Exhibit 366? Any objection to its admission?

Hearing none, the document marked as Exhibit 366 is received into evidence.

(Exhibit 366 received.)

MR. HARRIS: That's all the questions I have. Thank you, Tony.

HEARING OFFICER: Any cross-examination by the Surface Water Coalition?

Mr. Budge?

MR. BUDGE: Yes. IGWA also identified Tony as a witness, so perhaps I'll just do my direct examination and the Coalition can handle their cross in one fell swoop.

HEARING OFFICER: Okay.

DIRECT EXAMINATION

QUESTIONS BY MR. BUDGE:

Q. Good afternoon, Tony. I don't know if you can see me or not, but this TJ Budge. How are you?

A. Yes, I can see you. Thank you, TJ.

Q. Okay. I just got a couple questions.

The first one follows up on Mr. Harris's questions about the storage water supplies. I understand as your duties -- among your duties as Water District 1 watermaster, you oversee the Upper Snake River storage water system?

A. Yes. We keep track of the amount of natural flow that accrues to those reservoir water rights.

Q. And are rentals or leases of storage water handled through your office?

A. Yes.

Q. You're generally familiar with how the transactions of storage water in the Upper Snake River Basin are handled from year to year?

A. Yes.

Q. Are you familiar with the 2004 Nez Perce water rights agreement?

A. Somewhat, yes, I'm familiar with it.

Q. Are you aware that storage water is frequently leased out of the Upper Snake River Reservoir system to meet some flow augmentation requirements under that Nez Perce agreement?

A. Yes.

Q. Do I understand correctly that participation in rentals of storage for flow augmentation under that agreement is a voluntary program?

A. Yes.

Q. And do members of the Surface Water Coalition frequently participate in renting storage water?

A. Yes.

Q. And I believe those who do participate in that program receive rent on the storage water they lease?

A. If you mean payment, yes.

Q. Okay. That's all I had on that topic.

The other topic that I wish to ask you about is just about the application of the futile call doctrine in the Teton River Basin?

I understand that water distribution in the Teton River Basin falls under your jurisdiction as the Water District 1 watermaster?

A. Yes.

Q. Are you familiar with the application of the futile call doctrine in the Teton River Basin?

A. Yes.

Q. Could you explain how that works?

A. Yes. If you look at the Teton Basin as a whole, the lower part of the basin, the downstream part of the basin was developed earlier than the upper part of the basin. So the Teton River, typically towards midsummer/end of the summer, can cut down to the 1885, 1884 priorities, and so the entire flow or natural flow in the Teton Basin was used up after those years.

As the upper part of the basin was settled and they developed water rights on the tributaries that fed the Teton River, they had -- they were later in time, had later priorities than the diversions off the Teton River downstream. But those tributaries that they diverted water from, typically in midseason, even when there's no diversions from them, that water and those tributaries doesn't reach the main stem of the Teton River.

So you have a situation where this irrigation that was developed in the Upper Teton Basin on these tributaries, when they go out of priority on the main stem of the Teton River if we shut off all those diversions on the tributary and the water still doesn't reach the channel of the Teton River, we say it's futile for the lower senior priority diversions to call for

curtailment of those junior priority water rights on those tributaries when shutting off those junior priorities won't make a difference to the water physically reaching the Teton River channel.

Q. Thanks, Tony. That's very helpful.

Just for clarification. When you refer to the Upper Teton Basin, you're referring to that area in the Driggs-Tetonia area?

A. Yes. That whole upper valley before the river reaches the canyon where it narrows down.

Q. And then when you refer to the Lower Teton Basin, is that down in the, you know, Teton-Sugar City area?

A. Yes. It's where the water emerges out of the canyon there and into the valley there in Newdale, Teton, Rexburg, Sugar City, that whole area.

Q. Okay. And then you mentioned that the call becomes futile once the tributary doesn't reach the main stem. You're referring to the surface water connection between the tributary and the main stem of the Teton?

A. Yes.

Q. And how do you know when the tributaries disconnect?

A. It is visual. You get to a point -- well, over the years, the deputy watermaster in that area

responsible for regulating the diversion usually has a sense of when he shuts off all the diversions, water won't reach the Teton River. And so at that point the tributary is on a different priority system than the Teton River.

If that judgment is contested, then we actually go through and do a process where we shut off all the diversions on that tributary and let the water run for a certain amount of days. Sometimes it's been three days in the past, it's been as long as five days, and after that three- or five-day period, if the water still hasn't reached the Teton River from that tributary, then we call a futile call, and then we start turning on diversions on that tributary according to priority until all of the water is diverted.

Q. When the tributaries don't reach, is that because the water is just sinking into the ground?

A. Yes. At some point, usually further upstream on the tributary in the higher elevations above your irrigation land, you'll see water -- plenty of water in those tributaries. And then as it moves further downstream into the valley before it reaches the Teton River, it just completely sinks into the ground.

Q. Do you have any idea where it goes once it sinks?

A. I don't.
Q. Are there a lot of springs along the main stem of the Teton River in that upper basin that feed the river?
A. Yes, there are some springs.
Q. Is it your understanding that the water that seeps into the ground from those tributaries accrues to the Teton River downstream through a spring in flow?
A. Yes, that's certainly likely.
Q. Just one last question, Tony. Did you contribute in any way to the development of the Fifth Methodology Order?
A. No.
Q. You weren't asked any questions by folks at the Boise office as they were developing that?
A. No. I think the only time we get questions concerning the data that goes into that concerns our storage carryover numbers. [Unintelligible.]
COURT REPORTER: Wait. Excuse me. Hold on. Wait.
HEARING OFFICER: Tony, the court reporter.
COURT REPORTER: I'm sorry, but I missed some of your answer a while back. So I can read what I have, and then I need you to go from there.
"Answer: No. I think the only time we get

questions concerning the data that goes into that concerns our storage carryover numbers."

THE WITNESS: I'm having trouble hearing you. You need to get closer to the microphone.

COURT REPORTER: Okay. So: "Answer: No. I think the only time we get questions concerning the data that goes into that concerns our storage carryover numbers."

THE WITNESS: Yes.

COURT REPORTER: And then can you keep going from there.

THE WITNESS: They may have asked some other questions about storage allocations or water delivery to that effect, but as far as how the model works, you know, what equations are incorporated into it and what the output is, no, they don't share that information with us.

MR. BUDGE: I don't have any further questions.

HEARING OFFICER: Thank you, Mr. Budge.

Any cross-examination, Surface Water Coalition?

Mr. Thompson, if you'll come forward.

///

///

CROSS-EXAMINATION

QUESTIONS BY MR. THOMPSON:

Q. Hi, Tony. This is Travis Thompson for A&B Irrigation District, et al.

Can you hear me?

A. Yes, I can. Thank you.

Q. You talked about, with Mr. Harris, the joint Heise forecast. Is that something you look at every year?

A. Yes. We use that to determine how much flow augmentation volume is available to the Bureau each year.

Q. And do they issue that forecast monthly?

A. No. They do it annually, usually the week following April 1st.

Q. So the Bureau doesn't revise that in May?

A. Well, they -- well, yes, but that's not the April 1st forecast; that's the May forecast.

Q. That was my question. They do it monthly for a period of time starting in January?

A. Yeah. I have heard, yeah, but I don't pay any attention, usually, to those forecasts. It's only the April 1st forecast that I use in my job.

Q. So you didn't look at the May forecast to see if it went down or not compared to April?

A. I did not.
Q. Mr. Budge asked you questions about the rental pool and the Nez Perce agreement.
Do you recall those?
A. Yes.
Q. And under the rental pool procedures, do space holders have the ability to opt out of that rental pool?
A. Yes.
Q. In the context of the Surface Water Coalition, if they are injured and were to receive a storage mitigation assignment, could they receive that if they were not a participant in the common pool?
A. I don't know the answer to that question.
Q. Do the current procedures address that?
A. Well, to receive water, I don't think you need to be a participant. But to supply water, you do need to be a participant.
Q. So it's your testimony if somebody were to opt out of the rental pool, they could still receive a storage assignment if it was for mitigation purposes; is that true?
A. Yes.
Q. I think we emailed you a PDF. Do you have a copy of that, Tony?
A. A TDF? What's --

Q. A PDF file. I'm sorry.
A. Oh, PDF file. Thank you. Yeah, the watermaster report?
Q. Yes.
MR. THOMPSON: I'm just going to mark that as Exhibit 8.
(Exhibit 8 marked.)
Q. (BY MR. THOMPSON) And I'll represent to you, Tony, it's an excerpt from the 2011 annual report.
Have you had a chance to look at that?
A. Yes.
Q. And are you familiar with that document?
A. Yes.
Q. And can you identify it for the record?
A. It's an excerpt from the 2011 annual report of Water District 1 prepared by watermaster Lyle Swank.
Q. And does the water district keep this kind of information since that time?
A. Yes.
Q. And is that published?
A. Yes.
Q. And can you generally describe what those tables depict?
A. Those tables depict the amount diverted by each for diversions that are in our water right

accounting program.

Q. And are you familiar with the various canals and pumps listed in this exhibit?

A. Yes.

Q. And recognize that every year is different, but generally do these canals convert similar amounts every year?

A. Yes. Somewhat it varies just a little bit by water supply. Sometimes they're limited by water supply, and sometimes they're not.

Q. Do large open canal systems represented on this exhibit have different diversion needs compared to individual pumps?

A. Yes.

Q. Would that be reflected on the acre-feet per acre diverted column?

A. The acre-feet per acre diverted is simply the calculation of the volume that was diverted at the head of the canal and the amount of acres that the Water District 1 had on record at one point that the canal irrigated. But the problem with that acre-foot per acre diverted is we didn't know in any of these years these annual books were published the actual amount of acres that were being irrigated by the diversion.

Q. So the service area lists a number that may or

may not reflect the actual irrigated acres in a given year?

A. Right. That's the number that represents the maximum number of acres that could be irrigated by the diversion, but not, necessarily, the number of irrigated acres during that year.

Q. Based on your experience as watermaster, are any of these values unreasonable for the canals listed?

MR. HARRIS: Objection.

THE WITNESS: No. But at some point in the future years, we stopped listing those acres because --

MR. HARRIS: I'd like to lodge an objection.

THE WITNESS: -- because it gave some people the impression that those were the actual amount of acres being irrigated --

HEARING OFFICER: Just a moment, Tony. Sorry.

Okay, Mr. Harris.

MR. HARRIS: We called Tony as a fact witness to talk about the contribution of the natural flow from those lower drainages. We did not identify him as an expert to talk about rate-per-acre diversions or anything like that. So I think this goes beyond the scope of my examination.

HEARING OFFICER: That's true, Mr. Harris. Do you want me to allow the Surface Water Coalition to call

Tony as their own witness down the road if they choose to do that to explore this?

MR. FLETCHER: We'd do it today as soon as he's done here.

MR. HARRIS: I don't believe they identified him, but maybe I'm mistaken.

MR. FLETCHER: You did.

HEARING OFFICER: Well, I'm not restricting testimony.

MR. HARRIS: Okay.

HEARING OFFICER: Overruled.

MR. THOMPSON: Tony, thank you. That's all the questions I have.

MS. McHUGH: I have a quick question.

MR. FLETCHER: I just have a question.

Did his last answer get on the record, Mr. Olenichak's last answer?

HEARING OFFICER: I didn't hear it.

COURT REPORTER: Well, it's kind of chopped up with speaking in between trying to interrupt him. So not --

MR. FLETCHER: To clear that up, can you ask that question so it's on the record.

Q. (BY MR. THOMPSON) Tony, I think we were talking about the acre-foot diverted of the service

area, recognizing that these service area number of acres list a potential maximum number of acres within these canals. And I was asking you if there's any contention that any of these diversion rates are unreasonable by these canals.

A. Yeah. And again, my answer was that the service areas, it may be the maximum service area of the canal but not, necessarily, the number of irrigated acres. And that acre-foot-per-acre-diverted number that you see in the far-right column is based on the assumption that all those acres are being irrigated by the volume that was diverted and the acre-feet in the first column, and that may not, necessarily, be the case if the canal was irrigating less acres than the maximum that was listed on this table.

Q. So that could change the acre-foot-per-acre calculation; is that correct?

A. Correct.

Q. I guess in your experience with the values represented in this exhibit, do you believe any of those are unreasonable?

A. I don't know how to answer that.

MR. BUDGE: Objection.

HEARING OFFICER: Tony, this is difficult. We've got another objection.

The basis for the objection?

MR. BUDGE: Well, it calls for a legal conclusion. But I think Tony explained that he doesn't -- he can't answer that question, so he recognized it as such.

HEARING OFFICER: Okay. I want the answer on the record again, because I had to interrupt the testimony to address the objection.

So ask it again, Mr. Thompson, and let's get his answer.

Q. (BY MR. THOMPSON) And, Tony, this table shows total volumes diverted by canals all throughout Water District 1.

Do you have any reason to contend any of these values are unreasonable?

A. The volumes are accurate. The service area probably represents the maximum number of acres that can be irrigated, but not, necessarily, the actual number of acres that were irrigated in this particular year. And therefore, since the total diverted was divided into the service area acres that were listed, the acre-foot per acre diverted in that last column may not be accurate since we don't know for certain the number of acres that were actually irrigated in this particular year. And in future years, we stopped listing this acre-foot acre

diverted for that reason.

Q. Yeah. I don't know if you answered my question, Tony.

I guess the volumes represented, they all vary. I think they go from like 1 to above 10.

Do you have any reason to believe any of those values are unreasonable for those canals listed?

A. No.

Q. Thank you.

MR. FLETCHER: Do you want to admit that exhibit?

MR. THOMPSON: Yeah.

I'd move to admit Exhibit 8.

HEARING OFFICER: Any objection to receiving Exhibit 8 into evidence?

Hearing no objection, the document marked as Exhibit 8 is received into evidence.

(Exhibit 8 received.)

HEARING OFFICER: Mr. Fletcher, you have questions?

MR. FLETCHER: I do.

HEARING OFFICER: Would you come to the table. Thank you. I know you like to examine watermasters or former watermasters.

MR. FLETCHER: Yeah. Well, that's -- yeah.

HEARING OFFICER: That's an inside joke.

MR. FLETCHER: Yeah, it is.

CROSS-EXAMINATION

QUESTIONS BY MR. FLETCHER:

Q. Hey, Tony. This is Kent Fletcher. How are you?

A. Good, thank you.

Q. That water that's coming in below Heise flows into the storage system as well as used for natural flow; isn't that correct?

A. Yes.

Q. And that storage system doesn't only benefit the Surface Water Coalition, does it?

A. No, it benefits many.

Q. Now, the storage -- the Surface Water Coalition's source of water is not only storage water; correct?

A. Correct.

Q. It includes natural flow?

A. Yes.

Q. What did you observe prior to -- well, at the end of last irrigation season, what did you observe in the storage system concerning the amount of storage?

A. It was below average. We finished the

irrigation season with less water in the -- remaining in the reservoirs than what's typical.

Q. And what did you observe this winter before runoff started on the inflows into the reservoirs?

A. Well, before the snowmelt started, it was below average, and then, of course, when the snow started melting, we've been above average since that time.

Q. So before the snowmelt started, the flows coming into the river were below average?

A. Yes.

Q. You had mentioned that -- I think you were asked a very generic question about do members of the Surface Water Coalition generally participate in renting storage.

There are many members of the Surface Water Coalition who do not regularly rent storage; isn't that correct?

A. Yes, but the reason I answered the way I did was the rental pool procedures have recently changed where all participating space holders now are responsible for supplying a portion of their storage allocation, if needed, by the common pool.

Q. I see.

And so you were talking about flow

augmentation water?

A. Yes.

Q. But as far as actually renting water to a third party, most of the Surface Water Coalition members do not rent water to third parties; isn't that correct?

A. Well, under the most recent procedures, we have the small pool which is 5,000 acre-feet maximum, very small amount, but under the current procedures, the participants, including the Surface Water Coalition, could provide a small percentage to their storage allocation towards that small rental.

Q. Yeah, that comes out of everybody's storage accounts; correct?

A. Yes.

Q. But I'm talking about private leases. I should have said it better.

Most of these do not -- most of the Surface Water Coalition members do not have private leases; is that correct?

A. Yes. I think the -- yes, I think that is correct.

Q. And the storage you're talking about as far as flow augmentation, that is a result of the Nez Perce agreement?

A. Yes.

Q. And that is to protect the water users from claims of the tribes; is that correct?
A. Yes.
Q. The futile-call scenario that you were talking about on the Teton Basin, that was purely a surface water system; correct?
A. Yes.
Q. And so when you talk about curtailing in-season, you're only dealing with water that would accrue that season; correct? You're not dealing with what would happen from curtailment into future years?
A. I don't understand the question, but...
Q. I don't either, so let me -- in fact, let me just withdraw that question.
I guess the point is that that is a 100 percent surface-water scenario you're talking about?
A. Yes.
Q. And that's true throughout the state, as far as you know, isn't it; that if a senior cannot get his water for whatever reason, he doesn't have a right to call out a junior. Correct?
A. Yes. I think they have the same type of practice in the Big Lost Basin and probably in some other basins around Idaho.
Q. But those calls are not typically made under

the conjunctive management rules, are they?

A. No.

MR. FLETCHER: That's all the questions I have. Thank you.

HEARING OFFICER: Redirect, Mr. Harris?

MR. HARRIS: I do.

MR. FLETCHER: I think Candice has a few.

MS. McHUGH: Can I just -- it's not really redirect, I wanted to clarify something.

Now that Kent asked about recent rentals from this common pool and the small pool, I just wanted to clarify a few things, and then he can redirect. We listed Tony as a witness, but I guess I would cross him on what --

At this point is he your witness? I'm not really sure how that works. I just want to ask a couple clarifying questions, and I'm asking if I can do that.

HEARING OFFICER: What do the parties want me to do?

MR. BUDGE: Well, it's Rob's witness and mine, so anyone else would be crossing, so this would be the time if Ms. McHugh wants to ask questions for cross-examination.

MR. FLETCHER: Yeah. I don't think we have a problem with that as long as if she opens up something

new, I guess we would have the right to address it.

HEARING OFFICER: Well, I have a hard time characterizing these questions as cross-examination, at least technically, but okay.

Ask your questions.

CROSS-EXAMINATION

QUESTIONS BY MS. McHUGH:

Q. Good afternoon, Tony. It's Candice McHugh on behalf of the Coalition of Cities and McCain Foods specifically.

I wanted to ask a question -- just a clarifying question about a statement you made relative to an answer -- I think it was given by -- or in response to an answer by TJ and then Mr. Fletcher expanded upon it. It had to do with the storage assignment for mitigation purposes.

Do you recall testimony relative to how storage is assigned for mitigation purposes?

A. No. The way you're characterizing that, I'm not sure I recall what specific question you're asking me about.

Q. Fair enough.

You said recently that there were some changes made on how water is provided to the small rental pool.

Do you remember that line of questioning of Mr. Fletcher?

A. Yes.

Q. Okay. And can you explain what those changes were?

A. Yes. Prior to the last couple years, we've used what we call "late season fill" to supply common pool rentals which can be comprised of the 5,000 acre-feet or flow augmentation rentals. What that resulted in was some space holders had to provide a higher percentage of their storage allocations towards those rentals than others. And so in the last year or two, we changed the rental pool procedures to spread that obligation out to the small rentals and towards flow augmentation to all participating space holders, so each of those participating space holders supplies the same percentage of their storage allocation towards those rentals.

Q. And if a person went to this small pool, my understanding is they're -- and wanted to rent water from the small pool for mitigation purposes, is there some new rule or is there some procedure that they would have to follow to do that?

A. Yeah, I think the -- this past year, we specifically excluded using the small pool, the

5,000 acre-feet supply, for mitigation purposes. The purpose of the 5,000 acre-feet was to supply to small diversions along the river that would reduce regulation costs incurred by the watermaster.

Q. And members of the Surface Water Coalition, if they were going to receive water from the storage system, would they have to agree to accept that mitigation water, or is there a limitation on their ability to accept that mitigation water?

A. No, I don't think so. If someone purchased some rental water, for example, and said, "I want to supply that to Twin Falls Canal," I would add that to the Twin Falls storage allocation whether they wanted to use it or not.

Q. Okay. So I think I might have misheard earlier. I thought you had said something about they could opt out of having a storage assignment for mitigation purposes. Is that just not correct?

A. No. The opt out part is an option for all space holders to not participate in the rental pool process. And by doing that, they don't have to contribute any of their storage allocation towards these common pool rentals.

MS. McHUGH: Okay. That's all I wanted to ask. Thank you.

HEARING OFFICER: Redirect, Mr. Harris?

REDIRECT EXAMINATION

QUESTIONS BY MR. HARRIS:

Q. Tony, just a couple follow-up questions: Mr. Thompson emailed you the 2011 annual report from Water District 1 or select portions of it.

Do you recall that testimony?

A. Yes.

Q. As a general matter, what was the 2011 water year like?

A. I don't remember.

Q. Was it an above average water year or below average?

A. I don't remember. I don't think it was below average because those always stick in my mind, but whether it was average or above average, I don't remember.

Q. And the canals that are in the select portions here, don't those systems have return or tail-out locations that put water back in the Snake River or other natural streams?

A. Yes, I think many of them do.

Q. But the Twin Falls Canal Company and North Side Canal Company tailwater would come in below Milner

Dam; correct?

A. Correct.

MR. HARRIS: I have no further questions.

HEARING OFFICER: Okay. Mr. Budge, further questions?

MR. BUDGE: You know how much I like to get the last word in.

HEARING OFFICER: Okay.

MR. BUDGE: But I'm going to pass, so we're done.

HEARING OFFICER: Recross?

MR. FLETCHER: I just have a few minor questions since Ms. McHugh wanted to open up the nuances of the common pool and the rental pool rules, so I guess we'll talk about what those restrictions are on that.

HEARING OFFICER: Well, as Mr. Fletcher comes forward, I hope that we don't get into the rental pool procedures, because just an elementary acquaintance with the rental pool procedures might take the next six months.

MR. FLETCHER: Yeah, I'm -- I just want to point out three issues and see if Mr. Olenichak agrees.

///

///

///

RECROSS-EXAMINATION

QUESTIONS BY MR. FLETCHER:

Q. On the common pool that is referred to in the rental pool rules, Tony, how many acre-feet are available in the common pool?

A. Currently, the common pool consists of the pool augmentation water and the 5,000 acre-foot small rental pool.

Q. The flow augmentation water goes out for use by the Bureau for flow augmentation for salmon; isn't that correct?

A. Correct.

Q. None of the flow augmentation water is available to any water user in Water District 1; isn't that correct?

A. Correct.

Q. As far as the other 5,000 acre-feet we're talking about, in order to rent water out of that, you have to be a storage holder; isn't that correct?

A. No, that's not correct.

Q. Okay. Who are the -- what are the limitations on the people who can rent water out of the common pool?

A. Diversion regulated by Water District 1 for less than 100 acre-feet.

Q. So it would have to be a diversion above

Milner, then; correct?

A. Yes.

Q. And the most you can rent out of the common pool is 100 acre-feet; correct?

A. Correct.

Q. And isn't there a limitation in the rental pools that it cannot be used for mitigation?

A. Yes. I think there was a clause added during this past year for groundwater recharge or mitigation.

MR. FLETCHER: Thank you.

HEARING OFFICER: Any more recross?

All right. Thank you, Tony, for hanging in there.

Okay. I guess we're done for the day. We'll start at 9:00 a.m. in the morning again.

I would like to ask before convening tomorrow, Andrea, if you can work with Sarah Tschohl and maybe with Pete, maybe we can get a list of all the exhibits that have been admitted into evidence. Is that possible to distribute to the parties?

And then I think that would be helpful for everybody to look through and determine whether there are exhibits that the parties wish to offer prior to our adjournment and, all of a sudden, an attempt to try to identify what exhibits are in or out.

Would that be helpful to everybody?

Sarah?

MS. KLAHN: Are you going to want closing briefs or proposed orders?

HEARING OFFICER: I thought I would allow some opportunity for a short period of time, if people want to offer something in writing. I don't want to hear oral argument, however.

MS. KLAHN: Right. That's what I was wondering, if you wanted something in writing. Okay.

HEARING OFFICER: Yeah.

Okay. We'll see everybody at 9:00 in the morning.

(Hearing adjourned at 5:21 p.m.)

REPORTER'S CERTIFICATE

I, ANDREA L. CHECK, CSR No. 748, Certified Shorthand Reporter, certify;

That the foregoing proceedings were taken before me at the time and place therein set forth, at which time the witness was put under oath;

That the testimony and all objections made were recorded stenographically by me and transcribed by me or under my direction;

That the foregoing is a true and correct record of all testimony given, to the best of my ability;

I further certify that I am not a relative or employee of any attorney or party, nor am I financially interested in the action.

IN WITNESS WHEREOF, I set my hand and seal this 19th day of June, 2023.



ANDREA L. CHECK, CSR No. 748, RPR, CRR
Notary Public
P.O. Box 2636
Boise, Idaho 83701-2636
My Commission expires July 20, 2028.

$

$100 (2)
133:21;134:1

/

/// (8)
10:25;149:24,25;243:24,25;262:23,24,25

[

[As (2)
55:4;103:24
[sic] (2)
34:9;183:12
[Unintelligible] (1)
242:18
[Witness (1)
144:18

A

A&B (6)
89:24;127:5,7;140:9;211:8;244:3
ABA1 (1)
51:15
abandon (2)
222:8,14
Aberdeen-American (1)
123:14
ability (14)
171:9,23;175:15;188:12,13,15,16,25;192:24;193:1;199:17;200:13;245:7;260:9
able (30)
14:24;27:15;36:17;47:21;60:3;68:25;70:9;77:16,25;84:2;127:18;131:6;148:19;157:15;167:23;170:5;177:4;179:22;184:14,19;185:5;189:3,24;190:6;193:3,11,15;195:23;204:8,19
above (33)
17:22;24:23;38:16;56:12;73:4;96:22;97:10;104:4;144:19,21,21,24;201:24;218:10,19,21;229:20;231:25;232:10,14,17,17;233:6,17;234:5,14,16;241:19;252:5;254:7;261:13,17;263:25
above-average (5)
41:15;61:5;97:19;98:6;233:22
accept (5)
20:20;81:7;146:4;260:7,9
acceptable (2)
215:4;221:1
accepted (8)
73:5;75:21;95:4;215:6,7;219:11;220:6,8
accomplish (1)
15:3
accomplished (1)
91:15
according (2)
229:10;241:14
account (13)
28:10;37:10;42:20;53:1;61:12;62:14;63:15;109:1;113:24;117:19;179:14;183:4;231:7
accounted (5)
44:6,10;61:22;121:5;197:5
accounting (1)
247:1
accounts (1)
255:13
accrual (4)
164:3;165:4,9;225:12
accruals (7)
165:11;171:1;186:17,22;192:12;214:21;225:15
accrue (3)
178:22;179:2;256:10
accrues (2)
237:15;242:7
accumulation (1)
41:13
accuracy (5)
49:8;172:14,18;173:13;206:7
accurate (4)
58:14;164:10;251:16,22
accurately (2)
108:3;189:1
achieve (3)
147:6;168:1;189:3
achieved (3)
187:5;203:16;204:3
acknowledge (1)
181:3
acknowledging (2)
219:16,17
acquaintance (1)
262:18
acquire (1)
189:22
acre (19)
20:18;30:18;57:4;178:3,5,6,7,13,17;179:6;181:10,11;185:11;213:7;247:16,17,21;251:22,25
acreage (7)
16:8;20:15,25;27:16;113:7;198:17;199:7
acre-feet (70)
27:22;31:4;40:18,18;42:17;43:1,12;54:13,17,18,20,20;56:11,14;59:14,18,21;61:21,23;62:2,5;64:24;83:18,21;85:21;88:16,19;125:19;126:4;127:11,13;130:10,17;134:1;143:12;147:2,9,25;148:2,15;164:1,2,6,7;165:3,4,8,9,15;178:9,11;197:23;213:7,14;221:16,20;235:12,16,16;247:15,17;250:12;255:7;259:9;260:1,2;263:4,17,24;264:4
acre-foot (13)
43:10;131:10;133:21;134:2;163:20,24;197:22;221:21;247:21;249:25;251:21,25;263:7
acre-foot-per-acre (1)
250:16
acre-foot-per-acre-diverted (1)
250:9
acres (154)
15:5;16:10;17:16,18,24;18:1,9,11,12,15,18;19:3,11;20:11,20;21:5;25:7,9,13;26:17,24;27:2,5,6,20,21;28:8,11,17;29:1,3,12,13,18,21,22;30:4,7,11,15,17;31:5,8,12,21,24;33:3,15,20,23,24,24;36:4,5,8;56:14;57:5,13;58:1,2,4,6,8,12,14;62:12,13;64:18,20,21,25;65:1;86:12,15,23;87:2;88:11,17,20;93:9,18,23;94:22;95:4,6,12,14,15;96:6,13;112:12,14,18,20;113:11,14,20,24;114:4,9,20;117:22;118:4,9,11,12,13,15,19;119:2,4;125:5,7,8,9;131:1;133:1,2;163:6,7;164:1;172:11;178:16,23;179:4,7;183:15;185:16;194:13,17;195:17;200:9;209:1,5,13,20;210:4;222:2;247:19,23;248:1,4,6,11,15;250:2,2,9,11,14;251:17,19,21,23
across (8)
35:3;43:25;74:17;77:17;107:2;178:22;182:22;232:4
Act (1)
131:21
action (2)
133:15;176:6
actions (4)
91:23;132:14;134:7,15
actively (1)
183:19
activities (4)
12:13,14;73:22;101:25
activity (1)
165:24
actual (16)
31:2,3;57:13;73:5;79:2;155:23,24;156:10;179:11;207:17;209:10;219:5;247:23;248:1,14;251:18
actually (26)
21:9;46:23;49:25;58:20;59:7;63:3;70:2;83:1;86:21;94:13;133:21;177:8;178:21;179:6;180:1;181:4,8,14;189:3;196:21;205:22;209:7;231:16;241:7;251:24;255:3
ad (1)
186:16
add (8)
27:21;47:22,23;161:25;178:19;179:1;182:16;260:12
added (2)
164:22;264:8
adding (2)
59:17;86:13
addition (5)
42:20;43:21;52:12;57:19;229:20
additional (11)
94:17;103:10;120:5;127:13;155:4;158:21;172:22;185:2;189:23;199:22;200:5
additionally (1)
61:24
address (20)
11:8,10;15:13;16:21;22:2;24:21;42:10;60:1;69:15;103:9;122:17;154:13;157:1,24;175:14;179:14;187:19;245:14;251:8;258:1
addressed (3)
9:16;175:3;188:2
addresses (1)
80:24
addressing (1)
189:14
adequate (6)
37:5;97:11;100:15,20;189:22;198:25
adjacent (2)
202:18;219:25
adjourned (1)
265:15
adjournment (1)
264:24
adjudicated (1)
135:25
adjudication (6)
151:9,16,17,23;194:21;195:10
adjust (13)
67:5,9,12;68:7;77:4;78:7;80:11;83:12;84:2;114:6,21;192:24,24
adjusted (2)
72:8;113:23
adjustment (7)
61:11;113:24;183:9;185:20,23;197:10;200:20
adjustments (3)
179:13;186:22;192:2
administration (10)

53:1,5;109:2;168:24;
169:9;170:12;215:19,23;
216:1,6
administration's (1)
110:14
administrative (6)
168:21;188:16;206:7;
219:5;231:17;236:10
admission (4)
186:1;187:1;206:19;
236:13
admit (6)
87:7;148:25;206:17;
236:9;252:10,13
admitted (3)
129:19;149:4;264:19
adopted (3)
81:8;97:3;224:1
advance (1)
176:23
advanced (1)
63:23
advantage (1)
233:24
advisory (3)
13:8,10;65:13
advocating (2)
109:3;222:7
aerial (6)
27:6;33:14,20;96:3;
199:16;208:14
affect (5)
112:21;188:23;198:1,14;
224:10
affected (1)
235:22
affecting (1)
101:2
affects (3)
84:23;85:10;113:5
AFRD2 (2)
54:12;61:20
afternoon (7)
112:6;140:8;150:12;
207:7;211:7;237:5;258:9
again (44)
16:16,25;17:9;22:5;28:18,
20;35:5;40:4;46:5;53:17;
57:17;59:12;74:17;76:8,15;
81:14;84:11,13,20;86:10,23;
98:18;111:16;116:9;118:18;
120:6;134:21;135:5;138:10;
140:9;141:21;160:25;
166:13;174:18;176:11;
177:17;186:15;199:17;
215:6;217:20;250:6;251:7,9;
264:15
against (7)
37:8;43:14;57:10;95:2,3;
97:13;133:15
agnostic (1)
196:19
ago (2)
110:9;214:18
agree (29)
50:14;91:2;93:16;95:8;
96:5;101:8;103:12;108:12,
15;116:19;161:2,4,9;176:20;
181:19;186:21,24;201:18;
202:4,5;210:17;216:5,9,13,
24;217:3,13;224:9;260:7
agreed (2)
25:8;219:15
agreement (31)
61:25;131:5;134:9;135:4,
8,17,19,23,24;136:11;137:1;
138:15;145:19,23;146:19,
25;147:4,7,12,14,17;148:1,2,
19,20;223:17;237:24;238:4,
8;245:3;255:24
agreements (1)
12:16
agrees (1)
262:22
agricultural (2)
95:22;151:2
Agriculture (1)
199:15
ah (1)
204:12
ahead (4)
24:15;78:20;146:16;
164:20
aid (2)
134:23;168:20
al (4)
89:25;140:9;211:8;244:4
alarming (2)
191:14,25
alfalfa (1)
125:12
alignment (1)
156:24
allocated (3)
148:2,7;229:15
allocates (1)
229:14
allocation (15)
44:10;52:25;133:16;
143:8;147:22,22;148:13,14;
235:1;236:3;254:23;255:11;
259:17;260:13,22
allocations (3)
37:25;243:13;259:11
allotted (1)
126:8
allow (7)
68:6;106:15;189:22;
202:14;208:2;248:25;265:5
allowable (1)
180:21
allowed (7)
42:2;67:5,9,12;77:4;
126:11;234:19
allows (4)
106:25;202:6,8;234:6
alluvial (2)
105:21,23
almost (6)
42:18;47:1;86:16;88:18;
142:2;204:16
along (3)
193:21;242:2;260:3
alternative (3)
22:25;35:1;82:13
Although (1)
168:21
always (3)
62:8;108:12;261:16
Amalgamated (1)
124:24
Amended (4)
39:13;60:16,16;158:15
American (8)
51:25;71:5;102:2;104:18,
23;105:2;112:7;235:11
among (6)
127:24;145:17,24;147:13,
22;237:11
amongst (1)
217:17
amount (26)
68:20;77:17;78:1;85:21;
113:24;115:10,14;116:21;
125:25;126:3,12;127:17;
139:7;143:9;234:1,11;
235:15,16;237:14;241:9;
246:24;247:19,23;248:14;
253:24;255:8
amounts (4)
39:10;41:21;229:15;247:6
analyses (8)
48:1;73:17;191:7;193:15;
205:18,21;208:4;213:1
analysis (62)
14:22;15:5,21,24;16:3;
22:2,11,12,19,21;23:8;27:9;
30:15;31:2;35:15;42:12;
46:8,12;48:1;53:22;54:21;
55:13,22;57:18;60:3;73:14;
75:13;79:18;85:1,3;88:22;
115:1;128:9;130:1,4;139:6;
143:13,14,23;158:14,18,20;
160:5,5;163:6;165:7;179:24;
184:19;185:2;192:9;196:8;
200:16;205:3;219:23,24;
220:3,4;221:4;225:4,6;
226:12;227:10
analyze (3)
15:9;74:23;208:10
analyzing (1)
116:12
Anders (9)
21:14;31:7;50:10;51:2;
60:18;63:17;172:25;197:1,3
Anders' (2)
197:18;198:16
Andrea (3)
9:5;89:17;264:17
anisotropy (1)
106:1
annual (8)
39:1;77:11;131:16;
136:24;246:9,15;247:23;
261:6
annually (2)
223:2;244:14
answered (3)
156:5;252:2;254:19
anthology (2)
170:7,9
ANTHONY (2)
7:4;228:8
anticipate (4)
121:15;128:18,24;185:1
anticipated (1)
158:9
anticipating (2)
129:9;142:8
anymore (1)
83:13
anyways (1)
9:9
apologize (1)
184:12
Apparently (1)
195:21
appeal (1)
135:11
appears (6)
116:4;165:13;167:17;
190:6;192:23;220:14
application (11)
79:12;109:14;110:3,9;
118:11;128:1;148:6;154:13;
215:9;238:18,24
applications (2)
109:2,9
applied (10)
18:1;47:10;52:18;103:17;
110:21,22;165:15;167:18;
178:7;203:15
applies (2)
69:23;179:9
apply (6)
31:21;35:17;36:4;79:1;
184:3;200:14
applying (2)
21:6;36:3
apportion (1)
147:8
apportioned (2)
145:17,24
apportioning (1)
226:3
apportionment (1)
147:12
appreciate (1)
120:21
approach (8)
48:12;52:13;103:13,15;
166:4;169:25;188:2;203:21

approaches (1)
16:2
appropriate (16)
39:2,6,21;105:16;138:2;
167:13,15,19;169:5,18;
170:4;177:21;203:14,16;
204:3;224:7
appropriateness (1)
169:25
Appropriators (3)
122:22;213:4;223:17
Approval (1)
142:17
approved (5)
215:11;216:10;227:6,9,14
approximately (10)
30:17;64:21;90:13;125:5;
185:15;192:14;196:21;
197:23;235:8,11
approximates (1)
56:7
April (27)
13:16;37:3;46:9;55:19;
56:7;57:20;58:19,21,23,24,
24;85:8;88:23;101:15;
102:20;127:22;128:14;
230:6;231:18;233:4,12,16;
234:15;244:15,18,23,25
aquatards (1)
70:3
Aquifer (56)
12:2,5;13:4;44:1;49:25;
50:5;51:23;52:2;66:6,21;
67:10,11;68:3,5;70:2,3,4,21;
71:3,21,23;72:5,6;74:12;
76:4;78:5;80:13;82:17,18;
84:3,5,21;88:10;91:4,15;
105:21;107:1,25;131:23;
142:9;159:7;163:2;172:8,10;
179:19;180:1;189:8;202:7,9,
17;214:22,25,25;217:5;
220:7;224:23
aquifers (1)
71:10
aquifer's (1)
78:11
Aquifer-System (1)
106:8
archive (1)
94:17
archived (1)
34:10
area (36)
32:24;69:6,23,25;70:23;
72:4;79:2,3,3;95:20;101:22;
105:2,14;106:17,18;107:11;
114:25;124:16;131:23;
140:19;151:13;185:12;
209:24;210:20;229:17;
240:7,8,13,16,25;247:25;
250:1,1,7;251:16,21
areas (12)
70:25;79:8;112:8;140:19,
20;180:20;200:14,15;202:1;
234:5,15;250:7
arguably (1)
41:21
argument (1)
265:8
arguments (2)
154:6;161:1
argument's (1)
156:8
arise (1)
204:4
arisen (2)
135:2,7
arises (2)
230:18;234:5
Army (1)
230:8
around (34)
12:3,13,16;15:5;17:13;
25:12;27:5,11;28:24;30:2;
34:6;40:23;43:11;51:20;
53:23;54:22;67:21,25;68:4,
8;69:1;71:20;73:15;79:2,18;
81:15;90:13;96:15;100:8;
108:16;132:24;180:11;
194:25;256:24
around205 (1)
80:16
arrival (1)
165:10
arrive (3)
39:7;196:17,22
arrives (1)
196:14
articulate (1)
188:12
As-Applied (22)
13:16;14:23;15:6,17;19:8,
9;65:7;85:8;88:22;101:15;
128:15;137:24;154:20;
166:16,21,24;168:10,11;
187:16,22;203:24;235:13
ascertain (1)
203:15
Ashton (1)
218:18
aside (1)
27:1
aspect (1)
207:8
aspects (1)
71:18
assembled (2)
170:6,10
assertion (1)
197:3
assess (2)
194:24;195:2
assessing (4)
15:17;160:1,3;194:18
assign (4)
33:12;67:4;166:17;167:1
assigned (4)
157:25;194:21;218:11;
258:19
assigning (1)
158:2
assignment (5)
159:2;245:11,20;258:17;
260:17
associate (2)
33:3;150:25
associated (4)
29:18;31:23;56:3;102:13
Associates (1)
152:7
assume (3)
121:11;145:8;227:18
assumed (1)
147:23
assumes (1)
163:6
assumption (1)
250:11
attached (1)
26:9
attachment (2)
21:10;24:2
attainable (1)
174:24
attempt (2)
136:22;264:24
attempting (2)
91:22;136:10
attention (3)
53:21;104:12;244:22
attorney (1)
169:4
attorneys (1)
89:24
audio (1)
47:3
augmentation (11)
238:3,7;244:11;255:1,23;
259:9,15;263:7,9,10,13
authored (1)
214:9
authorized (2)
209:5,8
automated (1)
67:1
availability (1)
224:10
available (47)
14:19;27:8;31:20;32:3,5,
17;34:2,13;35:25;36:10,12,
19;53:2;63:16;90:24;91:1,3;
95:9;106:6;115:6;118:3;
130:3;157:1;170:23;171:5,
22,23;172:17;175:3,5,9,13;
180:22;182:15;183:4;
190:22;191:10;192:13;
198:4;200:12;205:18;
222:24;223:5,8;244:11;
263:5,14
average (45)
38:13,17;39:7,10,17,22,24;
41:3,5;42:5,16;44:19,22,23;
45:10,12,14,16,20;53:16,18;
61:5;74:17;96:22;97:5,8,10;
125:18;126:6;128:22;
144:19,21,22,23;178:22;
233:5;253:25;254:6,7,10;
261:13,14,16,17,17
averages (1)
37:20
averaging (2)
42:2;133:22
avoid (1)
53:4
aware (7)
126:14;127:24;128:3,14;
172:18;212:20;238:1
away (3)
44:19;80:18;225:2

B

bachelor's (2)
11:17;151:1
Back (23)
16:24;24:18;28:8,14;35:6;
47:3;64:8,10;65:3;89:16;
106:9;111:11,13;113:10;
121:25;141:18;155:7;
164:11;192:22;193:25;
224:15;242:23;261:21
background (7)
11:16;32:16;65:6,10;85:7;
150:24;228:23
balance (5)
37:4,5;41:23;43:13;57:9
balanced (1)
42:25
bar (4)
83:10,10;190:25;191:17
Barlogi (3)
132:18;194:8,10
barred (1)
184:18
bars (1)
191:22
base (1)
96:20
based (47)
28:4;34:9,11;35:22,24;
38:24;40:8,8;41:20;42:22;
45:8;51:9;55:12;57:23;
59:22;61:24;63:3;66:17;
67:5;69:21;70:11;72:5;74:1;
94:15;96:15;98:12;104:14;
105:8;109:10;110:4;113:7;
116:12;127:16;128:10;
129:25;130:3,15;147:9;
148:12,15;165:2;174:8;
207:21;227:18;233:4;248:7;
250:10
baseline (77)

23:4;36:24;37:1,9,16;
38:12,15,19,22;39:2,7,14,16,
18,20,21,23,24,25;40:4,6,10,
16,23;41:1,12,13;42:3,12,15;
44:11,13,14,21,22,24;45:7,
15,17;53:14,23;54:8,8;55:15,
16,17,19,22;56:8;57:7,8,22;
58:25;59:1,18,25;61:2,16;
62:7,8,21,25;88:3,7,20;
96:19,21,23;97:2,6,10;98:3,
4;99:17;101:1,4;147:10
baseline-year (1)
62:24
basic (1)
73:17
basically (68)
17:18;18:24;20:20;21:22;
22:2;23:1;25:16;26:25;
28:10;31:2;32:7,9,25;33:2,
14,17;34:25;37:10;42:5;
43:10;44:18;46:11;47:19;
48:7,14,18;49:3,7;50:4;
52:16,25;53:10;56:1,5,10,20,
22,24;57:25;58:8;59:8;
60:10;61:19;66:3,12,16,22;
67:3,20;68:13;70:20;71:2,4,
9,25;72:18;73:11;77:1;79:1;
81:7;82:7,12;85:18,23;
86:11;104:25;105:6;173:17
Basin (27)
144:20;151:17,22;195:10;
213:8;232:4,12,14,19;
233:23;234:18;237:21;
238:19,21,25;239:3,4,5,6,9,
10,20;240:7,12;242:3;256:5,
23
Basins (6)
229:25;232:3,6,6,9;256:24
basis (18)
35:18;81:24;93:12;
125:17;163:21,24;173:19;
174:6;191:14;194:15;
195:16,16;205:19;219:6;
223:5,8;226:11;251:1
Bates-stamped (1)
218:8
Baxter (3)
9:20,21,23
beans (1)
125:13
bearing (1)
190:9
become (1)
207:22
becomes (1)
240:18
beets (1)
125:13
began (1)
160:21
begin (1)
122:17
beginning (2)
50:22;119:21
behalf (7)
10:4;90:19;92:12;122:21;
132:13;153:9;258:10
behind (1)
129:13
belabor (2)
161:19;186:16
belief (2)
137:6;205:2
believes (2)
136:2;181:17
belong (1)
125:1
belonged (1)
125:25
below (16)
38:17;53:18;102:2,9;
103:7;218:20;232:19,23;
233:2;253:9,25;254:6,10;
261:13,15,25
below-average (1)
97:19
beneficial (8)
130:10;178:2,16,17;179:7;
181:14;185:17;197:23
benefit (9)
56:6;86:2,16;130:16;
177:25;179:2;197:15;221:7;
253:13
benefits (2)
102:8;253:15
best (28)
66:11,17,24;69:3;90:23;
91:1,2,14;95:8;96:15;
169:18,21;170:23;171:4,22,
23;175:3,4,9,13;190:22;
191:9;192:13;200:11;
202:15;217:19;218:25;219:1
bet (1)
141:6
better (18)
17:4;50:24;77:5;108:21;
140:25;141:11;176:19,20;
193:13;216:24;217:21;
219:18;220:6,9,10,12,15;
255:16
beyond (5)
109:12;127:12;134:12;
187:9;248:22
bias (16)
40:16;42:17;55:3;58:19;
59:4,17,24;60:11;61:8;62:6,
12,21;100:23,24;101:5;
103:17
Big (4)
13:10;125:12;235:24;
256:23
bigger (1)
124:24
binder (1)
16:18
binders (1)
129:13
Bingham (1)
123:15
biological (1)
229:1
bit (12)
43:20;61:9;65:21;66:7;
78:16;141:21,22;153:16;
180:10;198:4;199:11;247:8
Black- (1)
106:17
Blackfoot (51)
50:3,21;56:6;67:23;68:14,
23;69:13;70:6,14;71:3;72:4;
75:19;76:13;84:24;85:11;
86:3,17;91:7,16,17,24;104:1;
105:5;106:17;107:9,16;
108:22;119:24;171:1,2,12;
173:15;190:24;201:20;
216:25;217:3,19;218:15,20,
21,25;220:11;229:20,21,25;
232:15,24;233:7,14;234:5,13
Blaine (1)
124:14
block (1)
221:17
blocks (1)
199:13
blue (4)
77:13,21;83:7,10
Board (4)
102:11;142:13;151:8,8
Board's (2)
101:25;102:4
body (1)
28:14
Boise (1)
242:15
bold (2)
46:22;48:16
Bonneville-Jefferson (7)
150:2,14;152:9;153:5;
211:10,20;213:3
book (1)
217:25
books (1)
247:23
both (18)
20:5;52:20;84:2;91:11;
119:4;152:18;156:2;167:9;
168:11,13,14,20;175:15;
188:15;202:18;221:8;226:2;
229:5
bottom (8)
22:6;33:22;86:5,13;130:7;
176:19;202:18;218:8
Boulder (1)
11:13
boundary (6)
33:1;35:12;66:10;107:12;
209:12,12
box (20)
32:22;49:17,18,20,22,23;
50:2,13,16;51:3;101:14;
102:12,14,16,18;103:1,2,12;
119:22;209:14
breaches (1)
136:7
Break (13)
16:23;64:5,7,9;89:15;
111:3,11,13,15;193:22,23,
25;194:1
briefly (14)
12:25;32:13;35:21;36:25;
46:5;53:9;132:16;150:24;
158:23;173:3;177:15;
186:14;227:1;230:11
briefs (1)
265:4
bring (2)
106:12;137:2
bringing (1)
83:23
brings (2)
118:17;231:24
broaden (1)
220:1
broader (2)
174:17;202:21
Broadly (3)
146:20;176:5,7
broken (1)
85:14
brought (6)
53:20;76:24;81:14;
104:12;138:24,25
Bryce (12)
121:19;149:16;150:1,18,
20;176:10;188:3;194:7;
196:3,25;207:7;227:5
B-r-y-c-e (1)
150:18
Bryce's (1)
206:17
Budge (43)
7:6;16:20;121:13,14,17,
20;122:11,14;129:16,20;
132:4;134:12,19,22,25;
135:6,10,13,16,21;136:7;
137:22;138:5;144:11,14;
146:4,13,17;148:21;149:8;
236:21,22;237:4,6;243:18,
20;245:2;250:23;251:2;
257:20;262:4,6,9
budget (18)
67:12;68:2,6,8;74:5;76:20;
77:4;78:11;79:15;83:2,4,25;
84:3,5;108:1,17;159:4;
182:14
budgets (2)
151:19;214:3
buffer (4)
79:1,3,6,8
build (8)
66:9,10;69:5,5;177:7;
203:3,3,3

built (7)
68:11,25;69:9,25;100:23;
105:19,20
bullet's (1)
221:12
burden (1)
156:3
Bureau (5)
230:7;235:24;244:11,16;
263:10
Burley (1)
19:18
business (3)
11:8,10,12

C

calculate (15)
19:8;20:25;31:22;53:14;
58:13;74:7;108:4;119:2;
156:18;166:25;196:15,19;
198:8;203:6;204:14
calculated (15)
42:19;60:5,21;94:21;
112:12;113:3;174:20;178:5;
179:10;183:24;197:8,12;
201:14;202:2;205:24
calculating (4)
114:4;166:22;169:13;
198:8
calculation (38)
17:20,25;18:18,19;19:11;
20:4,8,12,21;21:7;23:3;
27:24;28:1;30:9,12;31:10;
54:1;57:14,24;58:9;61:22;
96:13;112:22;113:6,16;
114:11,23;115:19;143:6;
187:7,8;193:2;196:18;
198:13,15;204:2;247:18;
250:17
calculations (6)
18:2;19:1;168:14;197:21;
203:15;221:8
calibrate (2)
69:1;77:25
calibrated (8)
66:12,16,17;84:2;206:2,3;
216:21,24
calibration (26)
31:19,24;66:8,23;67:2,10;
68:7;69:7;72:9;73:12,12;
74:10,25;77:2,2;78:9;79:25;
80:1,9,15;81:3;83:19;84:6;
108:24;217:9,14
call (21)
11:3;68:17;90:2;101:19;
128:15;130:25;131:5;
150:19;159:5;172:3;211:19;
231:9;238:18,25;239:25;
240:17;241:13,13;248:25;
256:21;259:7
called (15)
10:18;28:24;29:12;32:24;
65:4,13;66:18;67:2;70:3;
106:23;122:5;150:2;170:6;
228:9;248:18
calls (6)
109:19,25;133:11;134:19;
251:2;256:25
came (3)
29:5;129:1;199:14
camp (1)
189:16
can (199)
9:8,18,22,23;10:13;11:7,
15;13:3;16:8,20;17:3,9;18:3;
20:2,5,6,10,16;21:11,19;
24:23;25:25;26:21;27:20,21;
28:18;30:23,25;31:13;32:13,
20,24;33:1,3;34:5,22;35:12,
17,21;36:24;37:3;38:14,15,
18;41:15;42:13,21;43:20;
45:5,11;46:11,17,22;47:11,
23;48:24;49:20;51:14;52:18;
53:9;54:5,9,24;55:8;57:15;
58:18;60:22;61:18;63:5,23;
65:6,21;68:21;69:14;71:15;
72:22,24;75:10;76:7,21;
78:10;80:16,23,23;84:18;
86:7,13,23;87:6;88:9,15;
89:11;91:20;95:16;96:15;
98:17;104:8,15,22;106:1,20;
107:3;110:7;111:8,24,24;
112:25;113:15;114:7;
115:12;117:19;118:14;
120:15;123:5;127:8,12,15,
20;129:7;133:23;134:22;
136:1;137:17;149:21;
150:16;151:4;153:15,15;
154:2;155:7;156:19;157:19;
158:25;163:1,18,19;165:3,
17,21;170:12;173:7,18;
176:4,7,13,22;177:2,6,12,13,
15,17;179:17;180:2;182:16;
183:10;184:5,10;188:22;
189:11;190:13;191:12;
193:21,21;195:15;200:13,
20;204:7,18;206:7;208:4;
216:14;218:18;222:11;
223:1;228:19;231:10;236:2,
24;237:5,7;239:7;242:23;
243:10;244:5,6;246:14,22;
249:22;251:17;257:8,12,17;
259:4,8;263:22;264:3,17,18
Canal (46)
19:22;20:15;27:19;30:16,
18;46:10;49:4;54:15,19;
56:19;58:4,7,14;60:15;62:3;
94:4;95:10;112:15;114:10;
127:6,14;132:22,23;140:22;
151:7,8,9;194:20;197:5;
209:23;210:15,19;213:7;
223:7;235:6,15,18;236:3;
247:11,19,20;250:8,14;
260:12;261:24,25
canals (10)
213:11;234:2;247:2,6;
248:8;250:3,5;251:12;252:7;
261:19
Candice (3)
9:11;257:7;258:9
candidate (1)
174:10
Canyon (20)
49:17,18,20,22,23;50:2,13,
16;51:3;101:14;102:12,14,
16,18;103:1,2,12;119:22;
240:10,15
capabilities (1)
188:18
capability (1)
36:1
capable (6)
106:19;171:13;174:10;
179:24,24;205:20
capture (2)
37:17;96:15
captured (1)
157:14
carburetor (2)
220:25;221:3
care (3)
113:17;149:20;174:20
career (1)
105:19
careful (1)
99:3
Carey (1)
123:13
Carlquist (12)
121:21,22;122:4,19;
132:10;135:1;136:1;140:2;
146:3,12;149:13;178:14
carried (1)
23:9
carry (1)
100:16
carryover (28)
15:8;53:8,10,11;54:1,3,17,
23,24;59:25;60:7,20,23;
99:17,18,22;100:2,2,8,12,18,
23,24;101:2;140:25;242:18;
243:2,7
case (16)
12:11;13:12;14:5;75:16;
90:15,18;135:20;136:13;
137:23;167:9;196:20;202:1;
204:14;209:22;220:11;
250:13
cases (2)
189:18;190:25
casting (1)
50:19
casual (3)
175:18;195:16,16
catch (1)
195:15
catches (1)
52:5
categories (1)
199:20
category (1)
118:12
cause (8)
10:19;122:6;150:4;183:22,
23;197:12;201:15;228:10
caused (2)
68:1;116:17
causes (4)
105:5;179:9;180:1;187:19
cell (5)
76:10;202:16,17,18;
219:22
cells (7)
20:11;76:12;202:19;
219:21,25;220:2,5
certain (10)
67:4;107:1;140:19;
144:24;189:7;200:16;219:8;
230:15;241:9;251:23
certainly (11)
36:1;141:10;157:22;
158:17;170:16;183:11;
184:23;185:5;189:16;
223:24;242:9
certainty (1)
109:13
cfs (1)
163:21
chair (1)
122:8
chairman (2)
124:7,9
chance (3)
51:3;141:11;246:10
change (39)
20:25;21:4;46:15;48:21;
53:19;54:8,11;72:10,25;
74:8,11;80:13,19;84:13;
94:3,24;99:18,22;103:3;
108:19;112:20;113:5,10;
114:3,18;128:8;130:22;
148:6;154:7;162:24;163:10;
164:25;194:16;195:12,17;
196:14;214:22;236:5;250:16
changed (16)
27:16;74:4;80:7;95:7;
111:23;112:18;127:25;
147:17;160:9,11,17,18;
169:1;230:13;254:20;259:13
changes (13)
22:13;50:4;53:25,25;
73:19,24;74:2;112:19;
120:25;127:24;220:7;
258:24;259:4
changing (8)
21:5;74:17,18;76:17;
113:13,15;114:9,12
channel (2)
239:24;240:4
characteristic (1)
199:14

characteristics (4)
104:1;106:21;179:18;
189:8
characterize (1)
96:12
characterizing (2)
258:3,20
charged (1)
127:12
chart (3)
75:10,11;119:3
charts (1)
191:8
chastised (1)
214:18
check (2)
74:23;150:19
checked (1)
34:10
cheese-processing (1)
124:23
choose (1)
249:1
choosing (6)
42:14;44:22;53:17;54:7;
59:17;78:25
chopped (1)
249:19
chose (7)
39:23;40:25;41:8,9,10;
79:9;80:25
chosen (4)
41:2,4;45:22;103:16
chug (1)
193:21
CIR (1)
83:20
circle (1)
220:1
circumstances (2)
43:17;170:13
citation (1)
162:25
citations (1)
165:1
cited (1)
155:11
cities (2)
124:25;258:10
City (4)
228:9;230:20;240:12,16
claims (5)
151:10,23;194:22;195:9;
256:2
clairvoyant (1)
228:6
clarification (3)
134:16;185:10;240:6
clarify (4)
34:5;117:18;257:9,12
clarifying (2)
257:17;258:13
clarity (1)
148:22
Clark (2)
86:6;123:15
classes (1)
33:18
classification (2)
33:14;95:19
classifications (1)
118:24
classified (2)
33:17;95:20
clause (1)
264:8
cleanup (1)
64:17
clear (9)
26:12;31:7;63:22;95:12;
100:12;177:21;189:19;
233:12;249:22
clearly (1)
120:6
clients (4)
9:13;73:14;132:14;215:8
climate (3)
37:10,13;38:1
clip (1)
210:3
close (6)
42:5;61:7;144:23;191:16;
204:13,13
closely (1)
56:7
closer (7)
41:9;44:23;82:22;84:8,8;
97:4;243:4
closing (1)
265:3
CLU (2)
32:25;199:12
Coalition (66)
25:14,16;29:15;36:8;37:3,
23;40:1,11;43:22;45:21;
46:14;53:12,25;59:10;61:15;
62:1,23;63:2;88:24;92:7;
95:13;103:8;125:23;130:17;
131:5,21;135:3,7;143:21;
146:19;170:14;171:20;
174:21;175:25;183:15;
189:21;191:25;197:15;
200:19;201:15,22;203:18;
211:2,19;221:14;226:16;
227:20;232:7;233:21;234:2;
235:3,5;236:20,24;238:10;
243:22;245:9;248:25;
253:14;254:14,17;255:4,9,
18;258:10;260:5
Coalition/Idaho (1)
223:16
Coalition's (5)
27:15;39:11;135:18;
179:11;253:17
co-chair (2)
122:25;123:1
coherent (4)
156:24;158:18;188:14,14
collectively (3)
147:1,1,18
color (1)
104:20
Colorado (1)
11:13
colors (1)
104:24
column (29)
18:4,7,15;19:3,6,14,19;
29:11,18,19,24;30:3,6,10;
55:20;56:18,23;85:13,16,20,
23;86:10,11;143:15;191:21;
247:16;250:10,13;251:22
columns (8)
19:5;60:15;85:12;86:22;
93:11,12;143:5,11
combine (1)
71:24
combined (2)
78:6;171:3
comfortable (5)
74:24;122:9;175:17,21;
199:4
coming (9)
35:3,18;53:3;97:16;
145:10,11;153:1;253:9;
254:10
comment (7)
18:3;27:13;34:5,9;56:9;
105:12;203:4
commented (1)
117:24
comments (18)
14:1,12,16;25:20;26:7,9,
10,11,18,22;27:3;45:24;
52:20;63:11,12;92:11,15;
197:17
commissioned (1)
31:16
committed (1)
29:17
committee (38)
13:5,7,10;22:10;23:15;
24:8,11;29:4;31:18;40:10;
65:14,16,20;73:3,11,24;
74:21;76:24;78:13,17,18;
79:5,16;81:6,11,14;106:13;
159:16,20;170:2,3;176:18;
214:8;219:9,14;223:13,15,19
committees (1)
13:3
common (13)
16:13;213:11;245:12;
254:23;257:11;259:7;
260:23;262:14;263:3,5,6,22;
264:3
communicates (1)
202:17
communication (4)
202:7,8,15,21
Company (35)
19:23;20:15;27:19;30:16,
18;46:10;49:4;54:16,19;
56:19;58:5,7,15;60:15;62:3;
94:4;95:10;112:15;114:10;
127:14;132:22,23;140:22;
152:8;194:21,23;197:5;
209:24;210:15,19;223:7;
235:6,15;261:24,25
company's (2)
151:9;235:19
compare (3)
47:22;83:10;190:21
compared (13)
45:12,18;50:3;60:12;
81:20,23,25;86:8;101:3;
126:17;216:25;244:25;
247:12
compares (2)
72:15;76:8
comparing (1)
45:10
comparison (3)
82:4;116:13;224:17
comparisons (2)
107:17;219:19
compatible (1)
223:3
compensate (1)
78:2
complained (2)
129:4,6
complete (2)
22:12;56:16
completed (2)
22:21;93:1
completely (4)
49:24;57:23;176:20;
241:23
compliance (12)
135:23;136:16,20;137:1,7,
11,13;138:1,1,12,18,19
comply (6)
136:11,16,19,23;137:6;
146:22
complying (2)
136:2;137:20
component (6)
36:23;38:1;57:22;76:20;
79:15;83:4
components (22)
15:19;36:12;38:12,14;
67:12;68:2,6,8;70:13;74:5;
77:4,17,19;78:12;79:14;
83:2,16,25;108:1,10,17;
203:2
compounding (1)
55:3
comprehensive (2)
50:18;52:13
compressed (2)
15:20;22:18
comprised (1)

259:8
computer (1)
208:2
conceptual (6)
68:11,18;71:18;108:10;
176:24;189:15
conceptualization (1)
68:22
conceptualizations (1)
69:22
conceptually (2)
68:11;179:16
concern (10)
44:12;49:14,16,19,22;
61:17;74:20;76:23;83:9;
191:19
concerned (5)
50:15;79:11;80:14;131:2;
174:2
concerning (8)
112:9;115:2;134:3;
139:19;242:17;243:1,6;
253:24
concerns (11)
48:25;49:1;54:4;73:23;
74:3;101:13;102:25;120:5;
242:17;243:2,7
concise (3)
153:21;161:1;180:15
conclude (2)
22:10;191:9
concluded (1)
42:12
conclusion (12)
21:20;30:24;99:4;109:25;
134:20;155:21,25;161:20;
188:7,9,10;251:3
conclusions (13)
35:21,22;42:8,10;84:20;
86:19;87:6;92:23;93:24;
155:15;156:17;157:2;191:6
conclusory (1)
200:23
condition (3)
162:23;164:24;214:23
conditions (6)
51:23;52:2;66:10;70:10;
76:14;107:12
conductance (1)
107:5
conductivity (3)
66:4;105:24,25
confidence (4)
94:9;98:13;107:16;176:7
configuration (1)
122:1
configured (1)
219:25
confirm (6)
31:25;64:25;95:5;123:11;
184:2;225:9
conflicting (1)
168:6
confused (1)
134:7
confuses (1)
218:3
confusing (1)
31:6
confusion (2)
196:13;206:12
conglomeration (1)
18:8
conjunctive (5)
90:6;177:22;216:2,6;257:1
connection (2)
86:1;240:19
connections (1)
121:12
connectivity (1)
70:9
consensus (1)
170:5
consequence (3)
156:14;201:12;205:1
consequences (3)
201:10,19;221:17
conservation (3)
12:14,16;147:5
conservatism (11)
41:20;42:23,25;43:2;
103:16;202:25;203:4,14,17,
25;204:7
conservative (7)
97:5;103:12;197:16;203:2,
11,12,13
conserve (3)
131:11;147:2,19
consider (12)
37:18;43:6;109:4;167:16;
169:19;180:22;181:1,17;
207:18,19;233:13,15
consideration (3)
100:5;192:25;224:7
considerations (1)
100:8
considered (17)
37:19;39:19;40:7;45:7,14;
46:21;47:14;162:3,4;167:10;
169:13;185:3;186:11;187:6;
198:5;213:23;220:21
considering (5)
39:15;63:19;79:8;167:13;
181:5
considers (2)
37:14;230:12
consistency (4)
154:16;156:15;158:4;
186:13
consistent (10)
36:3;45:22;58:5;62:11;
97:2,4,7;120:17,19;226:2
consistently (6)
30:16;31:11;49:12;62:16;
64:20;82:2
consists (2)
230:12;263:6
constrained (4)
44:4;98:14;99:8;217:21
constraints (5)
158:12;184:18;193:7;
205:8,9
construing (1)
163:22
consultants (2)
211:25;212:20
consulted (1)
82:6
consulting (3)
11:24;13:1;207:22
consumptive (9)
31:23;35:5;66:14;74:7;
79:14;96:13;108:17;127:17;
163:8
contained (2)
23:25;231:17
contains (1)
217:4
contend (2)
118:7;251:14
content (1)
230:15
contention (1)
250:4
contested (1)
241:6
context (8)
100:22;120:3;163:23,23;
172:2;174:3;224:4;245:9
continually (1)
34:14
continuance (1)
231:18
continue (7)
24:25;62:18;78:21;
131:19;142:8,24,25
Continued (4)
7:2;101:14;131:11,13
continues (3)
196:1;212:25;220:16
continuing (1)
218:14
continuous (1)
163:3
Contor (13)
121:19;149:17,18;150:1,
12,18;194:6;207:2;211:7,9;
212:13;218:9;227:21
C-o-n-t-o-r (1)
150:18
contribute (6)
139:6,12,13;232:6;242:11;
260:22
contribution (1)
248:19
control (4)
71:25;107:3;235:22;236:1
controlling (2)
71:2;107:6
controls (4)
68:14;70:5,10;72:3
convene (2)
17:12;28:21
convenient (1)
172:24
convening (1)
264:16
conversation (1)
175:18
convert (1)
247:6
copies (2)
14:19;153:14
copy (3)
14:8;162:12;245:24
corn (1)
125:12
Corps (1)
230:8
corrections (3)
120:13;121:5;157:6
correctly (2)
87:25;238:6
correlated (1)
50:8
correspond (1)
199:16
corresponding (1)
165:25
cost (4)
177:16,18;179:15;220:20
cost-benefit (1)
221:4
costly (1)
199:24
costs (1)
260:4
counsel (4)
120:16,24;121:4;138:24
counting (4)
47:4,7,13;119:5
County (3)
124:13,13,14
couple (24)
42:1;44:5;48:18;77:18;
82:1;140:10;141:16,18;
142:5;143:1,5;162:5;180:11;
186:13;193:21;200:22;
201:8;234:24,25;236:5;
237:8;257:16;259:6;261:5
course (4)
130:25;140:15;204:16;
254:6
COURT (26)
9:6;11:7;15:4;26:21;
28:12;33:5,10;64:11;78:15;
97:20;98:17,21;116:8;
152:19;153:15;185:14;
190:17;222:11;224:13;
227:16;242:19,21,22;243:5,
10;249:19
courts (3)

216:9;227:5,9
cover (2)
162:16;229:18
covered (2)
185:8;188:3
covers (2)
35:14;229:19
create (5)
42:2;60:11;153:8;185:19, 23
created (6)
32:15;48:6;56:1;198:22; 214:11;215:14
creates (5)
40:16;42:16;113:20; 168:10;208:14
creating (3)
37:6,7;79:12
credibility (1)
198:6
credit (1)
198:8
Creek (3)
232:22;233:7;234:13
CREP (1)
12:13
crescent (3)
169:20;221:1,3
Cresto (3)
21:14;22:6;25:20
criteria (29)
36:25;37:9,12,16;38:12, 15,25;39:9,18,23,24;41:14; 44:14,23;45:15,18;52:15; 62:21,24;172:14;173:21; 174:3,16;203:10;204:5; 213:21,21,22;219:8
criterias (1)
40:6
criterion (10)
174:13;176:12;202:24; 203:10;204:12,15,21;205:4; 206:6;213:20
criticism (1)
202:12
criticized (1)
104:11
critique (1)
69:24
crop (11)
27:22,23,24;36:13;112:22; 113:4,5,7;114:17,22;195:2
crops (5)
125:10,12,14,15;150:25
cross (3)
140:3;236:24;257:13
Cross-Examination (22)
7:7,8,9;89:8,21;110:25; 112:4;132:5,8;140:6;149:10; 207:5;211:1,5;226:22; 236:19;243:21;244:1;253:4; 257:23;258:3,7
cross-examine (1)
111:18
cross-examining (1)
89:25
cross-hatched (1)
191:2
crossing (1)
257:21
cubic-feet-per-second (1)
163:19
cumulative (2)
167:16;203:6
curious (2)
212:17,21
current (18)
22:13;23:3;26:3,18;37:18; 45:18;48:23;76:20;82:17; 85:7;115:11;122:24;152:10; 171:23;216:14;229:4; 245:14;255:8
currently (5)
22:12;203:22;207:15; 226:10;263:6
cursory (1)
154:22
curtail (8)
86:3,9;88:21;164:2; 178:10;179:4;222:2,2
curtailed (18)
43:12;56:15;57:5;85:22; 86:12,16,23;87:2;88:10,12, 17,20;131:3;163:7;164:6; 178:16,21;226:14
curtailing (1)
256:8
curtailment (69)
37:8;41:24;43:4,11,14; 55:5;56:2,5,13,13,17;57:10; 60:5;65:4,8;72:1;75:15,16; 84:10;85:7,15,20,21;87:3; 115:22;116:4,12;120:11,23; 128:12,16,18,24;129:2,10; 130:3,9,13;131:8;138:21,22; 140:13;145:2,6,10,11; 156:21;160:3;163:4,6,9,23; 165:3,6,8,24;166:3;181:12; 187:12;192:13;196:15,16; 201:16;216:15;224:10; 226:3,7;240:1;256:11
curtailments (3)
128:5;163:3;226:11
curve (2)
43:6;56:1
cut (3)
200:3;201:13;239:7
cutoff (1)
166:13
cuts (1)
200:18

D

daily (1)
223:5
dairy (1)
125:2
Dam (3)
229:21;232:10;262:1
darker (2)
70:22;104:20
dashed (2)
70:23;75:18
data (72)
20:11;27:7;28:25;30:22; 31:11;32:21;34:10;35:1,3, 14;47:23;50:13;57:17;66:14, 23;67:24;68:20;74:7;78:24; 79:4,23;81:23;82:1,4,5,14; 85:7;94:7,8;106:4;118:3,4,8, 8,18;171:10;173:8,9,9,23; 177:7,8;182:15;183:13,14, 18,21;189:17,22;195:5,6; 197:13,14,18;198:17,20; 199:19;200:8,12;202:2; 203:23;208:3,9;222:23; 223:22;224:3,11;230:12; 231:4;242:17;243:1,6
Dataset (36)
29:21,23;30:21;31:14,19; 32:1,5,9,15,19;33:17;34:2,4, 6,12,16,18,21;35:8;36:15; 58:10;63:16,20;93:17;94:12; 95:3,16,24;96:12;118:23,25; 182:22;197:13;198:21; 200:6,8
datasets (9)
29:3;31:1;55:24;93:13,22; 94:14;95:15;199:5,10
date (32)
12:21;29:13,16,17;43:5, 11;56:5,13,17;60:5;65:8; 69:22;85:7;87:3;96:6; 104:14;115:22;120:11,23; 128:16;130:15;138:22; 144:4;165:25;166:3,13,23, 25;196:15;224:6;226:3,18
dated (3)
20:6;21:15;26:14
dates (6)
56:2;92:16;96:3,16; 116:12;199:19
day (4)
170:23;229:13,16;264:14
days (4)
38:3;241:9,10,10
dealing (3)
108:13;256:9,10
dealt (3)
74:9;114:25;132:12
debating (1)
169:4
decade (1)
216:7
December (6)
128:16;130:15;211:12,13, 16;226:18
decide (1)
79:3
decided (3)
39:20;79:7;148:10
decision (14)
50:11;116:23,25;139:15; 156:10;161:11;174:6,7,8,16; 175:1;192:10,18;206:7
decisions (2)
138:16;204:20
decline (3)
142:4,24;143:2
declined (1)
141:21
declines (3)
140:24;142:23,25
decree (1)
18:10
decreed (1)
209:15
defensibility (2)
198:1;206:11
defensible (11)
156:1;167:8;183:9,12; 184:5;185:24;186:3,6,8; 200:7,11
defensibly (1)
183:16
deficiencies (2)
189:14;202:20
defined (1)
66:2
defines (2)
162:22;164:23
definitely (2)
22:17;46:7
definition (4)
109:8;164:9;165:12;193:2
degradation (1)
51:1
degrade (1)
51:11
degrading (4)
49:6,11,12;201:10
degree (9)
11:17,19;38:3;113:8; 150:25;151:1,2;191:25; 229:3
degrees (1)
171:21
delineation (1)
32:22
deliver (3)
91:16,24;99:3
delivered (1)
234:21
deliveries (1)
132:25
delivering (2)
98:9,23
delivery (4)
68:17;172:3;211:19; 243:13
demand (45)

17:15,20;18:7,16,17,23; 19:4;20:4,7,12,21;21:7;22:1, 8;23:3;27:25;30:8,12;31:10; 36:14,23;37:2,21;40:20; 41:19;42:18,22;43:7,10,22; 53:15;57:14,20,21,24;58:9; 59:1,17;65:9;97:6;101:6; 113:14;114:10;172:3;226:8
demands (2)
53:24;97:15
demonstrate (1)
55:6
demonstrates (1)
57:6
Department (75)
13:21;14:1;17:12;18:6; 20:23;22:21;23:22;24:24; 25:15;26:7,25;27:8;28:2,20; 29:6;31:8;32:7;34:3,12; 35:25;36:9;37:13;40:7;42:2; 45:14;46:7;49:2;55:13; 57:18;58:1,11;61:21;63:9; 69:19,20;75:14;80:25;81:10, 17;82:8,12;85:6;92:13; 93:14;94:15;95:9,11;97:10, 17;103:5;106:3;108:24; 117:22;118:3,7;121:1,6; 138:17;143:8;151:11,15; 154:7;159:18,19;176:15; 180:23;185:22;198:20; 199:15;205:3,18;210:5; 215:11;216:5;225:18
Departments (1)
29:23
Department's (16)
17:25;29:20;44:9;47:20; 50:11;55:22;61:10;65:12; 92:23;103:14;104:12; 113:14;161:4;214:11;216:2; 226:17
depend (3)
213:9;226:13,15
depending (3)
59:22;96:5;181:11
depends (7)
141:4;170:19;175:19; 176:2;206:6;209:9;213:19
depict (5)
209:7,19;232:1;246:23,24
depicted (2)
209:25;232:12
depicts (1)
232:2
deployed (1)
220:23
deposition (1)
56:20
deputy (1)
240:25
describe (19)
21:25;25:25;46:18; 124:21;150:24;151:4; 155:14;158:25;163:18,20; 165:10;173:3;183:8;187:18; 202:14;207:25;228:23; 230:11;246:22
described (5)
45:3;93:11;170:13; 187:20;208:21
describes (2)
84:20;208:25
describing (4)
21:22;65:10;72:11;73:2
design (4)
159:16;182:2;212:23; 214:6
designated (1)
29:16
designations (1)
33:4
designed (2)
32:25;168:20
desire (1)
142:15
detail (1)
15:14
detailed (7)
15:7;21:3;32:23,24;34:18; 35:16;209:2
detect (1)
195:11
determination (10)
56:11;97:20;101:15; 113:1;118:14;142:14; 180:23;182:4;219:5;235:21
determinations (1)
101:4
determine (12)
53:1;65:8;115:6,10; 139:22;166:12;173:14; 200:9;203:23;231:10; 244:10;264:22
determined (9)
54:2;55:21;57:23;60:24; 62:25;110:15,19;116:19; 133:2
determining (4)
25:9;199:7;210:18;226:2
develop (2)
52:24;66:9
developed (13)
32:10;33:15;47:21;53:4; 66:13;95:20;116:12;159:11; 182:20;199:2;239:5,11,20
developing (2)
35:7;242:15
development (3)
34:24;65:11;242:11
deviation (5)
44:19;59:6,9;103:7,18
dictating (1)
70:5
Dictionary (2)
162:22;164:23
differ (2)
191:10;192:14
differed (1)
171:5
difference (22)
40:15,17;54:7;55:14; 58:13;60:4;75:23,24;76:1,2, 15,16;83:16,20;84:10;94:9; 95:17;114:4,13;134:1; 171:21;240:3
differences (6)
74:12;75:5;77:1;83:18; 107:21;108:2
different (46)
18:8;25:23;30:24;35:22; 38:20;45:7;46:14,19;47:1, 13;49:24;50:4;75:25;79:8; 80:2,5,21;82:1,11;96:2; 113:19;116:12;119:2; 135:17;160:15,16;167:6,11; 169:24;173:23,24;191:5; 196:19;199:14;202:22; 208:17;215:24;216:21; 217:25;218:10,11,17;232:6; 241:4;247:5,12
differentiate (1)
66:3
difficult (5)
53:6;185:19;203:8;210:2; 250:24
dig (1)
162:6
Direct (21)
7:5,6;11:1;39:4;43:15; 87:22;90:4,12;92:3;122:13; 138:5;140:10,11;142:7; 149:15;150:10;212:11; 226:8;228:17;236:23;237:3
directed (2)
17:12;28:21
direction (3)
31:17;137:3;190:11
directly (3)
20:3;84:23;232:6
Director (25)
9:21;10:2,24;16:20;39:5; 64:2;92:13;110:1;124:5; 127:25;128:15;134:22; 135:21;137:13,22;138:17; 145:25;147:16;148:22; 193:20;194:4;196:2;206:23; 235:14;236:8
Director's (2)
148:5;216:10
disagree (1)
27:14
disappointing (1)
171:23
discharge (16)
50:1;66:23;68:14;70:6,13; 71:2,7;102:16,18,22;105:5; 119:23;151:12;163:2;217:5, 18
discharges (2)
49:23;50:2
discharging (1)
71:8
disconnect (1)
240:23
discrete (1)
199:13
discretion (2)
103:14;106:11
discretization (1)
170:20
discretized (2)
33:3,8
discuss (5)
16:7;67:17;76:19;103:24; 188:22
discussed (25)
14:12;17:14;23:12;47:18; 50:11;52:11;62:20;78:24; 81:15;92:4,21;99:14,16; 107:15;112:17;148:18; 173:2;180:9,10;186:15; 192:3,4;201:11;218:22; 230:24
discusses (2)
34:21;119:1
discussing (6)
57:6;64:18;146:18;186:2; 196:8;235:14
discussion (15)
25:7,11,12;112:11;167:25; 186:17;194:12;196:6; 197:18;198:17;201:5;202:4, 11;205:17;206:10
discussions (3)
186:19;223:23,25
display (1)
208:3
dispute (4)
135:2,6,10,13
distance (2)
10:15;85:25
distort (1)
187:7
distorts (1)
187:8
distribute (1)
264:20
distribution (5)
72:20;76:16;203:7;234:3; 238:20
district (106)
27:19;85:9,18,20,22,25; 86:12;89:25;112:7,8;123:4, 6,9,12,13,14,15,15,16,16,17, 21,25;124:3,5,11,19,22; 125:1,3,6,8,9,11,16,20,24; 126:1,4,7,10,22,25;127:6,7; 128:10,12;129:2;130:6,14; 131:13;132:14,17;133:4,6,8, 12,15;134:4,8,9;136:10,19, 25;137:8,14;139:17;142:14, 16,21;144:2;147:6;148:10, 14;150:2,14;151:21;152:9,

19;153:5;211:8,11,14,20;
213:12;229:6,11,12,13,17,
22;230:2,3,23;231:3;233:25;
237:12;238:22;244:4;
246:16,17;247:20;251:13;
261:7;263:14,23
districts (25)
29:22;85:14;86:5,14,25;
87:2;118:5;123:8;126:14,17,
21;136:19;139:21;143:9;
145:18,24;146:25;147:8,13,
19,23,25;148:1,10,18
district's (2)
85:10;146:21
ditch (1)
132:24
divergent (1)
170:10
diversion (25)
40:12;56:21,23,25;57:3,8;
63:4;81:23;82:5;125:18;
126:15,18,21;127:16;
131:14;183:22;213:6;
229:14;241:1;247:12,24;
248:5;250:4;263:23,25
diversions (31)
37:23;39:1,11;40:2;41:6,7;
42:16;45:21;61:16;62:22;
63:2;102:2;113:4;116:17;
133:13;134:4;229:16,21;
230:23;234:8,22;239:13,16,
23,25;241:2,8,14;246:25;
248:21;260:3
diversions' (1)
39:3
divert (8)
41:15;125:17,21;126:3;
127:8,15,18;178:15
diverted (15)
57:2;113:25;239:15;
241:15;246:24;247:16,17,18,
22;249:25;250:12;251:12,
20,22;252:1
divided (1)
251:20
doctrine (2)
238:19,25
document (22)
25:25;26:1,13;32:14;
87:11;120:19;129:14;149:5;
153:24;154:23;155:8;
159:22;160:13;182:2;198:6;
206:19,20;217:9;231:20;
236:14;246:12;252:16
documents (12)
15:4;154:21;155:2,11;
159:16,23;181:22;183:7,9;
184:1;214:7;215:21
done (58)
12:9,11,15;15:6;16:4,4;
28:2;30:4;34:18;35:23;
43:25;48:10;50:19,19;52:18;
58:3;61:14;64:4;65:12,13;
69:17,19;82:12,13;85:1;
87:14;95:15;106:7;108:6;
128:9;131:15;139:23,24;
143:12,14;151:25;158:8;
168:16;177:12,12,13;188:8,
20,21;190:10;192:19;
198:12;205:23;206:5;
211:13;217:21;223:9,11;
226:10;231:24;249:4;
262:10;264:14
doubled (1)
178:23
double-sided (1)
218:3
down (20)
22:6;23:11;67:5;77:4;
82:21;85:14;98:7;114:3;
141:19;142:23;153:16;
196:11;204:23;234:3,8;
239:7;240:10,12;244:25;
249:1
downstream (5)
234:9;239:4,14;241:22;
242:8
drain (1)
197:4
drainage (1)
232:22
drainages (4)
233:14;234:11,13;248:20
dramatically (1)
141:20
drastic (2)
73:19;80:20
drastically (1)
74:18
draw (4)
93:24;96:20;191:7;234:4
draws (1)
209:12
Driggs-Tetonia (1)
240:8
drivers (1)
75:5
dry (3)
43:18;60:25,25
due (3)
108:2;158:11;184:18
duly (4)
10:18;122:5;150:3;228:10
duplication (1)
129:17
during (20)
12:7;14:15;19:11;22:19;
72:9;90:9;91:25;92:3;115:7,
15;151:20;170:1;194:8;
196:4,25;198:16;199:20;
222:24;248:6;264:8
duties (2)
237:11,11

E

earlier (14)
27:18;33:16;83:9;93:5,11;
101:18;157:5;201:1;203:9;
206:13;215:17;231:13;
239:5;260:16
early (3)
92:4;96:7;222:21
earnest (1)
211:15
ease (1)
149:1
easier (2)
99:6,9
easily (1)
66:5
east (2)
105:7;122:19
Eastern (22)
12:2,4;13:6,8;31:16,18;
44:1;49:24;50:5;65:13;73:3,
10;106:10;159:15;170:2,14;
175:25;176:17;182:12;
214:7;223:14,19
easy (2)
123:10;195:11
economic (1)
177:20
economics (1)
151:2
edited (1)
164:13
educational (3)
11:16;150:24;228:23
effect (13)
128:4;156:13,13;163:19,
20;178:25;179:3,8,21;180:1;
181:7;197:19;243:14
effects (13)
53:5;160:3;165:6,24;
167:14,16,18,20;173:15;
180:3;203:6;214:21;223:4
efficiencies (2)
15:11;114:3
efficiency (12)
23:7;113:2,3,5,12,16,23;
114:12,14,18,21;221:20
efficient (3)
63:2;221:5,21
efficiently (1)
222:1
effort (2)
48:9;174:22
efforts (11)
90:10,24;92:4,14;95:14;
101:20,21,21;102:11,15,17
eight (3)
11:24;152:18;203:11
either (23)
18:10;27:6;29:12;33:12;
60:15;61:12,20;62:13;78:10;
79:19;93:12;95:5;116:3;
162:1,4;167:20;177:11;
196:20;200:18;201:13,13;
203:20;256:13
election (1)
230:1
elementary (1)
262:18
elevations (1)
241:19
eliminate (1)
130:10
eliminates (1)
83:8
Elisheva (1)
10:4
else (8)
42:11;50:8;112:24;
128:13;161:24;184:12;
227:17;257:21
emailed (3)
231:13;245:23;261:6
embarrassment (1)
163:14
embodied (2)
191:1,3
emerges (1)
240:14
employed (3)
43:3;51:8;152:8
employee (1)
229:10
employees (1)
132:24
employer (1)
152:6
employment (1)
207:21
employs (2)
132:22,23
enabled (1)
158:20
encounters (1)
71:4
end (5)
46:15;111:10;164:13;
193:19;253:23
ended (2)
134:5;159:13
endorse (1)
219:15
ends (1)
195:20
engineering (2)
19:16;69:18
Engineers (1)
230:8
enough (8)
140:15;175:11,14,20;
187:4;198:14;204:25;258:23
ensure (5)
100:19;101:9;120:18;
141:8;198:25
ensures (3)
41:14,16;63:5
entail (1)

208:1
entered (3)
131:6;134:10;136:12
entering (2)
194:19;195:12
entire (10)
35:4;42:18,22;44:16;66:1;
154:22;162:3;167:10;179:2;
239:8
entities (13)
28:12;37:3;40:12;46:14;
53:3,12,25;54:10;55:1;
59:10;62:23;95:13;232:8
entity (1)
113:12
environment (1)
105:23
environmental (3)
11:18;152:7;190:12
envision (1)
118:2
equal (1)
166:8
equation (1)
173:8
equations (1)
243:15
equivalent (4)
166:2;230:14;231:14;
236:12
erroneous (3)
27:23,24;113:21
erroneously (2)
179:7;181:10
error (4)
62:6;67:24,25;118:6
errors (2)
68:1,21
ESHMC (2)
159:20;170:2
ESPA (8)
55:6;90:6,18,22;91:23;
101:20,21;128:2
ESPAM (44)
13:9;34:23;55:24;56:2;
63:14,15,20;64:16;65:5,7,11;
67:1;68:16,18;70:7;75:21;
76:19;77:18;79:13;81:12;
82:17;103:25;106:2;110:20;
151:20;154:10;155:5;156:1;
158:24;159:1,18;160:2;
163:1;165:2;168:19;169:13;
170:11;172:6,15,18;176:15;
179:23;183:10;216:6
ESPAM1.0 (1)
160:2
ESPAM1.1 (5)
69:21;72:15,24;104:14;
159:11
ESPAM2.0 (1)
159:12
ESPAM2.1 (6)
75:20;76:9;107:18;171:7;
191:1;219:16
ESPAM2.2 (22)
69:23;73:2,5;75:22;76:8;
77:1;80:18;81:5,9;83:3,19;
106:22;107:16;108:6;158:2,
10;171:12;173:14;191:3;
216:13;219:15;227:16
essentially (41)
20:10;27:13,15;30:6;
31:10;32:20;37:1,17;38:3,
23;40:17;45:6;47:9;55:13,
19;59:4;60:4,8,17;61:11;
65:11;68:1;69:10,20,24;
70:5,19;71:18;72:3;73:24;
74:6;75:13;76:3,11;85:5;
104:17;156:7,17;221:4;
230:17;231:23
establish (3)
39:25;53:11;205:4
established (1)
204:21
establishes (1)
52:16
establishing (2)
174:16;204:5
estimate (14)
63:23;77:10,11;79:10;
91:3;108:22;164:8;173:10;
179:20;180:2;189:1;191:18;
192:12;225:15
estimates (3)
214:20,25;225:10
estimating (2)
34:15;188:23
estimations (1)
173:15
ET (12)
31:22;35:1,8,11;79:10;
82:1,3,6;89:25;140:9;211:8;
244:4
eternity (1)
166:7
ETRAN (4)
191:1,3;224:15,19
evacuate (1)
235:25
evaluate (10)
15:6;23:15;25:16;27:1;
36:7;40:6;51:21;52:3;
155:24;213:21
evaluated (2)
46:13;219:8
evaluating (3)
38:4;69:21;173:5
evaluation (2)
40:21;47:20
evapotranspiration (5)
31:22;35:3,18;38:2;208:6
even (13)
52:2;55:6;61:5;105:21,23;
136:15;140:18;141:7;
157:24;168:24;170:9;
178:12;239:15
eventually (1)
165:9
everybody (5)
111:4;128:13;264:22;
265:1,12
everybody's (1)
255:12
everyone (4)
131:18;138:18;147:23;
174:1
evidence (13)
58:6;87:12;94:2;99:11;
118:7;129:19;149:6;204:2;
206:21;236:15;252:15,17;
264:19
evolution (5)
40:14;72:12;73:8;74:16;
80:17
evolved (1)
38:19
exact (1)
50:12
Exactly (9)
27:24;34:7;80:7;106:8;
107:6;128:7;166:8;181:7;
198:14
Examination (18)
7:5,6,10;10:12;11:1;87:22;
117:11;119:18;122:13;
138:6;144:13;150:10;227:3;
228:17;236:23;237:3;
248:23;261:3
examinations (1)
151:22
examine (2)
89:18;252:23
examining (1)
10:3
example (16)
19:18;35:11;37:13;73:20;
94:6,11,19;95:24;113:17;
140:19;143:11;163:5;165:7;
209:4,19;260:11
Except (1)
179:16
exception (2)
159:7;229:24
excerpt (3)
148:24;246:9,15
excerpts (1)
70:17
excess (1)
201:16
exclude (1)
196:1
excluded (1)
259:25
excludes (1)
118:8
exclusion (1)
208:11
excuse (2)
91:17;242:19
exhaustively (1)
173:23
Exhibit (59)
14:7,14,17;16:13;17:7;
20:19;21:10;23:19;24:6;
26:4;28:15;87:8,12,13;88:1;
114:8;129:13,17,19,22,23;
145:14;148:23,24,25;149:6,
7;153:13;154:19;157:13;
162:7,8;164:11,15;182:7,17;
190:1,2;206:17,19,21,22;
217:23;227:24;231:15;
236:9,12,15,16;246:6,7;
247:3,12;250:20;252:11,13,
15,17,18
exhibits (5)
16:13,15;264:18,23,25
exist (4)
107:13;108:11;156:23;
189:23
exists (1)
179:18
expanded (1)
258:16
expect (4)
88:7,9;145:9,11
expected (1)
188:23
expedited (2)
153:20,21
experience (11)
51:5,18;63:13;141:7;
158:24;194:18;195:11;
208:21;215:25;248:7;250:19
expert (16)
13:17;14:5,11,22;24:3,4;
37:15;98:2;129:18;149:4;
150:23;153:8,25;187:4;
206:17;248:21
experts (1)
82:7
explain (39)
18:3;20:2;21:19;26:21;
28:18;30:23;31:13;32:13;
34:22;35:21;38:19;43:20;
48:24;53:9;54:5;55:8,9;
57:16;58:18;65:6,21;69:14;
71:15;72:14;74:1;75:10;
76:7,21;80:24;84:18;95:17;
104:8;165:21;166:9;173:18;
177:15;190:13;239:2;259:4
explainable (1)
173:12
explained (3)
49:9;173:8;251:3
explaining (1)
171:14
explains (2)
49:8;171:16
explicitly (1)
233:12
exploration (4)
158:5;174:17;185:7;

192:20
explore (3)
184:14;185:5;249:2
explored (3)
158:1,8;173:22
exploring (1)
138:7
expressed (4)
142:15;164:7;165:9;215:1
extended (2)
40:5;81:3
extent (5)
159:12,19;181:3;213:5;
220:12
extracted (1)
20:3
extreme (1)
39:22
extremely (1)
86:8
eye (1)
52:5

F

fact (20)
78:7;84:21;101:3;105:9;
128:11;136:14;138:17;
146:6;162:20;163:12;166:6;
178:19;179:1;180:16;
192:23;200:4;206:14;210:8;
248:18;256:13
factor (5)
37:13;171:6;186:9;
192:14;219:20
factors (5)
37:10;169:12,16;188:22;
230:16
factual (1)
155:20
factually (2)
155:22;156:9
failure (1)
183:18
failures (1)
183:21
fair (12)
96:19;101:11;140:13;
141:9;143:15,23;148:16;
168:12;172:1;180:25;
192:11;258:23
fairly (1)
141:20
fall (2)
27:25;95:25
Falls (50)
19:22;20:14;27:19;30:16,
18;31:5;42:14,16;46:9;49:4;
50:25;52:1;54:19;56:19;
58:4,7,14;59:12;60:14;71:5;
94:4,23;95:10;102:3;104:18,
23;105:2;112:8,15;114:9;
123:14;132:22,23;151:14;
174:1;197:5;209:23;210:15,
19;223:7;228:9;235:6,11,15,
18;236:3;238:21;260:12,13;
261:24
false (3)
204:10,17,18
familiar (18)
12:1,23;65:18;100:6;
109:9;198:10;207:22;
208:20;213:24;216:21;
230:6;235:2;237:19,23,25;
238:24;246:12;247:2
far (6)
19:19;243:14;255:3,22;
256:18;263:17
farm (1)
150:25
farmed (1)
151:6
far-right (1)
250:10
farther (1)
225:2
fashion (3)
108:19;187:6;188:14
fault (1)
199:24
favor (4)
42:17;59:4;103:7;200:19
feature (3)
109:11,12;208:12
features (1)
189:23
fed (1)
239:11
feed (1)
242:3
feel (3)
67:17;122:9;199:4
feet (5)
54:12;141:22,23,24;142:2
fell (2)
199:21;236:24
Ferrari (1)
221:2
few (17)
110:8;112:9;134:9;
144:15;145:13;172:9;
200:23;204:12,15;207:7;
211:8;218:14;222:17;
233:18;257:7,12;262:12
field (9)
79:2,20;81:18;95:22;
151:22;194:19;195:8,13;
200:3
field-by-field (2)
35:17;81:24
fields (1)
33:1
Fifth (50)
13:15;14:23;15:17;40:3;
45:8,15;54:9,14,17;55:4;
60:12,16;61:2;96:21;127:22,
25;137:23;154:18;155:21;
158:15;161:6;162:7,18;
165:13;166:24;167:7,17,22;
168:8;172:13;180:13,25;
185:12;186:2,5,21;187:10,
15,23;188:5;197:9;198:1;
199:8;200:9;202:23;203:23;
225:8,10;227:11;242:11
figure (46)
30:18;32:12,13;35:10,13;
55:25;60:10;70:15,25;72:16,
18;73:1;74:15;75:1,2,9,12;
76:7;77:7,9;80:4,17,23;
82:15,16,24;83:1;94:20;
100:18,24;104:10;120:12,12,
14,22;129:18;157:10,12,12;
165:18,21,22;166:6;190:5;
191:13,20
Figures (12)
38:7,9,11;44:13;70:16;
72:19;99:23;190:4,5,14,21;
193:5
file (2)
246:1,2
filed (1)
231:18
files (2)
56:4;85:6
fill (7)
140:18;141:1,5;229:22;
235:17,21;259:7
filled (1)
235:19
Final (1)
39:13
finally (2)
135:13;233:1
find (13)
10:7;32:24;56:5;118:5;
162:14;164:13;166:13,14;
168:3;172:16;187:24;208:8;
218:5
Finding (4)
162:20;163:11;180:16;
192:23
findings (4)
160:9,12;190:14,19
fine (7)
9:23;11:5,12;24:14;90:3;
106:16;142:18
finer (2)
189:1,2
finished (1)
253:25
first (37)
10:18;28:22;29:18;30:14;
38:22,22;39:4;43:16;76:25;
85:13,19;112:10;119:22;
122:5,10;132:16;140:11;
142:3;143:5,11,15;150:3;
151:12;155:19;159:11;
163:13;170:6;183:20,24;
187:9;191:17,17,19;192:21;
228:9;237:9;250:13
fit (3)
66:24;103:25;104:9
fits (1)
39:9
five (4)
147:11;171:6;191:16;
241:10
five-day (1)
241:11
five-eighths (2)
56:25;57:3
five-month (2)
168:2;191:15
flagged (1)
51:22
Fletcher (59)
7:8,11;24:8;110:25;111:1,
12,18,20,23;112:1,5,6;
116:15;117:1,4;119:13,14;
132:6,9,12;134:17;135:21;
136:4,5,9;138:3,7,8;140:1;
145:16,25;146:6,9,17;149:3,
11;226:23,24;249:3,7,15,22;
252:10,19,21,25;253:2,5,6;
257:3,7,24;258:15;259:2;
262:12,16,21;263:2;264:10
flew (1)
200:2
flexible (1)
106:25
flood (2)
235:22;236:1
flow (33)
37:25;52:10;70:10,12;
152:1;197:4,18,21;229:12;
230:9,18;234:2,4,8,18,21;
237:15;238:3,7;239:8,8;
242:8;244:10;248:19;
253:11,20;254:25;255:23;
259:9,15;263:9,10,13
flows (6)
49:21;119:23;197:8;
198:8;253:9;254:9
focus (2)
59:12;75:12
focused (6)
25:8;30:2;94:4;154:23;
167:18;201:21
folks (4)
164:19;212:4;221:18;
242:14
follow (1)
259:23
following (7)
26:6;29:15;30:10;81:10;
100:20;133:24;244:15
follows (5)
10:20;122:6;150:4;
228:11;237:9
follow-up (4)
144:15;175:4;201:9;261:5
follow-ups (1)

140:10
Foods (1)
258:10
forces (2)
71:6,7
forecast (46)
22:8;41:19;46:2,9,13,21,24;48:9,20,22,24;49:10;50:18,24;52:4,5,14,22,22,24;53:4;58:23,24,25;59:2,2,3,6,10;88:23;101:12;102:14;201:25;230:6,11,12,25;233:12,16;234:15;244:8,13,18,18,23,24
forecasted (4)
37:2;101:14;102:19;103:2
forecasting (3)
23:1;53:5;230:18
forecasts (2)
22:11;244:22
foregone (2)
178:21;197:24
Fork (6)
123:16;201:20;232:11,19;233:5,13
form (1)
30:24
former (1)
252:24
formulated (1)
125:24
forward (9)
10:7;88:7;89:1;121:23;130:23;149:19;220:9;243:23;262:17
found (13)
32:15;39:5;48:20;136:15;137:7,13,19;138:11;156:9;166:16;171:4,11;235:14
foundation (1)
146:9
four (8)
88:15;154:4;181:24;183:6;191:15;212:18;229:1,8
four-layer (1)
106:10
Fourth (7)
54:9,13,16;60:13,16,23;145:5
fraction (2)
131:9;178:20
fractions (1)
154:13
frame (8)
15:21;22:9,16,18;92:15;156:16;189:7;192:25
frames (1)
188:17
framework (3)
70:1;71:13;181:17
frameworks (4)
181:23;184:4;185:3,6
free (1)
234:17
frequently (2)
238:1,11
fresh (1)
153:1
frightening (1)
171:21

'

'from (1)
38:25

F

front (6)
21:13;139:1;143:4;145:14;153:24;233:9
frustrating (1)
136:14
FS (1)
83:12
full (7)
56:13;57:2;141:9,11;157:11;198:13;236:3
fully (3)
135:25;163:5;165:6
function (3)
76:9;105:4;114:17
functions (1)
211:23
fundamentally (2)
167:11;173:6
funded (1)
182:23
furnish (1)
115:14
further (31)
15:4;23:9;51:10;80:18;87:15;101:5;110:24;117:2;131:1;132:4;140:3;142:22;149:9,11;158:1,8;184:19;192:20;194:3;206:24;210:22;226:22,23;234:3,12,15;241:18,21;243:18;262:3,4
futile (5)
238:18,25;239:24;240:18;241:13
futile-call (1)
256:4
Future (11)
24:8,10,25;25:6;50:13;51:4;63:5;81:11;248:11;251:25;256:11

G

gage (6)
67:25;230:9;232:20,23;233:3,17
gain (5)
67:22,25;86:3;107:17,21
gains (6)
66:22;75:7,7;107:11;108:4,22
Garrick (1)
9:20
Gary (1)
21:14
gave (4)
26:7;81:1;170:14;248:13
gears (2)
186:12,14
general (10)
97:22;101:19,24;108:8;157:15,19;182:15,15;221:25;261:10
generally (13)
25:8;125:10;126:20;155:14;196:7;208:1;222:4;232:1;235:2;237:19;246:22;247:6;254:14
generate (4)
55:24;156:4;158:6,21
generated (7)
93:14;95:24;156:21;159:9,21,22;210:5
generates (1)
43:8
generating (2)
96:11;191:7
generic (1)
254:13
geographically (1)
85:9
geologic (2)
70:1;105:17
geology (2)
70:11;104:25
gets (1)
67:3
GIS (2)
207:23;208:13
given (18)
18:21;22:10;29:6;50:25;100:5;117:15;122:9;125:25;126:2;127:11;135:24;140:21;155:21;158:18;184:13;202:9;248:1;258:14
gives (2)
67:6;191:10
giving (1)
103:22
goal (6)
115:14;116:16;167:20,25;168:3,4
goals (3)
167:11,23;168:6
goes (10)
19:10;159:5,5;212:10;241:24;242:17;243:1,7;248:22;263:9
good (29)
9:15;10:6;11:3;43:24;44:3;50:17;51:21;52:21;87:24;89:23;112:6;132:11;140:8,9,12;141:7;150:12;160:12;169:23;175:11,14;204:24;205:10;207:7;211:7;221:11;237:5;253:8;258:9
Gooding (1)
124:13
go-round (1)
122:10
gosh (1)
11:9
grab (2)
162:7,12
grain (2)
106:16,24
grains (1)
125:14
grant (1)
34:25
graph (2)
77:19;191:17
gravity (9)
174:9,19,21;175:1,16;189:20;220:23;221:8,13
gray (3)
33:24;83:6,10
Great (5)
9:24;94:10;109:11;234:25;236:7
greater (1)
234:1
greatly (1)
176:7
green (3)
32:22;33:23;83:3
Greg (4)
173:1;180:9;181:16;188:1
Ground (15)
122:22;123:13;150:2,14;152:9;153:5;181:8;194:19;195:13;211:20;213:4;223:17;241:17,23;242:7
groundwater (124)
12:12;16:2;23:6,12,14;24:21;43:12;56:14;57:4;62:12;63:9,24;65:5;66:14;72:3;75:16;76:5;79:14;83:20;85:9,25;87:2,16;88:11,17,19;89:7;91:4;105:18;107:7,8;109:15;110:11,15;119:23;123:3,5,12,13,14,15,16,16,17,25;124:11,15;125:19,21,24;126:14,17,24;128:10;130:6,23;133:3,3,7,8,8,13,16;139:17,21;141:13,15,16;142:14;144:1,2,3;145:18;146:25;147:1,6,8,13,18,23;148:9;151:7;156:7;160:3;172:11;174:23;178:7,10,13,14,16,20;180:21;181:18,23;183:10,13,21,22;184:8;

185:4,17;203:19;204:9;
207:1,9,15,18;209:16,23;
210:25;211:11;213:25;
216:15;222:1,3,9,15,17,20,
23;223:4;224:4;264:9
group (49)
13:23,24;14:2,3;17:13,19;
20:6,9,24;21:21;22:21,25;
24:20;26:8,24;28:5,9,21,22;
29:4,7;32:17;40:9;45:9,25;
46:5,20;47:17;48:3,11,17;
51:20;53:21;54:22;60:10;
63:18;65:16;78:24;87:16;
89:7;92:5,8;93:9;100:10;
139:21;152:24;207:1;
210:25;223:16
groups (3)
12:17;13:20;35:23
grower (1)
223:1
growing (3)
38:3;41:17;195:2
grown (2)
125:11,14
guarantee (1)
141:10
guaranteed (1)
204:16
guess (18)
10:14;40:13;62:15;86:21,
21;111:9;146:20;175:4;
176:14;218:15;221:19;
250:19;252:4;256:15;
257:13;258:1;262:14;264:14
guessing (1)
191:22
guys (2)
9:18;153:15

H

half (1)
88:12
hand (7)
10:15;122:2;149:23;
174:24,25;175:15;228:5
handle (1)
236:24
handled (2)
237:17,21
handles (1)
130:22
hand-modified (1)
199:16
hand-verification (1)
199:23
handwork (1)
200:5
hanging (1)
264:12
happen (1)
256:11
happened (1)
200:1
happening (2)
93:25;128:18
happens (1)
71:1
happy (1)
111:7
harbor (7)
137:9,15,18,21;138:13,16,
20
hard (6)
15:12;74:1;78:9;177:13;
210:11;258:2
hardened (1)
27:6
harm (1)
201:22
harms (2)
203:18,19
Harris (23)
7:5,10;207:3,6;210:22;
227:25;228:15,18;236:8,17;
244:7;248:9,12,17,18,24;
249:5,10;257:5,6;261:1,4;
262:3
Harris's (1)
237:9
hay (1)
200:3
Hazelton (1)
122:20
head (2)
47:8;247:18
head] (1)
144:18
header (1)
103:22
hear (11)
9:8,19,22,23;111:24,24;
132:20;213:2;244:5;249:18;
265:7
heard (10)
26:23;27:18;33:16;49:15;
106:3;119:7;132:17;177:20;
178:8;244:21
HEARING (131)
9:3,7,15,20,22,24;10:3,6,
12,22;13:14,19;16:12,22,24;
23:18,23;24:5,10,15;26:1,5;
47:2;64:5,7,10,12;87:9,11,
15,18,20;89:6,13,16;109:20,
20,22;110:5,24;111:4,8,16,
22;112:2;117:3,7;119:11,13,
15,19;121:2,7,10,15,16,18,
22,25;122:8,11;132:5;
134:14,18,21,24;136:1;
138:5;140:3;144:11;146:8,
11;149:2,5,9,13,18,21;150:6;
158:16;160:21;184:22;
193:11,23;194:2;195:19,21,
24;204:22;206:18,20;207:1;
210:24;212:12;218:5;
226:22,24;227:18,25;
228:13;236:11,14,19;237:1;
242:21;243:3,20;248:16,24;
249:8,11,18;250:24;251:6;
252:14,16,19,22;253:1;
257:5,18;258:2;261:1;262:4,
8,11,16;264:11;265:5,11,15
heartburn (1)
187:19
Heise (15)
52:23;201:24;218:19;
230:9,16,19,20;231:25;
232:17,20,23;233:2,17;
244:8;253:9
held (4)
13:20;28:23;229:7;235:3
Hello (1)
195:19
help (3)
133:10;175:7;193:4
helped (4)
30:24;79:25;133:23;
234:22
helpful (4)
232:5;240:5;264:21;265:1
Henry's (6)
123:16;201:20;232:11,19;
233:5,13
hey (2)
222:1;253:6
Hi (3)
117:13;132:10;244:3
Higgs (10)
85:2;121:11,16;133:22;
138:25;143:3;145:15;
211:21,23;212:25
high (9)
63:5;104:19;144:7,8;
197:22;201:25;203:18;
228:24;234:11
higher (19)
41:12;53:24;57:8;59:18;
62:24,25;82:3;96:25;99:7;
104:21,24;113:20;126:8,18,
20;204:7;234:14;241:19;
259:11
highest (1)
37:24
highlight (1)
83:22
highlighted (3)
82:25;83:1,9
highlighting (4)
56:10,24;60:17;108:15
highlights (1)
60:19
Hill (1)
50:1
hindcast (11)
18:24;19:1,7;55:13;56:15;
57:18;60:4;88:2,2,13,15
hip (2)
175:18,21
hip-shot (2)
203:17,21
hired (3)
159:3;211:10;212:23
historical (8)
50:1;53:17;66:13,16,18,
20,24;147:10
historically (3)
54:24;147:20,21
history (2)
122:9;151:5
hit (1)
221:12
hold (3)
33:5;230:2;242:19
holder (1)
263:19
holders (7)
236:3;245:7;254:21;
259:10,15,16;260:20
homogenous (1)
66:2
honoring (1)
134:9
hope (2)
10:12;262:17
horizontal (2)
66:4;105:24
hosts (1)
202:16
hot (1)
41:16
hour (3)
64:8;111:14;210:9
hours (4)
182:10,10,11;193:24
huge (2)
15:19;83:15
humans (1)
204:8
hydraulic (3)
70:8;105:24,25
hydrogeologic (3)
70:1,18;106:7
hydrogeological (1)
104:1
hydrographer (2)
212:25;223:1
Hydrologic (15)
13:7,9;31:17,18;43:17;
66:4;68:14;71:9;73:3,10;
86:1;159:15;170:2;176:18;
223:14
Hydrological (1)
65:14
hydrologist (4)
151:18;152:11,12;230:5
hydrology (2)
11:20;151:2

I

Idaho (21)
34:25;122:20,22;151:3,11,

14,15,19;155:3;170:14;
175:25;182:12;213:4;
215:25;216:9;228:9;229:17,
20;230:21;232:4;256:24
idea (5)
52:20;80:2;142:22;
221:25;241:24
ideally (1)
174:8
identical (1)
163:3
identification (1)
100:1
identified (28)
14:7,14,16;19:5;28:11;
45:4;46:4;93:22,23;95:4;
100:4,13;101:13;102:25;
152:13;157:6;169:6,12;
176:11;181:21;183:16;
186:13;204:1;225:10,18;
226:17;236:22;249:5
identifies (2)
25:6;222:19
identify (19)
33:15,20;36:20;91:23;
95:14,15;97:18;123:5;
153:23;154:2;157:19;
167:23;179:6;184:2;199:13;
232:16;246:14;248:20;
264:25
identifying (1)
27:6
IDWR (22)
30:19,21;31:13;33:17;
34:21;36:6;152:14,20;155:5;
161:5;165:23;168:20;
177:12;191:2;199:16;
200:14,15;203:23;207:21;
208:8;229:10;231:24
IDWR's (1)
129:24
ignoring (1)
156:14
IGWA (27)
10:5,18;12:3,6,7,16,21;
15:23;61:25;73:14;90:10,14,
20;92:12;122:5,24,25;123:2,
9,22;135:2,7;136:16;139:12,
15;146:19;236:22
IGWA's (6)
12:12;16:14;85:13;123:5;
129:24,24
illustrate (1)
70:20
illustrates (1)
86:24
image (3)
9:9;33:12,22
imagery (6)
27:6;33:15,20;96:3,3;
199:16
images (1)
35:14
immediately (2)
81:13;183:16
impact (15)
57:12;76:13;85:17,18;
88:3;100:24;102:19;108:18;
110:18;128:7,11;129:8;
130:2;197:7;214:19
impacted (1)
184:21
impacting (1)
110:16
impacts (7)
106:16;109:16;110:12;
148:17;163:4,9;214:16
imperfect (1)
197:14
impermeable (6)
70:4,24;71:4,7;105:1;
106:21
implementation (2)
28:24;30:2
implemented (6)
18:25;21:24;28:6;107:13;
206:2;227:10
implementing (1)
20:17
implication (2)
185:10;204:18
implications (5)
158:1;160:1;162:4;181:5;
225:6
importance (1)
183:6
important (19)
42:24;59:16;65:24;67:8,
17;156:23;157:9;170:24;
171:19;172:21;173:5;
175:24;177:2;182:2,13,16;
186:9;191:24;201:23
imposing (1)
126:15
impossible (1)
189:9
imprecision (3)
179:9;183:5;191:25
impression (1)
248:14
improve (14)
22:11;28:3;46:11,21;
47:11;51:4,7;80:4;176:7,14;
177:14;189:12;192:3;199:17
improved (4)
25:10;46:10;48:20;158:14
improvement (3)
17:14;68:20;176:25
improvements (5)
21:25;48:9;81:12;108:3,5
improving (1)
52:10
inadequate (1)
201:14
inappropriate (1)
105:13
incentive (2)
63:1,4
inception (1)
124:4
include (6)
91:6;119:3;160:5;164:9;
208:23;232:11
included (9)
31:9;44:24;45:16;56:23;
57:13,20;62:4;171:8;230:14
includes (8)
18:23,25;27:5;33:18;
49:16;118:18;230:16;253:20
including (6)
52:16;91:7;107:14;119:7;
152:18;255:9
inclusion (3)
186:7,8;208:11
incomplete (2)
68:22;197:14
incorporated (1)
243:15
incorrect (4)
68:21;165:14,16;217:20
increase (5)
54:11;77:25;78:5;79:2;
142:1
increased (1)
99:22
increases (3)
54:23;163:2;220:2
increasing (4)
62:22;77:16;78:10,11
increasingly (1)
62:24
incredibly (1)
178:24
incurred (1)
260:4
indefensible (1)
170:12
independent (3)
177:8;179:19;199:3
Index (1)
48:19
indicate (5)
107:21;165:4,8;191:3;
215:13
indicated (4)
140:11;143:5;183:14;
221:15
indicates (3)
18:1;187:16;191:22
indication (2)
190:23;191:17
individual (9)
33:1,2;38:12;53:2;126:2;
147:5;160:12;222:25;247:13
individually (3)
59:16;137:17;182:24
in-field (1)
81:22
infinite (2)
164:2,4
inflow (1)
66:15
inflows (1)
254:4
influence (2)
76:4;102:15
influenced (2)
49:20;80:1
influencing (1)
102:12
inform (9)
169:8,8;174:6,15,24;
192:10,18;193:4;204:20
information (34)
28:4;29:1;32:7;34:10,11;
35:24;36:18,20;40:8;56:19;
57:19;60:7,9,14,18;94:15,16;
95:9;106:6;115:25;116:2;
148:16;153:2;154:25;155:4,
10;160:8;180:22;183:13;
185:23;197:25;198:4;
243:16;246:18
informative (1)
40:24
informed (2)
205:3;206:8
informing (1)
176:6
inherent (1)
187:2
inherently (2)
67:18;200:18
initial (3)
77:10,11;219:4
initially (4)
82:13;160:2;212:15;
230:13
initiated (1)
133:6
injured (4)
101:9;115:15,19;245:10
injury (3)
116:17,19;235:15
input (10)
49:13;66:14;71:20;74:9,
10;108:11;159:4;165:3;
170:21;171:10
inputs (2)
19:16;74:3
inquire (1)
134:22
inquiry (1)
146:2
ins (1)
159:5
in-season (32)
17:15,20;18:7,16,17,23;
19:1,4;20:4,7,12,21;21:7;
22:1;23:2;30:8,12;31:10;
36:14,19,23;57:21,24;58:9;
86:16;113:14;114:10;
116:14;133:12;168:1;172:3;

256:9
inside (1)
253:1
insights (1)
158:21
insist (1)
179:1
inspection (1)
157:11
instance (3)
169:22;178:3;208:5
instead (6)
41:5;57:25;105:9;232:17;
234:7,20
Institute (3)
11:18,20;155:4
instituted (1)
196:16
instruments (3)
188:16;192:24;193:1
insufficient (2)
23:14;54:25
intended (1)
131:22
intent (2)
131:24;168:24
interaction (1)
159:7
interactions (2)
107:4,10
interacts (1)
107:7
interconnected (1)
71:9
interest (2)
180:14;208:12
interesting (1)
86:22
interfingering (2)
70:21;104:25
interlayered (1)
70:21
interpreted (1)
147:17
interrupt (3)
15:13;249:20;251:7
interrupting (1)
195:21
interruption (1)
195:25
intervening (1)
94:7
intimately (1)
199:2
into (59)
27:25;28:10;33:18;42:19;
44:5,7;46:8;53:1;61:12;
62:14;78:9;85:8;87:12;
91:16,24;95:21;100:23;
102:9;109:1;113:23;114:25;
125:24;129:19;131:6;
133:23;149:6;157:12,21;
162:6;179:12,23;183:21;
191:11;199:21;204:7;
206:21;214:24;234:12,20;
236:10,15;240:15;241:17,22,
23;242:7,17;243:1,7,15;
251:20;252:15,17;253:10;
254:4,10;256:11;262:17;
264:19
introducing (1)
74:6
introduction (1)
48:19
intuitively (1)
204:8
investigation (4)
70:19;81:19,22;195:9
investment (1)
189:21
invited (1)
152:22
involved (5)
101:19;123:2;159:20;
183:20;199:2
involvement (1)
158:23
involving (2)
137:23,25
irrigate (2)
175:20;209:14
irrigated (115)
15:5;16:8,10;17:16,18,24;
18:9,10,18;19:3,11;20:11,18;
21:5;25:7,9,12;26:17,24;
27:5,20;28:8,17;29:1,3,21,
23,25;30:15,17,19,21;31:3,3,
5,14,21,25;32:4,8,15,18,21;
33:13,17,18,23;36:2,5,8,21,
21;58:10;64:18,20;79:2;
93:8,13,16,23;94:12,14,19;
95:3,7,16,18,21,24;96:6,9,10,
11,12;114:3,9;117:21;118:4,
8,13,19,23,25;119:2,4,5;
125:5,8,8;151:6;172:11;
178:4;181:8;194:13;195:5;
198:17,20,21;199:5,7;200:8,
9;209:6,10;247:21,24;248:1,
4,5,15;250:8,11;251:18,19,
24
irrigating (2)
64:21;250:14
irrigation (46)
23:2;27:19;28:12;37:11,
17,19,22;38:5;44:15;49:21;
51:25;53:13;89:24;91:19,21,
25;93:2;95:21;100:15;112:7;
123:9,21;127:6,7;163:7;
181:2,6;182:5;185:11,20;
194:18;195:1;196:12,17;
199:14;210:19;211:8;
222:24;226:8;229:16;
234:22;239:19;241:20;
244:4;253:23;254:1
irrigators (2)
124:15;138:21
isolation (1)
195:3
isolations (1)
194:25
isotropic (1)
66:2
issue (16)
16:8;22:14;51:16;63:8;
69:15;81:15;96:19;99:16;
102:12;106:12;179:14;
184:14;186:15;199:25;
204:6;244:13
issued (6)
127:22;128:15,25;129:2;
230:7;231:23
issues (17)
17:13,14;45:25;46:4;
71:13;90:6;92:20;108:16;
136:7;151:5;154:5,24;
176:11;186:13;204:4;
211:15;262:22
item (1)
64:17
items (1)
205:11
IWRRI (9)
158:24;159:1,2,25;182:12;
195:4;198:22;207:21;214:4

J

Jackson (4)
140:19;235:11,22;236:1
January (9)
45:24;73:4,9,23;76:24;
81:1;211:12,17;244:20
Jaxon (6)
85:2;121:11;133:22;
138:25;143:3;145:15
Jay (2)
132:18;194:8
Jefferson (2)
86:6;123:15
Jennifer (3)
43:6;55:23;115:24
Jennifer's (1)
83:1
Jerome (1)
124:13
job (4)
182:12;204:25;217:22;
244:23
John (2)
89:23;140:8
JOHNS (28)
149:16,20;150:8,11,13;
153:17,21,23;162:10,12,17;
185:18;190:19;191:6;
193:19;194:3,4,7;196:2,3;
206:16,23;212:9;215:18;
222:18;227:1,4,17
join (1)
9:12
joined (1)
123:4
joint (5)
52:22;230:6;233:12,16;
244:7
joke (1)
253:1
judgment (1)
241:6
July (4)
44:17;52:3,5;58:19
June (1)
9:4
junior (21)
41:24;43:14;55:5;56:14;
57:4;65:5;75:17;88:11,17,
19;109:15;110:11,15;
116:17;126:8;130:25;131:2;
234:6;240:1,2;256:21
juniors (2)
37:8;57:10
jurisdiction (1)
238:21
justifiable (1)
162:2
justifications (4)
161:3,5,21,25
justify (2)
154:7;174:25
justifying (1)
157:2

K

keep (4)
63:4;237:14;243:10;
246:17
Kent (5)
111:7;112:6;132:12;
253:6;257:10
Kilgore (1)
189:6
Kimberly (1)
50:1
kind (44)
15:4,12;27:10;32:22;
35:15;42:2,9,11;48:1,12;
49:25;52:1,24;57:5;69:14;
70:22,24;71:13;72:12;74:10;
80:3;81:15,24;84:19,20;
86:13;101:2;104:23;105:7;
106:5;108:8;141:25;154:4;
168:5;174:14,15;175:22;
177:17;180:11;183:17;
195:25;212:10;246:17;
249:19
Kindred (1)
190:11
kinds (1)
176:2
King (1)
50:1
KLAHN (3)

9:12;265:3,9
knew (1)
128:7
knowledge (12)
23:8;156:2;160:8;161:17;
172:13;198:19;206:8;212:1;
213:5;227:6,13,15
known (5)
108:17;160:14,15;189:23;
203:7

L

labeled (4)
18:5;30:3;32:12;60:15
labeling (2)
18:6;29:20
laid (3)
38:22;62:21;70:11
Lake (3)
140:19;151:13;235:23
land (7)
29:23;33:4;67:13;78:1;
94:19;199:13;241:20
landfill (1)
151:25
Lands (36)
29:21,25;30:21;31:3,3,14,
25;32:4,8,15,18,21;33:17;
36:2;58:10;63:15,20;77:24;
80:10;93:13,17;94:12,14;
95:3,16,18,22,24;96:12;
118:23,25;195:5;198:20,21;
199:5;200:8
Landsat (5)
33:12;36:6;118:4,8,18
language (2)
97:23,25
lapsed (1)
44:2
large (7)
27:19;140:15;178:24;
197:13;209:2;213:7;247:11
larger (3)
128:22;174:22;179:10
largest (3)
79:9,10,13
last (39)
16:17;18:4,15,15;22:7;
23:21;24:1;26:16;30:6,10;
33:21;56:18;63:8;64:2;87:5;
98:18;118:17;120:12;
141:16,18,20;142:5;143:1,2;
144:17;148:21;156:11,15,
22;184:25;234:24;242:10;
249:16,17;251:22;253:23;
259:6,12;262:7
late (5)
53:21;95:25;111:10;
211:16;259:7
later (7)
9:12;44:8;96:7,8;151:11;
239:12,13
Law (1)
188:7
lax (3)
98:6,7;99:1
lay (3)
27:10;69:25;177:21
layer (2)
65:25;106:2
layered (1)
202:10
layering (1)
189:16
layers (10)
70:3,4,24;71:5,7;105:14,
25;106:4,20,25
laying (1)
45:6
lays (2)
22:23;85:5
lead (2)
70:13;159:25
leading (3)
84:1,4;102:17
leads (1)
55:5
lease (1)
238:14
leased (1)
238:2
leases (3)
237:16;255:15,18
least (14)
34:4,9;52:21;88:19,24,25;
120:19;160:9;162:15;175:2;
185:15;205:24;211:18;258:4
led (2)
185:7;200:5
left (8)
19:19;35:13;73:1;77:10;
82:19;129:23;198:22;200:22
legal (4)
109:25;134:19;214:19;
251:2
legend (1)
165:25
lengthy (1)
170:16
less (27)
30:17;31:4;56:25;57:2;
59:7;64:21;72:11;80:11;
88:16;100:6;105:24;109:13;
128:11;131:10;139:14;
171:15,16,16;178:15;186:3,
5;189:2;201:13;222:3;
250:14;254:1;263:24
level (14)
37:7;62:14;66:22;94:9;
108:13;142:24;173:13,20;
200:5;203:14,16,16,24;204:3
levels (9)
52:1;54:25;66:21;73:20;
75:6;107:8;141:16;204:6,8
lies (1)
208:10
lieu (1)
187:12
lighter (1)
70:25
liked (8)
15:5,10,16;24:25;157:20,
22;158:7;215:7
likely (5)
51:6,10;74:8,11;242:9
limitation (7)
92:19,19,25;189:4,5;
260:8;264:6
limitations (2)
68:17;263:21
limited (5)
22:9,15;92:20;193:5;247:9
limits (5)
125:20;126:15,18,22;
180:2
line (17)
70:23;75:18,20;77:13,14;
109:4,7,8,15;110:3,9,20;
146:2;163:14;165:23;
176:19;259:1
linear (1)
52:14
lines (5)
75:12;77:20;96:8;111:1;
208:18
links (2)
36:13;231:4
lipstick (1)
176:21
list (7)
32:6;46:19;121:11;
149:14;212:18;250:2;264:18
listed (6)
247:3;248:8;250:15;
251:21;252:7;257:13
listened (1)
160:21
listening (1)
195:20
listing (3)
209:3;248:11;251:25
lists (1)
247:25
litigation (1)
12:8
little (20)
11:25;17:4;43:20;61:9;
65:21;66:7;78:16;84:7,8;
115:2;125:7;134:7;139:4;
141:21,22;151:9;153:16;
166:1;199:11;247:8
lived (1)
200:1
livelihood (1)
175:19
Liz (3)
21:14;22:6;25:20
local (1)
52:2
localized (1)
108:5
located (5)
124:12,13;157:7;225:1;
230:20
location (5)
116:20;121:12;163:4;
191:21;226:13
locations (2)
172:9;261:21
lodge (1)
248:12
logged (1)
9:10
logical (2)
154:15;158:4
logically (1)
50:6
logistical (1)
16:21
long (18)
11:22;12:1;27:16;38:4;
41:16;122:9;123:2;124:2,9;
127:19;153:25;172:12;
210:10;219:13;221:24;
229:7;241:10;257:25
longer (3)
39:17;57:22;163:10
long-term (4)
167:16,19;172:7,12
look (53)
16:9;21:11;37:22,24;38:1,
2,4;42:14,14;43:23;44:13,
20;45:18;47:22;49:19,25;
54:12,15;55:10;56:15;68:13;
69:20;77:9;80:4,17;86:5,22;
92:16;94:3;104:10,17;114:7,
7;118:22;123:7;130:5,8;
131:1;154:6,25;155:7;
174:10;176:15;179:12;
187:25;218:18;219:22;
231:12;239:3;244:8,24;
246:10;264:22
looked (17)
34:12;44:5;46:10;48:7;
61:10;63:17,19;81:18,22;
155:2,4,6,8;170:22,24;
182:23;217:16
looking (49)
12:12;16:2;17:16;22:5,25;
23:5,21;24:3;26:2,13,15;
28:16,24;40:5,17;41:2;43:7;
46:25;47:12;61:3;72:16;
73:12;75:16;77:6,7,22,23;
79:20;82:18;83:18,20;88:14;
92:11;96:22;98:4;102:21;
116:13;119:20;136:6;143:3;
165:18;180:16;190:4;
191:14;195:14;216:20;
218:2;226:6;232:18
looks (5)
19:18;32:9;62:1;120:1;

214:16
loss (1)
185:17
Lost (4)
13:10;47:3;236:1;256:23
lot (18)
12:8,11;24:16;43:25;
63:14;69:16;73:14;86:25;
105:20;112:11;125:2,4;
128:6;195:4,7;222:3;236:5;
242:2
loudly (1)
109:23
low (6)
44:15;45:12;86:8;106:16;
202:3;203:17
lower (16)
61:15;82:22;102:1,5,7;
105:2;126:18,21;130:20;
173:25;233:22,25;239:4,25;
240:11;248:20
lowest (1)
86:14
lunch (5)
111:9,10,13,17;117:13
Lyle (1)
246:16
Lynker (3)
11:13,22,23
Lynn (13)
121:20;122:4,16,19,21;
123:10;127:24;129:12,14,
20;140:8;144:15;149:8

M

Madison (1)
123:17
Magic (3)
86:6;123:13;151:13
magnitude (2)
163:4;179:20
main (13)
48:1;70:5;71:3;74:3;75:4;
86:18;112:25;229:21;
239:17,21;240:18,20;242:2
mainly (1)
80:14
maintain (1)
148:11
maintained (1)
230:25
major (3)
70:10;128:8;230:23
majority (1)
217:4
makes (5)
31:7;36:15;118:10;186:4;
200:6
making (6)
38:3;84:24;109:6;151:16;
195:8;197:3
manage (3)
133:3,5,9
managed (1)
102:1
management (14)
16:2;90:6;130:23;151:1;
168:23,25;177:22;215:15,18,
22;216:1,2,3;257:1
manager (3)
229:5,9;230:4
managers (3)
98:8,23;99:2
manner (2)
48:10;153:20
many (15)
60:12;99:23;125:5;
127:11;132:13;152:16;
159:23;176:16;179:4;
206:14;226:11;253:15;
254:16;261:23;263:4
map (10)
32:7;208:9;231:12,14;
232:1,12,18;233:4,9;236:12
mapped (1)
35:3
maps (1)
208:4
March (4)
21:15;26:14;92:17;93:1
margin (1)
103:16
mark (1)
246:5
marked (11)
87:11;149:6;154:19;
206:19,20;227:24;231:14;
236:12,14;246:7;252:16
Maryland (1)
229:1
mask (1)
33:14
massive (1)
54:23
master (1)
229:3
master's (2)
11:19;151:2
match (10)
23:16;66:17;67:22;69:4,6,
8;77:5,16;188:17;192:25
matches (1)
68:12
matching (1)
170:17
material (3)
32:16;164:21;235:14
math (1)
178:8
mathematical (1)
203:5
Matt (11)
21:14;31:7;50:10;51:2;
60:18;63:17;119:7;172:25;
197:1,3;198:16
matter (14)
12:9,11;13:17,24;16:21;
69:4;102:21;150:15;152:8,
24;153:22;155:6;189:6;
261:10
matters (6)
9:16;15:14,23;152:19;
157:20;189:20
maximize (1)
177:23
maximum (7)
177:25;248:4;250:2,7,14;
251:17;255:7
May (42)
11:3;44:2;64:23;89:18;
111:12,18;115:11;120:3;
122:8;130:17;146:12;
158:20;163:14;164:11;
169:16,21;177:5,9;188:1,22;
193:13;194:5;196:1;199:13;
204:4,25;206:13;207:19;
209:14;217:20;221:21;
225:11;227:25;243:12;
244:16,18,24;247:25;248:1;
250:7,13;251:22
Maybe (21)
9:10;31:17;34:8;51:25;
53:18;56:22;59:15;62:6,19;
79:11;99:9;106:3;120:15;
171:2;209:12;211:16,16;
223:24;249:6;264:17,18
May-through-September (1)
85:17
McCain (1)
258:10
McHugh (14)
7:9;9:11;87:17,18,19,23;
89:4;249:14;257:8,22;258:8,
9;260:24;262:13
mean (24)
30:25;51:7;60:2;64:25;
72:23;75:23;84:5,22;88:21;
92:18;100:14;105:11;
107:12;110:19;114:2;
142:20;146:2;177:18;
180:10;189:21;203:22;
216:1;221:23;238:15
meaning (1)
88:22
meaningful (3)
10:13;176:8,25
meanings (1)
214:20
means (10)
19:7;53:9;56:12;66:3;
140:25;144:22;171:13,16;
173:11;176:5
meant (5)
37:4,9;180:6;187:14;222:5
measure (5)
59:4;140:17;172:18;
203:22;231:7
measured (3)
35:2;223:22;230:25
measurement (5)
67:25;102:23;152:1;
183:12;222:20
measures (1)
229:12
measuring (2)
151:12;231:9
median (2)
232:2;234:14
medium (1)
172:12
meet (7)
62:24;97:15;131:7;
133:10;171:9,10;238:3
meeting (10)
9:13;25:2;38:15;45:9;
46:5;81:10;131:16,18;
136:24;174:11
meetings (8)
13:22;21:21;24:9,11;25:1;
28:23,23;223:22
meets (2)
45:17;65:9
melting (1)
254:7
member (7)
13:6;88:24;123:22,24;
124:2;151:8;223:20
members (32)
25:10;26:8;39:9;94:22;
99:19,23;100:19;102:20;
112:12;123:6,9;124:18;
125:6;126:15;129:1;133:6;
136:15,25;142:15,20;
148:14;170:8,8;233:21;
235:3,5;238:10;254:13,16;
255:4,18;260:5
memo (2)
21:9;22:6
memos (1)
92:17
mentioned (17)
12:25;13:4;16:8;18:12;
19:13;50:22;51:13;52:19;
56:10;73:13;77:3;90:12;
129:20;132:16;134:8;
240:17;254:12
Merriam-Webster's (2)
162:22;164:23
mess (1)
201:3
met (2)
39:18;203:24
meter (1)
223:1
method (12)
31:21;35:1;43:2;80:21;
81:25;82:3,8;83:7;96:14;
196:15;198:25;203:17
methodologies (1)
97:3
Methodology (91)

13:15;14:23;15:17,20;
17:24;21:24;22:13;23:3;
30:7,9;31:8;36:2,12;38:9,20,
22;39:5,25;40:3,25;42:20,
23;43:3;45:8,15;53:14,19;
54:13,16;55:4;58:2;60:12,
16,17;61:8;63:4,21,24;72:2;
84:25;95:5;96:21;97:18;
100:1,13;101:7,8;112:14,19,
21;116:16;127:22,25;
137:24;145:2,5;154:18;
158:15;161:7;162:8,18;
165:13;166:10,14;167:7,17,
22;168:8;172:13;180:14;
181:1;185:12;186:2,5,21;
187:11,23;188:5;195:6;
197:9;198:2,24;199:8;
200:10,14;202:24;203:23;
207:10,14;227:11;242:12
methods (14)
22:11;23:7;52:17;80:2,8;
156:23;182:15;183:3,5,25;
184:4;187:18;200:17;203:5
METRIC (28)
28:25;30:3,4,22;34:21;
35:8,11,13,15,16;36:18;
58:12;74:6;78:19,22,24;
79:4,12;81:16,20,21,23,25;
82:7,14;83:5;93:17;172:17
Mexico (3)
11:18,20;121:13
Mickelsen (1)
123:1
microphone (1)
243:4
Microphones (3)
9:7;10:8;16:25
Mics (1)
64:12
mid- (1)
172:7
mid-2000s (1)
123:3
middle (1)
130:8
midseason (1)
239:15
mid-season (1)
22:8
midsection (1)
130:2
midsummer (1)
95:25
midsummer/end (1)
239:7
might (6)
44:8;71:14;96:8;158:21;
260:15;262:19
million-dollar (1)
221:2
Milner (6)
102:9;218:11;229:21;
232:10;261:25;264:1
mind (5)
103:22;146:2;186:4;
193:17;261:16
mine (3)
61:17;92:17;257:20
Minidoka (33)
19:22;50:3,21;56:7;67:23;
68:15,23;69:13;70:6,14;
71:3;72:5;84:25;85:11;86:3,
17;91:8,17,24;104:2;106:18;
107:10,17;108:22;112:7;
119:24;171:2,15;173:16;
190:24;217:1,17;218:22
minimal (1)
41:17
minimum (6)
36:6;172:14;173:20;
174:16;202:24;210:13
Mining (2)
11:19,20
minor (2)
120:13;262:12
minus (2)
53:15;59:1
minute (2)
184:11;227:23
minute-by-minute (1)
223:8
minutes (2)
64:7;111:2
mischaracterize (1)
161:10
mischaracterized (1)
178:3
misheard (1)
260:15
miss (1)
204:11
missed (5)
33:6;78:16;116:9;158:19;
242:22
missing (3)
113:18;197:18;204:15
misspoke (2)
64:23;166:20
misstates (1)
146:9
mistake (1)
58:23
mistaken (1)
249:6
mistakes (1)
157:6
misunderstood (1)
222:6
misuse (1)
169:5
misused (1)
169:6
mitigate (4)
110:17;131:4;139:13,14
mitigating (2)
109:16;110:12
mitigation (35)
12:11,13,15;134:10;137:7,
8,12,14,20,25;138:1,12,13;
139:19;145:17;156:20;
166:18;167:3,5;187:12;
188:10;201:16;226:3,9;
245:11,20;258:17,19;
259:21;260:1,8,9,18;264:7,9
mixed (2)
63:15,20
model (224)
13:9;31:19,24,24;32:1;
34:15,23;35:5,8,12;43:3;
46:9,11;48:17;49:8,10,16;
50:9;52:4,25;55:24;56:3,4;
59:3;63:14,15,20,24;64:16;
65:5,7,11,12,18,20,21,25;
66:1,1,9,12,12,14,15,18;67:1,
10,16,19,20;68:5,8,9,10,11,
18,22;69:4,5,5,15,21,25;
70:2,7,8;71:13,18;72:9,10,
13,23;73:2,11,15,16,18,25;
74:2,4,9,19,22;75:14,25;
76:10,12,18,20;77:18,25;
78:4,10;79:13,17,22;81:3,5,
5,7,13;82:17,20;83:12,19,24,
25;84:2,12,23;85:6;86:25;
90:18,22;91:10,14,14,22,25;
96:14;105:9,10,13,18,20;
106:10;107:14,22;108:8,10,
14,25;110:20;115:5,12,12,
16,17,18;117:14;118:5;
128:2;130:16;148:6;156:2,4;
158:7,10;159:4,10,10,12,18;
160:2,2,16;163:2;164:4,5;
170:1,4,11,17,19,23,25;
171:9,10,13,19;173:5,8;
174:17;176:2,3,20,24;177:2,
4;179:14,17;180:2;189:1,3,
15,18;191:21,23;192:11,21;
202:10,12,13,16,20;205:20,
24,25;206:3;213:25;214:3,
13;215:3,5,14;216:6,10,14,
18,21;218:12;219:11,25;
220:16,19;223:22;224:16,
18;225:11,14;226:7;227:6,
10;243:14
modeled (2)
165:4;171:11
modeler (2)
67:3,6
modeler's (1)
106:11
modeling (57)
12:8,12,14,15;13:4,7,10;
15:6;31:18;65:14;73:3,10;
90:14;94:6;106:13;143:17;
154:8,16,17;155:6;156:1,16;
158:1,24;159:16,20;160:6,
10,15;162:4;166:4;170:2;
172:23;174:3;176:18;
179:19,19;181:25;187:3;
188:14,15;189:22,24;190:7,
10;191:1;196:14;198:11;
199:1;204:9;219:9;223:12,
15,19;224:4;225:24;226:1
models (30)
15:7;46:13,22,24;47:11,
18,21,24;48:9,20,22;50:18,
25;52:5,10,14;53:4;59:2,11;
67:18;74:16;104:22;105:20;
151:20;154:10,11;191:10,
12;192:14;206:1
models' (1)
190:23
model's (1)
191:18
MODFLOW (5)
106:15,19,23,23;107:13
modification (1)
99:17
modified (1)
143:13
moisture (1)
230:17
moment (7)
16:21;47:2,3;89:11;117:6;
146:18;248:16
moments (1)
110:8
monitor (3)
50:12;132:25;133:12
monthly (4)
173:14;223:10;244:13,19
months (5)
23:5;191:15,16;234:24;
262:20
moratorium (1)
144:4
more (64)
15:10,14,15;28:8;39:8;
45:19,21;50:20;51:10,24;
52:12,13;54:2;58:14;60:12;
63:6,6;72:11;78:9;82:6;
88:12,18;97:2,4,5,7;100:5,6;
108:3;126:7,8;129:25;
139:12;147:19,21;156:20;
158:18,18,18;164:10;
167:19;170:15,15,16;171:6;
172:6;176:5,6;184:13,14;
186:7,8;200:13;204:7;221:5;
222:1,1,20;224:3;233:18;
234:6,20,25;264:11
morning (8)
9:17;11:3;87:24;89:23;
90:1,5;264:15;265:13
most (34)
32:4,23;33:2;36:6,15,16;
46:8;55:6;56:7;58:10;61:3;
88:9;94:8;102:4,8;118:3;
144:2,5,5;156:23;157:9;
168:22;182:2;190:22;
191:13;192:13;196:16;
209:2;216:14;255:4,6,17,17;
264:3
mostly (2)

60:25;231:22
motion (1)
231:18
motorcycle (1)
221:1
Mountain (4)
152:7,8;190:11;231:13
mountains (1)
145:1
move (25)
13:11;20:1;25:19;36:22;
39:13;46:2;53:7;55:2;64:15;
71:6,25;72:22;80:23;82:24;
84:17;85:16;87:7;89:11;
148:25;161:12;162:6;
180:11;206:16;236:9;252:13
moved (2)
106:22;220:9
moves (3)
66:5;76:6;241:21
Moving (9)
47:17;58:17;65:3;75:8;
80:18;86:10;161:4,5;206:11
much (36)
15:9;40:20;41:15;45:19;
52:3;78:8;79:25;82:3;88:10;
94:3;103:16;114:6;115:6;
125:16,21;127:7,15;130:20;
144:25;145:9;147:5;173:7;
174:22;176:21;178:15;
181:13,20;184:17;189:6;
191:10;192:19;193:12;
194:15;235:8;244:10;262:6
Mud (1)
151:13
multilayer (3)
105:10,17;202:12
multiple (8)
70:3;105:14,25;106:4,19;
199:19,19;203:2
multiplier (4)
156:13;179:8;181:7;
197:19
municipalities (1)
124:25
must (1)
222:6
mute (1)
195:23
muted (1)
195:20

N

name (8)
11:7,9;89:23;112:6;
122:17;150:13,16;228:19
name's (1)
111:23
narrow (2)
170:13;179:2
narrows (1)
240:10
natural (16)
37:25;52:10;77:12,17;
229:12;234:1,4,8,17,21;
237:14;239:8;248:19;
253:10,20;261:22
nature (4)
70:21;167:12,15;211:24
nauseam (1)
186:16
near (44)
28:25;30:2,4;50:3,21;56:6;
58:12;67:23;68:14;70:6,13;
71:2;72:4;75:19;76:13;
84:24;85:11;86:3,17;91:7;
104:1;105:5;106:17;107:9,
16;108:22;119:24;171:1,2,
12;172:9;173:15;190:24;
199:25;216:25;217:3,19;
218:15,20,21,25;220:11;
224:25;230:20
nearing (1)
193:19
necessarily (8)
51:23;93:24;131:25;
141:8;248:5;250:8,13;
251:18
necessary (2)
131:7;174:25
need (46)
9:16;10:14;27:22,23,25;
41:11;44:3;47:3;54:23;55:9;
60:1;91:15,23;97:15;100:17;
101:10;109:22;112:23;
113:4,5,7;114:17,22;115:7;
117:19;140:25;157:6;
168:13;169:12;176:23;
177:23,24;178:6;179:6,11;
181:9;182:8;203:12,13;
217:25;228:2;234:4;242:24;
243:4;245:15,16
needed (11)
39:16;44:11;46:10;
170:18;176:9;178:18;
181:15;194:24;201:17;
226:16;254:23
needing (1)
221:18
needless (1)
185:16
needs (9)
41:23;53:11;54:17,23;
101:6;174:21;189:20;
201:15;247:12
Neeley (17)
75:19;76:13;91:16;105:5;
171:1,12,15;216:25;217:1,4,
17,19;218:16,21,22,25;
220:11
neglecting (3)
185:10;197:7;201:19
negotiate (1)
148:9
neighbor (1)
200:2
neither (6)
167:9;170:4;217:19;
218:24;219:1;226:11
net (1)
50:20
New (18)
11:18,20;43:2;47:22,23;
48:15;60:1;72:10,10;73:17;
76:17;83:6;96:20;148:6;
190:10;191:21;258:1;259:22
Newdale (1)
240:15
next (40)
9:25;20:1;29:24;32:4;
34:16,20;39:14;40:4;46:2;
51:8;53:12,13;57:12;58:17;
59:24;72:14;74:14;75:1,8;
81:12;82:24;84:11,17;85:20,
22;86:11,22;97:15;100:15;
121:10,18,21;149:17;
155:25;156:6,12;171:22;
190:5;236:5;262:19
Nez (4)
237:23;238:3;245:3;
255:23
nine (1)
123:8
nods (1)
144:18
none (4)
23:8;138:20;236:14;
263:13
nonirrigated (21)
28:10;31:8,12;33:13,19,
24;36:3,4;57:12;58:6;67:13;
77:24;78:1;80:10;83:17;
95:6,14,15;118:15,19;200:4
Non-irrigated (1)
29:20
nonirrigation (1)
124:21
nonirrigator (1)
124:18
nontarget (1)
186:23
nor (4)
204:2;217:19;218:25;
219:1
North (22)
54:15;62:3;86:6;123:12,
25;124:11;126:18;127:6,14;
130:5,6,22;134:15;139:6;
140:21;141:14;142:13,20;
143:11,16;144:1;261:24
note (4)
40:13;61:19;68:19;180:15
notes (2)
41:2;63:17
notice (1)
195:18
noticed (3)
120:11,16;202:22
November (4)
57:13,20,22;211:16
NRCS (2)
231:1,23
NRT (1)
30:22
nuances (1)
262:13
number (49)
12:17;15:1,19;16:16;
17:13;19:20;21:5;25:23;
36:11;64:22;79:22;86:12;
92:20;93:23;94:21;101:25;
112:11,14,18,20;113:11,20;
133:1;144:22;161:16,17;
162:16;177:9;178:24;
182:17;185:16;187:3,3;
195:20;196:19;209:1;220:5;
225:17;247:25;248:3,4,5;
250:1,2,8,9;251:17,18,23
numbered (1)
155:20
numbers (8)
20:18;45:7;117:23;119:3;
143:10;242:18;243:2,8
nutshell (3)
160:14;182:9,10

O

Object (2)
109:18;145:25
objecting (1)
146:6
objection (27)
87:9,11;109:18,20,21;
134:12,19,23;137:22,23;
146:5;149:2,3;206:18,20;
212:9,10;236:11,13;248:9,
12;250:23,25;251:1,8;
252:14,16
objective (2)
52:13;203:13
obligation (10)
65:9;110:17,22;131:7;
139:22;143:17,20;145:24;
156:18;259:14
obligations (4)
131:14;132:1;133:10;
145:17
observation (4)
67:21,24;69:6;77:16
observations (3)
66:18,20,25
observe (3)
253:22,23;254:3
observed (9)
49:18;77:5;122:1;141:15;
171:14;173:7,10;218:12;
233:20
obtainable (2)
186:9,10
obtained (1)

229:2
obvious (1)
187:3
obviously (1)
140:25
occasionally (1)
55:7
occupation (3)
152:10,11;229:4
occur (6)
61:4;62:7,15;183:14,18;
195:17
occurred (4)
23:5;61:13;62:3;98:13
occurring (5)
102:1,2,7;204:11;210:19
occurs (3)
61:2;62:15;134:4
off (16)
15:25;16:20;35:22;55:12;
59:11;89:10,13;117:7;141:4;
195:22;227:22;239:13,22;
240:2;241:2,7
offer (2)
264:23;265:7
office (3)
210:8;237:17;242:15
OFFICER (115)
9:3,7,15,20,22,24;10:3,6,
12,22;16:12,22,24;23:18,23;
24:5,10,15;26:1,5;47:2;64:5,
7,10,12;87:9,15,18,20;89:6,
13,16;109:20,22;110:5,24;
111:4,8,16,22;112:2;117:3,7;
119:11,13,15,19;121:2,7,10,
15,18,22,25;122:8,11;132:5;
134:14,18,21,24;136:1;
138:5;140:3;144:11;146:8,
11;149:2,5,9,13,18,21;150:6;
193:23;194:2;195:19,24;
206:18;207:1;210:24;
212:12;218:5;226:22,24;
227:18,25;228:13;236:11,
19;237:1;242:21;243:20;
248:16,24;249:8,11,18;
250:24;251:6;252:14,19,22;
253:1;257:5,18;258:2;261:1;
262:4,8,11,16;264:11;265:5,
11
often (4)
35:7;54:2;109:10;213:2
old (3)
155:2;190:8;191:23
OLENICHAK (5)
7:4;228:1,8,21;262:22
O-l-e-n-i-c-h-a-k (1)
228:22
Olenichak's (1)
249:17
omission (4)
186:4;197:20,25;202:1
omit (1)
209:2
omitted (2)
197:11,12
omitting (2)
52:17;197:21
Once (3)
188:8;240:18;241:24
one (78)
9:13;10:7;17:13;24:2;
25:1;26:14;28:22;40:13;
42:13;44:18;46:6;47:25;
51:7,18;58:5;59:5,9;63:8;
64:2,17;68:7;72:4,20;74:3,4;
75:4;76:11;79:9,13,24;
88:24;89:24;98:1;103:6,18;
112:10,17;117:24;118:23;
119:15;120:22;123:8;
129:12;138:18;146:24;
156:12,18,18,22;157:9;
159:23;161:16;170:1,21;
171:6,21;172:21,24;174:24;
179:3;182:1,2;187:3;191:13;
198:11;203:4;205:15,23;
207:8;212:8;219:22;225:6;
231:22,24;236:24;237:9;
242:10;247:20
one-month (2)
205:19;206:3
onerous (1)
182:25
ones (7)
46:23;47:10;155:7;
184:10;200:23;209:2;214:9
one-year (1)
139:5
ongoing (3)
101:20;165:24;177:11
online (1)
10:9
only (52)
18:1,20;19:10;28:6;36:3,4;
37:18,19;44:16;54:10;55:7;
57:1;58:3,4;60:23;61:13,22;
88:15;91:20;92:1;115:6,12,
19;119:4;134:3;163:1;
164:22;165:3;168:9;177:6,
22;178:20;179:20;181:3;
184:10;188:12;193:5;
196:20;197:19;200:11;
204:15;220:19;230:14;
233:16;234:22;242:16,25;
243:6;244:22;253:13,17;
256:9
on-the-ground (1)
79:21
open (6)
81:20;82:1,4;213:7;
247:11;262:13
opened (1)
138:6
opens (1)
257:25
operation (2)
202:14;210:7
operations (8)
44:2;98:7,8;99:2,7,9;
132:17;133:10
operators (1)
125:3
opinion (26)
62:6;91:13;95:1;103:18;
105:8;115:2;116:24,25;
158:6;165:12;167:6;168:5,
15;185:20,22;187:21;
188:20,21;198:7;200:8;
213:8;215:20;220:19,22;
222:19;226:1
opinions (3)
154:10;155:19;199:6
opportunity (7)
26:8;98:16,20,23;158:19;
221:2;265:6
opposed (2)
97:5,19
opposes (1)
23:3
opt (4)
245:7,18;260:17,19
option (1)
260:19
oral (1)
265:8
orange (2)
77:14,21
Order (99)
13:16,16;14:23,23;15:6,
17,18;17:11,24;18:24;19:8,
9;28:20;30:7,9;38:22;39:5,
14;40:25;45:8,16;54:13,16;
55:5;58:2;60:12,16,17;
63:21,25;65:8;72:2;85:8;
88:23;96:21;97:18;101:7,9,
15;127:22,25;128:15,24;
131:4,8;134:10;136:12;
137:20,24,24;141:1;142:9;
143:9;145:2,5;154:19,20;
155:21;156:8;158:15;161:7;
162:8,18;166:10,11,15,24;
167:8,17,22;168:8,9;172:14;
177:22;180:14;181:1;
185:12;186:2,5,21;187:11,
15,17,23;188:5;192:25;
198:2;200:10;202:24;
203:24;207:10,14;225:8,10;
226:17;227:11;235:13;
242:12;263:18
orders (8)
38:20;42:4;44:20;45:22;
96:24;101:5;155:6;265:4
organization (1)
122:25
organized (1)
89:12
original (2)
158:9;168:18
originally (2)
31:16;168:20
others (6)
22:1;126:19;155:5;158:8;
182:14;259:12
Otherwise (1)
146:13
ought (1)
220:9
out (64)
20:4;22:23;27:10;34:16;
35:14;38:22;40:14;41:23;
44:11;45:6;47:5,13;52:22;
55:18;57:1;59:2;61:7;62:22;
69:25;70:11;72:11;73:13;
74:23;78:8;85:5;88:15;
105:15;106:6;126:10;
131:13;136:15,16,20;148:5,
13;152:21;160:23;166:7;
170:19;176:1;178:9;197:22;
199:25;204:14;208:8;228:6;
236:1,2;238:2;239:21;
240:14;245:7,19;255:12;
256:21;259:14;260:17,19;
262:22;263:9,18,22;264:3,25
outdated (1)
28:8
outlier-type (1)
44:24
outlined (2)
15:2;183:25
outlook (1)
43:24
outlooks (1)
98:12
output (2)
115:17;243:16
outs (1)
159:5
outside (3)
109:19,24;212:10
over (48)
11:25;14:10;38:13,19;
39:11,22;43:11;47:24;49:6;
50:5;54:18,20;55:25;56:11;
57:4;59:21;60:22;65:20;
66:13,16;71:17;85:3;88:25;
90:7,8;91:18;100:16;125:7;
131:1;132:15;135:3,8;
141:16;142:4;160:9;166:3;
169:1;182:11;183:1,1;
189:25;193:17;200:21;
216:7;230:13;234:23;236:5;
240:25
overages (1)
133:24
overcome (1)
202:19
overdivert (1)
133:16
overestimate (3)
79:12;177:10;183:23
overfit (1)
177:2
overlap (3)

210:3,4,14
overlapping (2)
27:1,2
overlay (1)
32:23
overprediction (1)
102:18
Overruled (7)
110:5;134:18,21;136:3;
138:7;212:15;249:11
oversee (1)
237:12
oversight (1)
13:8
overstated (1)
112:14
owed (1)
143:21
own (8)
26:9;28:6;44:25;53:4;
126:24;127:2;133:7;249:1
owned (1)
33:2
owners (1)
33:2

P

package (9)
106:15;107:3,5;162:3;
202:5,6,13,14,19
page (69)
17:7;20:2;21:12;22:4;
23:11,21;24:1,4,5,22;25:19,
23;26:4,16;28:16;30:13;
32:12;35:10,20;38:18;42:10;
43:15;45:4;46:17;48:4;54:6;
55:11;57:15;65:3;68:19;
70:15;71:15;72:17;75:2,8;
76:19;77:8;80:23;93:6,6;
94:16;103:20,23,24;104:3;
114:8;119:20;155:17;
157:10,11;162:17,19;164:14,
15,15;165:17;180:13,16;
188:4;189:25;190:5,6;192:5;
193:17;217:24;218:2,6,13;
231:17
pages (2)
218:10,14
Palisades (4)
232:14,17;233:6;234:16
paper (3)
24:16;170:7;175:24
paragraph (8)
22:7;23:13;30:14;43:16;
104:4;119:22;120:4;157:11
paragraphs (2)
17:21;26:17
parameter (1)
108:11
parameterize (1)
106:20
parameters (11)
67:4,9;71:20;76:4;80:3;
81:2;83:12;84:3,5;107:25;
202:13
parcel (1)
209:10
Pardon (1)
228:2
parsed (1)
152:21
part (38)
12:14;13:19,22,24;17:15;
28:23;49:2;62:8;65:19;
78:14,23;90:19;98:18;
101:14;103:2;105:8;106:13;
114:14;141:3;149:4;152:17;
160:12;182:13;183:1,1,24,
25;199:23;223:12,14,15;
233:22;235:13;239:4,4,5,10;
260:19
partial (1)
18:10
participant (3)
245:12,16,17
participants (1)
255:9
participate (10)
12:17;13:5,9,20;65:15;
152:23;238:11,13;254:14;
260:20
participating (4)
10:10;254:21;259:15,16
participation (1)
238:6
particular (16)
42:14;49:5;68:15;71:21;
93:21,25;96:8;106:22;
120:17;138:6;142:24;
172:20;220:11;226:19;
251:19,24
particularly (9)
43:24;44:15;45:12;50:25;
74:3,14;82:20;86:4;198:23
parties (8)
87:10;121:6;150:22;
166:17;255:5;257:18;
264:20,23
partition (3)
156:19;187:11,15
parts (4)
107:1;144:24;154:23;
215:2
party (7)
101:9;115:15,19;156:20;
221:8,9;255:4
pass (1)
262:9
passes (1)
174:13
passing (1)
234:7
past (17)
23:9;42:3;63:10;131:15,
20;136:7;137:25;144:25;
148:12;208:20;211:14;
229:8,9;233:10;241:10;
259:24;264:9
patron (1)
126:10
patrons (7)
125:16,21;129:4,9;130:23,
24;131:11
PATTERSON (41)
10:2,4,4,6,23,24;11:2;
16:12,14,17;17:1,2,3;23:23,
25;24:13,16,18;26:3,12;
34:1;47:4;64:2,6,13,14,15;
78:20;87:14;109:18,21,24;
111:6;117:5,6,9,12;119:10;
120:24;121:3,4
Paul (1)
182:3
pay (3)
133:21;134:1;244:21
payment (1)
238:15
PDF (3)
245:23;246:1,2
Pelot (2)
182:3,23
pending (1)
93:3
People (6)
98:13;196:1;220:10;
248:13;263:22;265:6
per (10)
133:21;134:2;164:1,2;
209:1;213:7;247:15,17,21;
251:21
per-acre (1)
125:17
Perce (4)
237:23;238:4;245:3;
255:23
percent (55)
27:14,17,20;39:2,10;40:1,
11,15,15,24;41:1,6,7,10,10;
42:6,15;45:20;49:9,12;57:8;
76:1;86:23;87:1;88:13;89:1,
2;97:7;115:20;116:3,4;
118:14;142:4;143:16,18,20;
144:23;171:14,17;173:11,17,
18;177:3,9;178:12;194:16;
196:20;203:12;225:17;
233:5,6,7,7,8;256:16
percentage (14)
41:12;76:10,12;96:25;
115:23;129:24;144:7,8;
191:14;232:2;234:14;
255:10;259:11,17
Perfect (2)
26:16;150:22
perform (16)
14:24;50:9;157:16,16;
171:24;184:19;189:24;
193:3,15;200:16;203:8;
204:19;205:18;208:4;
212:25;219:24
performed (13)
47:24;50:22,23;90:19;
158:11;159:1;189:11,12;
192:10;204:3;219:23;220:3,
4
performing (3)
179:24;193:8;205:21
performs (1)
213:1
perhaps (11)
51:4;105:12,13;111:22;
172:12;173:1;181:13;
188:13;192:24;221:15;
236:23
period (26)
22:19;38:13,23;39:11,15;
40:5;45:11,19;55:15;60:22;
66:13,16;81:3;88:16;91:18;
133:25;164:2;168:2;171:5;
179:2;191:15,19;205:25;
241:11;244:20;265:6
periods (1)
206:4
permeability (1)
106:16
permissible (3)
149:17;209:11,18
permitted (2)
29:13;125:21
persisted (1)
104:15
person (1)
259:19
personal (1)
198:19
personally (2)
123:24;126:24
personnel (1)
159:20
perspective (2)
52:21;110:2
pertaining (1)
155:10
pertinent (1)
50:20
PEST (10)
67:2,3,4,9;68:6;69:3;77:3,
15;78:7;80:11
Pete (1)
264:18
PH-GW (1)
10:17
Phillips-head (1)
169:23
phone (2)
111:21;195:20
photo (1)
208:15
photograph (1)
96:6
phrase (1)
98:7

physical (4)
179:18;188:17;189:5,8
physically (2)
49:23;240:4
picks (1)
97:10
picture (3)
35:16;36:17;167:10
piece (3)
181:8;192:21,22
pieces (1)
21:25
pig (2)
176:22,22
pillow (1)
231:9
pipe (1)
178:13
piping (1)
212:22
place (17)
25:3,15;26:25;29:13;
125:24;133:23;134:4;
137:21;144:3,5;178:23;
181:12;208:23;209:7,11,18;
210:15
places (4)
184:2;205:14;209:24;
210:14
Plain (22)
12:2,5;13:7,8;31:17,18;
35:4;44:1;49:25;50:5;65:14;
73:3,10;106:10;178:10,20,
22;181:11;182:22;197:22;
214:7;223:19
plan (15)
12:15;16:3;125:23;
132:15;134:10;137:1,7,8,12,
14,20,25;138:12,13;188:11
planning (6)
20:24;136:10;146:21;
168:21;169:8;215:15
plans (2)
133:9;166:18
plants (1)
124:23
played (1)
40:14
please (34)
10:7;11:7;13:2;17:9;
42:10;62:18;65:6;93:7;
110:6;121:23;122:2,17;
146:13;149:15,19;150:6,16;
151:4;153:13,16,23;154:2;
155:14;158:25;162:21;
165:17;188:4,7,22;190:13;
192:5;228:5,13,19
plenty (1)
241:20
plotted (1)
208:9
plow (1)
184:1
pm (1)
265:15
point (29)
23:9;35:2;49:6;69:10;
84:14;92:20;93:21;96:11;
114:19;155:25;161:19;
182:24;189:11;201:23;
208:9,10;210:13,18;219:4,7;
236:4;240:24;241:3,18;
247:20;248:10;256:15;
257:15;262:22
pointed (1)
170:18
pointing (1)
43:23
points (10)
42:1;164:7,8;176:1;
182:21,24;193:21;204:12,
15;208:18
policy (10)
116:22,25;174:4,6,7,16;
176:6;187:4;192:10;204:20
polygon (4)
32:24;33:3;208:13;209:6
polygons (4)
33:12;199:12,12;208:17
pool (30)
245:3,6,7,12,19;254:20,23;
255:7;257:11,11;258:25;
259:8,13,19,21,25;260:20,
23;262:14,14,17,19;263:3,4,
5,6,7,8,22;264:4
pools (1)
264:7
portion (2)
129:23;254:22
portions (2)
261:7,19
Portneuf (7)
201:19;229:25;232:15;
233:1,8,14;234:13
position (7)
122:24;139:11,16,19;
194:20;229:7;233:19
positioned (1)
104:18
positions (1)
230:2
positive (3)
204:10,17,18
possibilities (1)
23:1
possible (9)
97:1;99:5;148:8;154:12;
188:18;206:13,14;235:21;
264:19
possibly (2)
140:17;156:21
post (1)
37:18
postcalibrated (1)
83:6
postcalibration (4)
77:14,22;83:11,13
potatoes (1)
125:13
potential (7)
59:21;62:21;98:6;109:4,4;
201:21;250:2
Potentially (9)
27:23;36:18;49:16;61:15;
62:5;76:25;88:11;94:13;
116:22
power (1)
49:8
PPU (1)
29:13
practice (2)
37:11;256:23
practices (4)
37:17,19,22;51:25
precalibration (5)
77:13,21;83:5,11,13
precautions (3)
169:11,12,16
precipitated (1)
163:14
precipitation (9)
38:5;41:18;44:16,17,18;
45:3,11;208:7;230:17
precise (1)
191:12
precision (16)
156:4;158:9;170:17,18,19;
172:14,18;173:13;174:18;
176:1;180:2;188:23;189:3,
13;192:20;220:24
predict (8)
59:7;76:2;91:3,20;171:19,
25;172:2;177:4
predicted (3)
44:3;75:20;235:17
predicting (2)
73:19,21
prediction (12)
68:15;76:2;84:14,24;
108:9;109:6;171:1;172:20;
174:9,19;177:9;201:12
predictions (6)
59:3;74:19;75:6;107:16,
21;120:6
predictive (2)
49:8;196:11
predictor (8)
48:24;49:17,23;50:7,16,
24;91:14;102:23
predictors (8)
46:20;47:1,10,13;48:13,
15,16;50:20
predicts (2)
75:25;101:6
preferred (2)
80:15;82:22
preimposed (1)
80:9
preliminary (6)
9:16;81:18;82:19;83:19;
84:6;212:13
preparation (2)
13:13;155:1
prepare (1)
194:21
prepared (12)
63:18;69:19;104:13;
138:25;145:15;151:8;155:2,
4,8;170:9;182:3;246:16
preparing (1)
158:16
prescribed (1)
48:12
presence (1)
104:25
present (14)
23:20;34:4;90:23;91:19,
21;160:19,20;193:11;194:7;
196:3,25;200:25;204:25;
205:12
presentation (5)
29:5;30:1;31:7;47:19;49:3
presentations (3)
22:24;159:15,17
presented (23)
17:18;18:9;27:7;28:9,11,
25;29:3;32:16;40:9;43:7;
54:21;60:9,19;73:10;100:9;
156:8;157:13;160:22;161:2,
6;193:13;212:11;214:6
presenting (1)
57:19
presently (2)
48:25;135:11
president (2)
139:11,16
pretty (8)
77:18;83:14;88:10;
104:19;119:6;132:11;
182:22;191:16
prevent (1)
193:7
previous (20)
18:13;39:17;40:23;42:4;
44:20;45:22;55:16,25;70:18;
96:23,24;97:3,7;101:4,4;
110:21;120:4;128:23;
133:24;147:11
previously (9)
17:6;20:17;28:11;95:5;
96:9,25;152:13;187:10;
235:25
primarily (2)
108:2;188:25
primary (3)
155:7;169:7;189:4
principal (1)
152:12
principle (2)
221:6,7
prior (14)
34:8;73:13;131:4;141:19,

25;155:6;168:4;194:6;
204:21;213:25;230:1;
253:22;259:6;264:23
priorities (5)
126:2,5;239:8,13;240:3
priority (14)
165:25;166:12,23,25;
224:6;226:18;234:7,8,21;
239:21,25;240:1;241:4,15
private (7)
151:25;152:3,19;207:22;
209:15;255:15,18
probability (1)
204:10
probably (19)
50:7;51:24;52:6;74:8;
75:4;82:10;84:13;86:18;
96:2;130:24;152:18;156:22;
193:23;199:24;211:12;
224:5;234:19;251:17;256:23
problem (7)
108:18;156:24;157:1;
172:1;187:17;247:21;257:25
problems (2)
172:3,4
procedure (1)
259:22
procedures (8)
245:6,14;254:20;255:6,8;
259:13;262:18,19
proceed (1)
10:13
proceeding (11)
18:21;20:20;112:10;
134:13;137:25;138:2;
152:14;153:9;155:9;170:25;
212:19
proceedings (3)
18:13;138:4;152:16
process (31)
25:15;26:25;27:5,11;28:3,
6;34:17,19;53:22;66:8;
67:10;68:7;69:7;79:4;118:2;
162:24;164:25;170:10;
173:9;175:22,22;195:1;
198:11;199:9,11,18,23,24;
207:17;241:7;260:21
processed (1)
78:25
processes (1)
167:11
processing (21)
25:9;30:4;78:19,23;79:11,
18,19,23;80:8,21;81:16,19,
20,23,25;82:8,11,14;83:5,7;
93:18
produce (5)
118:6,6;208:4;222:3;226:7
produced (5)
56:6;82:3;85:6;160:16;
165:23
product (1)
165:22
professional (5)
105:19;163:11;186:25;
188:9,11
program (10)
133:20;183:20;208:14;
229:1,5,9;230:4;238:8,14;
247:1
programs (4)
133:6;207:23,25;208:2
project (18)
12:2,23;15:11;23:7;98:8,
23;106:7;113:1,3,5,16;114:3,
12,18,21;212:8,22,23
projected (2)
53:15,16
projects (6)
13:1;99:2;212:3,7,18,20
propagate (2)
72:4;204:7
propagated (1)
102:9
proper (2)
202:6,8
properties (10)
66:2;67:10;68:3,5;71:22,
23;72:6,7,12;82:17
proportion (1)
148:11
proportionate (2)
85:13;129:25
proposed (8)
73:2,6,9;76:25;79:17,24;
81:4;265:4
proposing (1)
45:13
protect (4)
100:14,19;116:16;256:1
protection (9)
37:5,7;40:19;41:23;43:13;
57:9;97:12,13,14
protective (3)
41:22;59:13;183:5
provide (15)
26:9;113:17;170:3;
173:20;174:23;175:15;
176:8,13;181:9;182:1;184:5;
193:1;221:9;255:10;259:10
provided (17)
18:16;20:5,8;55:23;56:19;
92:12;116:3;153:11;155:11;
156:3;157:3;161:22;185:2;
191:2;213:21;226:9;258:25
provides (2)
181:22;224:22
providing (2)
37:5;159:14
proximity (1)
208:11
prudent (1)
189:21
published (2)
246:20;247:23
pull (1)
221:11
pulled (3)
15:25;38:9;55:18
pulling (1)
57:17
pump (2)
127:12,13
pumper (1)
88:19
pumpers (2)
109:15;110:11
pumping (12)
72:4;85:10;91:4;110:16;
147:9,10;148:14;178:21;
183:13;222:23;223:4,22
pumps (5)
141:14,14;147:24;247:3,
13
purchased (1)
260:10
purely (2)
95:21;256:5
purged (1)
204:23
purpose (14)
100:2,11,16,18;101:8;
158:6;168:19;169:1,19;
190:13;216:11;223:9;225:5;
260:2
purposes (12)
154:9;169:7,22;195:1;
199:1;211:18;245:20;
258:17,19;259:21;260:1,18
pursuant (2)
132:15;134:11
pursuing (1)
200:4
put (15)
15:21;27:4;46:8;55:14;
67:21;77:18;106:25;121:20;
125:24;133:23;143:4;
176:21;189:17;214:24;
261:21
puts (1)
108:24

Q

qualifications (1)
150:23
qualitative (1)
203:10
qualitatively (3)
160:11,17;162:1
quantify (1)
198:11
quantity (2)
226:15;231:10
quarter (5)
64:8;111:11,14;209:1,1
quarter-million (1)
221:16
questionable (1)
50:7
quick (2)
194:5;249:14
quickly (5)
11:15;66:5;71:25;155:16;
205:13
quite (5)
52:23;65:18;140:20;
180:10;199:4
quote (5)
39:4;50:12;64:19;215:14;
220:20

R

R16 (1)
157:12
R17 (2)
190:4,8
R18 (2)
190:5,8
R19 (4)
190:9,9;191:13,20
R2 (1)
51:3
R21 (1)
190:10
R7 (3)
165:18,21,22
rain (1)
236:5
rains (1)
234:23
raise (8)
10:15;45:25;63:8;102:12;
122:2;149:23;212:9;228:4
raised (5)
73:23;74:20;103:11,11;
199:25
Ralston (3)
69:18;70:16;104:12
ran (2)
73:16,16
range (7)
116:5,9,11;126:5;175:6;
217:14;218:16
ranged (1)
170:11
Rangen (6)
12:7,11;90:15;101:19;
109:11;155:9
ranges (1)
67:5
rapidly (1)
204:7
RASA (1)
106:7
rate (7)
35:18;56:24,25;82:3;
127:17,18;163:8
rate-per-acre (1)
248:21
rates (2)

56:21;250:4
rather (1)
205:14
ratio (6)
85:23;156:3;178:2;179:17, 17;220:20
ratios (3)
177:16,18;179:15
reach (71)
49:24;50:2,3,21;53:1;56:7; 66:22,22;67:22,23,25;68:15, 18,23;69:13;70:6,14;71:3,5, 8;72:5;75:7,7,19,21;76:6,13; 77:12;84:25;85:11;86:1,3,8, 17;91:6,8,16,17,25;104:2,23; 105:6,22;107:10,11,14,17, 21;108:4,18,22;109:10; 115:7;119:24;148:19;163:9; 171:3,3,11;173:16;178:22; 190:24;216:25;217:1,4; 219:23;239:17,24;240:18; 241:3,16
reached (2)
148:20;241:12
reaches (15)
102:9;165:4;186:23; 214:17;216:20,22;217:7,9, 15;218:10,17;219:12; 229:13;240:10;241:22
reaches' (1)
217:13
reaching (1)
240:4
reaction (3)
163:11;186:25;188:9
read (12)
33:7;72:19;162:20;164:21, 22;166:11;167:2;180:20,24; 187:14;223:2;242:23
read] (2)
55:4;103:24
reading (2)
87:6;177:21
reads (3)
17:22;22:9;30:14
ready (4)
9:4,13;164:16;185:13
real (1)
36:13
reality (3)
66:11;68:12;178:6
realization (1)
196:11
realized (4)
163:5;165:6;188:24;225:1
reallocate (1)
148:18
really (35)
19:10;42:22;43:13;48:11; 50:17;51:22;52:13;53:21,22, 25;54:21;57:9;58:21;63:1; 73:18,18;74:18,18;75:13; 78:9;79:6;80:14;82:25;86:1; 95:11;106:11;114:19; 120:21;148:22;168:24; 170:7;175:17;179:19;257:8, 16
real-time (5)
28:25;30:3,4;36:17;58:12
reask (1)
136:5
reason (19)
28:7;39:16;50:17;73:7; 78:22;79:6;83:22;94:6; 141:3;159:3;177:6;183:17; 199:23;225:23;251:14; 252:1,6;254:19;256:20
reasonable (50)
15:8;17:15,19;18:7,16,17, 22;19:1,4;20:4,7,12,21;21:6; 22:1;23:2;30:8,12;31:9; 36:14,23;45:20;53:7,10; 54:1,3;57:21,24;58:8;59:15, 25;60:6,20;99:16,18;100:1,2, 8,11,23,24;101:2;102:14; 113:14;114:10;206:6;213:8, 18,19,23
reasoning (4)
39:8;155:23,24;156:10
reasons (12)
46:6;69:8;103:6;155:20, 22;157:2;161:16,18,20,20; 220:14;224:2
reassess (1)
50:13
rebuttal (2)
193:21;194:5
recalculate (2)
113:11;114:14
recalculated (1)
114:8
recalibration (3)
68:20;82:13,19
recall (34)
21:2;22:15,24;23:16; 25:11;50:10;90:16;92:6,14, 22;98:5,10;99:20;101:16; 119:8;120:15;142:9;145:20; 146:17;186:19;194:12; 196:6,7;197:3;198:16;201:5; 207:12,14;211:14;225:13; 245:4;258:18,21;261:8
receive (9)
115:20;137:18;140:21; 238:14;245:10,11,15,19; 260:6
received (12)
87:12,13;142:16;149:6,7; 206:21,22;234:23;236:15, 16;252:17,18
receives (1)
101:9
receiving (2)
221:18;252:14
recent (8)
17:25;58:10;94:8;118:3; 190:22;192:13;255:6;257:10
recently (3)
147:16;254:20;258:24
recess (1)
111:17
recharge (28)
12:13;16:3;43:25;44:6,10; 61:12;62:2;67:14;73:22; 77:12,12,17,23;78:2;80:11; 83:17;98:15,19,22;101:21; 102:1,4,6,9,15,17,24;264:9
recharged (1)
61:21
Reclamation (2)
230:7;235:25
recognition (2)
221:6,7
recognize (4)
21:17;109:5;129:14;247:5
recognized (2)
24:19;251:5
recognizing (1)
250:1
recollection (1)
161:14
recommend (3)
22:13;25:1;192:2
recommendation (11)
22:3;25:3;26:6;46:15; 48:21;81:1,4;82:11;108:21, 23;175:10
recommendations (13)
21:3,22;23:22;52:9;79:16; 81:11,14;92:13,21,24; 151:16;176:17;212:24
recommended (2)
26:11;219:2
recommending (4)
21:4,23;24:24;27:4
record (38)
9:5;16:20,24;33:7;38:24; 39:15;40:5;44:16;45:19; 51:9;56:21;61:3;64:10;87:7; 89:11,14,16;117:8;122:18; 129:16;148:23;149:1; 150:12,17;152:22;157:7; 160:20;188:2;227:22; 228:20;231:16,17;236:10; 246:14;247:20;249:16,23; 251:7
recorded (2)
29:14;223:2
recording (4)
16:25;89:17;111:16;194:2
records (2)
55:6;229:10
recover (1)
142:23
re-create (1)
70:9
Recross (3)
119:11;262:11;264:11
recross-exam (1)
227:19
Recross-Examination (2)
7:11;263:1
recurring (1)
203:1
Redirect (15)
7:10;111:5,6;117:5,11; 144:11,13;206:25;226:25; 227:3;257:5,9,12;261:1,3
redo (1)
114:20
reduce (2)
42:20;260:3
reduced (4)
41:19;59:4,5;202:1
reducing (2)
59:13,19
reduction (11)
62:13;72:3;76:5;85:10; 103:19;125:25;131:14; 148:11;181:12,13;236:2
reductions (2)
131:20;142:8
reevaluated (1)
52:6
reevaluating (1)
23:6
refer (10)
24:1;26:17;51:14;157:10; 164:11;169:10;177:16; 182:8;240:6,11
reference (4)
93:1;149:1;168:4;232:5
referenced (2)
212:19;221:19
references (3)
30:20,24;181:25
referencing (2)
20:19;69:17
referred (11)
18:5,20;20:17;26:18; 113:20;152:23;159:24; 169:11;176:1;216:17;263:3
referring (18)
14:14;17:17;18:4;23:19; 31:1;69:16;71:21;75:2; 97:24;98:11;104:14;116:5, 10;148:23;221:13;223:18; 240:7,19
refers (2)
17:10;58:21
refine (2)
179:17;182:19
refined (1)
83:5
refining (1)
182:11
reflect (2)
224:12;248:1
reflected (4)
24:22;54:4;120:19;247:15
reflection (1)
107:24

reflects (1)
220:13
reformulate (1)
176:4
reformulating (1)
176:5
regard (8)
158:2,3;160:9;161:21;
189:13;193:4;202:24;204:21
regarding (14)
22:13;93:5;98:4,5;100:22;
101:13,21;110:3;154:10;
155:20;158:7,9;159:18;
188:10
regardless (1)
138:21
region (2)
104:2;107:2
regional (4)
52:1;106:8;107:7;219:24
regression (4)
47:18,24;52:15;174:1
regressions (1)
47:22
regular (1)
122:1
regularly (1)
254:17
regulate (2)
127:7,14
regulated (1)
263:23
regulating (1)
241:1
regulation (1)
260:3
regulatory (1)
204:17
relate (3)
98:23;190:14,18
related (15)
12:9,10;15:4;17:19;26:11;
37:22;56:20;76:23;101:3;
118:18;152:1,20;155:5;
159:1;203:4
relates (3)
58:19;66:5;71:12
relating (8)
10:19;84:21;122:6;150:3;
154:23;192:22;225:10;
228:10
relationship (3)
103:1;208:3;211:24
relative (6)
93:2;94:25;96:23;202:11;
258:13,18
release (2)
74:21;75:15
released (1)
84:12
relevant (4)
88:1;93:24;198:4;206:10
reliable (4)
186:10;201:13;222:20;
224:3
relied (1)
155:8
relief (19)
156:3,4;174:20,23;176:9;
177:16,18;179:15;188:23;
191:23,24;193:1,2;196:14,
16;220:20;221:9,10;226:15
relies (1)
214:13
reluctance (1)
219:15
rely (1)
228:3
relying (1)
183:9
remainder (1)
23:1
remaining (1)
254:1
remember (15)
22:17;59:16,19;106:8;
116:2;138:8;145:3;146:12,
15;217:16;227:7;259:1;
261:12,15,18
remembered (2)
78:25;79:5
remote (4)
27:7;32:21;121:12;199:19
remotely (3)
10:10,19;228:11
removed (4)
27:12;29:20;179:7;214:25
removing (1)
27:1
renew (1)
137:23
rent (7)
238:14;254:17;255:5;
259:20;263:18,22;264:3
rental (16)
245:2,6,7,19;254:20;
255:11;258:25;259:13;
260:11,20;262:14,17,19;
263:4,8;264:6
rentals (9)
237:16;238:7;257:10;
259:8,9,12,14,18;260:23
renting (3)
238:11;254:14;255:3
repeat (4)
98:17;110:7;222:11;
225:16
rephrase (2)
131:12;185:19
replacement (1)
219:16
replicate (1)
225:20
replied (1)
117:16
report (104)
14:5,11,22;15:2,7,9,15,21;
16:7;17:7,21;21:10,11,14;
22:5;24:3,4,22;25:19,21;
26:19;28:14;29:22;30:14,20;
32:6;34:20;37:15;38:7,10,
18;42:11;43:16;44:8;51:13;
64:3,19;65:3;68:19;69:12,
17;70:16,17;71:16;93:6;
95:4;100:4,25;103:21,23;
104:13;108:16,25;109:3,19,
25;112:13;113:13;129:18;
149:4;153:8,11,25;154:1,3;
155:1,11,12,15;157:3,7,12,
17;159:21,24,24;160:12;
161:22;163:15,20;165:17;
169:10;177:15;181:21;
184:12;186:13;190:19;
192:6,8;193:6,18;204:24;
205:11;206:17;208:25;
215:13;217:11;222:19;
224:16,21;246:3,9,15;261:6
reported (3)
58:11;61:20;223:2
REPORTER (20)
9:6;33:5,7,10;64:11;78:15;
98:17,21;116:8;153:15;
185:14;190:17;222:11;
224:13;242:19,21,22;243:5,
10;249:19
reporting (2)
61:25;134:3
reports (6)
13:17;30:19;98:2;168:22;
171:8;181:25
represent (13)
43:18;66:11;77:20;
105:16;106:1,20;112:7;
129:17;132:21;150:13;
166:2;216:15;246:8
representation (12)
51:21;106:16;131:25;
176:24;202:6,8,15;208:5,7;
218:24;220:7;228:4
representative (7)
51:23,24;119:23;120:2,7;
193:14,16
represented (9)
18:13;28:5;70:9;107:11;
215:3;218:16;247:11;
250:20;252:4
representing (5)
105:21;106:19;140:9;
153:5;202:20
represents (5)
124:15;165:23;190:25;
248:3;251:17
reproduced (1)
190:8
requested (1)
143:7
requesting (1)
80:6
require (1)
147:18
required (5)
133:21;175:13;193:2;
201:15;221:9
requirement (2)
139:20;188:13
requirements (1)
238:3
requires (2)
97:20;178:7
resampling (1)
68:20
Research (1)
155:3
reserve (1)
206:24
Reservoir (12)
52:1;104:18;105:6;107:4;
112:8;140:24;141:5;229:14,
23;234:20;237:15;238:2
reservoirs (8)
100:16;141:1;229:24;
234:7;235:9,10;254:2,4
resistance (1)
72:21
resolved (1)
135:14
Resource (2)
101:25;109:2
Resources (6)
151:12,16;152:2;155:3;
177:24;178:1
respect (14)
93:22;98:3;99:25;100:11;
101:7;102:1,6,13;103:11;
107:9,11;109:14;141:13;
143:25
respectively (1)
40:18
respond (1)
103:3
responded (1)
103:5
response (25)
25:20;75:15,18,21;76:9;
84:9;85:24;86:7,14;102:24;
108:18;109:10,12;116:14;
156:6;170:16;172:7,11;
188:11,11;189:19;191:18;
214:22;219:22;258:15
responses (9)
50:4;73:21;75:6;76:5;
91:3;190:24;220:7;224:22;
225:1
responsibility (9)
158:3;166:17;167:1,3,5;
187:12;198:23,25;226:4
responsible (7)
109:16;110:11;126:12;
156:20;159:3;241:1;254:22
restate (2)
146:13,16
restricting (1)

249:8
restrictions (1)
262:15
result (17)
56:16;62:23;76:11;92:14;
156:19;166:2,5,8;170:24;
187:3;196:11;202:2;217:17;
220:14;233:21;236:2;255:23
resulted (4)
33:21;79:10;99:18;259:10
resulting (4)
74:24;163:3;165:5;214:23
results (14)
69:4;76:17;77:3;79:13;
160:16;170:18;176:8;191:1,
2,3;218:12;220:1;225:7,24
retained (3)
90:10;164:22;211:25
return (9)
49:21;197:4,8,11,11,18,21;
198:8;261:20
returns (2)
197:10;198:11
revealed (1)
161:17
revelation (1)
129:5
reversed (1)
201:24
reverted (1)
28:7
review (15)
13:15;17:25;27:4;28:6;
38:21;40:8;50:18;73:11;
106:5;153:2;154:9,18,21,22;
167:22
reviewed (10)
30:8;61:10;77:2;82:8;
97:25;115:24;157:23,24;
172:23;220:4
reviewing (2)
61:18;158:15
revise (1)
244:16
Rexburg (2)
218:19;240:16
RICHARD (2)
122:4,19
riders (1)
132:24
Rift (1)
109:12
right (74)
9:15,24;10:15,23;12:8,10,
22;19:14;24:12,13,23,23;
33:22;34:15;38:11;55:5;
69:2,8,9;77:19;82:16;83:25;
89:8;92:18;104:4;107:3;
110:16;111:3,11;121:8,24;
122:2;123:18,19;126:2,6;
127:16;134:17;138:11;
146:8,11;149:18,23;152:19;
162:16;166:1;177:5;180:4;
183:6;184:11;185:16;195:9,
15;206:24;208:25;209:4,5,
13,16;210:11,14;220:14,14;
227:21,22;228:4;232:12,15;
246:25;248:3;256:20;258:1;
264:12;265:9
rights (35)
52:25;65:5;75:16;109:17;
110:12;125:1;126:7,8,25;
127:2,5,8;130:25;133:7,8;
141:13;144:1,3;151:25;
160:4;170:14;175:25;
208:21;209:11,23,25;
216:15;229:15;233:24;
234:18,20;237:15,24;
239:11;240:1
Rimrock (1)
49:21
Ririe (1)
230:20
RISD (7)
17:25;19:6,8,20;20:25;
22:11;57:13
River (68)
91:7;105:22;106:15;107:3,
4,5;144:20;151:17,22;159:8;
163:2;164:3,8;165:5;172:9;
189:7;195:9;202:5,6,7,9,13,
14,16,17,19;213:8;214:16,
23;215:1,2;218:10;220:7;
224:23,25;229:13,19,20;
230:23;232:3,10,16,17;
233:17;237:13,20;238:2,19,
21,25;239:6,12,14,18,22,24;
240:4,9;241:3,5,12,23;242:3,
4,8;254:10;260:3;261:21
road (2)
204:23;249:1
roads (1)
27:12
Rob's (1)
257:20
robust (7)
182:22;183:3;199:10;
200:6,17;201:25;203:5
Rocky (3)
152:7,8;190:11
Roger (1)
175:25
role (1)
159:14
room (2)
194:8;196:4
roughly (3)
47:15,16;126:6
round (1)
178:8
row (2)
130:5;191:20
R-squared (22)
49:5,7;102:13;103:1;
171:8,13,15;172:21;173:2,4,
7,11;174:1;176:14,19;201:6,
11;217:8;218:11;219:3,12;
220:12
rule (1)
259:22
ruled (1)
110:13
rules (6)
110:14;177:22;216:3;
257:1;262:14;263:4
rulings (1)
110:21
run (8)
56:6;99:7;115:5,18;166:7;
225:24;226:7;241:9
running (3)
80:3;91:14;191:7
runoff (7)
233:22,25;234:11,15,17;
235:24;254:4
runs (3)
80:5;225:16;226:1

S

safe (7)
137:9,14,18,21;138:13,15,
20
salmon (1)
263:10
same (32)
19:20;20:7;26:13;29:24;
31:7;48:10;69:22,23;74:15;
77:20;82:17;84:3;113:24,25;
115:19;128:12;156:8;163:7,
8;166:3;167:21;169:8;195:1,
2;197:19;198:3;226:8;
230:18;231:24;232:24;
256:22;259:17
sampling (1)
182:21
Sarah (5)
9:8,9;195:24;264:17;265:2
satellite (2)
96:3;200:2
satisfaction (1)
137:3
saw (11)
32:6;47:19;63:16;77:1;
78:3,3,4;82:2;94:15;108:19;
142:4
saying (8)
47:9;73:24;99:5;117:14,
18;120:7;203:22;222:9
scale (2)
189:2,2
scenario (2)
256:4,16
scenarios (1)
159:9
school (1)
228:24
science (17)
11:18;90:24;91:1,2;
170:24;171:22,23;174:14;
175:3,5,9;190:22;191:10;
192:14;229:1,3,3
sciences (1)
171:5
scientific (1)
175:6
scientist (1)
175:10
scope (5)
109:19,24;134:12;212:10;
248:23
score (1)
199:20
scoring (1)
199:18
screw (1)
169:23
season (27)
23:2;37:4;38:4,6;41:17;
44:15;53:13;85:19;91:19,21,
25;93:2;97:16;100:15;
116:21;127:19;134:5;168:2;
196:12,17;222:24;226:8;
229:16;253:23;254:1;
256:10;259:7
seated (2)
150:7;228:14
second (14)
11:11;17:22;19:14;29:19;
55:20;119:21;157:10;158:5;
163:15;170:8;183:25;
192:22;203:9;217:24
Section (30)
23:13;24:11;25:6;34:20;
35:20;48:23;55:2;58:17;
59:24;61:7;64:3,16;65:4,10;
67:16;69:17;71:12,15,19,21;
72:15;73:8;84:17,18,19;
87:5;103:22;104:5;119:21;
130:8
sector (2)
151:25;152:4
secure (1)
177:25
sediments (1)
106:17
seed (4)
125:14;194:23,25;195:3
seeing (8)
73:18,25,25;74:11;75:5;
80:3,4,7
seeking (1)
221:9
seem (3)
80:11;114:2,16
seemed (4)
46:8;48:10,14;63:19
seemingly (1)
63:3
seems (14)
18:11;28:7;36:17;38:21;
44:21;51:10;52:21;78:7;

114:11;116:22;174:2;
188:12;233:10;236:4
seeps (1)
242:7
select (3)
97:1;261:7,19
selected (5)
40:10;46:23;53:23;96:24,
25
selecting (1)
44:21
selection (4)
36:25;38:24;57:6;101:1
self-reported (1)
117:23
semi-irrigated (11)
33:19,20,23;95:18,19;
118:9,12,15,19;119:4,7
send (2)
131:13;148:13
sends (1)
126:10
senior (15)
37:6;40:19;41:22;43:4;
59:5;97:11;109:16;110:12,
16;126:7;183:6;234:8,21;
239:25;256:19
seniors (1)
116:16
sense (3)
36:15;118:10;241:2
sensing (3)
27:7;32:21;199:19
sensitivity (4)
79:18,23;80:6,20
sentence (3)
17:22;30:14;120:17
Sentinel (4)
48:19;51:18,20;73:20
separate (4)
105:11;108:8;137:25;
148:25
September (7)
44:17;73:6;81:6,6;115:11;
130:17;225:11
series (5)
21:21;28:23;37:9;55:23;
190:5
serious (2)
221:16,17
serve (1)
124:5
served (1)
151:7
service (9)
185:12;209:24;247:25;
249:25;250:1,7,7;251:16,21
Services (2)
69:18;213:1
serving (1)
123:1
set (10)
67:4;126:1,1,2;133:22;
170:21;173:20;174:5,12;
203:14
sets (2)
66:14;128:16
settled (1)
239:10
settlement (8)
12:15;61:25;135:3,8;
136:11;145:18;146:18;
147:14
several (3)
16:3;46:15;182:11
severe (1)
204:18
severely (1)
214:18
Shapefile (12)
29:12,14,17;94:22;95:1,
10;208:13;209:4,6,9,12;
210:4
shapefiles (6)
27:2;36:7;93:13;208:17;
209:25;210:5
share (9)
85:13;129:25;137:1;
139:14;147:8,9,24;148:15;
243:16
shared (1)
139:23
sheet (10)
18:19;19:2;20:5,8;30:9;
58:9;113:15;114:11,17,23
Shelley (2)
218:19,20
shift (9)
40:22;41:12;49:17;57:7;
61:1;84:11;186:12,14;
200:21
shifting (1)
43:21
shooting (2)
175:18,21
short (10)
55:7;105:22;117:9;171:5;
219:13,14;221:15,24;
227:19;265:6
shortage (3)
88:23;115:15;139:12
shortcomings (1)
197:14
shortfall (47)
27:25;41:19;42:18,22;
43:1,7,9,10;55:19,21;56:3,8,
11,12;57:14,20,21,23;58:13,
25;59:21;60:6,11,20,24;
61:4;65:9;113:21,25;114:5,
6,9;115:20;116:20;178:5;
179:10;183:24;196:12;
197:8,12,21;198:9,13;
201:14;202:2;226:8,19
shortfalls (3)
54:2;114:13;169:14
short-sighted (1)
189:19
short-term (8)
167:14,18;170:25;171:9,
10;172:3,6;173:18
Shoshone (1)
124:14
show (20)
29:9;35:16;37:15;38:11,
13;45:17;47:23;48:5;54:24;
60:4;85:19;121:18;139:5;
164:5,5,6;166:6;191:4;
218:10;225:5
showed (6)
47:19;48:2;49:4;56:1;
84:9;225:4
showing (16)
31:11;48:15;55:14;58:12;
60:10,14;72:19,20,22;73:4;
77:10;82:15;96:6;200:3;
209:9,10
shown (13)
21:1;33:23,24,25;57:2;
70:22,24;83:3,5,7;94:18;
96:9;193:5
shows (29)
29:11;30:16;31:4,11;
46:18;54:7;56:1;60:11;
64:20;70:1,20;74:15;75:3,
15,18,20;76:16;85:21;99:11;
129:22,24;130:2,9;131:1;
148:17;165:21;166:3;173:7;
251:11
shut (2)
239:22;241:7
shuts (1)
241:2
shutting (1)
240:2
Side (9)
54:15;62:3;73:1;77:19;
82:16;127:6,14;140:21;
261:25
sides (1)
205:19
signed (3)
147:14,25;148:1
significance (1)
52:16
significant (9)
20:14;25:7;40:22;68:17;
70:12;83:24;84:1,4;103:19
significantly (3)
77:18;78:4;233:21
Sigstedt (27)
9:25;10:17;11:3,9;23:18;
33:5;78:15;87:16;89:19,23;
110:6;111:9,19,20;116:8;
119:16,20;121:8;129:18;
157:23;176:21;177:1,5;
189:15;201:11;211:21,24
Sigstedt's (2)
24:3;200:25
silent (1)
187:15
similar (8)
19:22;50:19;83:14;
108:19;191:4;215:22;220:1;
247:6
similarly (2)
54:15;118:13
simple (1)
178:8
simplification (1)
67:20
simplified (1)
66:11
simply (4)
68:21;146:1;231:8;247:17
Simpson (21)
89:9,10,18,22,24;98:22;
110:1,8,23;115:4;117:14;
119:11,12;132:6;140:4,7,8;
144:9,16;149:12;226:24
simulation (6)
43:8,9;65:4;72:2;163:1;
165:2
simultaneously (1)
190:16
single (7)
36:11;49:13;65:25;106:2;
185:11;204:11;220:5
single-event (1)
226:11
single-layer (8)
66:1;70:7;105:9,17,20;
176:22,22;202:20
sinking (1)
241:17
sinks (2)
241:23,25
sit (3)
87:19,20;149:21
sites (3)
230:15,25;231:6
sitting (1)
132:18
situation (2)
174:19;239:19
six (3)
148:1;192:14;262:19
sketches (1)
182:1
skim (2)
180:18;188:7
Skyler (1)
150:13
slow (3)
153:15,17,19
slowly (1)
71:25
small (19)
125:13;131:9,10;139:7;
178:25;217:18;220:4;255:7,
8,10,11;257:11;258:25;
259:14,19,21,25;260:2;263:7
smallest (1)

33:1
Snake (60)
12:2,5;13:6,8;31:17,18;
35:4;44:1;49:24;50:5;65:14;
73:3,10;86:6;91:7;106:10;
123:12,25;124:11;130:5,6,
22;134:16;139:6;141:15;
142:13,20;143:11;144:1,20;
151:17,22;159:8,15;163:2;
164:3;165:5;170:2;176:17;
189:7;195:9;213:8;214:7;
223:14,19;229:19,20,23;
230:23;232:3,9,14,16,17;
233:6,17;237:12,20;238:2;
261:21
Snake's (2)
126:18;143:16
snapshot (2)
93:18;94:1
SNOTEL (2)
230:25;231:6
snow (13)
140:20;144:25;145:9;
230:14,15;231:8,9,10,11,13,
25;236:11;254:6
snowmelt (2)
254:5,9
snowpack (17)
98:12;128:22;140:12,18;
141:1,8;144:17,20;201:24,
24;202:1;230:24;231:7;
232:3;233:5,22;234:23
snowpacks (1)
140:15
sobering (1)
221:11
soil (1)
230:17
solid (3)
75:20;158:18;190:25
solved (1)
156:25
somebody (4)
195:19;213:2;228:6;
245:18
somehow (1)
95:7
someone (3)
175:16;212:23;260:10
someone's (1)
175:19
someplace (1)
189:7
sometimes (7)
29:14;195:15;204:11;
235:25;241:9;247:9,10
somewhat (4)
186:16;189:10;237:25;
247:8
somewhere (4)
132:24,25;178:10;197:22
soon (2)
169:5;249:3
sooner (1)
225:1
Sophia (28)
9:25;10:9,15,17;11:4,9;
17:3;21:13;47:4;64:15;
87:24;90:2,4;92:3;101:7,18;
103:20;107:15;117:13;
121:4;129:18;173:1;176:16;
180:9;200:23;201:3;202:5;
220:13
Sophia's (2)
149:4;201:18
sorry (21)
11:10;23:24;24:14,16,18;
25:23;47:7,8;58:20,23;
62:18;78:15;98:17;109:21;
116:8;166:20;190:20;
224:14;242:22;246:1;248:16
sort (17)
15:1;18:8;37:4;40:20;
51:22,24;59:20;68:24;72:21;
79:1;81:18;84:14;159:22;
210:3;212:7;224:3;231:20
sound (1)
123:18
sounds (3)
116:18;123:19;161:15
source (12)
62:11,13,20;63:15,20;
81:20;82:1,4;154:13;182:4;
195:6;253:17
sources (7)
35:2;61:8;82:2;96:2;
159:5,6;199:19
South (2)
122:19;234:12
southwest (2)
105:3;123:21
space (12)
235:3,9,10,17,19;236:3;
245:6;254:21;259:10,15,16;
260:20
Spackman (1)
21:15
spatial (4)
208:3,3,5,7
spatially (2)
193:14,16
speak (6)
109:22;121:2;156:9;
167:11;175:6;198:14
Speaking (2)
190:16;249:20
speaks (1)
181:22
specialists (1)
82:7
specialty (1)
125:14
specific (11)
37:12,16;52:15;101:1;
108:16;159:24;176:4;
179:13;216:20;219:21;
258:21
specifically (11)
46:6;56:9;90:10;94:23;
96:12;107:20;166:17;
190:23;195:14;258:11;
259:25
specification (1)
166:15
specifics (1)
218:23
specified (2)
168:10;187:22
specifies (1)
166:11
specify (4)
105:1;145:23;147:5;
172:14
spell (2)
150:16;228:19
spent (3)
15:10;182:10;228:25
SPF (5)
18:11;19:14;20:17;30:20;
95:4
spill (1)
235:22
splits (2)
85:8,9
spoke (1)
157:5
spoon-fed (1)
177:7
spot (1)
199:25
spread (1)
259:13
spreadsheet (6)
18:1,17,22;61:11,19;130:9
spring (9)
66:22,23;95:25;96:7,7;
102:24;119:23;234:23;242:8
springs (7)
105:7;165:5;172:9;215:2;
217:4;242:2,5
Spronk (2)
19:15;20:18
stabilize (3)
51:3;131:22;142:9
stabilizing (1)
142:19
staff (16)
13:21;14:13;17:12;20:23;
21:3,13,22;22:18,21;23:22;
24:24;26:7;28:20;36:9;
55:13;92:13
staff's (1)
18:6
stand (2)
134:25;149:21
standard (11)
27:14;44:19;52:17;59:5,9;
75:13;103:7,18;175:3,5;
203:13
standing (1)
228:4
standpoint (1)
39:1
stands (1)
106:23
start (6)
9:4;32:21;40:21;81:12;
241:13;264:15
started (13)
12:3,7;34:6,7,24;35:7;
90:13;204:23;211:15;254:4,
5,7,9
starting (16)
19:1;30:10;32:3,9;34:12;
40:20;42:17;56:22;59:20;
194:20;210:13,17;218:13;
219:4,6;244:20
starts (3)
29:11;37:4;43:10
state (65)
43:17;55:4;76:9,14;91:11;
103:24;110:14;115:1,3,18;
116:14;122:17;128:1,1,4,8;
130:1,4;139:5;143:6,13,17,
23;148:6,17;150:16;154:17;
158:4;161:6,12;162:2,23;
163:9,18,21;164:4,5,24;
165:13;166:2,5,8,10,15,19,
21;167:1,7,14,24;168:4,7,14;
177:25;187:11,22;192:9;
196:7,8,10,18;225:11;226:7;
229:2;256:18
stated (7)
153:4;167:23;168:3;
181:16;187:10;215:18,20
statement (12)
38:25;50:14;55:8,9;
101:11;120:4;161:3;163:22;
170:3;181:19;201:18;258:13
statements (2)
170:7,9
states (5)
120:6;132:23;138:13;
230:7,8
state's (1)
177:24
stating (1)
107:20
station (1)
230:19
stations (1)
35:2
statistic (3)
171:8;172:22;177:4
statistical (1)
203:7
statistically (1)
182:21
statistics (1)
172:23
stay (3)
21:11;26:3;126:12

steady (47)
76:9,14;91:11;115:1,3,18;
116:14;128:1,8;130:1;143:5,
13,17,23;154:17;158:4;
161:5,12;162:1;163:9,18,21;
164:4,5;165:12;166:2,4,8,9,
15,19,21;167:1,7,14,24;
168:4,6,14;187:11,21;196:7,
8,10,18;225:11;226:7
steady-state (6)
162:23;163:1,5;164:24;
165:2,7
stem (6)
229:21;239:17,22;240:19,
20;242:2
stemming (1)
68:21
step (1)
205:24
Stephanie (1)
123:1
stepped (1)
160:23
stepwise (1)
52:14
stick (1)
261:16
still (19)
22:5;28:15;95:6;108:11;
114:4;125:13;134:9;136:25;
139:1;152:3;167:19;169:8,
21;174:2;211:23;213:1;
239:23;241:12;245:19
stinking (1)
200:2
stippled (2)
70:23,25
stipulated (1)
150:22
stopped (2)
248:11;251:25
storage (55)
37:25;67:11;71:24;74:15,
16;75:3;78:3,5,11;80:12,13,
15,19;82:18,20;84:7;235:1,2,
8,19;237:10,13,16,20;238:1,
7,11,14;242:18;243:2,7,13;
245:10,20;253:10,13,16,17,
24,24;254:15,17,22;255:10,
12,22;258:16,19;259:11,17;
260:6,13,17,22;263:19
store (2)
234:6,20
stored (1)
235:25
story (1)
32:7
straight (1)
143:14
straightforward (1)
210:6
streams (1)
261:22
stress (3)
76:12;205:25;206:4
stressed (1)
76:11
stresses (2)
91:4,6
strike (2)
13:1;99:14
striving (1)
177:12
strongly (1)
39:8
struck (2)
147:13;164:21
structural (2)
74:1;176:23
structure (3)
65:22,25;66:10
studies (1)
106:7
stuff (1)
89:11
sub (1)
23:13
subbasins (1)
231:25
subcontract (2)
151:21;195:8
subdivision (1)
95:20
subject (7)
23:15;67:23;68:1;138:6,
21;157:20;224:9
submit (2)
14:1,5
submits (1)
36:8
submittal (1)
27:1
submittals (1)
25:13
submitted (11)
13:17;15:3;25:17;27:5;
29:15;61:25;95:2,13;120:25;
121:6;157:8
subsequent (1)
171:4
subset (1)
154:5
substantial (1)
159:14
subtract (1)
208:6
subtracted (2)
44:11;183:16
success (1)
185:7
successive (1)
191:9
sudden (1)
264:24
suffice (1)
15:15
sufficiency (1)
199:7
sufficient (2)
180:23;185:23
Sugar (3)
124:24;125:13;240:16
suggesting (1)
222:13
suggestion (1)
136:24
suggestions (4)
176:13;223:21,24,24
suitability (1)
169:19
suite (1)
199:12
Sukow (3)
43:6;55:23;161:10
Sukow's (2)
115:24;196:4
Sullivan (4)
157:23;173:1;181:16;
188:1
summarize (5)
42:1;48:7;169:15;177:17;
192:8
summarizes (1)
22:7
summary (7)
16:9;17:18;28:16;29:2;
49:19;87:5;93:8
summer (3)
96:8;183:2;239:7
supplemental (28)
23:6,12,14;24:21;62:12;
63:9;154:14;156:7,14;180:8,
21;181:1,6,18,23;183:10;
184:8,9;185:3,11,20;186:1;
207:9,15,18;210:18;222:17;
224:6
supplied (1)
116:20
supplies (7)
97:15;100:15,17;222:14;
234:1;237:10;259:16
supply (56)
37:11,24;41:15,20;42:21;
43:24;44:3;46:3,9,13,21,24;
48:24;50:18,24;52:14,22,24;
53:4,15,16,17;59:1,2,2,3,6,
11,19;62:13;98:12,15,24;
100:20;101:13,15;102:19;
103:2;131:6;141:9,12;
171:20;178:5,10,17;180:21;
232:7;233:13,20;245:16;
247:9,10;259:7;260:1,2,12
supplying (2)
131:4;254:22
support (6)
12:9;106:4;175:1;181:10,
11;189:17
suppose (2)
223:6,6
supposed (2)
31:9;38:16
surcharge (1)
127:13
sure (24)
34:7;37:18;38:3,21;66:9;
69:16;74:23;87:25;88:6;
96:16;104:10;111:5;119:6;
121:5;128:9;134:24;136:22;
137:3;144:22;145:7;157:13;
158:19;257:16;258:21
Surface (94)
25:14,16;27:15;29:15;
36:7;37:2,6,23;39:3,11;40:1,
11,19;41:6;43:22;45:21;
46:14;51:25;53:2,11,12,24;
59:9;61:15;62:1,22;63:2;
68:16;88:24;92:7;95:13;
103:8;109:17;110:12,16;
125:23;127:2,4,5,8,15;131:5,
21;135:2,7,17;141:8;143:21;
146:19;151:7;169:13;
171:20;174:21;178:4,6;
179:10;181:9,9;183:15;
189:20;191:24;197:15;
200:19;201:15,22;203:18;
211:1,19;221:14;222:3,8,14,
14;223:16;226:16;227:20;
232:7;234:2;235:3;236:20;
238:10;240:19;243:21;
245:9;248:25;253:14,16;
254:14,16;255:4,9,17;256:5;
260:5
surfaces (1)
27:12
surface-water (1)
256:16
surprise (4)
129:1;130:19;187:2;210:8
surprised (1)
140:16
surprising (1)
187:6
survey (1)
230:15
surveys (1)
195:5
sustain (1)
201:14
Swank (1)
246:16
SWC (18)
16:9;25:9;28:16;29:16;
39:1;57:8;93:8;94:22;95:2,9;
99:18,23;100:19;102:20;
112:12;185:11;192:11;
200:14
swear (2)
10:14;228:2
switch (1)
121:25
swoop (1)
236:25

sworn (4)
10:18;122:5;150:3;228:10
symbols (1)
166:1
synthetic (1)
42:3
system (30)
66:6;70:22;71:4;72:1,22;
99:7;105:17,22;126:1;
133:22;140:17,24;141:5,15;
162:23;164:24;183:13;
213:7,9;229:23;234:3;236:2;
237:13;238:2;241:4;253:10,
13,24;256:6;260:7
systems (3)
222:8;247:11;261:20

T

Table (53)
16:9;17:8,17;18:5,9;20:1,
3,7,16;21:1;28:16;29:2,10;
30:25;31:1;45:4,6,13;46:17,
18,22;47:12;48:4,5,6,15;
54:5,5;55:10,12,18,20;57:15;
58:18,18;84:18;85:1;88:1,2;
93:7;114:7;119:1;132:1;
138:24,25;143:3;145:14,14;
148:17,24;250:15;251:11;
252:22
tables (2)
246:23,24
tabulates (1)
86:11
tabulating (1)
59:8
tail-out (1)
261:20
tailwater (1)
261:25
talk (21)
36:24;42:25;69:12;106:3;
142:19;154:12,15;156:11,13,
15;158:23;162:5;176:10;
180:8;186:12,14;199:10;
248:19,21;256:8;262:15
talked (16)
49:17;128:6;133:17;
170:17;176:16;182:14;
189:10,15;194:24;199:11;
203:9;217:8;219:19;222:18;
225:8;244:7
talking (23)
22:18;32:8;43:4;54:10;
68:24;76:3;86:14;87:1;
136:7,9;172:8,10;177:19;
179:8;202:23;221:14;
249:25;254:25;255:15,22;
256:4,16;263:18
talks (4)
49:20;71:19;156:12;
208:14
tall (1)
191:22
tan (1)
33:25
tap (1)
221:3
tapping (1)
220:25
target (3)
67:21,24;186:22
targets (5)
66:19;69:4;77:5;171:9,10
task (2)
182:25;213:2
tasked (2)
159:25;212:18
tasks (1)
90:19
taught (1)
105:22
TDF (1)
245:25
technical (83)
12:17;13:8,10,20,23,24;
14:2,3;17:12,19;20:6,8,24;
21:21;22:20,24;24:20;26:8,
23;28:5,9,21,22;29:4,6;
30:15;32:16;35:22;40:9;
45:8,25;46:5,20;47:17;48:2,
11,17;51:20;53:21;54:22;
60:9;63:18;78:23;92:4,7;
93:9;100:9;116:23;152:24;
154:6,10;156:23;157:19;
158:6;161:3,5,12,16,18,21,
25;173:19;174:5,6,15,18;
177:11;189:10,12;192:1,9,
17;193:3;198:1,4;204:4,6,
19;206:11;214:7;219:6;
223:12,15
technically (19)
156:1,24;162:2;163:16;
165:14,15;167:8;168:12;
170:12;183:8,11;184:5;
185:24;186:3;187:20;
188:18;200:7;206:8;258:4
Technology (2)
11:19,21
tempered (1)
156:2
temporal (1)
189:2
temporary (1)
216:15
tempting (1)
174:11
ten (8)
11:25;12:4;65:20;90:7,8;
124:10;152:18;179:4
tends (1)
203:3
tens (1)
27:21
tension (1)
168:10
tenure (1)
170:1
term (3)
53:9;109:7;215:22
terms (62)
21:3;27:22;32:18;35:14,
17;36:8;37:21,24;38:16;
39:22;40:13,16,19,20;41:17,
18,22;43:7;44:15;45:20;
52:6;54:1;57:9;58:11;59:10,
17;65:23;67:7;69:7;70:10;
72:20;73:19,21;74:10,12,15;
75:6;76:1;86:2;97:5;98:8;
100:7;101:5;103:15,19;
104:19;107:6;115:22;135:3,
8,17,18,24;141:16;142:20;
145:22;146:24;147:17;
174:19;203:6;220:24;233:20
test (2)
79:22;81:1
tested (4)
47:10;48:14,18;227:16
testified (19)
10:19;24:19;42:9;62:11;
92:18;93:5;101:18;110:8;
122:6;134:15;150:4;178:14;
207:9;213:24;215:17;219:2;
225:9;228:11;233:11
testify (5)
85:2,3;122:21;135:22;
136:1
testifying (2)
101:12;110:2
TESTIMONY (68)
7:4;9:14;12:10;14:15;
18:12;27:18;33:16;36:10;
49:15;50:10,23;55:25;64:24;
65:23;67:7;73:14;87:25;
88:6;90:5,12,16;92:3,6,22;
96:18;97:1;98:4,5,10;99:14,
20;100:22,25;101:16;
107:15,23;110:2;115:4,9;
119:6,25;120:18,20;132:18,
22;139:4;140:10;142:7,10;
160:21;161:11,14;179:23;
184:21;193:4;194:8;196:4;
197:1;198:16;200:25;
206:13;207:8,12;245:18;
249:9;251:8;258:18;261:8
testing (1)
80:20
Teton (27)
232:12,19;233:6;238:19,
21,25;239:3,6,9,12,13,17,20,
22,24;240:4,7,11,16,20;
241:3,5,12,22;242:3,8;256:5
Teton-Sugar (1)
240:12
TFC (1)
42:16
TFCC (2)
55:6;64:20
Thanks (3)
9:24;227:17;240:5
theme (1)
203:1
themes (1)
202:22
therefore (2)
155:23;251:20
thinking (2)
148:7;163:15
Third (8)
39:13;40:25;155:25;
191:15,16,23;255:4,5
Thompson (23)
7:7;211:3,6,7;212:16,17;
218:7,9;222:13;224:15;
226:20;227:5;243:23;244:2,
3;246:5,8;249:12,24;251:9,
11;252:12;261:6
thorough (1)
48:12
thoroughly (1)
184:14
though (4)
55:6;168:24;187:4;206:1
thought (14)
74:7,9,21,22;120:17;
128:9;130:20;140:12,14;
141:11;153:17;175:22;
260:16;265:5
thoughtful (2)
170:15,16
thousands (1)
27:22
three (13)
33:18;37:10;48:15;60:23;
79:8;153:14;156:11;181:25;
183:20;199:20;205:22;
241:10;262:22
three- (1)
241:11
three-year (1)
133:25
threshold (4)
203:24;204:1,10;219:5
thresholds (1)
173:24
throughout (7)
15:2;65:25;101:22;
107:13;180:12;251:12;
256:18
thumb (1)
205:13
thumbnail (1)
182:1
time' (2)
162:24;164:25
time-constrained (1)
166:14
times (6)
47:11;134:9;144:23;
179:4;181:13;203:11
timing (9)
76:4,16;102:21,22,23,24;

165:10;188:24;192:12
tiny (1)
151:9
title (3)
152:10,11;153:25
titled (1)
24:10
TJ (3)
237:6,7;258:15
TJ's (1)
111:2
today (19)
9:11;11:4;14:11,15;65:24;
67:8;85:4;91:3;93:5;122:16,
21;207:8;211:9;220:16;
222:20;231:13;235:14,18;
249:3
together (5)
15:21;55:14;139:22;
143:4;174:23
told (3)
131:6,16;137:17
tolerance (2)
173:20;175:6
tomorrow (2)
9:14;264:16
Tony (29)
228:3,19,21;231:12,20;
236:18,22;237:5;240:5;
242:10,21;244:3;245:24;
246:9;248:16,18;249:1,12,
24;250:24;251:3,11;252:3;
253:6;257:13;258:9;261:5;
263:4;264:12
T-o-n-y (1)
228:21
took (4)
28:10;56:4;99:1;210:9
tool (29)
67:2;77:3;102:14;167:13,
19;168:19;169:3,4,18,18,19,
21;174:12,13;179:20;191:2,
4;214:10,13,16,20,25;
215:15;220:22,23,24,25;
221:10;224:19
toolbox (1)
169:20
tools (5)
156:25;174:10;188:14,15,
15
top (7)
41:18;43:16;59:11;
103:23;104:3;202:16;231:9
topic (3)
25:8;238:16,17
topics (1)
157:25
topography (1)
195:15
total (13)
37:23;39:1,3;40:1,11;
43:21;44:18;45:21;46:25;
61:15;165:4;251:12,20
totally (1)
140:17
touch (1)
221:2
touched (6)
61:9;83:2;175:2,11;
177:16;185:9
Towards (7)
164:13;239:6;255:11;
259:11,14,17;260:22
track (2)
229:22;237:14
tracking (1)
175:7
tract (4)
194:25;195:12,17;209:6
trained (1)
182:22
transactions (1)
237:20
transfer (5)
12:10;191:4;214:10,20;
215:8
transient (56)
43:3,8,9;56:2;85:17;86:25;
91:11,13,25;115:1,5,12,16;
116:13;128:1,4;130:4;139:5;
143:14;148:6,17;154:8,16;
158:1,4;160:6,10,15;161:6,
13,21,25;162:2;165:24;
166:4,7,9,12,22,25;167:7,12,
14,24,25;168:3,7,9,13;
196:20;206:11;216:18;
224:22;225:14;226:12;
227:10
transit (1)
223:3
transition (2)
198:23;222:15
transitioned (1)
151:24
transmissivity (15)
67:11;71:24;72:21,23;
74:13;82:18;103:25;104:9,
19,20,21,24;105:2,12,15
transparency (1)
159:14
Travis (2)
211:7;244:3
treated (1)
118:13
tremendous (1)
221:8
tribes (1)
256:2
tributaries (10)
229:19;239:11,14,17,21;
240:2,22;241:16,21;242:7
tributary (17)
66:15;67:13;77:22;78:1;
80:10;83:17;165:5;232:9;
233:2;239:23;240:18,20;
241:4,8,13,14,19
tried (3)
56:5;80:8;158:5
trigger (1)
221:11
trim (7)
109:4,7,8,14;110:3,9,20
trimester (1)
192:12
trouble (1)
243:3
true (11)
96:17;102:10;108:6;
114:20;163:22;196:10;
219:11;224:25;245:21;
248:24;256:18
truth (4)
10:19;122:6;150:3;228:10
try (9)
15:13;48:8;79:19;123:7;
136:14;153:18;168:1;
181:10;264:24
trying (19)
47:5;66:17,24;67:22;
70:19;77:15;78:7;79:3;80:2;
96:15;97:11;114:19;115:10;
153:19;156:25;167:15;
175:8;187:5;249:20
TSCHOHL (2)
195:23;264:17
Tuesday (1)
160:20
turn (15)
16:7;17:6;22:4;77:6;93:7;
103:20;129:12;153:13;
162:17;165:17;180:13;
188:4;189:25;192:5;217:23
turned (1)
73:13
turning (4)
96:18;169:23;193:17;
241:14
turnout (1)
223:7
TWG (4)
16:10;17:9;28:17,18
twice (1)
170:1
Twin (38)
19:22;20:14;27:19;30:16,
18;31:5;42:14,16;46:9;49:4;
50:25;54:19;56:19;58:4,7,
14;59:12;60:14;94:4,23;
95:10;112:15;114:9;132:21,
23;174:1;197:5;209:23;
210:14,19;223:7;235:6,15,
18;236:3;260:12,13;261:24
two (35)
17:21;26:16;71:24;79:8;
85:23;86:22;111:1;112:8;
120:5;141:20;155:19;156:6,
15,17;160:24;161:17;
169:24;171:4;175:12;187:4;
190:21;191:9;192:13;
193:24;205:19;217:7,9;
219:20;224:17,19;226:6;
228:25;235:9,10;259:13
twofold (1)
163:13
two-thirds (1)
64:4
type (13)
12:6;27:8;68:7,9;74:19;
86:2;87:3;129:25;130:1;
162:4;173:5;221:13;256:22
types (3)
125:10;173:23;226:6
typical (4)
43:18;173:24;174:17;
254:2
typically (5)
66:21;125:17;239:6,15;
256:25
typo (4)
58:21;120:1,11,23
typos (1)
157:14

U

ultimately (10)
33:21;39:23;62:23,25;
75:4;79:7,9;80:25;81:8,17
unable (6)
22:10;179:5;184:25;
200:16;205:6,7
uncertainties (1)
76:22
uncertainty (34)
67:16,19,20;68:2,4,8,10;
71:19,20;72:6;76:20;83:24;
84:1,4,22,23;103:4,6,8,11;
107:22,25;108:9,10,11,13,
25;109:1,5;117:15,19;
158:10;200:18,18
unclear (2)
115:2;139:4
under (44)
16:14;22:18;23:13;34:25;
43:7,9;56:2;65:12,13;69:12;
75:25;76:13;80:20;87:2;
92:15;96:21;119:20;120:12,
12,14;127:8;130:3;131:3,7,
20;132:1;143:17,23;145:2,4,
18;151:21;179:23;185:12;
190:10;198:23;213:22;
238:3,7,21;245:6;255:6,8;
256:25
underflow (5)
67:13;77:23;78:1;80:10;
83:17
underlying (2)
183:18;208:14
undermines (1)
198:5
underreported (1)
183:23

understood (4)
87:25;88:6,25;140:16
unheard (2)
213:15,17
unique (1)
43:17
United (2)
230:7,8
units (1)
105:1
University (5)
34:25;151:3,19;228:25;
229:2
unknown (1)
94:20
unless (4)
111:3,23;113:18;172:8
unlikely (2)
51:10;236:4
unnecessary (3)
37:7,8;57:10
unreasonable (5)
248:8;250:5,21;251:15;
252:7
unregulated (2)
230:9,18
unrelated (1)
212:3
unstructured (1)
106:24
unusually (1)
234:11
up (52)
23:4;25:4;27:21;31:22;
34:25;35:3,18;37:2;43:16;
47:3;53:3;65:8;67:5;76:24;
77:4;81:14;83:23;85:19;
86:13;89:11;105:6;106:12;
109:22;111:10;121:2;123:7;
126:1;133:22,23,25;138:6,
24,25;141:5,19;142:2,3;
144:23;149:17;159:13;
198:22;200:3,24;201:3;
231:24;234:17;237:9;239:9;
249:19,22;257:25;262:13
update (6)
34:14;39:14,16;40:4;
55:16;223:22
updated (6)
18:22;25:14;29:25;32:4;
94:25;120:25
updating (4)
36:1;58:4,8;114:16
upon (10)
96:5;105:8;110:4;113:7;
170:19;174:8;176:2;213:19;
214:13;258:16
Upper (12)
144:20;229:22;232:3;
237:12,20;238:2;239:5,10,
20;240:7,9;242:3
upriver (1)
217:15
upstream (7)
230:15,19,22;234:5,7,16;
241:18
up-to-date (2)
36:6,15
use (111)
23:6,12,14;24:21;27:8;
29:13;31:20,23;33:11,11,19;
35:4,5;36:18,19;39:6;52:23;
53:16,16,18;59:6,7;66:15;
74:7;78:19;79:4,14;88:13;
90:18,22;91:22;92:1;94:8,
20,22;96:1,2,3,13;101:14;
103:1;108:17;113:19;115:3,
16,18;118:4;124:25;126:11;
130:10;154:10,16,17;156:1,
2,14;158:7;163:8,21;168:2,4,
13;170:11;171:18;172:15;
174:12;177:23;178:2,16,17;
179:7;180:9;181:14,18,23;
183:10,12;184:2;185:4,17;
188:13;192:11;196:15;
197:24;200:8;207:10,15;
208:23;209:7,11,19,24;
210:14,15;211:20;215:4,8,
25;216:3,10,18;220:23;
221:20;222:1,18,20;225:11;
244:10,23;260:14;263:9
used (94)
17:24;18:15,19,20;19:3,7,
7,11,20;20:11,19,20,25;30:7,
11;31:5,12,19,24;32:1,3;
33:9;34:3;35:8;36:2,6,13;
37:3,16;38:23;39:17;42:5;
46:23;48:16;52:4;55:23,24;
58:8;63:21;65:7;67:1;91:10;
96:13;98:7;109:7,11;110:20;
112:22,24;113:1;117:15,17,
19,23,25;131:3;163:18,19;
166:10,12,15,16,21,25;
167:1,19;168:7,7,22,25;
170:13;173:9;177:7;179:20;
187:16,18,22;188:17;
192:17;198:24;199:12,18;
200:12;211:22;216:6,14;
220:20;224:16;225:15;
227:10;239:9;253:10;259:7;
264:7
useful (8)
158:22;169:22;172:22,24;
173:25;174:3;219:3,6
user (3)
40:19;178:13;263:14
users (13)
37:6;87:16;110:13;
124:24;133:16;141:9;147:1;
174:23;178:14;203:19;
222:7,14;256:1
uses (8)
23:4;106:2;124:21;167:6;
168:11;170:4;187:11;226:6
USG (1)
106:23
USGS (1)
230:19
using (56)
18:11;27:6,14;28:8;29:21,
22;31:22;35:1;36:4,14;
38:23;40:7;50:16;55:15,17,
22;56:8;58:1,1,2,11,14;
60:22;61:16;65:5;68:16;
73:15;75:19,21;78:19;79:19,
22,23;81:22;82:8,13;86:24;
88:3,7,14,20;91:10;109:1;
113:3,14;118:3;159:10;
160:1;169:13,25;173:14;
214:10,19;221:20;224:19;
259:25
usually (4)
241:1,18;244:14,22
Utah (1)
229:2
utilize (1)
94:20
utilizing (2)
96:20;196:10

V

valid (1)
182:21
Valley (10)
86:6;102:2,5,7;123:13,13;
151:13;240:9,15;241:22
valuation (1)
177:20
value (18)
49:5,7;80:13,13,15;82:21,
22;83:3,5;84:7;107:6;
113:13;176:14,19;201:11;
213:11;219:3;220:12
values (25)
39:6,7;67:13;72:24;74:17;
78:5;83:13;102:13;104:20;
165:3;173:2,4;201:6;213:18;
217:8,14,14;218:11,16;
219:12;234:14;248:8;
250:19;251:15;252:7
variabilities (1)
49:9
variability (7)
171:14,17;173:7,11,18;
177:3;220:2
variable (1)
86:1
variables (2)
48:24;52:17
variations (1)
194:12
varied (1)
219:20
varies (2)
115:22;247:8
variety (1)
96:1
various (18)
12:12;13:16;28:12;29:2;
33:4;53:11;56:2;66:13;
93:11,12;164:7;170:8,8;
211:23;219:12;229:14;
232:3;247:2
vary (2)
96:4;252:5
verification (4)
79:20,21;81:16;199:3
verified (3)
94:16;95:2;117:25
verify (4)
34:11;79:19;95:12;195:5
version (29)
20:5;66:11;72:10,23;73:5,
9,18;74:21;75:14,19,22,25;
76:17,25;80:17;81:5,8,13;
84:12;90:23;91:11,13,20;
92:1;106:22;111:2;170:22;
215:14;216:14
versions (8)
72:13;160:16;190:22;
213:25;219:20,20;224:17,19
versus (5)
41:23;57:3;83:11;102:23;
115:1
vertical (5)
66:4;70:8,12,22;105:23
vertically (1)
71:8
vicinity (3)
71:5;86:15;104:23
view (3)
191:11;210:2;231:22
viewpoint (1)
191:11
views (1)
170:11
visual (2)
157:11;240:24
volume (11)
31:23;77:11;85:21;91:24;
126:8,11;213:6;214:24;
244:11;247:18;250:12
volumes (5)
23:4;99:7;251:12,16;252:4
voluntary (1)
238:8
vote (1)
81:7

W

wades (1)
160:12
Wait (4)
190:17;222:11;242:19,20
wants (2)
203:20;257:22
Warner (1)
175:25
warranted (1)
103:13

water (324)
12:8,10,13,16;20:18;
25:14,16;27:15,22,23,25;
29:15;36:7;37:2,6,11,21,23;
39:3,11;40:1,11,19;41:6;
43:22,24;44:2,2,6,10;45:21;
46:14;49:19;51:25;52:25;
53:2,12,12,24;55:7;59:10;
61:12,15;62:1,22;63:2,6;
66:5,21;67:12;68:2,8,16;
71:7,25;72:22;73:20;74:4;
75:6;76:10,19;77:4;78:8,9,
11;79:15;83:2,4,24;84:3,4;
88:24;91:16,24;92:7;95:13;
98:9,11,15,24;99:3;100:20;
101:9,25;103:2,8;107:25;
108:16;109:2,17;110:12,13,
16;112:22;113:4,5,7,25;
114:17,22;115:6,11;122:22;
123:14;124:24,25;125:1,16,
23;126:2,11;127:2,4,5,8,8,
15,16;130:2;131:4,5,7,11,21;
132:25;133:11;135:2,7,18;
139:7;140:22;141:4,9,9,12;
143:21;146:19;147:2,19,24;
150:2,14;151:5,7,12,16,19,
21,25;152:1,9,18,20;153:5;
154:13,14;155:3;159:3,6;
169:14;170:14;171:20,20;
172:2;174:21;175:20,25;
177:24;178:4,6,9;179:10;
180:8;181:9,10;182:5,13;
183:12,15;186:1;189:6,21;
191:24;195:9;197:15;
200:19;201:15,22;203:18;
208:21,25;209:5,11,13,24;
210:14;211:1,19,20;213:4,
11;214:3,24;221:14,16,17,
18,20;222:3,7,8,14,14;
223:16,17;226:16;227:20;
229:6,11,12,15,17,22;230:2,
3,14,23;231:3,11,14;232:7,7,
18;233:13,20,24,25;234:2,6,
20,20;235:3;236:1,12,20;
237:10,11,13,15,16,20,23;
238:1,10,11,14,20,22;
239:11,15,16,23;240:1,3,14,
19;241:2,8,11,15,17,20,20;
242:6;243:13,21;245:9,15,
16;246:16,17,25;247:9,9,19;
248:25;251:12;253:9,14,16,
17,17;254:1,14,16;255:1,3,4,
5,9,18;256:1,6,9,20;258:25;
259:20;260:5,6,8,9,11;261:7,
10,13,21;263:7,9,13,14,14,
18,22,23
watermaster (11)
229:5,8;230:1;233:19;
237:12;238:22;240:25;
246:3,16;248:7;260:4
watermasters (2)
252:23,24
watershed (2)
229:3;233:17
watersheds (1)
234:1
way (33)
10:13;42:25;46:12;53:13;
62:21;64:4;67:2;69:9;82:10;
84:1;108:22;115:6,17;131:3;
147:18;156:18;168:6;
174:12;177:11;182:20;
184:24;185:19;187:16,21;
198:7;201:13;203:22;206:2,
2;219:25;242:11;254:19;
258:20
ways (6)
46:11;79:24;119:2;
163:21;169:24;183:4
wear (1)
176:22
weather (1)
35:2
website (2)
155:5;231:3
week (1)
244:14
Weekly (1)
223:10
weeks (1)
236:6
weigh (1)
231:8
weighed (1)
220:24
weight (1)
231:10
welcome (1)
87:20
well-justified (1)
79:6
wells (7)
48:18;51:19,20;73:20;
151:12;224:25;225:1
weren't (4)
99:2;129:9;179:22;242:14
west (1)
151:13
wet (1)
131:4
whatever's (1)
93:22
what's (20)
18:10;28:24;45:22;65:13,
24;70:5;93:25;94:18;109:7;
122:24;152:10,23;163:11;
168:18;174:24;185:10;
186:25;187:5;245:25;254:2
wheeled (1)
61:12
whenever (2)
56:12;84:11
whereby (1)
126:1
wherever (1)
78:10
white (2)
129:13;170:7
whole (8)
107:2;160:24;172:10,11;
186:5;239:4;240:9,16
Who's (1)
152:6
wide (2)
50:20;103:16
widespread (1)
74:12
Willow (5)
232:14,22;233:7,13;
234:13
W-I-M-S (1)
183:12
window (1)
191:11
windshield (1)
195:5
winter (3)
144:17,20;254:3
wish (6)
155:19;207:2;217:21;
219:17;238:17;264:23
withdraw (1)
256:14
withdrawal (1)
146:4
withdrawals (1)
159:6
within (27)
27:17;36:20;37:12;70:4;
85:19,22;95:16;126:12;
130:14;144:1;157:24;168:2;
170:1;171:22;175:5;180:2;
183:14;185:11,16;209:13,
23;210:19;217:14;218:16;
229:13;230:2;250:2
without (7)
32:22;37:6;53:3;87:6;
194:19;195:12;218:23
witness (46)
9:17,25;10:11;12:9;23:21;
26:6;33:8,11;78:18;98:19;
110:7;111:24;116:11;121:9,
10,18,24;122:10;134:23;
135:5,9,12,15,20,22,23;
146:15;152:14;153:19;
162:13,15;185:13,15;
190:21;224:14;236:23;
243:3,9,12;248:10,13,18;
249:1;257:13,15,20
witnesses (4)
149:14;160:22;194:6;
202:23
WMIS (3)
183:14,19;224:11
W-M-I-S (1)
224:14
wonder (2)
111:8;221:11
Wonderful (1)
14:10
wondering (1)
265:10
WOOD (10)
9:18;16:16,19;24:7,12,14,
17;162:9,11,14
word (8)
33:6,9;168:22,24;214:19;
216:1,3;262:7
work (47)
12:6,25;14:24;15:24;22:7;
24:25;25:6;35:23;92:5;93:1,
9;105:15;121:4;127:10;
151:4,11,18,21,25;152:1,1;
157:16;158:8,9,11,25;169:4;
170:18;174:15,18;175:9;
177:11;189:11,12;190:8;
192:1,17;193:3,8;197:15;
198:10;204:9,19;211:13;
220:16;221:10;264:17
workaround (1)
16:1
worked (11)
12:20;32:19;90:14;
151:15;155:3;159:1;194:23;
199:3;212:13,21;214:3
working (56)
12:3,4,17;13:20,23,24;
14:2,3;16:3;17:13,19;20:6,8,
24;21:21;22:20,25;24:20;
26:8,23;28:5,9,21,22;29:4,7;
32:16;34:24;35:23;40:9;
45:9,25;46:5,20;47:17;48:2,
11,17;51:20;53:21;54:22;
60:9;63:18;65:20;78:8,23;
81:12;90:5,14;92:8;100:10;
152:24;211:15;212:2,4;
223:16
works (5)
67:3;114:23;239:2;
243:14;257:16
worry (1)
169:5
worst (4)
217:18,20;218:25;219:1
wrapped (1)
200:24
wrench (3)
169:21;221:1,3
wrestling (1)
182:11
writing (3)
159:16;265:7,10
written (2)
14:12;132:22
wrong (4)
69:5;84:15;175:20;177:6
wrote (1)
98:7

Y

yea (1)

142:18
year (160)
23:4;25:2;30:11;31:20;
32:4,10;34:13,14,16;36:11,
24;37:16;38:19,22;39:2,8,14,
17,18,19,20,21,23,24,25;
40:4,6,10,16;41:1,9,12,13,
22;42:3,12,15,19,21;43:19,
25;44:1,11,13,14,16,21,24;
45:15,17;47:23;49:13,19;
51:8,8;53:15,23;54:8,8;
55:16,16,17,19,20,23;56:10,
23;57:7,8,22;58:25;59:1,18,
22,25;61:2,16;62:7,7,8,25;
86:24;88:3,8,18,20;91:21;
94:14;95:23;96:19,20,21;
97:2,6,10,19,19;98:3,5,13,
15;99:3,17;100:20;101:1,4;
115:7,11,15,20;116:4;
125:19;127:11,23;128:14,
19;129:10;131:12,14;
133:24,24;136:10;138:12;
139:13,20;140:13;141:12;
145:6,10,12;146:22;163:8,
10,10;164:1,2;168:16;187:8;
191:15,16;199:20;201:23;
204:11;233:20;234:10;
237:21,21;244:9,12;247:5,7;
248:2,6;251:19,24;259:12,
24;261:11,13;264:9
years (72)
11:24,25;12:4;32:2,3;34:8;
35:6;37:1,18;40:23;45:7;
47:24;55:6;56:16,16,24;
57:1,1,3;60:12,17,19,23,25;
61:5,14;65:20;84:13;88:9,
15;89:1,2;90:7,8;94:7,17;
96:22,23;98:6;124:10;
128:23;132:13,15;141:17,18,
19,20,25;142:5;143:1,2;
144:25;147:11;182:11;
183:20;204:16;206:15;
214:18;221:15;228:25;
229:2,8,9;230:13;235:24;
239:9;240:25;247:22;
248:11;251:25;256:11;259:6
yellow (2)
75:12,18
yep (1)
32:2
yesterday (2)
111:2;132:18

Z

zeros (1)
185:16
zoomed-in (1)
35:16

0

0.06 (1)
130:17
0.1 (1)
171:15
0079 (1)
218:22
04 (1)
53:18
05 (1)
82:22
05S31E27ABA1 (1)
51:14
06 (5)
39:10,24;40:25;45:16;
53:18
08 (3)
39:10,24;41:1
08-'12 (2)
41:3,4

1

1 (28)
40:15;131:10;151:21;
171:17;178:3,17;179:6;
213:12;221:21;229:6,11,12,
17,22;230:2,3,23;231:3;
233:25;237:12;238:22;
246:16;247:20;251:13;
252:5;261:7;263:14,23
1,000 (5)
163:6,7;164:1;165:8,9
1.1 (1)
159:11
1:00 (1)
111:14
10 (13)
28:16;49:12;60:10;93:6;
120:22;141:19,22;180:13,
16;204:16;213:16,22;252:5
10,000 (2)
27:21;61:21
100 (8)
39:10;40:24;41:10;42:6;
178:12;256:16;263:24;264:4
100,000 (2)
59:21;133:2
100.00001 (1)
203:12
101 (6)
40:1,24;41:1,6,10;45:20
102,000 (1)
125:8
103 (4)
14:14;21:10;23:24,25
104 (3)
40:11,15;41:7
106 (1)
42:15
1092 (1)
122:19
11 (2)
30:13;165:17
11,500 (1)
54:12
110,000 (1)
54:18
12 (7)
32:12;39:24;41:1;141:19;
142:2;164:15,15
120 (1)
233:6
120,000 (1)
40:18
124 (1)
233:5
125 (5)
217:24;218:2,6,7,13
13 (2)
35:10,20
13,324 (1)
235:16
15 (7)
64:7;115:20;116:3,4;
141:23;196:20;225:17
15,000 (5)
30:17;31:4;64:21,24,25
150 (1)
144:23
15-minute (1)
193:24
16 (4)
56:16;57:1,3;218:19
16th (3)
21:15;26:14;45:24
17 (2)
38:18;229:9
178 (1)
233:7
18 (1)
42:10
180- (1)
133:1
186 (1)
233:7
1884 (1)
239:8
1885 (1)
239:7
19 (2)
30:17;45:4
190 (1)
218:2
1900 (2)
56:13,17
194,732 (2)
30:18;64:22
195,000 (1)
133:1
1953 (4)
128:16;130:15,25;226:18
1961 (2)
43:11;75:17
1983 (1)
229:3
1986 (2)
34:8;35:6
1990 (1)
230:5
1993 (1)
144:3
1996 (2)
34:8;35:6
1999 (3)
205:22,25;215:13
1st (4)
234:15;244:15,18,23

2

2 (7)
23:13;112:8;126:5;
178:15;194:17;195:17;
221:20
2,000 (4)
164:1,2,6,7
2.1 (6)
18:5;72:24;84:9,10;108:3,
20
2.2 (9)
72:15;84:10;107:18;108:3,
20;125:19;126:4,6;220:6
2.2.2 (1)
119:21
2.4 (1)
126:5
20 (4)
43:15;76:1;143:2;204:16
200,000 (1)
125:7
2000 (13)
18:2;19:2,4,8;20:13;34:9;
37:18;38:24;39:2,15;40:5;
55:15;57:19
2000s (1)
222:21
2000-to-2021 (1)
45:10
2001 (1)
151:20
2004 (1)
237:23
2005 (3)
123:3;205:25;230:5
2005-2007 (2)
18:11;19:14
2006 (11)
32:14;34:7;35:6;39:1,6;
160:13;163:15,20;165:22;
206:1;230:4
2008 (8)
30:21;32:9;34:3,12;38:24;
39:3,6;69:18
2010 (6)
11:24;18:25;19:10;151:20,
24;198:22
2011 (10)
29:21;30:21;93:17;94:5,
11;95:3;246:9,15;261:6,10
2012 (5)

12:3,20,21;39:19;90:13
2013 (12)
12:3,21;18:6;19:6,20;
94:12,19,21;95:1,8;117:22;
206:3
2014 (8)
18:2,21;19:4,8;20:6,13;
39:16;47:21
2015 (41)
11:23;13:24;14:2,13;
16:10;17:9,11,23;18:18;
20:23;21:15,21;22:22;23:22;
24:20;25:20;26:7,14;28:9,
22;30:10;32:17;46:4,20;
47:14;48:11;50:19;52:20;
63:11,18;92:4;93:2;134:8,
10;135:3,8;136:11;141:25;
145:18;146:18;147:14
2017 (9)
29:25;30:22;32:10;34:13;
93:17;94:5,5,11;210:4
2018 (29)
40:7,10;42:15;43:18,23;
44:7,11,12;45:9,16;53:23;
55:17,22;56:8;57:7;59:24;
61:2,10,13,18;62:3;88:3,7,
20;96:20;98:4,12;99:3;101:5
2019 (1)
230:4
202 (1)
148:4
202,000 (2)
125:7;148:2
2020 (7)
40:7;45:9;73:4,6;76:24;
79:17;211:13
2021 (8)
30:5,22;34:16;40:6;58:10,
12;93:18;206:14
2022 (24)
13:21,23;14:2,16;18:23;
20:9,9;28:5,17,18;29:4,6;
40:9;47:17;48:2;52:20;
55:15;57:19;58:11;63:12;
93:9;100:10;152:23;211:16
2023 (7)
45:24;136:10;138:1;
154:20;203:24;211:17;
231:19
205 (2)
148:4,12
205,000 (2)
148:3,15
20-year (1)
88:16
21 (3)
188:8;192:23;218:21
2-1 (4)
16:9;17:8;21:1;32:12
2-10 (1)
58:18
216 (1)
233:8
217,151 (1)
130:10
21st (1)
127:22
22 (2)
46:17;48:4
2-2 (2)
20:1;35:10
228 (1)
7:5
23 (3)
56:16;119:20;180:16
2-3 (5)
28:16;31:1;38:7;93:7;
119:1
237 (1)
7:6
24 (1)
132:24
2-4 (2)
45:4,6
240 (3)
148:7,12,19
240,000 (4)
147:2,9,25;148:2
240,000-acre-foot (1)
145:23
244 (1)
7:7
25 (3)
54:6;142:4;189:25
2-5 (2)
46:17;47:12
25,000 (1)
54:20
250,000 (1)
235:12
2500 (1)
122:19
253 (1)
7:8
258 (1)
7:9
26 (1)
55:11
2-6 (1)
48:4
261 (1)
7:10
263 (1)
7:11
27 (2)
57:15;114:8
2-7 (3)
38:8;54:5,5
28 (2)
190:6;192:5
2-8 (2)
55:10;88:2
28th (1)
231:18
29 (3)
157:10,11;193:17
2-9 (1)
57:15
2-acre (1)
195:12

3

3 (4)
71:15;141:24;178:16,23
3,262 (1)
143:12
3.3 (1)
191:1
3.4 (1)
191:4
3.4.2 (1)
69:12
3.4.3 (2)
71:15;104:5
3.4.4 (1)
84:17
3.8 (1)
80:23
3:30 (1)
193:25
30 (10)
47:1,10;65:3;111:2;
155:17;162:17,19;209:5,7,19
300 (4)
154:19;162:9,10;182:21
300- (1)
86:15
300,000 (3)
83:18;88:16,19
30th (3)
128:16;130:15;226:18
3-1 (4)
70:15,20;84:18;129:18
3-10 (1)
120:22
32 (1)
68:19
3-2 (1)
70:15
32,000 (1)
40:18
33 (2)
70:15;104:10
3-3 (2)
72:16;104:11
34 (3)
71:15;103:20,23
3-4 (1)
75:2
35 (1)
188:4
3-5 (1)
75:9
36 (2)
72:17;188:4
3-6 (1)
76:7
366 (6)
227:24;231:15;236:9,12,
15,16
37 (1)
75:2
3-7 (2)
77:7,9
38 (2)
75:8;195:20
3-8 (1)
82:15
387 (1)
114:8
39 (1)
76:19
3-9 (1)
82:25
3rd (1)
233:4

4

4 (3)
23:13;24:11;57:1
4,000 (1)
62:2
4,000-foot (1)
54:10
40 (3)
77:8;209:8,20
400,000 (1)
86:15
40-acre (3)
195:12,17;209:6
40-acre-tract (1)
194:15
41 (1)
80:23
42 (9)
171:13,14;173:11,11,17,
18;177:3,9;218:21
44,715 (1)
19:19

5

5 (10)
27:14,17,20;173:25;178:9,
11;194:16;213:7;219:2,21
5,000 (9)
61:20,23;209:14;255:7;
259:9;260:1,2;263:7,17
5.1 (3)
143:16,18,20
5.8 (1)
178:8
5:21 (1)
265:15
50 (2)
21:12;59:20
50,000 (2)
59:14,20
500 (9)
153:13;164:11,15;190:1,2;

206:17,19,21,22
500,000 (1)
43:12
511 (1)
157:13
512 (2)
217:23;218:1
515 (2)
182:7,18
55 (1)
22:4
56 (4)
23:11;24:4,5,22
57 (1)
191:21

6

6 (2)
178:23;179:4
60 (6)
88:13;89:2;179:7;181:13;
185:16;197:23
60,000 (4)
42:17;43:1,10;59:18
600,000 (1)
83:21
61 (1)
218:20
65 (1)
132:24
65,000 (1)
54:17
66 (3)
25:19;26:4;89:1
68 (1)
26:16

7

7 (2)
213:14;231:17
7.3 (1)
80:4
70 (1)
87:1
75 (1)
191:20
75,200 (1)
235:16

8

8 (7)
17:7;246:6,7;252:13,15,
17,18
8,000 (1)
209:13
80s (1)
142:3
826 (1)
88:1
829 (6)
129:13,17;145:14;148:23;
149:6,7
83 (2)
162:20;163:12
83335 (1)
122:20
837 (14)
14:7;16:13,17,19;17:7;
24:4,6;26:4;28:15;87:8,12,
13;129:19;148:24
85,000 (1)
54:20
88,000 (1)
131:1
8th (1)
9:4

9

9 (4)
20:2;116:3;196:20;225:17
9,000 (2)
62:4,5
9:00 (3)
9:3;264:15;265:12
900 (1)
57:4
90s (2)
56:22;106:9
916 (1)
14:17
93,000 (1)
54:13
940,000 (1)
57:4
941,000 (1)
56:14
97 (2)
39:2;87:1
97,000 (1)
56:11

BEFORE THE DEPARTMENT OF WATER RESOURCES

OF THE STATE OF IDAHO

IN THE MATTER OF DISTRIBUTION OF	**) DOCKET NO.**
WATER TO VARIOUS WATER RIGHTS	**) CM-DC-2010-001**
HELD BY OR FOR THE BENEFIT OF A&B	**)**
IRRIGATION DISTRICT, AMERICAN	**)**
FALLS RESERVOIR DISTRICT #2,	**)**
BURLEY IRRIGATION DISTRICT,	**)**
MILNER IRRIGATION DISTRICT,	**)**
MINIDOKA IRRIGATION DISTRICT,	**)**
NORTH SIDE CANAL COMPANY, AND	**)**
TWIN FALLS CANAL COMPANY	**)**
_____	**)**

BEFORE

HEARING OFFICER: GARY SPACKMAN

VOLUME IV

Date: June 9, 2023, 9:03 a.m.

Location: Idaho Department of Water Resources
322 East Front Street, 6th Floor

REPORTED BY:

ANDREA L. CHECK, CSR No. 748, RPR, CRR

Notary Public

A P P E A R A N C E S

for the Department of Water Resources:
Office of the Attorney General
Idaho Department of Water Resources
BY MR. PETER A. WOOD, ESQ.
322 East Front Street, Suite 648
Boise, Idaho 83720-0098
pete.wood@idwr.idaho.gov

For the City of Pocatello:
Somach Simmons & Dunn, P.C.
BY MR. MAXIMILIAN C. BRICKER, ESQ.
1155 Canyon Boulevard, Suite 110
Boulder, Colorado 80302
mbricker@somachlaw.com

For the Cities of Bliss, Burley, Carey, Declo, Dietrich, Gooding, Hazelton, Heyburn, Jerome, Paul, Richfield, Rupert, Shoshone, and Wendell:
McHugh Bromley, PLLC
BY MR. CHRIS M. BROMLEY, ESQ.
& MS. CANDICE M. McHUGH, ESQ.
380 South 4th Street, Suite 103
Boise, Idaho 83702
cmchugh@mchughbromley.com

A P P E A R A N C E S (Continued)

For the Surface Water Coalition, Twin Falls Canal Company, North Side Canal Company, and Milner Irrigation District, A & B, Burley Irrigation District:

Marten Law
BY MR. JOHN K. SIMPSON, ESQ.
101 South Capitol Boulevard, Suite 305
Boise, Idaho 83702
jsimpson@martenlaw.com

For the Minidoka Irrigation District, AFRD#2:

Fletcher Law Office
BY MR. W. KENT FLETCHER, ESQ.
1200 Overland Avenue
Burley, Idaho 83318-0248
wkf@pmt.org

For the City of Idaho Falls:

Holden, Kidwell, Hahn & Crapo
BY MR. ROBERT L. HARRIS, ESQ.
1000 Riverwalk Drive, Suite 200
P.O. Box 50130
Idaho Falls, ID 83405
rharris@holdenlegal.com

A P P E A R A N C E S (Continued)

For Idaho Ground Water Appropriators, Inc.:
Racine Olson, PLLP
BY MR. THOMAS J. BUDGE, ESQ.
& MS. ELISHEVA M. PATTERSON, ESQ.
201 East Center Street
Pocatello, Idaho 83201
tj@racineolson.com
elisheva@racineolson.com

For Madison Ground Water District, Henry's Fork Ground Water District, Jefferson Clark Ground Water District:
Rigby, Andrus & Rigby Law, PLLC
BY MR. JERRY R. RIGBY, ESQ.
25 North 2nd East
Rexburg, Idaho 83440
jrigby@rex-law.com

For Bonneville-Jefferson Ground Water District:
Olsen Taggart, PLLC
BY MR. SKYLER C. JOHNS, ESQ.
P.O. Box 3005
Idaho Falls, Idaho 83403
sjohns@olsentaggart.com

A P P E A R A N C E S (Continued)

For Bingham Ground Water District:

Dylan Anderson Law

BY MR. DYLAN K. ANDERSON, ESQ.

P.O. Box 35

Rexburg, Idaho 83440

dylan@dylanandersonlaw.com

For Twin Falls Canal Company:

Marten Law

BY MR. TRAVIS L. THOMPSON, ESQ.

163 2nd Avenue West

Twin Falls, Idaho 83301

tthompson@martenlaw.com

I N D E X

W I T N E S S E S

TESTIMONY OF SCOTT KING	**PAGE**
Direct Examination by Ms. McHugh	14
Cross-Examination by Mr. Thompson	24
TESTIMONY OF DEAN DELOREY	
Direct Examination by Ms. McHugh	27
TESTIMONY OF CHARLES BROCKWAY, Ph.D., P.E.	
Direct Examination by Mr. Thompson	35
Cross-Examination by Mr. Budge	57
Cross-Examination by Mr. Harris	102
Cross-Examination by Mr. Anderson	123
Cross-Examination by Mr. Bricker	126
Redirect Examination by Mr. Thompson	132
Recross-Examination by Mr. Harris	138
TESTIMONY OF DAVID B. SHAW, P.E.	
Direct Examination by Mr. Thompson	141
Cross-Examination by. Mr. Budge	147
Cross-Examination by Mr. Bromley	156

I N D E X

W I T N E S S E S (Continued)

REBUTTAL TESTIMONY OF MATTHEW ANDERS, P.G.
Direct Examination by Mr. Wood 171
Cross-Examination by Mr. Budge 180

REBUTTAL TESTIMONY OF BRYCE CONTOR
Direct Examination by Mr. Johns 186
Cross-Examination by Mr. Fletcher 190
Cross-Examination by Mr. Harris 193

E X H I B I T S

NO.	MARKED	RECEIVED
SWC		
2 -	***	199
4 -	***	56
5 -	***	56
6 -	***	56
7 -	***	56
IDAHO FALLS, POCATELLO, AND COALITION OF CITIES		
317 -	***	14
348 -	***	196
349 -	***	196
350 -	***	196

E X H I B I T S (Continued)

NO.	MARKED	RECEIVED
BONNEVILLE-JEFFERSON GROUND WATER DISTRICT		
502 -	***	185
504 -	***	185
505 -	***	185
506 -	***	185
515 -	***	185
McCAIN FOODS USA, INC.		
600 -	***	14
601 -	***	14
602 -	***	14
603 -	***	14
604 -	***	14
AMALGAMATED SUGAR COMPANY		
700 -	***	28
701 -	***	28
702 -	***	28
703 -	***	28
IGWA		
837A -	198	199
838 -	101	102

E X H I B I T S (Continued)

NO.	MARKED	RECEIVED
COMMON EXHIBITS		
900 -	***	197
901 -	***	197
902 -	***	197
903 -	***	197
904 -	***	197
905 -	***	197
906 -	***	197
908 -	***	197
909 -	***	197
910 -	***	197
912 -	***	197
914 -	***	125
928 -	***	197

P R O C E E D I N G S

HEARING OFFICER: The 9:00 o'clock hour has arrived. Let's go on the record.

Okay. Are there preliminary matters we need to discuss this morning?

MR. THOMPSON: I just have one, Director.

This is Travis Thompson.

HEARING OFFICER: Yes.

MR. THOMPSON: Yeah. One of our witnesses, Chuck Brockway, had a procedure Tuesday. He thought he would recover in time to get here, but he's still feeling the effects of that. So I asked the parties last night if they would stipulate to allowing him to participate remotely. With your permission, he's able to do that, so I'd like to bring that up.

HEARING OFFICER: Any objection from the parties?

Okay. We've allowed that remote participation earlier in the hearing, so I'll allow it again. It causes some difficulties, but I recognize that there are circumstances that may arise.

I also, last night, received word from Sarah Klahn that she had an emergency and will not be here today, so she is excused. She said that her

interests will be adequately represented today by Mr. Bricker or others.

So thanks for being here, Mr. Bricker.

I also asked that Sarah, Andrea, and Pete Wood compile a list of exhibits.

Have those been compiled and distributed? Pete or Andrea, do you know?

MR. WOOD: I don't know. Let me send Sarah an email. I didn't do --

COURT REPORTER: She's was working on it, so --

MS. TSCHOHL: They were distributed to everyone, and they should be on your desk as well.

HEARING OFFICER: Okay. So the parties, apparently, have a list of those exhibits. And either at recess or lunchtime if you could review that exhibit list and ensure that the exhibits that you want received into evidence at least have been offered. And any that are -- have not been offered, we'll do some cleanup at the end, or you can offer those as testimony as presented.

Okay. Other matters we need to talk about? The next witness?

MS. McHUGH: Sorry. So many cords. Sorry.

MR. THOMPSON: Two for two.

MS. McHUGH: Two for two. It's because I have flip-flops on, and I shouldn't be wearing those.

HEARING OFFICER: Apparently, you're calling a witness.

I'm glad to see you're light on your feet this morning, Ms. McHugh.

MS. McHUGH: I know.

Yes. McCain Foods would call Scott King.

HEARING OFFICER: Mr. King, if you'll come forward.

SCOTT KING,

called by McCain Foods, having been first duly sworn to tell the truth relating to said cause, testified as follows:

HEARING OFFICER: Please be seated here.

MS. McHUGH: And can the witness have exhibit -- the McCain exhibit book. I think it should be --

Is it in front of you?

Okay. And then also there will be exhibits -- the volume that includes Exhibit 317.

And, Mr. Director, I'll let you know, I had asked the parties if they would stipulate to the

exhibits offered by McCain, which were Exhibits 600 -- well, I'll wait a minute -- Exhibit 600, which is water rights for the McCain factory. In your book you should have Water Rights 2749, 7130 -- oh, that's wrong -- 2747, 2748, 2758, and 13970.

And just for the parties' notes, when I submitted these originally, I had three additional water rights included in there, and those have been removed from Exhibit 600.

And then Exhibit 601, 602, 603, and 604, the parties have agreed to have those -- to stipulate to their admission.

And then Exhibit 317, that exhibit has also been stipulated for admission.

HEARING OFFICER: Is the stipulation that's represented by Ms. McHugh -- is the stipulation accurate, and the parties agree to the --

MR. FLETCHER: It is, from our extent.

HEARING OFFICER: -- to the admission of these documents?

MR. FLETCHER: Yes, the Surface Water Coalition has stipulated.

HEARING OFFICER: Okay. And no objection from anyone else?

Okay. So the documents marked as Exhibit 601

through 604 -- well, let's recite all of them, 601, 602, 603, 604, and Exhibit 317 are received into evidence.

MS. McHUGH: And Exhibit 600.

HEARING OFFICER: Pardon me?

MS. McHUGH: And Exhibit 600.

HEARING OFFICER: Oh, I'm sorry. That's right. It started at 600. I apologize. And 600.

Thank you for the correction.

(Exhibits 600 - 604 and 317 received.)

DIRECT EXAMINATION

QUESTIONS BY MS. McHUGH:

Q. Good morning, Scott. Candice McHugh on behalf of McCain Foods.

Would you please state and spell your name for the record.

A. Scott King. S-c-o-t-t, K-i-n-g.

Q. And would you provide a brief background as it is relevant -- as it relates to today's proceeding?

A. I'm currently employed as a civil engineer with HDR, Inc. Previously with SPF Water Engineering, SPF --

COURT REPORTER: Okay. Slow down a little bit for me. Okay?

THE WITNESS: Will do. Sorry. Thank you.

SPF Water Engineering and HDR merged about a year ago, and I've been with SPF since around 2004.

As it relates to this hearing, I have worked on water right issues for McCain Foods going back to my time at SPF and continuing to HDR.

Q. (BY MS. McHUGH) And are you familiar with McCain's groundwater rights that divert from the Eastern Snake Plain Aquifer and serve the Burley facility?

A. Yes, I am.

Q. And could you look at Exhibit 600.

A. Yes.

Q. And you've been a consultant for McCain for, roughly, ten years? A little over ten years?

A. Yes. I believe I first started working for McCain Foods in late 2014.

Q. Does Exhibit 600 accurately show the water rights that McCain Foods uses for the Burley facility -- currently uses for the Burley facility?

A. Yes.

Q. Are there other water rights that McCain has at the Burley facility?

A. Yes.

Q. And why aren't they included in Exhibit 600?

A. Those ones are not being used, and I understand that they're part of a mitigation plan

already. So they're unused water rights. McCain doesn't need them.

Q. Is it your understanding that they're already curtailed under maybe a nonused -- because of a different water --

A. Yes. If I said "mitigation plan," I was incorrect. It's unused because they're curtailed because of their junior priority.

Q. In this particular case relative to McCain's interests, what were you originally tasked with doing?

A. In 2014 -- currently or in 2014?

Q. Currently.

A. Okay. I was tasked with providing technical analysis of McCain's water use as it related to developing a mitigation plan to address shortfalls in curtailment due to the Surface Water Coalition call.

Q. And when did you start working on that task with McCain?

A. That was March of this year.

Q. And why did you start working on it in March of this year? Do you know?

A. That's when I was asked to begin working on it.

Q. Are you aware of the proposed curtailment date that's pending on the aquifer back to December 31st,

1953?

A. Yes.

Q. And when you learned that as a consultant with McCain, what was the response to that?

A. We had conversations. We met and discussed the plans that we had considered for mitigation before and were trying to develop alternatives to meet this deadline, this date.

Q. And when did you learn of the proposed curtailment back to 1953?

A. Sometime late in April.

Q. And did you assist McCain in figuring out what to do in response to that curtailment date?

A. Yes.

Q. Could you look at Exhibit 601.

A. Yes.

Q. And could you identify that document?

A. This is a letter from McHugh Bromley, your law office, to Southwest Irrigation District petitioning to join the district for mitigation purposes.

Q. And what happened after that letter was sent to Southwest Irrigation District?

A. The district accepted the petition and allowed McCain to join the district for mitigation purposes.

Q. And why did McCain decide it needed to send a

letter to Southwest Irrigation District rather than continue your work on developing its own mitigation plan?

A. We didn't have sufficient time to develop McCain's own plan, so Southwest Irrigation District was the best alternative to meet that deadline.

Q. Was it your understanding there was a deadline that McCain had to meet in order to avoid curtailment this season?

A. Yes.

Q. Do you remember what that date was?

A. I think that was May 5th.

Q. And was that based on an order by the Director?

A. Yes.

Q. Once the letter was sent to Southwest Irrigation District and they accepted McCain within their boundary, do you know what happened next?

A. That I believe you notified the Department of Water Resources that McCain Foods had been accepted into Southwest for mitigation purposes.

Q. Can you look at Exhibit 602.

A. Yes.

Q. Can you identify that document.

A. Yes. This is your notice of mitigation to the

Department of Water Resources that McCain Foods was accepted into Southwest Irrigation District for mitigation.

And in the last paragraph they're requesting some kind of acknowledgment from the Department of Water Resources that they had been accepted.

Q. Okay. And if you could turn to Exhibit 603.

A. Okay.

Q. Have you seen that document before?

A. Yes.

Q. And what is that document?

A. This is an email from Garrick Baxter to you acknowledging that IDWR understands that these four McCain Foods water rights that were in Exhibit 600 were brought into Southwest Irrigation District for mitigation.

Q. And what is your understanding of what will happen if Southwest Irrigation District is not in compliance with their mitigation plan?

A. Part of this email also states: "So long as Southwest Irrigation District is in compliance with its approved mitigation plan, the four rights should be protected from curtailment."

So I would understand, there, if Southwest is not in compliance, that it could mean that McCain Foods

could be curtailed.

Q. Does McCain have any water rights senior to December 31st, 1953?

A. No.

Q. And do you have an understanding of what would happen if McCain did not have any water rights -- valid water rights at its Burley facility?

A. My understanding that McCain Foods would not be able to operate without having water.

Q. And throughout this process, has McCain had any concern about the process relative to understanding when the curtailment date was announced and being able to protect its water rights?

A. Yes, that there was insufficient time to develop their own mitigation plan to meet the deadline.

Q. Was McCain Foods' interest in developing its own mitigation plan its first priority, or was it -- how did that work?

A. McCain Foods wanted to have their own mitigation plan that they would be in control of.

Q. Do you know whether McCain can or could mitigate for its own groundwater pumping for itself?

A. I believe that they could develop a mitigation plan to operate on their own, to have their own mitigation plan, but we have not been able to construct

that by this deadline.

Q. Can I have you look at Exhibit 317.

A. Yes.

Q. Have you seen that document before?

A. Yes.

Q. And can you tell me what that document is.

A. This is a FAQ document that's on the Department of Water Resources front page address, "Surface Water Coalition delivery call and the Amended 5th Methodology and April 2023 As-Applied Orders."

Q. And can you turn to the -- I think it's the last page in that; I think it's page 3. It's a three-page document.

A. Yes.

Q. And do you see where that document discusses what would happen if you're a food producer and were under a mitigation plan or if you're a food producer without a mitigation plan?

And then I think the last paragraph says, "Can I file my own mitigation plan?"

Do you see that?

A. Yes.

Q. Can you read the last paragraph, question and answer.

A. The question: "Can I submit a mitigation plan

now and get it approved in time for this coming irrigation season?"

And the answer is: "It is unlikely that a mitigation plan can be approved before a potential curtailment order is issued. Once a plan is submitted, the plan must be advertised and is then subject to protest deadline. The plan is subject to hearing if protested or if the Director determines a hearing is necessary. This process can take many months."

Q. Can you turn to Exhibit 604.

A. Yes.

Q. Have you seen that document before?

A. Yes.

Q. Can you tell me what it is.

A. "This is the Notice of Possible Curtailment Call for Groundwater Rights with Priority Dates Junior to December 30th, 1953 - Surface Water Coalition Delivery Call," dated May 1, 2023.

Q. Is it your understanding that this is the letter that McCain received at its Burley facility?

A. Yes.

Q. I believe towards the end of that document -- I think it's in bold and it may be underlined -- it says something along the lines that "during the consideration of the mitigation plan, curtailment will not be stayed."

Do you see that?

A. No, I don't. I'll have to read this. What was it?

MS. McHUGH: I'm sorry, can I approach the witness, Director?

Q. (BY MS. McHUGH) It's the end of the fifth paragraph.

A. Okay. Gotcha. I was looking at the last paragraph.

Q. If you would look at the fifth paragraph there.

A. Yes.

Q. Can you read the last, I think, three sentences.

A. Yes. Beginning about halfway through this paragraph: "Upon receipt of a proposed mitigation plan, the Director will publish notice for two successive weeks, after which ten days will be allowed for the filing of protests. The Director may hold a hearing if necessary to determine whether a proposed mitigation plan will mitigate an injury to the SWC," Surface Water Coalition, "caused by diversions of groundwater authorized by junior priority groundwater rights. If the proposed mitigation plan is protested, the Director will hold a hearing. Please be advised that a

curtailment order is not stayed pending evaluation of a mitigation plan."

Q. Was it your understanding as a consultant for McCain Foods and McCain's understanding that if they filed a mitigation plan, that they would still be subject to the curtailment order?

A. Yes.

Q. And do you know when that May 1st letter was received at the Burley facility from McCain?

A. I understand McCain received that on May 12th.

MS. McHUGH: I have no further questions.

HEARING OFFICER: Other questions of Mr. King from the groundwater users?

Cross-examination?

MR. FLETCHER: I don't have any.

MR. SIMPSON: No.

MR. THOMPSON: I've got one.

HEARING OFFICER: Thank you, Mr. King -- Mr. Simpson.

Mr. Thompson, do you have some questions?

CROSS-EXAMINATION

QUESTIONS BY MR. THOMPSON:

Q. Good morning, Mr. King.

A. Good morning.

Q. Travis Thompson for A&B Irrigation District, et al.
A. Good morning.
Q. Just one question -- a couple questions.
Ms. McHugh asked you about timing of when McCain's could file a mitigation plan this spring.
Do you recall that?
A. Yes.
Q. Has McCain Foods attempted to file a mitigation plan anytime in the past?
Do you know?
A. Under this delivery call, not that I'm aware of.
Q. Anything that would prevent them from submitting a plan prior to this spring?
A. The only thing that I think that might prevent them is knowing what they need to submit the mitigation plan for, the details, the requirements of what they're mitigating.
Q. As far as the priority date?
A. Yes.
Q. I guess any of their rights junior to '53, would they have any reason to put a plan together before this year?
A. We weren't aware of what priority date would

require a mitigation plan, so -- and we didn't have water rights -- the 1953 date is new.

Q. Are they aware of the Surface Water Coalition's priority dates for their senior surface water rights?

A. I assume that they are, yes.

MR. THOMPSON: Thank you.

HEARING OFFICER: Any more cross-examination? Redirect, Ms. McHugh?

MS. McHUGH: No.

HEARING OFFICER: Thank you, Mr. King. Next witness?

MS. McHUGH: Amalgamated Sugar Company would call Dean Delorey.

HEARING OFFICER: Mr. Delorey, if you would come forward, please. Would you raise your right hand.

DEAN DELOREY,

called by Amalgamated Sugar Company, having been first duly sworn to tell the truth relating to said cause, testified as follows:

HEARING OFFICER: Thank you. Please be seated.

Ms. McHugh.

DIRECT EXAMINATION

QUESTIONS BY MS. McHUGH:

Q. Thank you. Good morning, Mr. Delorey.

A. Good morning.

Q. Could you state and spell your name for the record, please.

A. Yes. Dean Delorey, D-e-a-n, D-e-l-o-r-e-y.

Q. And, Mr. Delorey, have you ever been a witness in a judicial or administrative proceeding before?

A. No.

Q. Would you briefly explain your position at Amalgamated Sugar Company?

A. Yes, I'm the director of environmental affairs. My primary focus is on environmental compliance. I've worked with the company for over 30 years. I'm familiar with the -- each of our sugar beet processing facilities, and so my primary work is environmental compliance.

Q. Are you familiar with Amalgamated Sugar's groundwater rights that divert from the Eastern Snake Plain Aquifer for one of its beet processing facilities?

A. Yes, I'm familiar with the Mini-Cassia facility.

MS. McHUGH: And, Mr. Director, I probably should have done this before I started my examination, but you should have in front of you exhibits for Amalgamated Sugar Exhibits 700, 701, 702, and 703, and the parties have stipulated to the admission of those four exhibits.

HEARING OFFICER: Based on Ms. McHugh's statement that the parties have stipulated the admission of these documents, I will receive the documents marked as Exhibits 700, 701, 702, and 703 into evidence.

(Exhibits 700 - 703 received.)

Q. (BY MS. McHUGH) And so you are saying that you are familiar with the water rights for the Mini-Cassia facility that Amalgamated Sugar operates?

A. That's correct.

Q. Would you just generally tell me where that's located?

A. The Mini-Cassia facility?

Q. Yes.

A. The Mini-Cassia facility is located just outside Paul, Idaho.

Q. And if you look at Exhibit 700 in the binder in front of you.

A. Yes.

Q. Does that exhibit accurately show the water

rights for the Mini-Cassia factory except for the small domestic rights that are not subject to curtailment?

A. Yes.

Q. Are you aware of the proposed curtailment of the aquifer back to December 31st, 1953?

A. Yes.

Q. And what was Amalgamated's response when they learned that there was a potential curtailment back to December 31st, 1953?

A. Well, our initial response was to get legal involved. We've hired -- we've worked with you, and you're our groundwater expert and water rights expert, so that was our initial response. And I understand based on the initial response was for us to join the Magic Valley Ground Water District and see if we could be covered under their mitigation plan.

Q. If you could look at Exhibit 701.

Do you recognize this letter?

A. Yes.

Q. And what is it?

A. This is a letter requesting to allow Amalgamated to join the Magic Valley Ground Water District as a mitigation-only member.

Q. Was there any consideration of Amalgamated trying to develop its own mitigation plan, or was the

only option to look at Magic Valley?

A. We just haven't had time to look at our own mitigation plan, so this was the most efficient way of getting covered under a mitigation plan.

Q. And what happened after this letter was sent to Magic Valley Ground Water District?

A. We were just awaiting response from -- to find out if we would be part of the Magic Valley Ground Water District.

Q. And did they respond?

A. Yes.

Q. And if you would look at Exhibit 702.

In addition to some other things, could you explain what Exhibit 702 does relative to Amalgamated's enrollment in Magic Valley Ground Water District?

A. The primary purpose of this is a request to IDWR for notice of mitigation and for us to be covered under the Magic Valley Ground Water District and their approved mitigation plan.

Q. And would you look at Exhibit 703.

Have you seen this document before?

A. Yes.

Q. And what is it?

A. This is a response from IDWR stating that Amalgamated could be part of the Magic Valley Ground

Water District.

Q. And what is your understanding of what will happen if Magic Valley Ground Water District is not found to be in compliance with their mitigation plan?

A. There's potential for curtailment of our junior water rights.

Q. And Amalgamated has a couple water rights that are senior -- if you look back at Exhibit 700 --

A. Yes.

Q. -- that are senior to the December 31st, 1953, priority date.

What would Amalgamated -- what would happen to Amalgamated's operation at Mini-Cassia if it lost its water rights junior to the 1953 date?

A. Well, I would just say this -- are you saying the junior or the senior?

Q. I'm saying: What would happen if you lost your -- the water rights junior to 1953?

A. Well, we would -- to be honest, we just need time to evaluate or do a water balance to understand what -- how it would impact our facility.

So we would have to have -- I'd have to have discussions with the plant manager there to know what -- in terms of what that potential -- if there would be any potential issues, so...

Q. And Amalgamated hasn't had -- hasn't done that yet or is in the process of doing that, I suppose, because it takes some time because the water use in your facility is pretty complex?

A. Yeah. The water balances are complex, so we just need the time to be able to evaluate the overall water balance in term of groundwater usage.

Q. And --

COURT REPORTER: Can you guys please slow down for me.

THE WITNESS: Oh, sorry.

Q. (BY MS. McHUGH) And when did Amalgamated become aware of the December 31st, 1953, curtailment date?

A. That was back in early May.

Q. And did you understand that there was a deadline that you needed to comply with at that time?

A. Yeah. Talking with you, I understand there's a deadline, yes.

Q. Okay. And was there any time for Amalgamated to evaluate its own mitigation plan and the impact of the curtailment date on its operations?

A. We haven't had time to evaluate a mitigation plan.

Q. Okay. And you're in the process of

understanding kind of how to react to curtailed water use, potentially?

A. Yeah. Based on my understanding and my short course on water rights, we would likely hire someone to assist us with a mitigation plan.

Q. And what is your understanding of whether Magic Valley Ground Water District is in compliance with its mitigation plan?

A. Magic Valley is not in compliance with their mitigation plan. And, likely, we need to put together a mitigation plan as a corrective measure.

Q. I guess what I was asking is: What's your understanding of whether Magic Valley Ground Water District is in compliance with its mitigation plan?

Do you know whether it's in compliance or not?

A. I guess, based on my discussions with you, I'm not sure that it's going to be approved. And they may not be in compliance with their plan.

MS. McHUGH: I have nothing further.

HEARING OFFICER: Cross-examination?

Nothing?

Okay. Thank you.

THE WITNESS: Thank you. Appreciate it.

HEARING OFFICER: Next witness?

Are we shifting now? Are these Surface Water

Coalition witnesses that are being called?

MR. THOMPSON: Director, I think we'd call Chuck Brockway next. We might take a minute off the record to get it set up.

HEARING OFFICER: Let's go off the record for a moment.

(Break taken.)

HEARING OFFICER: Back on the record.

So we're back on the record, and it appears that Mr. Brockway is ready. And I think when you start to question him and he responds, Mr. Thompson, perhaps we'll see his full image on-screen.

Mr. Thompson, you -- oh, I need to swear him in, I forget, as they are online.

Mr. Brockway, if you'll stand, please, if you can, and raise your right hand.

Thank you.

CHARLES BROCKWAY, Ph.D., P.E.,

called by the Surface Water Coalition, having been first duly sworn to tell the truth relating to said cause, testified remotely as follows:

HEARING OFFICER: Thank you. Thanks for audibly responding.

Mr. Thompson, you may question Mr. Brockway.

DIRECT EXAMINATION

QUESTIONS BY MR. THOMPSON:

Q. Good morning, Chuck.

Can you hear me okay?

A. Good morning, Travis. I can hear you. I can't see you, though.

Q. Okay. That's probably better for you.

A. That's fine with me.

Q. Can you please --

HEARING OFFICER: Just a minute.

Why is that? Do we know?

MS. TSCHOHL: I believe our signal is just a little bit weak, so it's prioritizing audio.

HEARING OFFICER: Okay. Well, we can see Brockway. But anyway, let's -- we'd rather see the witness than Mr. Thompson anyway; right?

MR. THOMPSON: Absolutely.

HEARING OFFICER: All right. Here we go.

Q. (BY MR. THOMPSON) Chuck, can you please state and spell your name for the record.

A. Charles G. Brockway; C-h-a-r-l-e-s, G., B-r-o-c-k-w-a-y.

Q. And where do you work?

A. Brockway Engineering.
Q. And what is your current occupation?
A. Civil engineer and owner of the company.
Q. Is your CV attached to what's been marked the Surface Water Coalition Exhibit 4?
A. Yes.
Q. And does that generally describe your education and work history?
A. Yes.
Q. Have you been qualified as an expert witness before IDWR in prior cases?
A. Yes.
Q. Can you generally describe what Exhibit 4 is.
A. It's an expert report that was prepared by myself as well as Erick Powell, who also works for Brockway Engineering, and Dave Shaw, ERO, relative to the Fifth Methodology Order and the As-Applied Order.
Q. And can you just generally describe what you were asked to do for that report.
A. We were asked to review the Fifth Methodology Order and the As-Applied Order and provide technical comments on those orders primarily as it relates to irrigated area, project efficiencies, and the baseline year.
Q. And it looks like this report is broken up

into parts by letters; is that correct?

A. Correct.

Q. And I'll try to just walk through some of these parts with you.

Could you please summarize your opinion for Part A, describe what that is?

A. So Part A has to do with a comparison of the project irrigated areas that the Twin Falls Canal Company utilized in the Fifth Methodology relative to the other members that are out there, primarily the 2011 and the 2017 products that IDWR has set forth based on the irrigated lands dataset.

So we did a GIS comparison of those three shapefiles. I'll call them the methodology acres, the 2011 acres, and the 2017 acres. Rasters filed were provided by IDWR for those --

COURT REPORTER: Okay. What kind of files? Can you repeat that? What kind of files were provided?

THE WITNESS: Raster files, r-a-s-t-e-r.

COURT REPORTER: Okay. You can keep going. Just maybe slow down a little bit.

THE WITNESS: All right.

Raster files were provided by IDWR. Shapefiles were created in ArcMap. The shapefile files were intersected to determine their differences.

And we found that the 2011 and 2017 shapefiles were nearly identical, so we focused on the 2017 difference shapefile. And we, to the extent we could, explored the reason for the differences between the 2017 shapefile and the methodology shapefile for the Twin Falls Canal Company.

So we found that there were a number of factors that entered into the differences between those two shapefiles, and those are outlined in the report: Primarily ditches, ponds, other waterways that were taken out in the '17; there were fields that were not, apparently, irrigated in the 2017 photo; some pivot corners that, apparently, were not irrigated.

And then the other primary category would be developed areas around the fringe of municipalities, as well as roadways.

So that's what we did for Part A.

Q. (BY MR. THOMPSON) And, Chuck, can you turn to Exhibit 5.

Do you have that?

A. Yes.

Q. And can you generally describe that, for the record?

A. So this is an exhibit that shows the acreage comparison between the 2017 and the methodology acres.

The red line is the Twin Falls Canal Company service area, and the blue lines in that map are the differences between the 2017 acres and the methodology acres.

Q. And is there a date for the photo that this is overlaid on?

A. It's the 2021 aerial photo.

Q. If you could turn to Exhibit 6 -- or is there anything else on Exhibit 5?

A. No.

Q. Could you please describe Exhibit 6, for the record.

A. Exhibit 6 is just an example of where the 2017 irrigated area shapefile omits some fields that are definitely irrigated. So this is not meant to be a comprehensive analysis by any means. We simply pulled a snippet from a section of the shapefile to illustrate that there's a half-pivot that was omitted from the '17 shapefile and a small field on the right side of the map that was also omitted.

Q. And does this exhibit depict what could be waterways or canals that have been taken out as well?

A. It does, yes.

Q. Can you describe Exhibit 7, for the record, please.

A. Exhibit 7, again, is a snippet that we pulled

from the overall shapefile just as an example, not meant to be comprehensive of another problem that we found with the 2017 and the 2011 shapefiles, which is that there are registration differences between the '17 and the methodology shapefile. And by that -- when I say "registration," by that I mean the rectification of the aerial photo with the section lines.

And what you see there, there is a shift. And so what that results in is a -- an inconsistency in the acres delineation. Because there are roadways that were rightly removed in the 2013 Methodology delineation and roadways that were rightly removed in the 2017 delineation. However, in the 2017 delineation they were not added back in, so we have a double-counting of acreages that are removed.

Q. Now, turn your attention to the left side of that exhibit -- I guess the -- I'll call it the west side of the map if we're looking north.

A. Yes.

Q. Do you see a number of thin yellow lines horizontal in between the fields.

Do you see those?

A. Yes.

Q. Do you know what those may be depicting?

A. Those are likely --

COURT REPORTER: Can you start your answer over again? Because I had trouble hearing.

THE WITNESS: Those are likely depicting waste ditches that were present when these areas were gravity-irrigated. And now that it's been converted to a center pivot, those ditches are not there.

Q. (BY MR. THOMPSON) And over to the southeast side of that exhibit, I see some curved yellow lines.

Do you have an idea what those might be depicting?

A. Those are likely depicting, again, ditches or laterals that were removed in the 2017 delineation.

Q. Chuck, in your opinion, is it appropriate to remove ponds and waterways and consider them to have no consumptive use?

A. No, not in terms of demand, because a canal and a lateral and a ditch all evaporate from the water surface and have evapotranspiration from the vegetation on the ditch banks, and those are real consumptive demands that have to be met by the project diversion.

Q. So even if that is not an irrigated acre, would that still be considered a use or a demand of the water diverted from the Snake River?

A. Yes.

Q. I'd like to turn back to Exhibit 4, Part B. I

think it begins at page 6.

A. Travis, if you wouldn't mind, if I could just hit one more thing on Part A before we leave that.

Q. No, go ahead.

A. Well, one primary category of areas that are removed from the 2017 delineation are developed areas around the fringe of municipalities. These represent, typically, rural or semirural subdivisions on the edges of cities that are being developed. I think there are just some comments to keep in mind relative to that.

One is that these subdivisions are entitled to the same share delivery as the agricultural field was prior to the development. So the canal company has to be prepared to meet that same demand, even though the area is being developed and the actual irrigated acreage is going down. So while the consumptive use may be going down, the demand will usually not. And this is just a function of the nature of small residential developments.

Water use occurs in these developments at a much higher rate over a shorter period. So to even get the demand to stay the same as it was with the agricultural use, you have to enforce a strict rotation. So I think that's just an important demand side of the equation to keep in mind relative to subdivision

developments.

Q. At least in Twin Falls County, are you aware of requirements when land is developed to retain surface water for continued irrigation use?

A. Yes. The City of Twin Falls has that ordinance.

Q. If we could turn to Part B, page 6.

A. Okay.

Q. Can you generally describe what you reviewed and what this part addresses?

A. This section describes a statistical analysis of the annual water diversions for the Twin Falls Canal Company from Water District 1 adjusted for wheeled or recharge water for the years 2000 through 2021.

Figure 4 in our report shows those data points as well as a statistical trend line calculated for the data. In order to assess whether there was a trend in the data, we subject the data to a Mann-Kendall analysis -- that's M-a-n-n, dash, K-e-n-d-a-l-l -- to determine if there was a statistically significant trend in the data, and we found that the data shows that there was no trend.

And let me clarify something I said earlier.

The whole dataset was from 1977 through 2022, but the wheeled and recharge adjustments were only from

2000 through 2021 --

COURT REPORTER: Wait, wait. I apologize, Mr. Brockway. I couldn't hear that very well, so, "The whole dataset was from 1977 through 2022, but the wheeled and recharge adjustments were only from"?

THE WITNESS: 2000 through 2021.

I'm sorry, I'll speak more clearly.

Q. (BY MR. THOMPSON) Anything else on that part before we move on, Chuck?

A. No, Travis, other than just to make the observation that when you do a trend analysis, it's important to be very careful because the period that is selected for analysis can have a strong influence on whether or not a trend is detected. So, for example, if one were to use the period 2005 through the current, the analysis would likely show a trend upward. If one were to use the period 1990 through 2005, it would likely show a trend downward. So we felt that in order to get the full picture of what was happening to the Twin Falls Canal Company demands, we used the entire period of record.

Q. That period would capture years of above average water supply and below; is that correct?

A. That is correct.

Q. I'd like to turn to Part D, page 11.

Could you generally describe that section and what you looked at?

A. Part D was a general exposition on factors that affect project efficiency in any canal company but in particular large canal companies like the Twin Falls Canal Company.

And, again, just to restate what has been stated before, the project efficiency is defined as the crop water need, which is the consumptive irrigation requirement times the irrigated acres divided by the adjusted diversion. And the Fifth Methodology Order spells that out.

The project efficiency is a lumped parameter that essentially accounts for all of the operational water requirements that are needed for -- to operate the project but that do not directly go toward meeting the evapotranspirative demand of the crop.

So for a large company, these would, of course, start with the on-farm efficiency, which ranges from roughly 50 percent for gravity methods to roughly 80 to 85 percent for a high-efficiency center pivot system. Then you, typically, have a significant amount of canal seepage or conveyance loss, which varies from project to project but may range from 20 to 30 percent of the total diversion.

Related to that, you have the required wetting of the canal system that has to occur during the spring, the initial startup of the project when the canal beds are dry.

Another big factor in a large company is the operational spill. And I think we heard Jay Barlogi testify to this earlier. This is always necessary to -- in order to deliver water to users within the system, particularly those near the tail end of the system.

That spill has to be maintained in order to allow the buffering, if you will, for variations in demand by irrigators on the system. If you don't have that spill, you won't be able to reliably serve the tail ends of the system.

Another big factor is variations in meteorological conditions which affect on-farm demand by irrigators. For example, if a cool, rainy period comes in, that could lead to rapid decreases of on-farm demand as irrigators turn off, but that doesn't mean that a large canal company can simply reduce its diversion at the river. If it tried to do that, if it tried to follow every little variation and meteorological demand, then when the ordinary warm weather returned, they wouldn't be able to ramp up quick enough to meet that demand of returns. It's only if that cool period were

sustained for, you know, a number of days, maybe weeks that the project diversions could, potentially, be adjusted.

The other factor in project efficiency that's been talked a lot about is the conversion to sprinkler irrigation, which has happened across the plain, including on the Twin Falls Canal Company. And I think we heard some testimony that the current estimated sprinkler irrigation percentage on the Twin Falls Canal Company is about 50 to 60 percent.

So the important thing to keep in mind on sprinkler conversion is that it always leads to an increase in on-farm efficiency; that is, a center pivot system will, as a general statement, but will be more efficient than a gravity irrigation system. However, that does not always, necessarily, translate to an increase in overall project efficiency for a large system. And there are two general reasons for that.

One is a sprinkler irrigation farm has more of an on/off demand structure as opposed to a more continuous demand for a gravity irrigation system. So the canal company has to be prepared to deal with that on/off situation. So they have to maintain, essentially, the same diversion in the canal that they had before. And this goes, again, back to the

operational spill requirement.

The second factor, which is not unique to Twin Falls but it certainly occurs, to a great extent, on the Twin Falls Canal Company system, is that conversion to sprinkler irrigation results in a reduction of incidental recharge from irrigation, which leads to a reduction in drain flows that are relied upon for redelivery. So with gravity methods, there's a lot of irrigation infiltration, a lot of subsurface storage that occurs, drain flows are sustained, and that water is released later in the season. And that drain water is treated as project water that can be rediverted to meet obligations downstream and, again, potentially later in time.

So if there's -- if that drain flow goes down, that water that can't be rediverted has to be made up from somewhere, and so it has to come from a river. So -- and this is all very case-specific, of course, but in the Twin Falls Canal Company tract, when irrigation began -- or since irrigation began, the groundwater levels have increased, you know, from a low of 20 to 30 feet up to more than 100 feet in some areas.

And so that resulted in waterways flowing that ordinarily didn't flow. It augmented existing perennial streams. It created seeps and springs that didn't exist

before. And it created -- or it necessitated the development of hundreds and hundreds of drain tiles and seep tiles to lower the water table and capture that water and redivert it downstream.

So that's a factor that has to be taken into account in the Twin Falls Canal Company tract. And it is too simplistic just to say, well, diversion to sprinkler automatically must lead to a commensurate increase in project efficiency.

Finally, the other big factor in any big canal company is that in the shoulders of the irrigation system, efficiencies naturally tend to be low. So when the water is turned on in April, a major amount of water is needed to charge the system, to fill the canals, and that may take several days.

Similarly, that high initial seepage rate in the canals has to be overcome. During this time the crop water need is relatively low and so the overall project efficiency is, therefore, very low.

Similarly, in the late season, say in October, crop water need is lower, but the water is still in the canal system in order to convey the water to the end of the system to meet those tail end delivery obligations. Those don't go away just because we're in the tail end.

And my understanding and my reading of the

Fifth Methodology Order is that it does incorporate some provisions to ensure that the reasonable in-season demand is not underestimated in April or overestimated in October.

So I'm sorry, that's a very lengthy explanation of what we did, but it was just an overview of all the factors that have to be taken into account for a large canal company much beyond simple on-farm efficiency and conveyance losses.

Q. Do you have any other comments about challenges with project efficiency in large open canal systems, or does that pretty much cover it?

A. I think that pretty much covers it.

Q. Would you agree that changes in irrigated acres is not the only factor that would affect canal project efficiency?

A. Yes.

Q. Chuck, could you look at Part F, beginning at page 13. Can you generally describe that opinion?

A. Yes. So in Part F, we looked at the effect of an irrigated area reduction on the reasonable in-season demand as calculated in the methodology order.

Now, obviously, as a general principle, if there are fewer acres irrigated, everything else being equal, you would need to divert less for those acres.

However, in the methodology, the diversion demands are taken as a given whatever the acres may be for a project. Those diversions and those acres are used to then calculate the project efficiencies -- again, as the consumptive irrigation requirement times the acres divided by the diversion. Then those project efficiencies are used to calculate the reasonable in-season demand adjustments.

So, again, it's -- the diversions -- the actual observed diversions are taken as a given. So if the -- say the -- for example, the true acres, if we knew that, were 5 percent lower, then the project efficiencies would also be 5 percent lower, and the reasonable in-season demand adjustments, in theory, wouldn't change.

Now, I had time to look into the guts of the reasonable in-season demand spreadsheet to see what it may actually be doing, but what I just described is an accurate statement of the equations that are found in the Fifth Methodology Order.

And then, of course, the baseline year demand doesn't depend on acres at all, it's simply a selection of a year from, again, actual observed conditions -- sorry -- actual observed diversions.

So I don't think it's valid to simply say,

well, if your true acres are 5 percent less than what you say they are, your demands ought to be 5 percent less. The equations and the methodology are not set up that way.

Q. So removing one irrigated acre would not automatically equal a reduction in that amount of water needed to divert at the river?

A. Correct.

Q. Anything else on that before I turn to Part G?

A. No.

Q. Could you generally describe the -- what was offered at Part G on page 14 of your report?

A. Well [unintelligible] --

COURT REPORTER: Mr. Brockway, can you start your answer over again.

THE WITNESS: Part G talks about supplemental groundwater usage, which is the usage of private wells for supplemental purposes on surface water irrigated lands, which does occur within the Surface Water Coalition members' service areas and within the Twin Falls Canal Company service area.

The percentage of land in the Twin Falls Canal Company service area is -- that is served by supplemental wells, in my experience, is fairly low due to the overall reliability of the surface water supply

within the company.

A couple of things that should be taken into account when determining -- or evaluating the effect of supplemental groundwater usage:

One is that these groundwater supply systems, in my experience, on a particular farm, they are rarely nice, clean-cut, stand-alone systems. They're always hydraulically interconnected with the surface water supply systems somehow. There's usually multiple fields, multiple pumps and booster pumps and application systems that may be interconnected and used in some complicated and sometimes mysterious fashion that's only known to the irrigator.

And so, really, it's hard to assess -- to make an accurate assessment of the degree to which groundwater usage is employed. Really, to do it right, you'd almost have to ground truth each individual system of the farm operator.

The second point to make is that, similarly to what I said in the previous section, if you could quantify an acreage or an equivalent acreage, if you will, of land that was supplied by groundwater, that could, potentially, reduce the number of acres that are irrigated with surface water.

But, again, since the diversions are taken as

a given, that would simply reduce the project efficiency a little bit, which is based on those diversions, and those lower efficiencies would then be utilized in the methodology to calculate the reasonable in-season demand adjustments.

So, again, it's not valid, I don't think, to say there's just a one-for-one reduction if we were to identify the acres that are irrigated with groundwater based on the methodology equations.

Q. (BY MR. THOMPSON) Chuck, just one last part, I guess.

Could you look at Part H and describe opinions offered in that section?

A. Yes. Part H talks about the baseline year selection. And it is a brief recapitulation of the requirements for selection of the baseline year in the methodology order and a reproduction of Matt Anders' chart that was presented on November 11th, 2022, to the technical working group, where it was indicated that 2018 and 2020 were the only years that met all of the evaluation criteria, and those are highlighted in yellow; and then just a brief discussion as to the position, if you will, of 2018 within the overall dataset.

And there's different ways to do that. You

can look at a ranking analysis. You can look at different probability distribution fits. We chose to fit a normal distribution to the annual diversion volume data, which is a reasonable fit.

And, based on that, the 2018 year, which was selected by IDWR in the methodology, was at the 84th percentile. So it was certainly above average, and it was reasonably conservative, but it wasn't an extreme year like the highest year ever or the 95th percentile or 99th percentile.

So, again, consistent with the goal of being conservative to protect the senior surface water right holders, we felt that an 84th percentile was, again, reasonably conservative but not extreme.

Q. Chuck, in your opinion, I guess, does -- how that is used at the beginning of the year, protecting senior water rights in the event the water year does not turn out as forecast, is that a reasonable approach?

A. I think it's reasonable.

Q. That's all of the questions I have, Chuck.

MR. THOMPSON: I would move to admit Exhibits 4 through 7.

And we've tendered Dr. Brockway as an expert on the subjects addressed in the report.

COURT REPORTER: I'm sorry. I didn't get

that.

"And we tender Mr. Brockway" --

MR. THOMPSON: Dr. Brockway as an expert on the subjects addressed in the report.

HEARING OFFICER: It's my understanding that Mr. Brockway has been recognized as an expert through stipulation of the parties, so he is so recognized.

Any objection to the admission of the documents marked Exhibits 4 through 7?

Hearing no objection, the documents marked 4, 5, 6, and 7 are received into evidence.

(Exhibits 4 - 7 received.)

HEARING OFFICER: Mr. Simpson?

MR. SIMPSON: Mr. Hearing Officer, if I could have a moment with Mr. Thompson?

HEARING OFFICER: Sure.

MR. FLETCHER: Go off the record just a second.

HEARING OFFICER: Let's go off the record.

(Discussion held off the record.)

HEARING OFFICER: Let's go back on the record.

Further questions, Mr. Thompson?

MR. THOMPSON: No, thank you.

HEARING OFFICER: Any further questions from the Surface Water Coalition?

MR. FLETCHER: No, thank you.

HEARING OFFICER: Okay. What do we want to do at this point? Do we want to break for 15 and give the parties a chance to regroup and prepare?

All right. Let's break and come back at 10:30.

(Break taken.)

HEARING OFFICER: Let's go on the record, Andrea.

Mr. Brockway, are you there?

THE WITNESS: I am here.

HEARING OFFICER: Good. It looks like Mr. Budge has come forward for cross-examination.

Mr. Budge, you may examine.

CROSS-EXAMINATION

QUESTIONS BY MR. BUDGE:

Q. Good morning, Chuck.

How are you?

A. Hey, TJ. Doing good.

Q. Chuck, how long have you worked for Twin Falls Canal Company?

A. Oh, goodness, probably since the '90s.

Q. And just generally speaking, what type of work do you do for the company?

A. We work as needed, whatever they may need relative to the water rights or water supply evaluations or general advice at board meetings. A little bit of everything.

Q. Do you do fieldwork for them as well, analysis out in the field?

A. No, haven't really done that, at least recently.

Q. Let me have you turn to your expert report, Exhibit 4.

A. Yes.

Q. And if you'd turn to -- the pages aren't numbered, but I guess the second page or the first page with text, Section A: "Evaluation of TFCC Project Evaluation Acres." I've got some questions about that section.

A. Yes, I'm there.

Q. In that first paragraph you referred to the acreage used in the Fifth Methodology Order, the 194,732-acre figure. And then you say: [As read] "This is based on detailed aerial photo inspection and a delineation created by Twin Falls Canal Company consultants in 2013."

Did you participate in creating that shapefile?

A. I may have had some input into that, but I believe the primary consultant on that was Dave Shaw.

Q. Okay. Are you familiar with that GIS shapefile?

A. Yes.

Q. Are you sufficiently familiar with it that you're comfortable testifying about it today, or is that something I need to discuss with Dave?

A. Well, you know, I haven't looked at every part of it, for sure, but I can certainly take a stab at it.

Q. Are you familiar with the parts of that shapefile that are included in your expert report?

A. Yes.

Q. Okay. Let me have you turn to that page of your report. I think it's page 5.

A. Yes.

Q. Page 1 of the report says that this was created with a detailed inspection of photo or satellite imagery aerial or satellite imagery.

Can you explain the process that was used to create the 2013 shapefile?

A. That's a better question for Dave, but I think it just involved examination of the aerial photo and drawing lines on the map, if you will, in the GIS system to represent areas that were irrigated and excluding

those that did not appear to be irrigated.

Q. Okay. And looking at Exhibit 4, there's an excerpt of a portion of Twin Falls Canal Company's service area. And that image at the bottom, at the footer, says it's showing the difference between the 2013 and 2017 area. And I want to make sure that I understand correctly what it depicts.

The yellow areas marked in that image, are those areas that the 2017 irrigated lands dataset shows as not being irrigated but the 2013 GIS shapefile shows as being irrigated?

A. That is correct.

Q. So if we were looking solely at the 2013 GIS shapefile, all of the land in yellow would have, you know, been blue, essentially?

A. Yes.

Q. In terms of the process to generate the 2013 GIS shapefile, your request is that I discuss that with Dave Shaw?

A. I think he can shed more light on it than I can, yes.

Q. Okay. Do you know if, in 2013, those involved in that, if they excluded, from the irrigated area, what I would call rural farmsteads? They're, like, homes out in the country that you can see some of those, you know,

on this image?
A. I don't know.
Q. Do you know if they compared Twin Falls Canal Company delivery records to see if the water deliveries corroborated the aerial imagery?
A. I don't know.
Q. Do you know if there was any field verification involved with water users?
A. I don't know.
Q. Do you know if they took into account groundwater rights within the company's service area?
A. I don't know.
Q. Do you know if they took time to carve out private roads and subdivision roads, things of that nature?
A. It does appear so because they are excluded.
Q. There's some roads excluded?
A. It does appear so, yes. Again, certainly did not look at every square inch, but it does appear that roadways including major roads and driveways were excluded.
Q. Do you utilize GIS mapping frequently as part of your professional work?
A. Yes.
Q. If you were asked by Twin Falls Canal Company

to prepare a precise map that depicted irrigated acres, is that something you could do?

A. Yes.

Q. Twin Falls Canal Company has not asked you or your firm to do that?

A. No.

Q. Let me have you turn to page 4 of your report. I understand this is also an excerpt -- an image showing an excerpt of Twin Falls Canal Company service area; is that correct?

A. Yes.

Q. Did you create Exhibit 4?

A. Yes.

Q. And I understand the land that's highlighted in blue on Exhibit 4, that's land that is shown as irrigated in the Department's 2017 irrigated lands dataset?

A. Correct.

Q. And it looks like the irrigated lands dataset carves out things like roads, ditches, farmsteads, and some fields that were not irrigated at that time?

A. Correct.

Q. Do you know why the 2017 irrigated lands dataset was created?

A. Not exactly.

Q. Do you know who created it?
A. Well, my understanding is it was the Department staff.
Q. Do you understand they created that for use in the ESPA model?
A. I have heard that testimony, yes.
Q. Are you familiar with the ESPA model?
A. Yes, somewhat.
Q. Do you understand that that dataset is used in the ESPA model?
A. That is the testimony I've heard.
Q. You don't have personal knowledge of that?
A. No.
Q. Would you agree that when Department staff is evaluating irrigated acreage, their sole priority is to make sure that the data is as accurate as possible?
A. Well, I will give them that benefit of the doubt, TJ.
Q. You would agree that Department staff don't have any self-interest in showing more or less acreage than is actually irrigated?
A. Not that I'm aware of.
Q. If I just make a rough comparison of the 2013 GIS shapefile versus the 2017 dataset, would it be fair to say that the 2013 GIS shapefile was created with more

of a brush approach, whereas, the 2017 dataset was created with more of a scalpel approach?

A. Oh, I'm not sure I would characterize it that way. Again, I haven't been able to examine every bit of both datasets.

Q. So I'm just -- Chuck, I'm just looking at the GIS -- the 2013 shapefile, and the only thing that's excluded are what appear to be two public roads. And then if I look at the 2017, it's much more precise. There's a lot of smaller areas and ditches and homesteads that are excluded.

Would you agree that the 2017 process was a more precise process?

A. Well, I would agree that it does exclude more areas.

Q. But your opinion today is that the 2013 GIS shapefile is a more accurate depiction or analysis of irrigated acreage than the 2017 irrigated lands dataset?

A. Well, I think it goes back to my direct testimony as just one example. I don't think that ditches and laterals should be excluded, because they are a real consumptive demand that has to be met by the system. So that would be one quibble.

Another quibble with the 2017 would be these --

Q. Hey, Chuck. Chuck.
A. Yes, sir.
Q. I'll just interrupt because I understand that. But just on the whole --
A. Yeah.
Q. -- is it your testimony today, this is your opinion, that the 2013 GIS shapefile is a more accurate representation of irrigated lands in Twin Falls Canal Company than the 2017 irrigated lands dataset?
A. I don't have enough information to say that, TJ.
Q. Okay. So --
A. My testimony is that -- yeah. Go ahead.
Q. Okay. So you're not rendering an opinion that the 2013 shapefile is more accurate than the 2017 dataset?
A. Correct.
Q. Do you know why Twin Falls paid its consultants to develop the 2013 GIS shapefile?
A. Not exactly.
Q. You understand that that analysis was done prior to the 2015 settlement agreement between IGWA and the Surface Water Coalition?
A. Yes.
Q. You understand at that time, the way IGWA

provided mitigation is by renting and delivering storage water to members of the Surface Water Coalition?

A. Yes.

Q. You understand that if Twin Falls Canal Company could demonstrate a greater number of irrigated acres than had been used previously in the methodology order that the methodology order would calculate higher water demand for Twin Falls Canal Company?

A. If the order calculation methodology stayed the same, was not changed by the Department, then, yes.

Q. And so you understand that if Twin Falls Canal Company could show higher acreage, the methodology would create larger mitigation obligations, which means IGWA would have to provide larger amounts of storage to Twin Falls Canal Company to avoid curtailment?

A. Well, again, this goes back to my direct testimony relative to the equations and the methodology that are employed. The diversions from the river are taken as a given, whatever the acres may be, so --

COURT REPORTER: Wait. Mr. Brockway, sorry, I missed something. "The diversions from the river are taken as a given, whatever"?

THE WITNESS: Whatever the acres may be.

COURT REPORTER: Okay. And then you can continue.

THE WITNESS: If the true acres were larger, the same diversions would be used to calculate the project efficiencies. So the project efficiencies would just be a little bit higher. And then those efficiencies would be used in the reasonable in-season demand calculation.

Q. (BY MR. BUDGE) So, Chuck, do you agree that it would benefit Twin Falls Canal Company to be able to have a -- have the methodology order use as large of an irrigated acreage figure as possible?

A. No, for the reason I just described.

Q. Okay. You understand that the 2013 GIS shapefile was developed solely by Twin Falls Canal Company personnel and the company's consultants?

A. That's my understanding.

COURT REPORTER: "That's my understanding"?

THE WITNESS: That's my understanding.

Q. (BY MR. BUDGE) Chuck, I apologize there's occasions when we can't -- when there's like a technical glitch, and we don't hear your testimony, so if needed, we'll just ask you to repeat the answer.

A. I understand. That's fine.

Q. We did catch that one.

That process of creating the 2013 shapefile, that was not a collaborative process with the Department

of Water Resources?

A. I don't know that for sure, but I don't think it was. It may have been.

Q. And that was -- there was no collaboration with groundwater users or others outside of the company besides the company's consultants?

A. Not that I'm aware of.

Q. It was not performed by an independent third party?

A. You mean other than Twin Falls Canal Company consultant?

Q. Correct.

A. Not that I know of.

Q. And it was not presented in a hearing where it was subject to scrutiny by the parties to this case?

A. I don't know.

Q. Okay. Let me have you flip back to page 2 of your report. And you'll see at the bottom of page 2, there's a series of numbered paragraphs where you identify factors that influence the determination of acreage within a large canal company.

Do you see that?

A. Yes.

Q. I want to ask you about some of those. Paragraph 1 discusses ponds and other waterways whether

private or company owned.

You understand that Twin Falls Canal Company's water rights are for irrigation; correct?

A. Correct.

Q. And you would agree that the Department should not be curtailing groundwater irrigation rights to deliver -- so that Twin Falls could deliver water to private ponds and waterways?

A. Well, let me clarify. What I mean is privately owned irrigation ditches and ponds used for an irrigation system.

Q. Okay. So to clarify your report, you're not talking about other types of waterways; you're talking solely about what we would call regulating ponds for irrigation purposes and then irrigation ditches?

A. Correct.

Q. Let me ask you about No. 2. You refer to fields not being irrigated some years, and then you say: "Fields may have been left idle due to a limited water supply."

Were you here when Jay Barlogi testified that he's not aware of any fields that have been dried up due to lack of water?

A. Yes.

Q. You don't have any personal knowledge as to

whether any farmer within Twin Falls Canal Company has dried up a field because they did not have adequate water?

A. No.

Q. And you understand that fields are sometimes left idle as part of a fallowing program?

A. Yes.

Q. You understand that fallowing is sometimes used as part of a crop rotation to maintain soil health?

A. Yes.

Q. And every year there's going to be some number of acres within Twin Falls Canal Company's service area that are idled as part of a fallowing program; right?

MR. THOMPSON: Objection; foundation.

THE WITNESS: I think that's a fair statement.

MR. BUDGE: There was an objection from Travis.

HEARING OFFICER: Oh, I didn't --

MR. THOMPSON: Sorry.

HEARING OFFICER: I heard a voice.

MR. BUDGE: I should have just kept going.

MR. THOMPSON: I objected to the foundation of the question. I think Mr. Budge was asking about every year that there are acres in a fallowing program, and I didn't see the foundation for that question.

HEARING OFFICER: Okay. I'm not sure all of that was audible, but, Andrea?

MR. THOMPSON: You can sustain it.

(Record read by reporter.)

HEARING OFFICER: Overruled.

Q. (BY MR. BUDGE) Chuck, let me ask you about paragraph 4. And you're discussing there development of ag land into residential subdivisions. There's been quite a bit of that happen around Twin Falls in the last decade or two; right?

A. Yes.

Q. You give an example that if you have a 40-acre parcel that's converted to a subdivision, you may end up with, you know, half of that land actually being irrigated?

A. Yeah.

Q. This is just a hypothetical, I understand?

A. It is, yes.

Q. And the remaining 20 acres that irrigation is typically going to consist of grass and maybe some, you know, gardens or other landscaping?

A. Yes.

Q. Is it your testimony that grass consumes twice as much water as other crops grown on Twin Falls' tract, like hay, corn, sugar beets, et cetera?

A. No.
Q. So you would agree that the amount of crop ET would decrease when a 40-acre tract of farmland is converted into a residential subdivision?
A. Yes.
Q. I think your testimony was that the timing of irrigation changes because subdivision water use typically happens during a shorter period of time with maybe higher diversion rates?
A. Yeah, that is correct. Just the nature of small residential systems. For example, in a typical quarter-acre lot with a sprinkler system, each circuit may be designed for 18 gallons per minute, let's say, which is 2 inches -- 2 miner's inches, or about 3.2 shares in Twin Falls Canal Company.
I mean, that's about 12 times the amount on strictly a per-acre basis as compared to an agricultural parcel. It's just because small residentials have an extremely high flow rate for short periods of time. So unless there's a strict rotation in force, the actual demand will go up compared to an agricultural scenario.
Q. And in that context when you refer to "demand," you're referring to diversion rate?
A. Correct.
Q. You're not saying that the actual crop water

need, or ET, goes up. That actually goes down; right?

A. That actually goes down.

Q. Okay. Let me have you turn to the next page. In Item 5 you talk about land being fallow because the land is not fully covered by canal shares.

Do you understand that Twin Falls Canal Company does allow stockholders to buy and sell shares within the company?

A. Yes.

Q. So a farmer could sell shares they didn't need or if they needed income or something, but a farmer could sell part or all of their canal shares?

A. I believe that's the case, subject to company policies.

Q. And if a farmer utilized a fallowing program where, say, you know, one-fourth of its farm was fallow every year, it may not -- that farmer may not need enough shares to irrigate the whole farm every year?

A. I'm sorry, TJ. Run that scenario out again. I'm sorry.

Q. If a farmer utilizes a fallowing program as part of their crop rotation and leaves 25 percent of their farm fallow each year, that farmer may not desire or need to keep shares sufficient to irrigate the entire farm every year; correct?

A. He may not, yeah. Or he may keep his full shares and just use them on the remaining land.

Q. Okay. Let me ask you about paragraph 7.

You say: "The company's obligation is to be prepared to deliver water under all outstanding shares regardless of the status of the underlying land."

You're not testifying that when it comes to making curtailment decisions the Director should assume that parking lots, roads, driveways, and things like that are irrigated? You're not rendering that opinion, are you?

A. No, that's not what it says there.

Q. In terms of what the company needs to be prepared to deliver water to, they need to deliver water to land that's actually irrigated. Would you agree with that?

A. From the company's standpoint, their obligation is to deliver a particular user's shares at his authorized headgate. And what the user does with those shares or how many acres he irrigates with them is not governed by the company or even usually known by the company.

Q. So if the company has a tract of land in its service area that was formerly irrigated farmland and now it's a strip mall, should the company divert

water -- is it your opinion that the company should plan to divert water from the Snake River for delivery to that strip mall?

A. Well, I don't know. That's an extreme scenario. I mean, that would be a question for the company.

I mean, if a shareholder had shares and had a headgate, maybe his ditch goes somewhere else, to some other land that's being irrigated. I don't know.

Q. Yeah, but I'm talking about shares that are associated with the strip mall. You've put in your report that the company has to be prepared to deliver water to that strip mall.

Is it your testimony that the Director should curtail, potentially, junior groundwater users so that the company can deliver water to a strip mall?

A. No, I'm not making any opinion as to what should be curtailed or not curtailed.

Q. Would you agree that no irrigation occurs on a strip mall?

A. Correct.

Q. So you would agree, then, when crop water need is calculated, there shouldn't be an ET calculation or a demand calculation for land that's not actually irrigated?

A. The ET calculation could take that into account; that's right.

Q. Okay. And you would agree that the Department should not assume that acres that aren't capable of being irrigated -- they should not treat those as irrigated acres in the methodology order?

A. I think that's reasonable.

Q. At the bottom of page 2 -- and I do see a page number at this point -- you've got -- that last paragraph there, there's one sentence.

And at the bottom of that, you say: "the acreage used in the Fifth Methodology is reasonable, and there is no clear and convincing evidence at this time to adopt a different figure."

A. Yes.

Q. You're not a licensed attorney, right, Chuck?

A. That's right.

Q. And you understand that "clear and convincing evidence" is a legal standard?

A. Yes.

Q. And you understand you're not qualified to render opinions as to satisfaction of legal standards?

A. Yes.

MR. BUDGE: Director, based on the witness's testimony, I would move to strike, from his report, the

bottom paragraph on page 2 and have it redacted from the record.

HEARING OFFICER: I'll deny the motion. I think there's been enough reference in previous material, both submitted by the groundwater users, referring to "clear and convincing evidence" that I'm not going to start striking these references from individual reports.

Denied. Go on, Mr. Budge.

MR. BUDGE: Okay. And I will just note, for the record, that the groundwater users expert reports do not reference the clear and convincing standard. They do reference what is reasonable.

And I appreciate the ruling but did want to make that clear.

HEARING OFFICER: Well, certainly reasonable if you want to start -- if you want to start distinguishing between one legal standard and another, as it being appropriate, Mr. Budge, we can go through that. But the ruling is denied.

Go on, please.

MR. BUDGE: Okay.

Q. (BY MR. BUDGE) Chuck, are you familiar with the METRIC ET dataset used by the Department?

A. Somewhat.

Q. What's your experience with that dataset?
A. I personally don't have much experience with it, TJ --
Q. Okay.
A. -- just as a recognition that it's out there, general knowledge of how it's calculated, but not much direct experience.
Q. Thanks, Chuck. I appreciate that.
Chuck, were you involved or did you assist Twin Falls Canal Company in resolving their water right claims in the Snake River Basin Adjudication?
A. Yes.
Q. I understood from Mr. Barlogi's testimony that there was a process where the company and the Department worked together to identify the number of acres that were irrigated for purposes of the adjudication.
Were you involved in that process?
A. That was a long time ago, but I do remember being involved somewhat.
Q. Okay. Do you recall reviewing satellite imagery and working with the Department to determine the number of acres decreed under Twin Falls' water rights?
MR. THOMPSON: I'd like to lodge an objection, Director.
I guess the line of questioning regarding the

pre-partial decree process in the SRBA, I believe, is beyond the scope of this proceeding, isn't relevant.

We've had clear court decisions that say conjunctive administration is not a place to readjudicate a water right, so I think anything predecree, going into the process, what was done, is beyond the scope and irrelevant.

HEARING OFFICER: Well, thank you for the objection. I'll allow some exploration in this area, recognizing your statement is correct.

Mr. Budge, go ahead.

Q. (BY MR. BUDGE) Yeah, Chuck, were you involved in preparing the GIS shapefiles that were used in the -- as part of the adjudication to define irrigated acres for Twin Falls Canal Company?

A. So, again, TJ, that was a long time ago, but my recollection is we had -- we did some work in aerial photo analysis.

I think -- my recollection was this may have been pre-GIS days, so it may have been some hand calculations. But, I'm sorry, I don't have a clear recollection of that.

Q. That's fine. And I appreciate that.

Let me have you turn back to your expert report, and we'll flip to page 14, I believe, involving

supplemental groundwater use.

A. Yes.

Q. I am looking at heading G on page 14 in the first paragraph. And you discuss there that there are groundwater wells used for supplemental purposes within Twin Falls Canal Company's service area, but the percentage of the water supply is generally low due to the overall reliability of the surface water shares.

Do you understand, Chuck, that the methodology order does not account for supplemental groundwater use?

A. Yes.

Q. And you understand that the methodology order assumes that every acre within the company is irrigated solely with surface water?

A. I would have to examine the methodology order closely, TJ, but I think that's probably implicit in the analysis, yes.

Q. Have you analyzed how many acres within Twin Falls Canal Company have supplemental groundwater rights?

A. No.

Q. Do you have a rough idea?

A. No.

Q. Is this something you could do if you were asked?

A. We could analyze the areas that are covered by groundwater rights. That would be what could be done without field investigation.

Q. And you could do that analysis because the Department has, in its database, groundwater right points of diversion and places of use?

A. Correct.

Q. And then you would have to work with the canal company to figure out how much of that groundwater irrigated land also receives surface water?

A. Yes.

Q. It's the --

A. I'm sorry. We work with the canal company and the water user.

Q. Okay. It would be both; you would have to have the canal company's cooperation so you know where they deliver water, and then you may also want to work with the individual farmers?

A. Correct.

Q. Without access to Twin Falls Canal Company's water delivery records, there wouldn't really be a very good way of calculating or determining which acres receive supplemental groundwater use?

A. I don't understand the question, TJ.

Q. So in order to evaluate supplemental

groundwater use in a reliable fashion, it would be important to know which parcels of farmland the company delivers surface water to?

A. Yes.

Q. And that's data that's held by the Twin Falls Canal Company; that's not data that's held by the Department of Water Resources; correct?

A. Correct.

Q. So that's not data that IGWA or other groundwater users have access to?

A. Not that I know of.

Q. So you would agree, then, that neither IGWA or the other groundwater users in this case even have access to the data that would be needed to analyze supplemental groundwater use within the company?

A. Well, that's a broad --

COURT REPORTER: Mr. Brockway, can you start your answer again, I apologize.

THE WITNESS: That's a broad question. Some analysis could probably be done given available public data. But, yes, I believe to the extent that actual share locations and delivery locations are needed to make that analysis. I'm not sure that's public information.

Q. (BY MR. BUDGE) So it would require Twin Falls

Canal Company's cooperation for somebody to do that type of analysis; correct?

A. I think to do it right, yes.

Q. Okay. So for that to be done right, the canal company holds the cards, essentially?

A. I don't know. That's a judgment call.

Q. Let me ask you a little bit about the Fifth Methodology Order.

I assume you've read that?

A. Yes.

Q. Have you been familiar with the methodology order prior to your preparation for this case?

A. Somewhat.

Q. Do you generally understand how the methodology functions as defined in the order?

A. I think so.

Q. If you'll turn to Exhibit 300 -- and I believe Mr. Thompson emailed that to you today -- that's the Fifth Methodology Order.

A. Yeah, I have it.

Q. And then, Chuck, if you could flip to page 9 and draw your attention to paragraph 19.

A. I am there.

Q. Do you see in that paragraph where it talks about current conditions needing to be represented by

the net area of irrigated crops?

A. I see that.

Q. You understand that that net area is referring to actual irrigated acreage?

A. I'm not sure of the definition of the net area, frankly.

Q. Okay. Do you understand that the methodology order uses irrigated acreage to calculate water demand for members of the Surface Water Coalition?

A. Yes.

Q. And so you would agree that it's important to have --

A. Partially.

Q. I'm sorry, you would agree that it's important to have accurate irrigated -- accurate irrigated acreage information for use in the methodology by the Department?

A. Yes, I would agree that more accuracy is better.

Q. Thank you.

I believe Exhibit 337 was also emailed to you today. It's a collection of letters from legal counsel for certain members of the Coalition to the Director.

A. Yeah, I have that.

Q. Are you aware that members of the Surface

Water Coalition are required annually to submit their irrigated acreage to the Department for use in Step 1 of the methodology order?

A. Yes.

Q. Have you seen these letters before?

A. No.

Q. Does the company ever consult with you about its irrigated acreage in connection with preparing these letters?

A. No.

Q. So you don't maintain any type of database or analysis of irrigated acreage within the company?

A. No.

Q. Let me ask you just a couple other questions about the supplemental groundwater usage portion of your expert report. That's Exhibit 4, I'm on page 14, Section G.

A. Yes.

Q. That paragraph at the top that I quoted earlier states that "the percentage of water supply provided by groundwater is generally low due to the overall reliability of the surface water shares."

Can you explain that sentence?

A. The Twin Falls Canal Company water supply is generally reliable, obviously, during the shortages.

However, there hasn't been the need to develop supplemental groundwater on the Twin Falls tract as there has been, for example, on the North Side tract.

COURT REPORTER: On the what tract?

THE WITNESS: North Side.

COURT REPORTER: Thank you.

Q. (BY MR. BUDGE) So, Chuck, you're aware of other surface water delivery entities where there's larger percentages of supplemental groundwater wells?

A. Yes.

Q. And that typically occurs when the surface water supply is less reliable?

A. That's been my observation and experience.

Q. Okay. Were you here for the testimony of Jay Barlogi earlier this week?

A. Yes. I had to step out for a few moments of it, but I think I heard the bulk of it.

Q. During part of his testimony, I was asking him about the types of crops grown within the company's service area, and there were quite a few, including wheat and barley.

Do you recall that part of his testimony?

A. Yes.

Q. And you understand that wheat and barley are typically harvested in, you know, early August?

A. Yes.
Q. And you would agree that once those crops are harvested, the crop water need within the company would decline?
A. Yes.
Q. Mr. Barlogi also testified about some of the efficiencies that the company has implemented in recent years.
Do you remember that part of his testimony?
A. Yes.
Q. He mentioned automation and the Kinyon Pond and also some lining projects.
Do you recall that?
A. I do.
Q. One of the projects he mentioned was a large canal lining project that happened in 2019 on the High Line Canal.
Is that something you are familiar with?
A. No, other than to know that it occurred.
Q. Okay. And then he mentioned an upcoming large lining project that's, I think, slated for 2024.
Is that something you're involved with?
A. No.
Q. Okay. You understand when a canal company is lined, that's typically done to minimize or eliminate

the amount of seepage out the bottom of the canal?

A. Yes.

Q. And so if the water is diverted into the canal, that results in a decrease in the total amount of water lost through the bottom of the canal?

A. Yes, that's the objectives.

Q. And when those lining projects are implemented, the canal efficiency improves; correct?

A. Correct. Well, sorry, TJ. Efficiency is calculated lots of different ways. Let's say it this way: The conveyance loss from the canal decreases.

Q. That's a better way of saying that. Thank you, Chuck.

And I sometimes hear canal companies say that through these types of projects, they're able to stretch their water further. Would that be fair to say?

A. Generally that's true.

Q. Let me ask a few questions about the increase in sprinkler irrigation efficiency within Twin Falls Canal Company, and I believe you mentioned that it's gone from about 25 percent to 50 to 60 percent.

Was that based on Mr. Barlogi's earlier testimony in this case?

A. Yes.

Q. And you testified that when a shareholder

converts from flood irrigation to sprinkler irrigation, less water is applied to the farm field?

A. I think that's generally true. The on-farm efficiency can improve.

Q. And then the corollary to that is on that particular field, less water is diverted from the canal?

A. To that particular field. The same shares may be diverted to other lands, but for that particular field that got converted, generally that on-farm diversion will increase.

Q. And also as a result, you have less wastewater runoff under sprinkler irrigation than flood irrigation?

A. Generally, yes.

Q. And wastewater is typically collected in drains or what's sometimes called waste ditches; is that right?

A. Yes.

Q. And Mr. Barlogi testified that some of those drains or waste ditches come back into the canal system. Are you aware of that?

A. Yes.

Q. And others leave the system. They may discharge into a creek or into the canyon or something like that?

A. Yes. They may be lost from the system, if you

will.

Q. And so when a farmer converts from flood to sprinkler irrigation, there's some amount of system loss that is essentially saved to the system.

Would you agree with that?

A. When a farmer converts -- I'm sorry, say that again.

Q. When a farmer converts from flood to sprinkler irrigation, there's some amount of system loss that is saved to the system?

A. Well, by system loss, if you mean runoff from his farm.

Q. Yeah, that's --

A. I assume that's what you mean.

Q. That's a better way of saying it.

So there's some amount of farm runoff that is conserved or saved?

A. Or it decreases, the runoff decreases.

Q. And there's also a decrease in the amount of deep percolation or aquifer recharge when somebody converts from flood to sprinkler irrigation?

A. Yes.

Q. Let me ask a few questions about project efficiency.

You testified there's many factors that affect

project efficiency, including canal seepage, wetting of banks, operational spills, and sprinkler irrigation.

Do you recall that testimony?

A. Yes.

Q. And you testified that these and other factors should be taken into account when analyzing project efficiency?

A. When making a determination on evaluation or a judgment as to the reasonableness of a calculated efficiency. They're all factors that contribute to the need for water diversion that does not directly go to meet the ET of the crop.

Q. Okay. And you understand that the methodology order does not take any of these factors into account when it calculates project efficiency for members of the Surface Water Coalition?

A. Not directly, that's right.

Q. If I understood your testimony right, the methodology order uses an equation that simply divides the diversion volume by crop water need?

A. It divides the crop water need by diversion volume.

Q. I have that backwards. Thank you for the correction.

And so if the conveyance efficiencies of

Twin Falls Canal Company improve, the methodology order makes no change in the reasonable in-season calculation?

A. That is correct. Yes. That's a true statement.

Q. So when Twin Falls Canal Company installed their canal lining project in 2019, the methodology order didn't make any adjustments to account for that improvement?

A. Well, not directly, but to the extent that may have showed up as a change in the diversion volume, then the equation that you just spoke of would have picked it up.

Q. So if the company had reduced its diversion volume as a result of that improvement, then you would have seen some change in the diversion volume input into the methodology?

A. And some change in the efficiency, project efficiency.

Q. Okay. And we talked earlier that there's been a pretty substantial increase in the amount of sprinkler irrigated land, from 25 percent to 50 to 60 percent.

The methodology order does not do anything to directly account for that added efficiency?

A. Not directly.

Q. So if I understood your testimony, if

Twin Falls Canal Company becomes more efficient in using water, the equation used in the methodology order does not change the reasonable in-season demand?

A. Not directly, only if it shows up as a change in the diversion plan.

Q. And if irrigated acreage declined in the company, the methodology order would not change the reasonable in-season demand volume?

A. It's the same answer. The diversion volume is the baseline -- basis for the methodology calculation of the project efficiency.

So it's crop water need, which is a consumptive irrigation requirement, times irrigated area divided by the diversion point. The measure they observed diversion volume.

Q. So if Twin Falls' irrigated acreage decreased by one half, as long as they continued to maintain a stable diversion volume, their reasonable in-season demand would not change?

A. That's what the equations and the methodology set forth.

Q. Let me go back to your expert report. And we can turn to page 7.

A. Okay.

Q. And I'm looking at Figure 4, which you

discussed with Mr. Thompson.

And I understood your testimony to be, in your report, that this shows that Twin Falls Canal Company's diversions have remained relatively constant since the late 1970s?

A. Yes.

Q. And there's a statement in your report that diversions have all been within plus or minus 150,000 acre-feet of the average?

A. Yes.

Q. So do those gray horizontal lines that parallel the average -- there's one above and one below -- does that reflect the plus or minus 150,000 acre-feet figure you're talking about?

A. Yes.

Q. Okay. So I can see there's just a couple orange dots that are kind of outliers that reach that 150,000 acre-feet figure?

A. Yes. The 150,000 figure, plus or minus -- excuse me. Let me back up.

The average value plus or minus 150,000 acre-feet represents the range of the data.

Q. Okay. I understood that correctly, then.

And then if we took out those outliers, you know, like 2005 and 2020 and we go back to, say, 2000,

it looks to me like diversions have probably been plus or minus maybe 50- or 75,000 acre-feet?

A. I would agree. It does appear to be -- it does appear that the variability in the data has been less in recent decades.

Q. And at the bottom of that section of your report -- and I'm looking right above the heading number "C" -- or labeled "C" -- you state at the end that: "there's no statistically significant trend in the data set, and if any trend exists, it is a very weak downward trend."

You're referring to the time period of 46 years shown in that graph?

A. Yes.

Q. And I believe you testified earlier that if we were to look at a shorter time period, say, from the early 2000s, it would show an upward trend?

A. It could if you select the right starting and end date. That's the -- that's one of the bugaboos with trend analysis.

Q. Did you run that analysis with a shorter time frame to see what it would show?

A. I believe we did do some interdecadal, if you will, analysis to see what that would show, but I don't remember what the results were.

COURT REPORTER: A what kind of analysis?

THE WITNESS: Oh, let me change that word.

Let me say: We did analysis on certain periods within this dataset, but I don't remember what the results were.

Q. (BY MR. BUDGE) Just looking, you know, at the graph, isn't it obvious that if we used, like, from 2000 to today, so the last two decades, there's an increasing trend?

A. I think so. I think the data would probably show that.

Q. And during your -- during the discussion we had just a moment ago about project efficiency and crop water need and reasonable in-season demand, reasonable in-season demand is driven largely just by diversions; correct?

A. In the methodology order, you mean?

Q. Yes.

A. Yes.

Q. So increasing diversions will show -- will produce increasing demand within the methodology order irrespective of whether crop water need is going up or down or efficiency is going up or down?

A. I'm not sure you can make that blanket statement, TJ. But it is -- again, it's -- the

methodology assumes that the diversions are what they are, they're a given, and those are used to calculate project efficiency. And those are used, together with the crop water need, to calculate the reasonable in-season demand adjustments. So those factors go into that equation.

And then, of course, the baseline year demand doesn't have anything to do with acres, it's just based on diversion.

Q. So as diversions go up, the baseline year goes up?

A. No. The baseline year is a discretionary selection by the Department.

Q. Do you understand the baseline year has to be above the average?

A. Yes.

Q. So as diversions go up and push the average up, that forces the baseline year to go higher?

A. It could if, as happened this year, the average becomes greater than the previously used baseline year, then I assume the Department would reevaluate that.

MR. BUDGE: I don't have any further questions.

Thanks, Chuck.

THE WITNESS: Thanks, TJ.

HEARING OFFICER: Further cross-examination by the groundwater users?

Mr. Harris?

MR. BUDGE: Hey, Director, do you mind if I ask -- there's a document I left on my desk that I forgot to ask Chuck about.

HEARING OFFICER: You're asking to displace Mr. Harris?

MR. BUDGE: He hasn't taken his seat yet.

MR. HARRIS: Come on up.

HEARING OFFICER: All right.

MR. THOMPSON: TJ, I just had a question about the numbering of that exhibit.

I think you had numbered that as a Coalition exhibit. I wonder if you can just renumber it to whatever IGWA's exhibit number is?

MR. BUDGE: Yeah, we can do that. And it's not labeled on its face, so when we get to the admission portion of it, we'll do that.

Q. (BY MR. BUDGE) Chuck, I had your attorney email to you a couple copies of your expert report. It's pages 4 and 5 that I've added some red highlighting on.

Do you have those?

A. I see those. Yes, I have those. Yes.
Q. Chuck, except for the red highlighting, do you recognize those as Figure 2 and Figure 3 from your expert report?
A. Yes.
Q. I'll represent that I've added the highlighting. And what I've done is identified areas that do not appear to be irrigated with water from Twin Falls Canal Company.
And I'll give you some examples. I'm looking at Figure 2 to begin with; that's the 2017 irrigated lands dataset, and I'll just start in the upper-right-hand corner. That upper-right-hand red box is what I call a farmstead. It's a house and a yard that's out in the country.
Do you see that?
A. Yes.
Q. I assume you are aware that rural farmsteads like this typically have domestic wells?
A. Yes.
Q. And they're typically using their domestic wells for their culinary use and their, you know, yard and garden and things of that nature?
A. They --
COURT REPORTER: Mr. Brockway, sorry. You're

going to need to start your answer over.

THE WITNESS: They are using it for in-house purposes for sure. Sometimes they irrigate their half-an-acre allowance with the domestic well; sometimes they use their surface water shares, in my experience.

Q. (BY MR. BUDGE) Okay. If you can just take a moment to look at the areas I've highlighted in red. There was some pivot corners, and then the others are all farmsteads.

If you can just confirm that you agree that that's what I've identified?

A. Yes, I see them, TJ.

Q. Okay. And so these are areas that are not irrigated with the canal water unless the farmstead is using canal water for its landscaping and gardening around the house.

Do all the red areas look okay on that, Chuck?

A. I'm sorry. What's the question?

Q. Okay. And maybe you answered this already, but you've had a chance to review the areas that I marked in red on that?

A. Yes.

Q. Okay. And you agree that they're representing either pivot corners or rural farmsteads?

A. It looks that way, yes.

Q. And then I've done the same thing on Figure 3. The one difference for Figure 3 is there's that chunk in the middle where the red is shaped like an E.

And on this hard copy version it's kind of hard to see, but as you're aware -- as you're familiar with the original, that highlighted area that looks like an E is actually some subdivision roads. It looks like a newly created subdivision that has roads but no homes yet.

Do you recognize that?

A. Yes.

Q. Other than that subdivision, as I've just described, the other areas, you'd agree, represent rural farmsteads or pivot corners?

A. It does appear that way.

MR. BUDGE: I would move to have this document marked as the next IGWA Exhibit No. --

MS. PATTERSON: 838.

MR. BUDGE: -- 838 and admitted into evidence.

(Exhibit 838 marked.)

HEARING OFFICER: Any objection to the admission of this document?

Hearing no objection, the document marked as Exhibit 838 -- is that correct -- is received into evidence.

(Exhibit 838 received.)
MR. BUDGE: Thank you. And thank you for the accommodation.
HEARING OFFICER: Mr. Harris.

CROSS-EXAMINATION

QUESTIONS BY MR. HARRIS:

Q. Mr. Brockway, good afternoon.

Can you still only hear us? Or can you see us yet?

A. I can hear, but not see.

Q. Okay. Rob Harris here on behalf of the City of Idaho Falls.

Is it okay if I call you "Chuck" today?

A. Absolutely.

Q. Do you have, close to you or on your computer, Exhibit 300, which is the Fifth Methodology Order?

A. Yes.

Q. Your report, which is Exhibit 4, and then the expert report of Greg Sullivan with Spronk Water Engineers, that's Exhibit 347A. I'll be referring to those. So I wonder if you could just have those pulled up.

MR. THOMPSON: Rob, I think I'll have to email him that.

THE WITNESS: Okay. I have those pulled up, Rob.

MR. HARRIS: Okay. Great.

Q. (BY MR. HARRIS) You are described as one of the three authors of Exhibit 4; correct?

A. Correct.

Q. Did the three authors prepare different sections, or did you contribute to all of it and are able to testify as to all parts of it?

A. The three authors wrote different sections.

Q. What sections did you prepare?

A. I prepared -- well, let me clarify.

Brockway Engineering, myself and Erick Powell, prepared all but Section C; Dave Shaw prepared Section C.

Q. Okay. Thank you.

How long did it take you to prepare this report?

A. Probably three days.

Q. Would you have liked to have had more time to prepare it?

A. Yes.

Q. Okay. The Fifth Methodology Order describes the steps that the Director takes to calculate a material injury number for each member of the Coalition;

correct?

A. Yes.

Q. So it's essentially a formula. Would you agree with that?

A. Yes, or perhaps algorithm would be more appropriate.

Q. And it is an update to the Fourth Methodology Order that was issued in 2016; correct?

A. Correct.

Q. And the report is to be based on, "the best available science and underlying water data"; correct?

A. I don't know. Are you quoting from the order?

Q. I am. So if you look at page 2 of the Fifth Methodology Order, it uses a phrase there: "Apply the best available science and underlying water data."

Do you see that?

A. I do see that. Thank you.

Q. So from a technical standpoint, what does it mean to you to apply the best available science and underlying water data?

A. Well, goodness, that's, obviously, a broad question. That's open to interpretation by different people. Some things that occur to me would be that it would be using standard mathematical protocols, standard protocols for analyzing agricultural water use. The

underlying data should be available and reasonably accurate. I don't know, Rob, that's a -- that's not one that you can pin down precisely.

Q. I think you gave a good answer. And what I'm getting at is you said it had to have some reasonable accuracy; correct?

A. I would adopt that, yeah.

Q. So it doesn't, necessarily, mean that the data has to be perfect or 100 percent certain, does it?

A. No.

Q. Okay. I want to turn to page 1 of your report, so it's Section A, "The Evaluation of Twin Falls Canal Company Project Acres."

And would you agree with me that irrigated acres identifies land where there is the artificial application of water to grow crops?

A. Well, I -- that's a very narrow definition, but in the case of the methodology, it does need to include things like that, in my opinion, waterways that are a real consumptive demand that the system has to meet even though they don't meet your narrow definition.

Q. And I'll get to that here in a moment, but just in terms of irrigation, you would agree with me that it's the artificial application of water to land to grow a crop; right?

A. Yes.
Q. That didn't come through, but I think you said "yes"?
A. Yes.
Q. And so that would not include roads, sidewalks, parking lots, and other hardened acres?
A. Yes, right.
Q. And, in fact, if you have the Fifth Methodology Order in front of you, on page 10 --
A. Okay.
Q. -- paragraph 21, could you read paragraph 21 for us. You don't need to read the citations, but go ahead and read that.
A. "Estimates of irrigated acres from the hearing show a trend of decreasing irrigated acreage. According to the Hearing Officer, beneficial use cannot occur on acres that have been hardened or otherwise not irrigated."
Q. So you would agree that the number of irrigated acres for each Coalition entity feeds into the Fifth Methodology calculation; correct?
A. Correct.
Q. And so the number of irrigated acres would affect the end result of projecting material injury, would it not?

A. Well, this goes back to my previous testimony that the equations in the methodology order assume that the diversion volumes, the observed diversion volumes are -- again, whatever the number of acres are -- the project efficiencies are calculated based on crop water need divided by diversions, and then those project efficiencies go back into the -- those calculated project efficiencies go back into the reasonable in-season demand adjustment equation.

Q. So I'll have you look at page 9 of that methodology order and look at paragraph 19.

And, Chuck, I understand your argument, and I would categorize your argument as twofold. One is the one you're making where you're saying irrigated acres don't really matter, but there's also a component of your report that indicates that because there are some errors that could happen with generation of a shapefile, that the acreage shouldn't be updated.

And I'm asking you about the latter one, which is whether or not acres can be depicted through shapefiles and how that factors into this methodology.

So paragraph --

A. Oh, I see.

Q. So paragraph 19, you would agree with me, says: "A baseline year must be recent enough to

represent current irrigation practices. Current conditions should be represented by (a) the net area of the irrigated crops."

Do you see that?

A. I do.

Q. And so is it your position, then, that the Director was in error to look at irrigated acres as he indicated he has in the Fifth Methodology Order?

A. No.

Q. Okay. So in terms of just calculating irrigated acres, you and your office are familiar with GIS software; correct?

A. Yes.

Q. You know how to generate and amend shapefiles?

A. Yes.

Q. You've used them in water transfers and other analyses; correct?

A. Correct.

Q. In fact, on your website, you indicate that you employ Jennifer Jennings who is, quote, a specialist in GIS mapping and analysis using ArcMap; is that right?

A. That is -- that was right up until a few days ago, but she's no longer with the firm.

Q. Oh, I'm sorry to bring that up.

Okay. But that's something you're personally

trained and others in your office on how to do that; right?

A. Yes.

Q. So as for polygons that are created with GIS, would you agree that they represent the best available technology to calculate the size of areas that are covered by the polygon?

A. Yes, I would say so.

Q. Pretty accurate in calculating acreage; right?

A. If the area photo is rectified properly, it can be quite accurate.

Q. And with the update to the Fourth Methodology Order from 2016 to the Fifth in 2023 to have the best available science, that would include an update to the actual irrigated acres; correct?

A. It would.

Q. And if we look at what qualifies as irrigated acres, would you agree that open water in ditches, ponds, or other waterways are not -- they're not irrigated, are they?

A. Under the definition you provided, no.

Q. And as I understand your testimony, I think what you're, essentially, saying -- and I'll get to your other arguments in paragraphs 2, 3, 5, and 6 -- but it's that irrigated acres don't matter; what matters is just

the diversions.

That's the second position in your report; correct?

A. Well, we can talk about that when we get there. It's just -- it's not that they don't matter. It's important to understand how they're utilized or not utilized in the methodology equations.

Q. I understand.

But you're basically -- well, let me -- if I were to say I'm not sure I understand your answer, could you just describe what it is you're arguing, then? If you're saying that it doesn't matter what the irrigated acres are, it's the baseline year, and that's determined by the historic diversions?

A. Right. The baseline year demand doesn't have anything to do with acres. It's simply a discretionary selection that fits the criteria outlined in the methodology order.

Q. Okay. I appreciate your answer. I'm just going through my questions because I think that answers a fair amount of them.

And actually TJ gave a hypothetical, but does that -- that I'll just ask again -- but does that mean that if Twin Falls Canal Company's acres go down 100,000 acres, do we keep considering the diversions as

a given and compute project efficiency values lower and lower, say, down to 20 percent?

A. Well, that is a big hypothetical, obviously. If the acres were to reduce by 50 percent, it probably would show up as a reduced diversion demand, and so then, over time, that would show up as changes in the calculations that are in the methodology order.

Q. And I think Travis gave you an example of 1 acre, so I gave you 100,000 just to cover the range.

But the -- based on at least some calculations, there's been approximately a 15,000-acre change in the system based on the shapefiles; correct?

A. Yeah, I've seen those numbers.

Q. And overstating the number of actual irrigated acres, from a technical standpoint, would result in a higher determination of material injury; correct?

A. Well, again, it's not that clear. It's not a one-for-one calculation like that based on the methodology equations.

Q. Okay.

A. I could go through that again if you'd like.

Q. No, I think I understand your testimony. Thanks.

A. Okay.

Q. I do want to turn to Part B of your report,

which is the trend in the Twin Falls Canal Company diversion.

And I think you've taken the position that they've actually decreased over time; correct?

A. No. Rob, I don't think I would take that position. It's just if you look at the numerical value of the trend to calculate it, it's very slightly downward but not enough to be statistically significant and not enough to render that opinion.

Q. But your analysis of that begins in 1977; correct?

A. Correct.

Q. Okay. In the Fifth Methodology Order on page 3, the Director states: "To capture current irrigation practices, identification of a baseline year" -- abbreviated "BLY" -- "is limited to years subsequent to 1999."

Do you see that?

A. I do see that, yes.

Q. So the Director began his analysis in 2000.

Is it your position that the Director was incorrect to pick a time period after 2000 in his analysis?

A. No.

Q. Okay.

A. No. That's just a discretionary decision.
Q. Okay. And, in fact, I'll -- you indicated in your testimony to Mr. Budge that -- kind of just eye-balling recent diversions that it's likely increased.
I want to have you look at Greg Sullivan's expert report just a few pages from the very back. It's Table 2-1.
A. Uh-huh.
Q. And there's a chart in there that -- well, let me know when you get there.
HEARING OFFICER: What is the exhibit number?
MR. HARRIS: 347A.
HEARING OFFICER: Thank you.
THE WITNESS: Table 2-1. Okay. I'm there.
Q. (BY MR. HARRIS) Great.
This is a chart that summarizes the historic diversions of each of the Coalition entities.
Do you see the column for Twin Falls Canal Company?
A. I do.
Q. And do you see that there's some averages below them where you can actually see the average diversions from 2000 to 2014 of 1,045,120 acre-feet?
Do you see that?

A. Yes. Yes.
Q. And then do you see that there's an average of 2015 to 2021 of 1,098,477 acre-feet?
A. I do see that.
Q. So, at least based on those time frames, it appears that there's been an increase of over 50,000 acre-feet per year during the 2015-to-2021 time frame; correct?
A. I'm just checking to make sure these are adjusted volume. Yes. Yes. So assuming Greg's math is right, which I'm sure it is, then that is correct.
Q. Great. And so since the Fourth Methodology Order was issued in 2016 -- now we're in 2023 -- certainly since 2016 Twin Falls Canal Company diversions have increased; correct?
A. Well, I'd have to do the analysis just for that short period, Rob. I don't know if I can answer that today.
Q. Well, it's got a time period of 2015 to 2021. I'm just saying since 2016, based on these data, up to 2021, it looks like they've increased.
A. So you're asking me if the period 2016 to 2021 is greater than --
Q. I said -- yeah, greater than 2000 to 2014.
A. Well, I'd have to calculate the average of

2016 to 2021. That's not shown on Table 2-1.

Q. Okay. But at least from 2015 to 2021 it appears it's increased?

A. Yes.

Q. On -- I'm now going to have you turn to Part D of your report.

A. Uh-huh.

Q. And so that's on page -- well, I'll have you turn to page 13.

You gave a hypothetical there in the middle paragraph. You say: "A simple example calculation demonstrates this."

Do you see that?

A. I do.

Q. So the example assumes 56 percent on-farm efficiency, 20 percent canal loss at the diversion, and operational spill of 15 percent with an overall project efficiency around 42 percent; right?

A. Yes.

Q. And --

A. Well, that's -- the 42 percent is a calculated number based on above assumptions.

Q. Right. And you were here -- or I believe you said you were listening in on Mr. Barlogi's testimony that sprinkler irrigation comprises 50 to 60 percent of

Twin Falls Canal Company's irrigation practices today?

A. Yes.

Q. So in your hypothetical, would you expect Twin Falls Canal Company's on-farm efficiency to be 65 percent, in that range?

A. Oh, I think that may even be a little high, Rob. But that's maybe in the ballpark.

Q. But in your hypothetical you arrive at a calculated 42 percent project efficiency; right?

A. Right.

Q. In the methodology order it projects an efficiency that's 35 percent; correct?

A. On average.

Q. On average.

And so doesn't that mean that the company's collective losses, either conveyance losses or operational spills, must be greater than those in the hypothetical?

A. No. Because as I said in the last sentence there, this doesn't account for factors that are very difficult to even put a number on, such as the seasonal shoulder effects and the weather -- the short-term weather changes that reduce the crop water need but don't result in a diversion reduction.

So my only point with this paragraph is to say

using numbers that we have, that we can reasonably estimate, it's really easy to get to a number like 42 percent.

So my point here is that it's not at all unreasonable for a large canal company with a thousand miles of ditches and laterals to have an efficiency of something like 35 percent.

Q. Did you review the project efficiency of other Coalition members?

A. No.

Q. Was there a reason you did not look at those numbers?

A. Our task was, in the interest of time, primarily to focus on the hot-button company for this matter, which was Twin Falls Canal Company.

Q. So you don't know why the other members have been able to operate with much greater project efficiency values? You wouldn't have any knowledge of that?

A. I have general knowledge, but I don't have any specifics for you.

Q. I have one more area of inquiry, and then I'll be done. And it's Part G under "Supplemental Groundwater Usage."

A. Yes.

Q. You testified before that you're familiar with GIS shapefiles; correct?
A. Yes.
Q. And your office utilizes ArcMap, which I'm also familiar with, so you know how to use the clip, merge, buffer, intersect functions that can show areas where groundwater shapefiles overlap with company shapefiles?
A. Yes.
Q. And you could perform a function that would yield a shape that would show where that overlap occurs; right?
A. Yes.
Q. And the same thing with points of diversion?
A. Well, clarify that, if you would.
Points of diversion for wells would be the individual private wells.
Q. Correct.
A. Whereas --
Q. Yeah. And you could at least get an initial list of the privately decreed groundwater rights that exist within Twin Falls Canal Company's service area?
A. Yes.
Q. Okay. And those shapefiles have attribute data associated with them; correct?

A. Yes.
Q. It would have things like legal descriptions or IDWR metal tag numbers or even WMIS diversion numbers in it; correct?
A. Yes.
Q. And in terms of knowing who owns the properties where these shapes are, have you utilized tax parcel data that's generated by the counties to show land ownership?
A. Yes.
Q. And that's fairly readily available these days; right?
A. It is.
Q. And so wouldn't that be a starting point of where groundwater may be used within the company?
A. Yes.
Q. Are you familiar with the -- well, you are familiar with the WMIS database maintained by the Department; correct?
A. Yes.
Q. And that's an acronym for Water Management Information System?
A. Yes.
Q. And that system tracks groundwater diversions either measured by flowmeters or calculated through PCC

calculations; correct?
A. Yes.
Q. Okay. And, in fact, I believe you've used those in transfers and other situations, have you not?
A. Yes.
Q. And so do you consider them to be a reliable source of information, albeit maybe not perfect, for historical groundwater diversions?
A. Yes.
Q. I believe you said "yes"?
A. Not perfect. Yeah, I would agree with you, Rob. Not perfect, but reasonably reliable in most cases.
Q. And best available; right?
A. I think so.
Q. Okay. And I think the point of the Director's order is that supplemental groundwater use may be looked at because it may contribute to the overall water supply.
Do you agree with that?
A. Sorry. Could you restate that?
Q. Yeah. I believe that the Director's order -- the reason supplemental groundwater use is even mentioned is that it could be considered a source of water supply to irrigate acres within the Twin Falls

Canal Company's service area; correct?

A. So my apologies. I'm not familiar with where that's mentioned in the order. I would have to go reread that again.

Q. I'll refer you to page 10 at the bottom, paragraph 23.

Do you have that in front of you?

A. Okay. I'm there.

Q. It says: "There are lands within the service area of SWC entities that are irrigated with supplemental groundwater."

Do you see that?

A. I do see that.

Q. And that's under the section of the order under "Irrigation Practices," which is also under the available water supply to those that irrigate within the service area.

Do you see that?

A. I do see that.

Q. So as I understand the order, the analysis of supplemental groundwater is that it would provide another source of supply as to what could be irrigated acres within the company; right?

A. Right.

Q. Okay. And wouldn't WMIS data that's matched

to places of use points of diversion groundwater rights be a reliable starting point to determine how much supplemental groundwater is used?

A. It would be a starting point.

Q. And may be subject to some ground truthing as you said before; right?

A. Right.

Q. All right. I just have one more question. The last one is on the baseline year discussion.

Isn't it true that so long as Twin Falls Canal Company continues to increase its diversions, then the average will increase, and then in a few more years, there would be a higher baseline year with higher demand? Isn't that the end result of just looking at diversions?

A. If Twin Falls Canal Company diversions continue to increase, under that hypothetical, then, mathematically, their average will also continue to increase. What the Department does with that in the future is not something I can say.

Q. But if they continue to base mitigation obligations on that calculation, wouldn't that require the groundwater users to provide more upfront water?

A. Well, if -- under your assumption that a new baseline year is selected?

Q. Yes.
A. It could, yes.
MR. HARRIS: Director, I believe that's all of the questions I have.
Thank you.
HEARING OFFICER: Thank you, Mr. Harris.
THE WITNESS: Thank you, Rob.
HEARING OFFICER: I assume there is more cross-examination?
MR. BRICKER: Yeah.
HEARING OFFICER: Okay. Well, let's break for lunch. Come back at a quarter after 1:00. Thank you.
(Lunch break taken.)
HEARING OFFICER: Okay. Let's go back on the record. Next to examine.
Are we on, Andrea?
COURT REPORTER: Yes.
HEARING OFFICER: All right. Thank you.
Mr. Anderson, you may examine.
MR. ANDERSON: Thank you.

CROSS-EXAMINATION

QUESTIONS BY MR. ANDERSON:
Q. How are you, Mr. Brockway?
A. I'm doing fine, thank you.

Q. Good. I'm Dylan Anderson. I've seen you before. I don't know if we've actually met in person or not, but I just have a quick question for you.

As you explained with irrigated acres, as they would go down, the efficiency would go down, or as they would go up, the efficiency would go up, so they don't really affect the reasonable in-season demand. Is that an accurate representation as you've explained it?

A. They don't affect it on a direct proportionate basis; that's right.

Q. So if the Department wanted the actual irrigated acres to be reflected in the reasonable in-season demand, would they, then, need to somehow fix efficiency? "Fix," I mean make it static or control for that number?

A. That could be a way to do it.

MR. ANDERSON: That's it. That's the only questions I have.

Thanks.

HEARING OFFICER: Okay. Next?

Mr. Bricker, come forward.

MR. BRICKER: Before I begin the examination, Director, I believe the parties, we've all stipulated to admitting Exhibit 316 into evidence, and I just wanted to make that clear now.

HEARING OFFICER: 316?
MR. BRICKER: Yeah.
MR. FLETCHER: Which is the same as 914; right?
MR. BRICKER: Also 914, the same document.
HEARING OFFICER: Okay. There's a stipulation to the admission of 316 and what? Corresponding 914?
MR. BRICKER: Correct.
MR. FLETCHER: It's the same exhibit.
MR. BROMLEY: They just need 316.
MR. FLETCHER: Mr. Director, are we on the record?
HEARING OFFICER: We are.
MR. FLETCHER: Can we go off for just a second?
(Discussion held off the record.)
HEARING OFFICER: Back on the record.
So the parties have stipulated to the admission of Exhibit 914, which also corresponds to what was marked as 316. Thank you. It's received into evidence, Exhibit 914.
(Exhibit 914 received.)
MR. BRICKER: Good to go?
HEARING OFFICER: Yes.
///

CROSS-EXAMINATION

QUESTIONS BY MR. BRICKER:

Q. Good afternoon, Mr. Brockway.

A. Good afternoon.

Q. My name is Max Bricker. I represent the City of Pocatello. I have a few questions for you here.

So in your report, you state that: "The diversion volume in the Fifth Methodology baseline year of 2018 is at the 84 percentile and provides a reasonable factor of safety to protect senior water right holders."

Is that right?

A. I am getting there. One second. Are you looking at the conclusions?

Yes. Okay, I see that. Uh-huh.

Q. And you also state that: "Using 2018 as the BLY provides a reasonable factor of safety without being extreme."

Right?

A. Yes.

Q. Isn't it possible that diversions from a baseline year at a percentile lower than the 84th could still provide a reasonable factor of safety?

A. Well, obviously, the word "reasonable" was up to interpretation. So in general, yes.

Q. Thanks.

Isn't there already an additional safety factor by using the forecast supply minus one standard deviation?

A. Yes.

Q. If the safety factor is too high, then won't the forecast shortage almost always be greater than the actual shortage determined at the November 1st reconciliation?

A. The conservatism built into the system or into the algorithm could be set such that that would be the case.

Q. And similarly, if the groundwater users have to provide mitigation water based on an overly conservative forecast shortage, won't they almost always end up overmitigating?

A. That is the same answer to my previous question.

Q. Thanks. Doesn't that suggest that there is a point at which too much conservatism in the forecast ends up being a waste of the resource?

A. That's a policy question not a technical question, so I don't have an opinion on that.

Q. Okay. Also in your report you state that: "Operational spill is always necessary in order to

deliver water to users within the systems. Spill must be maintained in order to account for variations in demands by irrigators. Without spill it would be impossible to reliably serve the tail ends of the system."

Correct?

A. That's true.

Q. Even if operational spills were necessary, the amount can be reduced with more prudent management; correct?

A. Possibly.

Q. And isn't there a point when operational spills become excessive?

A. Again, there's no bright line there. I think there would be, but there's no set point or a bright line.

Q. Fair enough.

Okay. Also in your report, you state that: "It is not unreasonable to see flat or declining project efficiencies even though sprinkler conversions are continuing to occur."

Is that right?

A. Yes.

Q. So if on-farm efficiencies increase as sprinkler conversions continue and conveyance losses

stay constant but project efficiencies stay flat, that must mean that operational spill rates have increased; right?

A. Well, that's one possibility, but there could be other operational factors that might enter into that, as I've indicated.

Q. You also state that: "It has been demonstrated herein that the project efficiency is reasonable."

Right?

A. Yes.

Q. How are you defining the term "reasonable"?

A. Well, the hypothetical calculation that Mr. Harris and I went through, I think, is a good foundation for that. There are just certain levels of system losses, if you will, that can be reasonably achieved. There's no set definition for reasonable, but there are, certainly -- I think the term has been used -- "industry standards" that can be used to define whether waste is going on. So my only point of that calculation was just to demonstrate how very easy it is for a large, slow-moving canal system to have efficiencies that are very low.

Q. And you agree that project efficiencies can change; right?

A. Yes.
Q. And you also agree that a project whose operations are reasonable at one point in time could at some point in the future cease to be reasonable?
A. No. That's -- I don't know about that.
Q. So as an example, just because something was reasonable in the year 1910 doesn't, necessarily, mean it's reasonable today; right?
A. Well, I believe the definition of reasonable is to compare it with current industry standards or current state of the art. I think I would generally agree with that.
Q. So if the technology changes, that could render an outdated operation no longer reasonable; right?
A. Possibly.
Q. Isn't it true that Twin Falls Canal Company's baseline year demands are equal to its 2018 diversions in the Fifth Methodology Order?
A. What are you asking me, if the Department chose 2018 as the baseline year?
Q. Yes.
A. That's true.
Q. And its diversions in that year are the baseline demand?

A. Correct.
Q. Isn't it also true that Twin Falls Canal Company claims to divert roughly 1,100,000 acre-feet annually?
A. I think that's the round number that is often cited or stated.
Q. Okay. So hypothetically here, when multiplying 1,100,000 acre-feet by an average project efficiency of .35, that equals an annual crop water need of roughly 385,000 acre-feet; right?
A. Yes.
Q. Now, in your example in your report, you arrived at a project efficiency of .42; right?
A. For that purely hypothetical example.
Q. Sure. So in my hypothetical, if you were to divide that calculated crop water need of 385,000 acre-feet by a project efficiency of .42, doesn't that equal 917,000 acre-feet, roughly?
A. Yes.
Q. So if that crop water need were to stay consistent and the canal company in this hypothetical were to achieve a project efficiency of .42, its diversions could decrease by a magnitude of roughly 200,000 acre-feet; right?
A. Yes.

Q. Doesn't that indicate that a change -- a minor change in project efficiencies -- we'll call it a few decimal places -- can make a significant difference in demand by a magnitude of tens of thousands of acre-feet?

A. Yes.

MR. BRICKER: That's all of the questions I have. Thank you.

HEARING OFFICER: Other questions from the groundwater group?

I don't see anybody.

Redirect, Mr. Thompson?

MR. THOMPSON: Good afternoon, Chuck. This is Travis Thompson back here for a few redirect questions.

THE WITNESS: Hey, Travis. I can see you this time, so that's good.

MR. THOMPSON: Good for you or me? I don't know.

THE WITNESS: Well, I don't know.

REDIRECT EXAMINATION

QUESTIONS BY MR. THOMPSON:

Q. Can you -- you had a long discussion with Mr. Budge about irrigated acreage in the context of reasonable in-season demand and how that's calculated in the methodology.

Do you recall that?

A. I do.

Q. Can you provide a summary of your understanding?

A. Yes. Let me try to tidy this up because it's sort of been, I think, saved in a fractured manner. So let me try to summarize.

As a general principle for irrigation systems, of course the number of irrigated acres matters. You know, a diversion requirement is generally a requirement of irrigated acres. I don't think that's in dispute.

So my testimony is not that irrigated acres don't matter. But just looking at the mathematics outlined in the methodology that are required to make the reasonable in-season demand calculation right now for this year, the observed diversions are a given, and the historic project efficiencies are calculated as the consumptive irrigation requirement times the irrigated area divided by the observed diversions. Then the project efficiencies are used to calculate the reasonable in-season demand adjustments for this year. And, of course, the baseline year is not a function of acres at all.

So if the acreage s in the methodology are wrong, if you somehow knew that, then you would have to

go back and recalculate the historical project efficiencies, otherwise they would also be wrong. Then those different efficiencies will be used to calculate the reasonable in-season demand for this year.

Theoretically, the reasonable in-season demand calculated in that way might not change. Again, just talking about the specific calculation for this year.

Now, that may not exactly be true because things are confounded somewhat by the fact that the Department actually used different acres, historically, for some period in the past. And I have not delved into the guts of the reasonable in-season demand calculation spreadsheet to know exactly what it's doing. I'm just observing the mathematics in the methodology.

If the -- if a different acreage were used, it would not result in a direct proportional reduction in the reasonable in-season demand calculation for this year, as has been claimed.

So that's kind of a -- as tidy as I can make it a summary of how the acres play into or don't play into the calculation of the reasonable in-season demand.

MR. FLETCHER: Somebody needs to mute. They did.

Q. (BY MR. THOMPSON) Okay. Chuck, we're still here. Just had somebody, I think, that was off mute.

A. Okay.
Q. Did you hear the testimony of Jay Barlogi, that the Twin Falls Canal Company has over 100 miles of main canals and roughly 1,000 miles of laterals?
A. I did.
Q. And do you know the length of the lining project completed on the High Line in 2019 that Mr. Budge was discussing with you?
A. I don't know the exact length.
Q. I guess, would that be an important factor to consider to determine the impact on overall canal seepage?
A. Yes.
Q. And you've looked at the diversion data for large open canal systems in southern Idaho; is that correct?
A. In general, yes.
Q. Is 5 to 6 acre-feet per acre a reasonable diversion rate, in your opinion?
A. Yes.
Q. Getting back to these -- we talked about the regression analysis on trends and diversions for Twin Falls Canal Company.
Do you recall that discussion?
A. Yes.

Q. I think Mr. Harris pointed out to you the Fifth Methodology Order looking at a period of 1999 to 2021.

A. Right.

Q. And do you recall if 2001 to 2005 were multiple years of drought?

A. Yes.

Q. Would those be considered years of limited supply?

A. I'm not sure if they all were, but, in general, yes.

Q. And I think Mr. Budge talked about a trend of -- 2015 to 2021 showing an increasing trend in diversion; is that correct?

A. I believe so.

Q. I guess by that same analysis, would -- what would 2020 through 2022 show?

A. Well, it's only three years, but they will be decreasing.

Q. So it certainly depends on the number of years and what you're looking at for a trend analysis; isn't that correct?

A. It does. That's correct.

Q. Mr. Budge asked you some questions about Exhibit 838.

Do you recall those?
A. Yes.
Q. And I think that was an exhibit that he had overlaid some red-shaded areas in.
Do you recall that?
A. I do.
Q. Would you agree that the interpretation of what is actually irrigated can vary depending upon the individual involved?
A. Yes, very much so.
Q. So an attorney's interpretation, like Mr. Budge's, could vary from an engineer's. Would you agree with that?
A. Yes, I agree with that.
Q. And the particular year could change what actually happens on the ground; is that correct?
A. Yes.
Q. So a corner left out of irrigation in 2021 could actually be irrigated in 2023?
A. Yes, that's right.
Q. Finally, just a question Mr. Harris asked you about desiring to have more time to prepare your report in this case.
Do you recall that?
A. Yes.

Q. Do you work within the deadlines set for contested cases and adapt to what is required?
A. Oh, yes.
Q. Is that what you did here?
A. That's what I did here.
MR. THOMPSON: That's all of the questions I have.
Thank you, Chuck.
THE WITNESS: Thank you.
HEARING OFFICER: Recross, Mr. Budge?
Mr. Harris?
MR. HARRIS: I actually have just a couple.

RECROSS-EXAMINATION

QUESTIONS BY MR. HARRIS:
Q. Chuck, Rob Harris again.
Just to follow up, more of a foundational question to Mr. Thompson's question.
You said that you looked at the diversion data of large canals in southern Idaho.
What -- specifically, what canals were you looking at?
A. Well, let me clarify, Rob. Not for this case. My testimony is that I'm generally familiar with diversion data and volumes for large canal systems.

Q. Okay. And I guess, again, just a foundational question is: How are you familiar with those? Or what canals did you look at?

A. Just in the course of my general work. So it would be companies such as North Side -- excuse me -- Aberdeen-Springfield and some of the other eastern Idaho canal systems.

Q. And North Side Canal Company is an on-demand system like Twin Falls Canal Company is; correct?

A. I believe so, yeah.

Q. And the tailwater from that system comes in below the Milner Dam into the Snake River Canyon?

A. Yes.

Q. Mr. Thompson asked you some questions about Exhibit 838 about those red-shaded areas and about individual interpretation, that it can be different.

Do you recall that testimony?

A. Yes.

Q. Would you say it's often different or -- based on the photos, you can typically see green vegetation growing to indicate it's growing; right?

A. You can. And then there are those areas that are not green and are subject to interpretation.

Q. But wasn't that the same process that was used in the Snake River Basin Adjudication to determine

irrigated acres, in your experience?

A. I think generally, yeah. I mean, they started as a -- from a -- as a first cut, if you will, looking at land that was green or showed an infrared signature and then applied some human brain power to look at some areas that may not have been so clear.

MR. HARRIS: That's all of the questions I have. Thank you.

HEARING OFFICER: Mr. Anderson --

THE WITNESS: Thank you.

HEARING OFFICER: Mr. Anderson, further questions?

MR. ANDERSON: No, Director. Thank you.

HEARING OFFICER: Mr. Bricker, further questions?

MR. BRICKER: Nope.

HEARING OFFICER: Any other recross?

All right. Thank you, Mr. Brockway, for participating today.

THE WITNESS: Thank you, Director. I appreciate you for accommodating my situation here.

HEARING OFFICER: Yep.

Next witness.

MR. THOMPSON: The Surface Water Coalition will call Dave Shaw.

HEARING OFFICER: Mr. Shaw, if you'll come forward, please.

DAVID B. SHAW, P.E.,
called by the Surface Water Coalition, having been first duly sworn to tell the truth relating to said cause, testified as follows:

HEARING OFFICER: Thank you. Please be seated.

Mr. Thompson?

MR. THOMPSON: Thank you, Director.

DIRECT EXAMINATION

QUESTIONS BY MR. THOMPSON:

Q. Dave, could you please state and spell your name for the record.

A. David, D-a-v-i-d, middle initial "B" as in "boy," Shaw, S-h-a-w.

Q. And where do you currently work?

A. I work for ERO Resources Corporation.

Q. And what is your occupation?

A. I'm an engineer.

Q. Is your CV attached to what's been labeled as Exhibit 4 in this case?

A. Yes, it was.
Q. Does that generally describe your education and work history?
A. It hits the high spot, yes.
Q. Have you been qualified as an expert witness before IDWR in prior cases?
A. Yes.
Q. Can you generally describe what you were asked to do for the report identified as Exhibit 4?
MR. HARRIS: Director, real quick.
Dave, could you pull the microphone a little closer just so we can hear a little better.
Thank you.
THE WITNESS: I was asked to look at the methodology order and the As-Applied Order and evaluate its implementation.
Q. (BY MR. THOMPSON) And if you could turn to that Exhibit 4, page 7. It should be behind you.
A. Okay.
Q. Does that Part C of pages 7 through 11 generally reflect your work product in this report?
A. Yes, it is.
Q. And can you describe those opinions that you've offered there?
A. This was as a result of looking at

efficiencies. Mr. Sullivan and others were looking at the efficiencies and trying to do a trend analysis for changes in efficiencies over time. I thought it would be important to look at how the efficiencies were calculated, and that's primarily where I focused my effort.

Efficiency, I think everyone has talked about it before, it's crop water need times acres divided by diversion. Acres has been discussed here a lot. Crop water need, not so much. We know AgriMet is used for the ET values. Mr. Sullivan called them a CIR, consumptive irrigation requirement. But there wasn't -- hasn't been such discussion about crop mix. And that's also an important element in determining water use efficiency and crop water need.

Q. And is that crop data layer, is that CDL data that the Department uses?

A. The Department's used that since 2007. Prior to 2007, that data was not available. The information was reported on a countywide average. My recollection is the Department averaged the crop mix for the county or counties in which a delivery organization was located, and then from that, created some kind of an average that they used for the water delivery organization.

Q. And do you have some recommendations on the use of that data in the methodology going forward?

A. I do.

Q. And could you describe those?

A. My understanding of the current methodology and the technical work group was provided with a copy of what IDWR calls their calculator worksheet during the TWG meetings during last fall and winter.

My understanding is for the period 2000 through 2014, the crop mix for all of those years has been averaged together. So any trends, changes over time, have been lost. So the crop water need is calculated by the ET or CIR for a particular year against an average of the crops that have been raised over that 2000-to-2014 period.

Starting in 2015, IDWR took the prior three years -- so '12, '13, and '14 -- averaged that crop mix or those crop mixes and then used that average to calculate crop water need for 2015, and that's continued through last year.

Q. And does that data become available like as the actual data at the end of the year?

A. I understand it's available after the first of the year, so 2023 data will be available January 2024.

Q. And is there a question whether they'd go back

and insert the actual data into that number?

A. To have a true estimate of system efficiency, yes, they need to use the crop mix for the year they're using the diversion data from.

Q. Can you generally describe Figure 6 on page 11, what that depicts?

A. This is an estimate of alfalfa and corn from the CDL data for Twin Falls Canal Company for the period 2007 through 2022.

And then there's a third line that are the diversions for Twin Falls Canal Company adjusted for recharge.

And it shows the trends of increasing both alfalfa and corn, and there's a slight increase in diversion. I did not test it to see if it was significant or not.

Q. Those graphs confirm what you heard from Twin Falls Canal Company's manager Jay Barlogi earlier this week?

A. He has said there have been recent increases in alfalfa and corn, yes.

Q. And does that sort of crop mix, increases in those type of crops, impact water demand within the project?

A. It does. Alfalfa, Twin Falls AgriMet on

average is a little over 40 inches per year. Small grains -- wheat, oats, barley -- is low, 20 inches per year. So not quite 100 percent increase, but pretty significant increase going from small grains, for example, to alfalfa. Corn is in the upper 20s, lower 30, so even going from small grain to corn is roughly a 50 percent increase.

Q. And do you have any comments on, I guess, challenges with project efficiency in large, open canal systems?

A. I've heard there are challenges, yes.

Q. Do you have familiarity and experience with large, open canal systems in Idaho?

A. I do.

Q. And do you have any opinions on how the Twin Falls Canal Company operates and maintains its system?

A. Compared to other water delivery organizations I've seen in Idaho, I think they're well-managed. They do a good job with maintenance. I think their delivery system and their plan for delivery is reasonable.

MR. THOMPSON: I don't have any other questions. We'd just tender Mr. Shaw as an expert in the fields that he testified to in his report.

HEARING OFFICER: Excuse me. You want

Mr. Shaw recognized?

MR. THOMPSON: As an expert for the subjects that he's testified to in his report.

HEARING OFFICER: And I believe the parties have stipulated to recognize Mr. Shaw as an expert, so he is so recognized.

No further questions, Mr. Thompson?

MR. THOMPSON: No, thank you.

HEARING OFFICER: Cross-examination?

Mr. Budge?

CROSS-EXAMINATION

QUESTIONS BY MR. BUDGE:

Q. Good afternoon, Dave. How are you?

A. Good, TJ. How are you?

Q. Very good. Thank you.

A. Besides wanting to go home.

Q. Yeah, I'm looking forward to that.

MR. FLETCHER: It's all up to you, TJ.

MR. BUDGE: It's only going to take me ten minutes, Kent.

MR. FLETCHER: Oh, gosh, the TJ multiplier coming on.

Q. (BY MR. BUDGE) Dave, if would please turn to page 2 of your report for the heading "Evaluation of

TFCC Project Acres."

A. What page was that?

Q. It's just on the second page. It's heading A. Are you looking at Exhibit 4?

A. I am.

Q. And this is part of the expert report that you submitted?

A. Yes.

Q. And do you see at the top of page 2 a heading A?

A. Yes.

Q. Titled "Evaluation of TFCC Project Acres"?

A. Oh, okay. Yes.

Q. You were here when I discussed this with Mr. Brockway earlier today?

A. Yes.

Q. You recall I was asking him about the process used to create the 2013 GIS shapefile of Twin Falls Canal Company's irrigated lands?

A. Yes.

Q. And I understand that you participated in developing that shapefile?

A. Yes, I did.

Q. Can you explain the process that you went through to develop that?

A. As we looked at both 2011 and, I believe, 2013 aerial photography, we had done some prior work for Twin Falls where we had some historical photography for -- I think mostly areas along the boundary of the delivery organization, so we had some history on what had happened on some of those lands. So we tried to, very carefully, identify acres that were either irrigated in 2011 or 2013 or appeared they had been irrigated in recent years.

Q. And the data that went into that was you had aerial photography, I understand?

A. Yes.

Q. Or was it satellite imagery?

A. Aerial photography.

Q. Aerial photography.

And then you said on the fringes of the company, you had some other type of information. Could you clarify what that was?

A. Yes. We had some historical photography, some old black-and-white photos from Department of Ag.

Q. Okay. And your goal was to identify acres that were irrigated or had been irrigated in years past?

A. In recent years past, yes.

Q. Going how far back?

A. Well, the oldest photography I recall we used

was 2011, so it would have been that.

Q. And if you'll turn to page 5 of your report.

A. Okay.

Q. And my understanding is this is an aerial image of a portion of Twin Falls Canal Company's service area that shows which -- that uses highlighting to identify which lands were shown as irrigated in the 2013 GIS map versus which lands are shown as irrigated under the Department's 2017 irrigated lands dataset; is that correct?

A. That's my understanding also, yes.

Q. So if I want to use this map to understand just what was identified as irrigated in the 2013 GIS shapefile, I should consider everything with blue highlighting and yellow highlighting as having been identified as irrigated lands in the 2013 shapefile?

A. Yes. It looks like there's some yellow over the top of some of what we had already excluded. So it isn't everything that was yellow.

Q. So this photograph with the highlighting in blue, it has "2017 Irrigated Shape."

Do you see that?

A. Yes.

Q. So am I understanding correctly that everything in blue is identified as irrigated lands in

the 2017 dataset?

A. That's my understanding, yes.

Q. And then the yellow there in the legend says "2017 Difference." My understanding from talking to Mr. Brockway is that the land identified in yellow was shown as irrigated in the 2013 GIS shapefile but is not shown as irrigated in the 2017 dataset.

Am I understanding that correctly?

A. I don't think so. If you look at -- this is laying on its side, but the north/south yellow line kind of through the middle, some of those -- some of that area shows up as not being irrigated in the 2013 dataset, but is kind of merged with the yellow.

Q. Yes, I see that. So if I look approximately in the center of the image, there's a horizontal sliver that's not highlighted with either blue or yellow.

Do you see that?

A. Yes.

Q. And my understanding is that is the roadway that had been excluded from the 2013 GIS analysis?

A. That's correct.

Q. And just north of that excluded sliver there's a yellow parallel sliver, it's highlighted yellow that refers to a roadway.

Is it your assumption that that roadway

identified in yellow, that's parallel, is the roadway that was excluded in 2013?

A. The area that has no color on it is what was excluded in 2013.

Q. Okay. And you heard me discuss with Mr. Brockway or identify a number of farmsteads, and there's a subdivision or development that shows as being irrigated under the 2013 GIS shapefile?

A. Yes.

Q. And none of those farmsteads were excluded from the 2013 GIS shapefile at least in this section of the service area; correct?

A. Yeah, I don't have that in front of me. But, yes, I understand that.

Q. As a general rule, when you were creating the 2013 GIS shapefile, you did not exclude these residential properties that I've referred to as "farmsteads"?

A. No, I -- I think I tried to exclude hardened areas around farmsteads if there were large buildings or something like that.

Q. Okay. But none of those are excluded from either of these images?

A. Not from these images, no.

Q. Okay. And where there were subdivisions that

had been developed within the canal company service area, did you go through and carve out the roads and houses, or did you include the subdivision?

A. It's been too long, TJ. I remember I excluded the whole Twin Falls metropolitan area, but I can't remember for sure what we did with subdivisions.

Q. Okay. Generally, you were excluding land that was not capable at all of being irrigated, like parking lots and roads, things like that?

A. Yes.

Q. If it was irrigated or was capable of being irrigated, you generally included those lands?

A. Yes.

Q. As part of your analysis, you did not make an evaluation of supplemental groundwater rights within the company's service area?

A. That's correct.

Q. Did you compare your -- the 2013 GIS shapefile with company water delivery records to see if service water deliveries corresponded with the shapefile?

A. I didn't do that. Mr. Barlogi, at the time, was working in the central office, and I worked with him to get -- to do that kind of analysis and review what I had done.

Q. And you're not sure what he did in that

regard?

A. I'm not.

Q. You could have, with some additional time and effort, carved out farmsteads and subdivision roads and things like that if you had been asked to do that?

A. Well, at least as they existed in 2013, whatever the latest photography we had.

Q. And had you been asked to make an analysis of supplemental groundwater use, you had the ability to do that at that time?

A. Well, you could make an estimate. I've worked with place-of-use shapefiles from IDWR in other areas, and I keep being reminded not to put a lot of confidence in them.

I've also worked with WMIS data in other areas, and it's difficult to get like minds to agree on what the numbers are.

Q. You're familiar with the WMIS database?

A. Somewhat, yes.

Q. And, of course, you're very familiar with the Department's water rights database?

A. Yes.

Q. And if somebody asked you to do your best to analyze the extent of supplemental groundwater irrigation, it's within your expertise to do that?

A. Yes.
Q. But you've not been asked to do that for Twin Falls Canal Company?
A. That's correct.
Q. When that 2013 shapefile was created, I understand that was created strictly by Twin Falls Canal Company personnel and their consultants?
A. Yes.
Q. The Department was not involved as part of a collaborative process?
A. That's correct.
Q. And groundwater users or others were also not involved in that process?
A. That's correct.
Q. You understood at that time that it would benefit Twin Falls Canal Company to have as many acres identified as being irrigated as possible?
A. My direction was to accurately identify the acres being irrigated.
Q. I understand that, but you did understand that it would benefit the company to have as many acres identified as irrigated as possible?
A. Well, within their decree, yes.
MR. BUDGE: Okay. I have no further questions. Thank you.

Thanks, Dave.

HEARING OFFICER: Further cross-examination of Mr. Shaw?

Mr. Bromley?

MR. BROMLEY: Just a few.

CROSS-EXAMINATION

QUESTIONS BY MR. BROMLEY:

Q. Hi, Mr. Shaw.

A. Mr. Bromley.

Q. Okay. Figure 5 --

Do you have your report there? It's on page --

A. Yes.

Q. -- page 9.

So the Department's using the average of the three preceding years to determine the crop mix; is that correct?

A. That's the average crop mix, yes.

Q. But the Department's using the reference ET from the current year and methodology; correct?

A. Correct.

Q. So isn't it true that the differences between the 2018 to 2020 line and the 2021 line in Figure 5 are largely due to discrepancies in reference ET between

those years not due to differences in cropping?

A. And this is just for illustration purposes to show the difference that can occur between a three-year average and the next year.

Unfortunately, I didn't have CDL data to show here. So it's simply for illustration purposes.

Q. Thank you.

At the top of page 10, the first full sentence, I'll just go ahead and read that.

It says: "In Manager Barlogi's deposition we heard about the continual improvements being implemented by the Twin Falls Canal Co. (TFCC), and when CWN's were appropriately calculated, we believe those improvements will show continued reasonable use of the water resource."

Do you see that?

A. Yes.

Q. But as Dr. Brockway testified, if Twin Falls Canal Company doesn't actually reduce its diversions, then those improvements won't have any effect on the efficiencies used in the methodology; correct?

A. No. That was a no. Okay.

Q. Thank you.

All right. Let's look at the bottom of page 10, the last full sentence there, Mr. Shaw. And

I'll go ahead and read that.

A. I think we're -- maybe we're talking past each other.

Q. Okay.

A. I did not agree with Dr. Brockway.

Q. Oh, you don't agree with Dr. Brockway?

A. No.

Q. How is that?

A. Can you read your original question back to me?

Q. Sure thing. Absolutely.

So what we heard Dr. Brockway testify to a few times, both on cross with Mr. Harris and then, again, on, I believe, with City of Pocatello's attorney and, possibly, then with groundwater district's attorney, was that a number of statements that if Twin Falls Canal Company doesn't reduce its diversions, then a lot of what goes on in the calculations and the methodology order just continue to show increased need, even if, for example, acreage was reduced.

A. But if increases on diversions are necessary to meet increased crop demand because of improved efficiency from sprinklers or raising more water-intensive crops, then that would show up in improved efficiency, but it would not reduce diversions.

Q. Okay. So let me just ask the question one last time. And just answer it, please, so we can make sure that we're not talking past one another and that I didn't mishear what you said and you didn't mishear the question.

So as Dr. Brockway testified, if the canal company doesn't reduce its diversions, then these improvements won't have any effect on the efficiencies used in the methodology; correct?

A. No, I don't think that is correct.

Q. So at bottom of page 10, then, I'll just read this sentence -- the last sentence at the bottom of page 10.

"Figure 6 below shows the changes in alfalfa and corn acres since 2007 along with an increase in diversions by Twin Falls Canal Company to meet the demands of the more water-intensive crops."

And then we flip over to the next page, and we see Figure 6. So Figure 6 is a little "apples and oranges," isn't it? Because you're comparing alfalfa and corn acres to Twin Falls Canal Company diversions in acre-feet; correct?

A. Correct. That's why there are two y-axes.

Q. So you haven't actually computed the effect that the changes in alfalfa and corn acres has on crop

water need in acre-feet, have you?

A. No, I haven't.

Q. Still on page 11, Mr. Shaw, above paragraph D, the last paragraph there, there's discussion about changes in delivery that have occurred within the area of A&B Irrigation District.

Do you see that?

A. Yes, I do.

Q. Do you know if the A&B water rights have been updated through transfers to allow for surface water use on Unit B?

A. My recollection is they have a new permit for those acres.

Q. So this is the pipeline, then, from the river that's bringing surface water into some of those acres on Unit B?

A. Yes.

Q. Okay. When I read it, it was a little unclear to me if it was using -- I guess I would say, more senior A&B rights for irrigation.

But you've answered my question, which is it's that pipeline.

A. Yes.

Q. So thank you for that.

In your direct with Mr. Thompson, you said

Twin Falls Canal Company is a well-managed company compared to other Idaho canal systems.

Do you remember that?

A. I do.

Q. Have any of the systems that you were thinking of placed delivery calls?

A. Well, on some of those systems there are people shut off every year to supply water for the canal. That could be managed better.

Q. Okay. But have any of those companies filed a delivery call under the conjunctive management rules?

A. I don't know.

Q. Thank you.

Let's flip back to page 2, and this is paragraph 7.

And it says: "The company's" -- I'm sorry. Let's go to the second sentence of paragraph 7.

"The company has no way of knowing whether land covered by shares will or will not be irrigated and must prepare to meet the share delivery obligation."

Do you see that?

A. I do.

Q. Wouldn't you agree, based on your experience, Mr. Shaw, that farmers typically know which lands will be irrigated prior to the irrigation season because

they've already made cropping decisions, bought seed, bought chemicals?

A. Typically, yes.

Q. And in your experience for permissible places of use, is it a typical condition that the Department sometimes places, on rights with PPUs, to notify the Department as to which acres are going to be irrigated?

A. If there is a --

COURT REPORTER: Okay. Wait. I didn't hear that.

THE WITNESS: If there is a permissible place of use placed on the water right, then, yes, to Mr. Bromley's question.

Q. (BY MR. BROMLEY) So wouldn't it be reasonable for the company to ask its shareholders to notify it over the winter as to which acres will be irrigated and what crops will be planted?

A. No. I think it's up to the water user. If I am a water user, like Mr. Barlogi says, this is going to be a short year, and I've got 80 acres in new alfalfa and 40 acres of winter wheat, and I was going to plant potatoes but decided, no, I'll save my water for the crops I've got in the ground, I'm not going to irrigate that 40. And I wouldn't get my full water delivery, whatever it happens to be for the year, and I don't

think that matters to the companies.

Q. Okay. When I go over your Section 5 on crop water need, Mr. Shaw, I see a lot of suggestions to the Department as to how to get better and use more current data to better understand crop water need.

Is that a fair summary of what you're asking?

A. Yes.

Q. And then in Part A, though, of your report about Surface Water Coalition irrigated area, particularly Twin Falls Canal Company, you're advocating to use the 2017 shapefile for irrigated area for Twin Falls Canal Company; correct?

A. Not the 2017 shapefile, I don't believe.

Q. So you're using the 2017 shapefile, and then what are you doing with it?

A. We took the 2017 -- Mr. Brockway -- Dr. Brockway and his shop the 2017 raster irrigated lands dataset and overlaid it over the 2013 shape that had been prepared for Twin Falls Canal Company. I don't think there's a recommendation that the 2017 be the determination of acres for Twin Falls Canal Company.

Q. So the methodology order is using 2017 acres, the 2017 shapefile; correct?

A. No.

Q. No?

A. To my understanding, it's using the 194,000 acres from the 2013.

Q. Oh, that's correct. I'm sorry. That's a bad question.

So what you're advocating, though, for, with acres, is something that's from 2013, 2017 that's old data; correct?

A. Yeah. Well, its four years old, yes.

Q. But with crop water need, you're asking for current data, last year's data, as recent data as you can get; correct?

A. Well, crop water -- crop mixes can change from year to year, we know that, and that's a critical element in calculating crop water need that hasn't been, in my opinion, appropriately used. Irrigated acres may change over time. If there were resources to update that shapefile every year, you would have -- that would be the best solution. But we haven't seen that happen.

Q. And it would be seem to be consistent that if we're looking for use of best available information to use, in fact, what is best available information; correct?

A. And right now that's the 2013 shape.

Q. Even though that's from 2013 and we're in 2022?

A. That's the best available we have, yes.
MR. BROMLEY: Nothing further. Thank you.
HEARING OFFICER: Additional cross-examination?
I don't see any hands in the air.
Redirect, Mr. Thompson?
MR. THOMPSON: I don't have anything.
HEARING OFFICER: Okay. Thank you, Mr. Shaw.
Next witness?
Do we have another witness? I'm looking at the list, and I don't recall whether Alan Jackson intended to testify, whether the parties intended to call Alan Jackson.
MR. ANDERSON: No.
HEARING OFFICER: Do not intend to call Mr. Jackson?
MR. ANDERSON: No.
HEARING OFFICER: Are there any other witnesses slated to be called?
Mr. Anderson?
MR. ANDERSON: I don't think so. I just had a quick offer of proof I was going to put into the record.
HEARING OFFICER: Okay.
MR. ANDERSON: If that's appropriate now. I don't think we have any -- I created a quick outline

just to make it quick. I know we're -- it's Friday.

HEARING OFFICER: Well, in addition, I think we may have some rebuttal witnesses.

MR. ANDERSON: Right.

MR. FLETCHER: So far everyone said they don't have any rebuttal.

HEARING OFFICER: Well, I think the Department intends to recall Matt Anders, at least.

MR. ANDERSON: Well, I would think this would be appropriate before case in chief, if that's all right?

Just some quick background, Director. We have requested Mat Weaver as a witness; that was denied.

There are two exhibits identified in the City's exhibits -- one is Exhibit 340, one is 354 -- and then there are some questions and topics that would have come out of those exhibits. I've put those in outline form. I'd just like to offer that as an offer of proof.

MS. McHUGH: You're offering those two exhibits as the offer of proof?

MR. ANDERSON: Well, and the information, as well, contained in the outline. Along with those exhibits, there would have been questions, had he been made available as a witness.

MR. FLETCHER: Can we address that?

HEARING OFFICER: Yeah. I don't even understand what I have in front of me.

MR. ANDERSON: Sure. I can explain a little bit.

Just in offering the exhibits as well as the not being able to question Mat Weaver and not having him made available as a witness, this is the evidence that we believe he would be able to testify to. He would have answers to these questions. We believe that they're relevant to the methodology order, to the amendments made.

Both of these exhibits show examples of information about the methodology order to individuals outside the Department and also gathering information from individuals outside the Department, and so that's why. That's the gist of our offer of proof. If there are any questions, I can go into further detail.

HEARING OFFICER: Mr. Fletcher?

MR. FLETCHER: Yeah, we'd move to strike this and these exhibits. These were settlement documents. They say right on the documents they're for purposes of settlement discussion.

We just had a hearing in front of the Director where this issue came up about trying to present settlement discussion topics to the Director, and the

Director ruled that no settlement discussion would be allowed, and this is a backdoor attempt to do that very thing. And so we would ask that this be stricken from the record and that it not be considered since it is purely settlement discussion material.

MR. ANDERSON: If I could address that?

HEARING OFFICER: Okay, Mr. Anderson.

MR. ANDERSON: I don't think we're offering this for the proof of the matter. There's nothing about these documents that we're saying, you know, that you need to consider even the content of the documents. What we're saying here is there's evidence that -- information from the settlement agreement was used in the amendments of the methodology order.

HEARING OFFICER: By what? By a string of emails?

MR. ANDERSON: Well, the string of emails suggests that there was -- that the negotiations will inform the urgency of the finalization of the amendment to the methodology order. That suggests that there was information that came from the negotiations and, again, as far as settlement -- the privilege of settlement documents and settlement negotiations, again, we're not offering this for the proof of the matter. It's to show that information was used from those settlement

agreements to go to the methodology order. I think it's completely different, and it's not excluded by that evidentiary rule.

HEARING OFFICER: Okay. Mr. Anderson, I'm not even accepting this. I will tell you that I am always meeting with staff trying to establish priorities as to what I need to work on and what I don't need to work on, and that's what I'm doing here.

MR. ANDERSON: Well, I'm not intending to try to make you a witness, Director. I just -- this is information that was disclosed to us as part of a request.

HEARING OFFICER: That's fine. And we supplied this information in good faith, but I don't see anything in this that would either establish any nefarious intent or any reason to bring in this document that was -- I've never seen this document that I'm aware of. SWC discussion points, main discussion points, I've never seen any of this, and I think it's because it was part of settlement, and I was excluded from those discussions.

So my string of emails in here and what's included simply was an attempt on my part to say what do we need to prioritize and work on in the many responsibilities that the Department and the Director

has, and that was the intent of these emails. And we disclosed them in good faith, and I guess, from my perspective, for you to even insinuate that there was something nefarious, I find to be offensive, and I won't let it in. Thank you.

MR. ANDERSON: Okay.

HEARING OFFICER: Make sure we don't have that in the documents.

Okay. Rebuttal witnesses, Mr. Johns?

MR. JOHNS: I'd like to call Bryce Contor to rebut Mr. Brockway and Mr. Shaw's testimony, just briefly.

HEARING OFFICER: Do you want to wait until after Mr. Anders testifies, or do you want to call him now? I guess in the order of presentation, I'd prefer to have Mr. Anders go first.

MR. JOHNS: That works.

HEARING OFFICER: It seems to me it would work better for you as well.

MR. JOHNS: I think so. Thank you, Mr. Director.

HEARING OFFICER: There's Matt Anders.

If you'll come forward, Mr. Anders. You're already sworn in.

THE WITNESS: Oh, all right.

HEARING OFFICER: Please be seated.

MATTHEW ANDERS, P.G.,
called as a rebuttal witness by IDWR having been previously duly sworn to tell the truth relating to said cause, testified as follows:

DIRECT EXAMINATION

QUESTIONS BY MR. WOOD:

Q. Hello, Matt.

A. Good afternoon.

Q. I realize you've already testified in this matter, but can you please state and spell your name for the record one last time.

A. Sure. Matt Anders, M-a-t-t, A-n-d-e-r-s.

Q. And can you briefly tell us where you work and what role you played in developing the Fifth Methodology Order?

A. Yeah, I work for the Idaho Department of Water Resources. I did research and development on some of the methods in updating the method in the Fifth Methodology Order. I also participated in drafting portions of the order.

Q. And did you listen to the testimony of Bryce Contor and Sophia Sigstedt yesterday?

A. I did.
Q. Matt, can you please find Ms. Sigstedt's expert report which was previously admitted as Exhibit 837. And I'll have you turn to page 20 -- Exhibit 837, page 20, not page 16 of her report.
A. Page 20, I'm there.
Q. And does that have a bell-shaped figure at the top?
A. Yep, a blue one.
Q. And can you please find the sentence about halfway down the first paragraph that reads, "for 2018 there is a note"?
A. Yes, I see it.
HEARING OFFICER: Where are you again? I'm sorry.
MR. WOOD: Yeah. So it's Exhibit 837, page 20, but realizing that there's -- the document has two different page numbers on it. So this one says "Exhibit 837, page 20" as opposed to the actual number of the document, which is 16.
HEARING OFFICER: I'm with you.
Q. (BY MR. WOOD) And can you find that sentence about halfway down that starts, "For 2018 there is a note"?
A. Yes, I found it.

Q. Can you please read that sentence into the record.

A. "For 2018 there is a note about AFRD2 recharging between 5,000 - 10,000 acre-feet of recharge to Mile Post 31 for Magic Valley Ground Water District, and the calculation shows only 5,000 acre-feet of recharge was accounted for."

Q. And what is your understanding of what Ms. Sigstedt meant by that sentence?

A. My interpretation is that she's saying that we have missed or not adjusted the diversion for AFRD2 for 5,000 acre-feet.

Q. And have you had a chance to investigate that allegation?

A. I did.

Q. And what was your conclusion?

A. So after Ms. Sigstedt's testimony yesterday, Kara Ferguson and I looked through the calculator, and we found the note that she was referring to. And it's on the "Demand" tab, and it's where we're adjusting the demand for recharge and wheeled water.

And we looked at it, and she is correct, there was an adjustment for 5,000 based on the recharge -- the way we do our recharge adjustments. In this case, for recharge, it's a subtraction.

But we also found that in what we call the "adjustment side," the adjustments coming from -- the lease is coming from Water District 1. There were two private leases in there as well, for 10,000 acre-feet.

So what we concluded was that -- what we should have done was subtract 10,000 acre-feet from AFRD2's diversion in 2018 for this recharge that she is referring to.

In actuality, we subtracted 15,000. And we think that's because the data are coming to us from two different places. We get them from the recharge program here at IDWR, and we get them from Water District 1. And those leases and that note were referring to the same water, but we didn't realize it. So we subtracted too much from AFRD2 in that case. So there is an error in our baseline year for AFRD2. It's 5,000 acre-feet too low.

Q. Too low?

A. Yes.

Q. Can you please read the next sentence, the one starting with "Additionally, IGWA's settlement."

A. Okay. "Additionally, IGWA's settlement performance report shows almost 4,000 acre-feet of recharge by North Snake Groundwater District through North Side Canal Company that is not accounted."

Q. And what is your understanding of what Ms. Sigstedt meant by that sentence?

A. Similar to the previous line, she thinks that -- or my interpretation is she thinks we have -- we missed making an adjustment for 5,000 acre-feet of recharge for Magic Valley.

Q. And have you had a chance to investigate this allegation?

A. We did.

Q. And what did you conclude?

A. So, again, we -- after her testimony yesterday, we were looking through the adjustments for Magic Valley Ground Water District -- maybe I should back up.

So we recorded the baseline year at the technical working group. And based on discussions with the technical working group, we decided we needed to go back through the adjustments and make sure that we had everything. Because we were going to use 2018 as a baseline year.

In that second review, Kara found that we had missed this 4,000 acre-feet that Ms. Sigstedt is referring to. So at the time of the technical working group, we didn't have it in the baseline there. We hadn't made the subtraction. But for the Fifth

Methodology Order, we did do the subtraction.

So there was a change in the numbers between the technical working group and the Fifth -- what actually came out in the Fifth Methodology.

Q. But the numbers in the Fifth Methodology Order are correct; is that true?

A. Yes, they are correct in this case.

Q. Matt, can you now turn to page 28 again, of Exhibit 837.

A. Okay. I am on page 28.

Q. And do you see the paragraph entitled, "2.4.4 Bias in 2018 Baseline Year for Reasonable Carryover."

A. I do.

Q. And can you find the sentence about halfway through that starts "Figure 2-10 is IDWR's hindcast"?

A. So "Figure 2-10 is IDWR's hindcast analysis showing annual carryover volumes for Twin Falls Canal Company 1995 to 2022 under the Fourth Methodology Order (baseline year 06/08/12) and the Fifth Methodology Order (baseline year 2018)."

Q. Now, can you turn to Exhibit 300, which is the Fifth Methodology Order.

A. Okay. I have that.

Q. Well, let me back up. Let me back up for just a second.

Can you read the final sentence of that paragraph. I believe you didn't read the final sentence.

A. Oh, back on page 28?

Q. Yes. I'm sorry.

A. Okay. No problem.

"Under the Fifth Methodology Order, 19 out of the 30 years would have resulted in a carryover shortfall and that these occurred even in average and above-average years. Figure 2-1."

Q. Okay. So now let's turn to the Fifth Methodology Order, which is in Exhibit 300.

A. Yes.

Q. And can you turn to page 28 -- excuse me -- 23. And I'm looking for paragraph 68.

A. You said 23?

Q. Page 23, yes.

A. Okay. I'm on page 23, and I see paragraph 68.

Q. Can you explain what information is contained in paragraph 68?

A. So this paragraph describes the calculation that we use for calculating what we referred to as "maximum projected carryover need."

We take the projected -- yes, the projected demand of the 2018 baseline year, and we subtract the

projected supply, which is the average supply for the '02-'04 irrigation seasons.

And then under it is a table that shows the calculation -- the numbers used in the calculation. And then on the right is the maximum projected carryover need.

Q. And can you read the footnote that's in Footnote 18 there?

A. "This Fifth Methodology Order updates this chart with the baseline year and calculates new maximum projected carryover need values."

Q. And can you now turn to paragraph 78, which is on page 29.

A. You said 78?

Q. 78.

A. Okay. I'm on page 29. I see 78.

Q. Can you explain what information is contained in paragraph 78?

A. So paragraph 78 is the reasonable carryover values that we are assigning for the Fifth Methodology.

In the pages that we went -- that we just went through before the -- between the previous table on page 23 and here on 29, we do some additional analysis, and we adjust some of the numbers.

So we adjust the maximum projected carryover

need numbers from the table in 68. Three of those we've adjusted in Table 78: AFRD2, BID, and Twin Falls Canal Company.

Q. And so am I correct in understanding that the Fifth Methodology Order used the adjusted carryover data in paragraph 78, not the maximum projected carryover data in paragraph 68?

A. That is correct.

Q. And Ms. Sigstedt's conclusion was based on the maximum carryover data in paragraph 68; is that correct?

A. I believe -- I'm not totally sure, but I believe that that was the case.

Q. And so Ms. Sigstedt -- if that's true, then Ms. Sigstedt's conclusion that 19 out of the last 30 years would result in carryover shortfall was based on incorrect data; is that right?

A. Yes, that is correct.

Q. And when the adjusted carryover data in paragraph 78 is used, the proper data that was used in the Fifth Methodology Order, how many years out of the last 30 would have resulted in a shortfall?

A. Six.

MR. WOOD: Nothing further.

HEARING OFFICER: Okay. Examination? What's the order of examination? Do we have the groundwater

users go first?

Okay. Mr. Budge.

CROSS-EXAMINATION

QUESTIONS BY MR. BUDGE:

Q. Matt, you had so much fun on Tuesday that you wanted to come back.

A. It's hard to resist. I agree.

Q. I just have a few follow-up questions on several of your comments related to the expert report of Sophia Sigstedt.

The first discussion that you have with Mr. Wood was related to some of the recharge data of AFRD2 and North Side Canal Company.

Do you recall that?

A. Yes, I do.

Q. And Ms. Sigstedt's comments were based on information the Department had produced concerning that aspect of the methodology order?

A. Yeah, the first --

Q. I'll reask the question.

A. Yeah.

Q. There was a discussion about how much recharge had happened through AFRD2.

Do you remember that?

A. Yes.
Q. And Ms. Sigstedt cited a Department document that showed that there had been between 5,010,000 acre-feet of recharge through AFRD2?
A. Yes. The note that she is referring to comes -- is in our -- what we call "our calculator."
Q. And then when she brought that to the Department's attention, that caused you and Kara Ferguson to go explore that further?
A. Yes. Yep.
Q. You're not suggesting that Sophia made any type of intentional error or intentionally tried to mislead the Director by pointing that out in her report?
A. Oh, no. Certainly not. I mean, it was poorly documented in the calculator, it was ambiguous in there. And these are the kinds of things we want, the consultants to point out to us, like, you made an error, here, fix this, fix that.
So, no, not at all.
Q. Okay. And the same would be true for the issue involving North Side Canal Company recharge?
A. Yeah, the adjustments are very confusing, so it's hard to know if everything got included. So we appreciate the check.
Q. Okay. The Department didn't -- before issuing

the Fifth Methodology Order, there wasn't, like, a draft order that was provided for review by the parties; right? It was just issued on April 21st and implemented immediately?

A. That is correct.

Q. Had the process started sooner with either a hearing or some other collaborative process, these types of issues may have been raised before the Fifth Methodology Order was issued?

A. Possibly. Once we're drafting, things are always in flux. It's possible that we could have talked to them, but it's not guaranteed.

Q. I understand.

And you've sat through most of the hearing?

A. Yeah, I have. I've sat through all of it.

Q. Have you learned information at the hearing that you think may be useful or inform changes in the methodology in the future that may help it function more effectively?

A. Yeah --

MR. WOOD: Director, I'm going to object to that. That's outside the scope.

HEARING OFFICER: Sustained.

Q. (BY MR. BUDGE) Matt, have you learned anything at the hearing that may cause you to go back

and revisit certain parts of the Fifth Methodology Order?

MR. WOOD: Same objection.

HEARING OFFICER: Sustained.

MR. BUDGE: No further questions.

HEARING OFFICER: Thank you.

Other cross-examination? Any more questions for Mr. Anders?

I guess one of the reasons for my sustaining the objection is that the focus of the question -- or the focus of the questioning was very narrow in its scope to correct some information.

Thank you, Mr. Anders.

THE WITNESS: Thank you.

HEARING OFFICER: Now, I don't think -- I don't think the Department has any other information to put on in rebuttal.

MR. WOOD: That's correct.

HEARING OFFICER: Okay. We have a request for some additional rebuttal.

Was that from you, Mr. Johns?

MR. JOHNS: That's correct.

HEARING OFFICER: Okay.

MR. JOHNS: I'd like to call Bryce Contor back to the stand.

HEARING OFFICER: Mr. Contor, you're already sworn in. If you'll take a seat.

MR. JOHNS: Just one item, Director, and I talked with the Surface Water Coalition, and I assume the groundwater folks are okay, but we would like to offer Exhibits 502, 504, 505, 506, and 515 and request that they be admitted by stipulation.

HEARING OFFICER: Give me the numbers again.

MR. JOHNS: 502, 504, 505, 506, and 515.

HEARING OFFICER: And you represented that you've spoken to the Surface Water Coalition. What's the result of those conversations?

MR. JOHNS: I believe that they were okay with stipulating to the admission of those exhibits.

MR. FLETCHER: Did you say something? No. We're good.

MR. JOHNS: And yeah, 502, 504, 505, 506, and 515.

MR. THOMPSON: [Unintelligible.]

COURT REPORTER: I can't hear you, Mr. Thompson.

I couldn't hear what he said.

MR. FLETCHER: Can you repeat those again slowly?

MR. JOHNS: 502, 504, 505, 506, and 515.

HEARING OFFICER: And based on your question, Mr. Fletcher, are these references a matter of first impression with you?

MR. FLETCHER: No. I was -- no. I should do one thing to the latest. I was going to ask the last witness if AFRD2 got paid extra for the extra 15,000 that was reported, but I'm trying to keep this moving along.

HEARING OFFICER: So is there stipulation to the admission of these exhibits that have been --

MR. FLETCHER: There is from us.

HEARING OFFICER: Pardon me?

MR. SIMPSON: From us.

MR. FLETCHER: There is from the SWC.

HEARING OFFICER: And I assume there are no other objections.

All right. The documents that have been marked as Exhibits 502, 504, 505, 506, and 515 are received into evidence.

(Exhibits 502, 504 - 506, 515 received.)

MR. JOHNS: Thank you, Mr. Director. And I'll try to be concise with my rebuttal here.

///

///

///

BRYCE CONTOR,

called as a rebuttal witness by the Bonneville-Jefferson Ground Water District, having been previously first duly sworn to tell the truth relating to said cause, testified as follows:

DIRECT EXAMINATION

QUESTIONS BY MR. JOHNS:

Q. Bryce, welcome back up to the stand.

A. Thank you.

Q. Just briefly, were you present during the testimony of Mr. Brockway and Mr. Shaw?

A. Yes.

Q. Do you recall discussions regarding fallowing of acres and how that factors into calculations in the methodology order?

A. Yes.

Q. Okay. Have you performed technical work pertaining to the fallowed acres similar in this regard?

A. Yes. When I was making recommendations in the Snake River Basin Adjudication, I had to look at parcels -- aerial imagery and decide whether a field that was not green in that particular image was in general irrigated.

When I worked for IWRRI on the water budget

for the ESPAM model, we had to wrestle the same question in preparing the irrigated lands dataset. And now as I work helping clients prepare their claims in the Bear River Basin Adjudication, I have to wrestle the same question.

Q. So you have some expertise in this area?

A. Yes.

Q. Thank you.

MR. JOHNS: Would we be able to bring up -- or give him a copy of Exhibit 4?

MR. WOOD: Exhibit 4?

MR. JOHNS: Correct.

THE WITNESS: I have it here.

Q. (BY MR. JOHNS) Okay. Could you turn to page 2, and just quickly look over that. I just want to ask you just a couple questions that came up during Mr. Brockway and Mr. Shaw's discussions with counsel.

A. The one I have, the pages are not numbered, but I'm looking under Heading A, "Evaluation of TFCC Project Acres."

Q. And Item 5?

A. Item 5 is -- Item 5 that page is numbered, and it is numbered 2. Yes, I see that, Item 5.

Q. Now, I'm just going to ask you a couple questions.

First, is it reasonable that some fields would be fallowed in some years?

A. Yes.

Q. How so?

A. Well, so Dr. Brockway described a number of reasons that could occur. I think Mr. Barlogi did. And for the most part, those ring true to me. I couldn't repeat every discussion that they gave.

Q. But you agree it would be technically defensible to factor that into the methodology order?

A. Yes.

Q. If you were assigned to count acres, how would you treat fallowed acres?

A. So it would depend on the purpose. If I were trying to describe a permissible place of use, if I were trying to describe historical irrigation over a period of years, if I were trying to describe a service area, those acres definitely would want to be included if -- unless they were -- had never, ever been irrigated.

Q. But in a future year, that field might not be fallowed?

A. Yeah, that's right. And so I didn't finish. I'm sorry. If I was trying to determine the actual quantity or amount of irrigated acres, then for that year, those acres should need to be excluded.

Q. So excluding the fallowed acres would not distort the total acreage?

A. No, because, as I think Dr. Brockway explained, this parcel may be fallowed this year and irrigated in the next year. But the underlying mechanisms that caused the fallowing, that caused the rotation, those will be ongoing. And so this parcel becomes irrigated, this parcel becomes fallowed next year, the -- not only would excluding them be technically defensible, it would be more defensible and more correct than including those.

Q. Anything else you need to add on fallowed acres that was discussed?

A. I don't think so, thank you.

MR. JOHNS: I don't have any more questions.

HEARING OFFICER: Cross-examination of the witness, Surface Water Coalition?

Do you need a moment?

MR. FLETCHER: No. I just -- I didn't really understand some of the testimony.

HEARING OFFICER: Okay. Mr. Fletcher.

MR. FLETCHER: Thank you.

///

///

///

CROSS-EXAMINATION

QUESTIONS BY MR. FLETCHER:

Q. Thank you. Mr. Contor, I just need some clarification.

So when you say a fallow acre should be excluded, excluded from what?

A. Oh, I'm sorry. Yeah, that was unclear.

So from the calculation of actual irrigated acres in a year when we're doing the evaluation, if that acre is not irrigated in that year, it should not be counted.

Q. Okay. So if an acre on Twin Falls Canal Company, for example, is fallowed -- say a corner of a pivot, for example -- does that clearly indicate that the shares attributable to those acres aren't being used elsewhere?

A. I don't think it does. But the underlying assumption is that if those shares are being irrigated elsewhere, that irrigation will appear in the dataset. And then in a following year, if that irrigation is moved back to this corner, then it will have to disappear from where it was, and that's the rationale.

Q. So if -- are you saying that somehow each year someone should determine the actual irrigated acre s in that irrigation season?

A. So I'm saying that that may -- that is the best available science, whether it's attainable is a different question. What I'm saying is, is that if you -- it's going to be what I would call a "dynamic equilibrium." So this year this one's irrigated, this one's fallow; next year this one's irrigated, this one's fallow; next year this one's irrigated, this one's fallow. But any one of those snapshots would be a reasonable representation of the ongoing dynamic irrigated area.

All of the mechanisms that Dr. Brockway talked about, in my estimation, would be relatively constant year to year. That's what I was trying to say. So if you want to know exactly where every irrigated acre is, then, yes, you would have to do it every year. But if you want to know the quantity, the periodic snapshots should be adequate.

Q. Just because a farmer fallows an acre one year doesn't mean he, necessarily, fallows any acres the next year?

A. For an individual farmer, that is correct, but all of the mechanism s that Dr. Brockway described would operate in every year, and they would have similar effects year to year.

Q. So the Department is using data from prior

years in order to make this calculation; correct?

A. So currently, yes.

Q. And the shapefiles it's using are from prior years; correct?

A. Yes.

Q. So I guess it's your testimony that if an acre shows up as being fallow but has a right to be irrigated, it should not be included in the current year even though it could be irrigated in the current year?

A. So my testimony is that if the goal is to use prior data to do an estimate of the total quantity of acres that would be irrigated in the current year, that the best estimate -- given the fact that we have to use old data because the current year hasn't occurred yet -- the best estimate of what would happen in 2023 would be what actually happened in 2022.

And if in 2022 some random fraction of acres, for a number of reasons that Dr. Brockway explained well, were not irrigated, it's likely that under those same mechanisms, approximately the same number of acres in 2023 also would not be irrigated. The probability that they would be the exact same locations is fairly low. But the probability that the 2022 representation would be the total correct number of acres is fairly high.

Q. You would agree with -- I think it was Dave Shaw's testimony that each farmer makes his own determinations; correct?

A. I would agree with that, yes.

Q. And it's not the canal company making that determination?

A. I would agree.

Q. And the farmer is determining if he's laying 1 acre fallow or not fallow in any particular year?

A. I agree.

MR. FLETCHER: Thank you.

HEARING OFFICER: Redirect, Mr. Johns?

Do you have questions, Mr. Harris?

MR. HARRIS: I do have some follow-up.

HEARING OFFICER: Go ahead.

MR. JOHNS: Go ahead.

CROSS-EXAMINATION

QUESTIONS BY MR. HARRIS:

Q. Mr. Contor, just to pick up from Mr. Fletcher's comments.

It's your understanding that irrigated acres is part of the methodology order; correct?

A. Yes.

Q. And the shapefile that was actually used in

the methodology order was the 2013 shapefile, which essentially is -- it's 194,732 acres?

A. Yes.

Q. There's a more recent shapefile that has less acres than that; correct?

A. That's my understanding.

Q. And that was not used in the methodology order?

A. That's my understanding.

MR. HARRIS: Okay. No further questions.

HEARING OFFICER: Any recross? I assume no recross.

MR. FLETCHER: No recross. That's not mine.

HEARING OFFICER: Well, I guess --

MR. FLETCHER: It wouldn't be me. It's his counsel.

HEARING OFFICER: Well, let's call it.

Is there any further examination of Mr. Contor?

I appreciate Mr. Contor being here for the duration.

Thank you, Mr. Contor.

Are there other witnesses?

I see heads shaking no.

Ms. McHugh's negotiated the cords once more.

Do you have something to say?

MS. McHUGH: I was just getting close to a mic once we start discussing exhibits.

HEARING OFFICER: All right. Well, before we do that, let's break for 15 and come back. We've been here for almost two hours, and everybody can organize their thoughts and maybe organize their notes.

Come back at quarter after.

(Break taken.)

HEARING OFFICER: Back on the record.

Are we on?

COURT REPORTER: Yes.

HEARING OFFICER: Thank you, Andrea.

Are you at the podium to lead the discussion?

MS. McHUGH: I'm at the podium to just offer the fact that I believe we have a stipulation to three more exhibits to be admitted into the record, and then I'm going to be done.

HEARING OFFICER: Okay.

MS. McHUGH: So Exhibit 348, 349, and 350, which are summaries of the City of Pocatello, City of Idaho Falls, and Coalition of Cities water rights.

HEARING OFFICER: 348, 349, and 350.

And the parties have discussed these three exhibits? There's a stipulation for admission?

MR. FLETCHER: Yes.
MR. SIMPSON: Yes.
HEARING OFFICER: I hear no negatives.
MS. McHUGH: They're all falling in line right now.
HEARING OFFICER: Okay.
MS. McHUGH: Thank you.
HEARING OFFICER: So the documents marked as Exhibit 348, 349, and 350 are received into evidence.
(Exhibits 348 - 350 received.)
HEARING OFFICER: Have the parties reviewed the compilation of admitted exhibits, and is there any discrepancy?
Ms. Patterson?
MS. PATTERSON: No discrepancy. It looked accurate.
So I thank everybody, including our court reporter and Sarah, for keeping track of those.
IGWA would like to, with the stipulation of the other parties, admit the documents that were presented to the technical working group. And those are exhibits -- they're common exhibits, 900, 901, 902, 903, 904, 905, 906, 908, 909, 910, 912, 914 was previously admitted, and 928, which was discussed.
HEARING OFFICER: And have all of these

documents been reviewed by the parties?

Are these documents that were reviewed or presented by the Department to the technical working group?

MS. PATTERSON: They were presented to the Department for the technical working group, and they were made available by the Department as a part of its notice of what the parties may take -- may use for the scope of this hearing.

HEARING OFFICER: Okay. So based on the represented -- or represented stipulation, I will receive into evidence the documents marked as Exhibits 900, 901, 902, 903, 904, 905, 906, 908, 909, 910, 912, and 928.

Is that correct? Is that comprehensive?

MS. PATTERSON: That is.

(Exhibits 900 - 906, 908 - 910, 912, and 928 received.)

MS. PATTERSON: And we have one last item.

Director, if you'll recall, at the end of Sophia's testimony you asked her about a portion of the report where it looked like there was a typo.

Ms. Sigstedt confirmed that that was a typo, and she sent in an updated expert report which removes the errata. I've circulated, for the parties, the

redline version so you can see what was updated, and we have a clean updated report that I would like to label as 837A, similar --

HEARING OFFICER: What's the number?

MS. PATTERSON: 837A.

And this is similar to what the Cities did for the updated report of Mr. Sullivan.

And so I would just ask that, you know, where we reference 837 in the record, we'll actually be referring to the updated report which removes errata.

(Exhibit 837A marked.)

HEARING OFFICER: So are you moving for the admission of 837A --

MS. PATTERSON: That is correct.

HEARING OFFICER: -- what has been marked as 837A?

MS. PATTERSON: It's the updated expert report of Sophia Sigstedt, and it removes errata.

HEARING OFFICER: And have the parties had the chance to review the documents?

MR. FLETCHER: We did. I looked through it. I didn't have any issue. Most of it was just switching -- words had been switched and added an "A" in there. She did add a "not" somewhere, but that's okay. We talked about that.

HEARING OFFICER: Okay. So based on the represented stipulation, I'll receive the document marked as 837A into the record.

(Exhibit 837A received.)

MS. PATTERSON: Thank you.

HEARING OFFICER: Other corrections?

Mr. Thompson.

MR. THOMPSON: I believe the parties have stipulated to Exhibit 2 for the Surface Water Coalition. It's information contained in Exhibit 4, but it just has a little additional detail.

So I would offer that.

HEARING OFFICER: Okay. And based on the represented stipulation, I'll receive Exhibit 2 into the record.

(Exhibit 2 received.)

HEARING OFFICER: Others?

MR. BUDGE: Director. Last night I filed a motion to take official notice of the joint forecast. It was brought to my attention that the document I had attached to my motion is not the actual joint forecast of the Bureau and the Corps of Engineers. I've not been able to obtain what I understand to be the full joint forecast, so I'm going to withdraw that motion at this time.

If at some point we're able to locate the full document, then we may refile that motion at a future date.

HEARING OFFICER: Okay. Well, it is a document that the agency would typically rely upon, so I don't know that anybody would object as long as there's a disclosure to all of the parties.

MR. BUDGE: And I have discussed that with the Surface Water Coalition, and they agree.

So I'm just, for the record, withdrawing the motion that was filed yesterday.

HEARING OFFICER: Okay. Thank you.

Okay. Other cleanup?

All right. So let's just talk about post-hearing processes.

So as I have stated before, this is an expedited process. I apologize to everybody because of the -- in my opinion -- the urgency of holding this hearing, and as a result, I will allow some briefing, but I think it needs to come in within a week. I know that's probably a deadline that nobody likes, so I'll allow simultaneous briefs to be filed. No responses or replies.

So let's anticipate any briefs coming in by the close of business a week from today, which would be

nine plus -- is what, the 16th? Is that correct?

MR. BRICKER: Yes.

HEARING OFFICER: Well, let's talk a little bit about some of what I'm concerned about in the briefing.

And I've listened to four days of testimony from many witnesses, and I appreciate the participation of the attorneys. And I have respect for both the water bar and for the experts who work on these matters.

I want to answer the question that Mr. Budge asked of Mr. Anders and just say that there was much presented today that needs to be considered in the future as we refine the methodology order. It is a dynamic document. It's intended to be. And, honestly, that was the reason for reissuance.

So let's talk about some of that information that was presented and the context of that information in terms of the law and the delivery call as, at least, I remember it.

So people can correct me either here today or in the briefing. But my understanding in this delivery call is that there's been a determination of material injury already. And there's been a determination that pumping of the groundwater depletes flows in the Snake River, and those flows are flows that the Surface

Water Coalition depends upon for its water supply.

And it's also my understanding that the courts have said that at least there's a presumption that the senior water right holders are entitled to their water as described in the decrees that have been issued by the Snake River Basin Adjudication court. And so there's a presumption in favor of the senior water right holder that they're entitled to the quantities and the other elements that are in the water right.

And, from my perspective, the methodology order is an attempt to evaluate the actual use of water by the seniors to determine whether there is some adjustment that is appropriate from the decreed amounts. And that's the reason for the clear and convincing standard that's been imposed and that the Department has been told by the courts it needs to -- for any adjustment that that's the standard or the proof that needs to come to the Department. And that's the reason for safety factors built into the methodology order.

And so much of what I've listened to, honestly, is testimony about uncertainties in that process. And if there are uncertainties in determining by clear and convincing evidence that there's an adjustment that's appropriate, then I want to know what the fallback is legally.

Because, frankly, the presumption is that the senior is entitled to the elements of the water right. And if those adjustments are to be established by clear and convincing evidence and the evidence that comes in during the hearing establishes uncertainties about whether it's clear and convincing, then I want to know what the Department's fallback position is.

Is the position that we -- there's a determination of material injury, but there's so much uncertainty that the Department should not be administering the water rights? Is the question that there is so much model uncertainty that there is no determination of what a curtailment date should be.

And then I think -- associated with that, I think there's also a question about burdens of proof. In other words, in the conjunctive -- and I don't know the answer to this, necessarily, but under the conjunctive management rules, who bears the burden of establishing, by clear and convincing evidence, what those adjustments should be? Is it the Department's burden? Is it the senior burden? Or is it the junior burden?

And, honestly, who has that information? I mean, there was an attempt, I think, through the questions to say that the senior has total control over

determining whether there's supplemental groundwater use or not. And yet the groundwater diversions are diversions that are measured by the groundwater users and at least reported on an annual basis and reported long after the season is over.

So I guess my question is: Who bears that burden? I don't know the answer to that question, but it seems to me it has some relevance in what we're talking about.

So I think we need to be thinking rather than trying to look at all of the nuances and all of the deficiencies. I think we need to look at it in the framework of what have the courts told us and what are the standards that need to be applied in looking at how the methodology operates within the larger realm of water administration and conjunctive water administration?

Now, there's one other matter I just want to talk about, and I suspect that we will -- there will be arguments about due process and the fact that people didn't have enough time to prepare. And, you know, I think there are questions about whether there were any property interests that were injured prior to this hearing or the people that were deprived in some way in a property interest. Certainly, that harbinger of that

possibility is out there.

But I think the real question is, what do we do in terms of water administration and timely water administration and try to figure out what's adequate.

I'll also point out that there was a theme, I think, through the discussions about the inability to prepare. And I guess I feel a little bit -- you know, I don't know how to characterize this, but, you know, we have been involved in this dispute for 20 years now -- or going on 18, I'd say. And there have been opportunities for people to develop mitigation plans; there have been opportunities for people to gather data; there have been opportunities for folks to take on responsibility to prepare.

And I find I'm a little incredulous that people will come into the hearing and say, "We haven't had an opportunity to get ready." And I guess I just turn around and say, "Doggone it, there have been years of opportunity to prepare."

Now, maybe not for a change from steady state to transient, and, certainly, that's an issue that can be taken to the courts or I need to reconsider; I don't know. But to say that there hasn't been an opportunity to put in place safeguards for the possibility of water administration, I'm a little incredulous at that.

All right. I don't know whether there are other issues. You're certainly welcome to raise them.

Mr. Thompson.

MR. THOMPSON: A page limit, maybe, for post-hearing briefs for Mr. Harris.

MR. HARRIS: Mr. Thompson just referred to me, that that's the only reason for a page limit.

HEARING OFFICER: Did he suggest a number?

MR. HARRIS: No, he suggested he needed it because of me.

HEARING OFFICER: Because of you?

MR. HARRIS: Because of me.

HEARING OFFICER: I'm -- I won't impose a page limit, but you know what, if -- just think about the number of those briefs that I might receive and how quickly I need to get through them. So I would suggest brevity.

And one of the reasons that I wanted to talk about issues was to try to get you to focus and maybe not spend so much time arguing about this little nuance or that little nuance in the expert reports, because I think there's a larger framework we really need to be thinking about. And I, hopefully, at least, made a crude attempt at trying to identify a framework.

All right. Anything else?

Thanks, everybody, for your help --

MR. BRICKER: Thank you.

HEARING OFFICER: -- and your patience.

We'll close the record.

(Hearing concluded at 3:36 p.m.)

REPORTER'S CERTIFICATE

I, ANDREA L. CHECK, CSR No. 748, Certified Shorthand Reporter, certify;

That the foregoing proceedings were taken before me at the time and place therein set forth, at which time the witness was put under oath;

That the testimony and all objections made were recorded stenographically by me and transcribed by me or under my direction;

That the foregoing is a true and correct record of all testimony given, to the best of my ability;

I further certify that I am not a relative or employee of any attorney or party, nor am I financially interested in the action.

IN WITNESS WHEREOF, I set my hand and seal this 13th day of June, 2023.



ANDREA L. CHECK, CSR No. 748, RPR, CRR
Notary Public
P.O. Box 2636
Boise, Idaho 83701-2636
My Commission expires July 20, 2028.

*

*** (36)
7:16,17,18,19,20,22,23,24,25;8:5,6,7,8,9,11,12,13,14,15,17,18,19,20;9:5,6,7,8,9,10,11,12,13,14,15,16,17

/

/// (7)
125:25;185:23,24,25;189:23,24,25

[

[As (1)
58:20
[unintelligible] (2)
52:13;184:19

A

A&B (4)
25:1;160:6,9,20
abbreviated (1)
112:16
Aberdeen-Springfield (1)
139:6
ability (1)
154:9
able (17)
10:15;20:9,12,25;32:6;46:13,24;64:4;67:8;88:15;103:9;117:17;167:6,8;187:9;199:23;200:1
above (7)
44:22;55:7;94:12;95:7;97:15;115:22;160:3
above-average (1)
177:10
Absolutely (3)
35:19;102:15;158:11
accepted (5)
17:23;18:17,20;19:2,6
accepting (1)
169:5
access (3)
81:20;82:10,14
accommodating (1)
140:21
accommodation (1)
102:3
According (1)
106:15
account (12)
49:6;50:7;53:3;61:10;76:2;80:10;91:6,14;92:7,23;116:20;128:2
accounted (2)
173:7;174:25
accounts (1)
45:14
accuracy (2)
84:18;105:6
accurate (14)
13:17;51:19;53:15;63:16;64:17;65:7,15;84:15,15;105:2;109:9,11;124:8;196:16
accurately (3)
15:16;28:25;155:18
achieve (1)
131:22
achieved (1)
129:17
acknowledging (1)
19:13
acknowledgment (1)
19:5
acre (13)
41:21;52:5;80:13;111:9;135:18;190:5,10,12,24;191:14,18;192:6;193:9
acreage (28)
38:24;42:15;53:21,21;58:19;63:15,20;64:18;66:12;67:10;68:21;76:12;84:4,8,15;85:2,8,12;93:6,16;106:15;107:18;109:9;132:23;133:24;134:15;158:20;189:2
acreages (1)
40:15
acre-feet (28)
94:9,14,18,22;95:2;113:24;114:3,7;131:3,8,10,17,18,24;132:4;135:18;159:22;160:1;173:4,6,12;174:4,6,16,23;175:5,22;181:4
acres (112)
37:14,15,15;38:25;39:3,3;40:10;45:10;50:15,24,25;51:2,3,5,11,22;52:1;53:23;54:8;58:15;62:1;66:6,19,23;67:1;70:12,24;71:19;74:20;76:4,6;78:15,22;79:14;80:18;81:22;97:8;105:13,15;106:6,14,17,20,23;107:4,14,20;108:7,11;109:15,18,25;110:13,16,24,25;111:4,15;120:25;121:23;124:4,12;133:9,11,12,23;134:10,20;140:1;143:8,9;148:1,12;149:7,21;155:16,19,21;159:15,21,25;160:13,15;162:7,16,20,21;163:21,22;164:2,6,15;186:15,19;187:20;188:12,13,18,24,25;189:1,13;190:9,15;191:19;192:12,17,20,24;193:22;194:2,5
acronym (1)
119:21
across (1)
47:6
actual (20)
42:15;51:10,23,24;72:20,25;82:21;84:4;109:15;111:14;124:11;127:8;144:22;145:1;172:19;188:23;190:8,24;199:21;202:11
actuality (1)
174:9
actually (23)
51:18;63:21;71:14;73:1,2;74:15;75:24;101:7;110:22;112:4;113:23;124:2;134:10;137:8,16,19;138:12;157:19;159:24;176:4;192:16;193:25;198:9
adapt (1)
138:2
add (2)
189:12;198:24
added (5)
40:14;92:23;98:23;99:6;198:23
addition (2)
30:13;166:2
additional (7)
13:7;127:2;154:3;165:3;178:23;183:20;199:11
Additionally (2)
174:21,22
address (4)
16:15;21:8;166:25;168:6
addressed (2)
55:24;56:4
addresses (1)
43:10
adequate (3)
70:2;191:17;205:4
adequately (1)
11:1
Adjudication (7)
78:11,16;79:14;139:25;186:21;187:4;202:6
adjust (2)
178:24,25
adjusted (9)
43:13;45:11;47:3;114:10;145:11;173:11;179:2,5,18
adjusting (1)
173:20
adjustment (7)
107:9;173:23;174:2;175:5;202:13,17,24
adjustments (15)
43:25;44:5;51:8,14;54:5;92:7;97:5;133:21;173:24;174:2;175:12,18;181:22;203:3,20
administering (1)
203:11
administration (6)
79:4;204:16,17;205:3,4,25
administrative (1)
27:11
admission (14)
13:12,14,19;28:5,8;56:8;98:19;101:22;125:7,19;184:14;185:10;195:25;198:13
admit (2)
55:21;196:20
admitted (6)
101:19;172:3;184:7;195:17;196:12,24
admitting (1)
124:24
adopt (2)
76:14;105:7
advertised (1)
22:6
advice (1)
58:3
advised (1)
23:25
advocating (2)
163:10;164:5
aerial (13)
39:6;40:7;58:21;59:19,23;61:5;79:17;149:2,11,14,15;150:4;186:22
affairs (1)
27:16
affect (7)
45:4;46:16;50:15;90:25;106:24;124:7,9
AFRD2 (9)
173:3,11;174:15,16;179:2;180:14,24;181:4;185:6
AFRD2's (1)
174:7
afternoon (6)
102:8;126:3,4;132:12;147:14;171:11
ag (2)
71:8;149:20
again (40)
10:20;39:25;41:2,11;45:7;47:25;48:13;51:4,9,23;52:15;53:25;54:6;55:11,13;61:18;64:4;66:16;73:19;79:16;82:18;90:7;96:25;107:4;110:23;111:17,21;121:4;128:14;134:6;138:16;139:1;158:13;168:21,23;172:14;175:11;176:8;184:8,23
against (1)
144:14
agency (1)
200:5
ago (5)
15:2;78:18;79:16;96:13;108:23
agree (49)

13:17;50:14;63:14,19;
64:12,14;67:7;69:5;72:2;
74:15;75:19,22;76:3;82:12;
84:11,14,18;87:2;90:5;95:3;
100:10,23;101:13;104:4;
105:14,23;106:19;107:24;
109:5,18;120:11,20;129:24;
130:2,12;137:7,13,14;
154:16;158:5,6;161:23;
180:8;188:9;193:1,4,7,10;
200:9
agreed (1)
13:11
agreement (2)
65:22;168:13
agreements (1)
169:1
agricultural (5)
42:12,23;72:17,21;104:25
AgriMet (2)
143:10;145:25
ahead (8)
42:4;65:13;79:11;106:13;
157:9;158:1;193:15,16
air (1)
165:5
al (1)
25:2
Alan (2)
165:11,13
albeit (1)
120:7
alfalfa (9)
145:7,14,21,25;146:5;
159:14,20,25;162:20
algorithm (2)
104:5;127:11
allegation (2)
173:14;175:8
allow (8)
10:20;29:21;46:11;73:7;
79:9;160:10;200:19,22
allowance (1)
100:4
allowed (4)
10:19;17:23;23:18;168:2
allowing (1)
10:14
almost (5)
53:17;127:7,15;174:23;
195:6
along (5)
22:24;149:4;159:15;
166:22;185:8
alternative (1)
18:6
alternatives (1)
17:7
always (9)
46:7;47:12,16;53:7;127:7,
15,25;169:5;182:11
AMALGAMATED (15)
8:16;26:13,20;27:14,21;
28:4,14;29:22,24;30:25;
31:7,12;32:1,12,20
Amalgamated's (3)
29:7;30:14;31:13
ambiguous (1)
181:15
amend (1)
108:14
Amended (1)
21:9
amendment (1)
168:19
amendments (2)
167:11;168:14
amount (15)
45:22;49:13;52:6;72:2,16;
88:1,4;90:3,9,16,19;92:20;
110:21;128:9;188:24
amounts (2)
66:14;202:13
analyses (1)
108:17
analysis (39)
16:14;39:15;43:11,19;
44:11,13,16;55:1;58:5;
64:17;65:21;79:18;80:17;
81:4;82:20,23;83:2;85:12;
95:20,21,24;96:1,3;108:21;
112:10,20,23;114:16;
121:20;135:22;136:16,21;
143:2;151:20;153:14,23;
154:8;176:16;178:23
analyze (3)
81:1;82:14;154:24
analyzed (1)
80:18
analyzing (2)
91:6;104:25
ANDERS (11)
7:4;166:8;170:14,16,22,
23;171:3,15;183:8,13;
201:11
Anders' (1)
54:17
A-n-d-e-r-s (1)
171:15
Anderson (24)
123:19,20,23;124:1,17;
140:9,11,13;165:14,17,20,
21,24;166:4,9,21;167:3;
168:6,7,8,17;169:4,9;170:6
Andrea (6)
11:4,7;57:9;71:2;123:16;
195:13
announced (1)
20:12
annual (5)
43:12;55:3;131:9;176:17;
204:4
annually (2)
85:1;131:4
answered (2)
100:19;160:21
anticipate (1)
200:24
apologies (1)
121:2
apologize (5)
14:7;44:2;67:18;82:18;
200:17
apparently (4)
11:15;12:3;38:12,13
appear (10)
60:1;61:16,18,19;64:8;
95:3,4;99:8;101:15;190:19
appeared (1)
149:8
appears (3)
34:9;114:6;115:3
apples (1)
159:19
application (3)
53:10;105:16,24
applied (3)
89:2;140:5;204:14
Apply (2)
104:14,19
Appreciate (9)
33:23;77:14;78:8;79:23;
110:19;140:21;181:24;
194:20;201:7
approach (4)
23:4;55:18;64:1,2
appropriate (7)
41:13;77:19;104:6;
165:24;166:10;202:13,24
appropriately (2)
157:13;164:15
approved (5)
19:22;22:1,4;30:19;33:17
approximately (3)
111:11;151:14;192:20
April (5)
17:11;21:10;49:13;50:3;
182:3
Aquifer (5)
15:8;16:25;27:23;29:5;
90:20
ArcMap (3)
37:24;108:21;118:4
area (43)
36:23;39:2,13;42:15;
50:21;52:21,23;60:4,6,23;
61:11;62:9;70:12;74:24;
79:9;80:6;84:1,3,6;86:20;
93:13;101:6;108:2;109:10;
117:22;118:22;121:1,10,17;
133:19;150:6;151:12;152:3,
12;153:2,5,16;160:5;163:9,
11;187:6;188:17;191:10
areas (29)
37:8;38:15;41:4;42:5,6;
48:22;52:20;59:25;60:8,9;
64:10,15;81:1;99:7;100:7,
13,17,20;101:13;109:6;
118:6;137:4;139:15,22;
140:6;149:4;152:20;154:12,
16
arguing (2)
110:11;206:20
argument (2)
107:12,13
arguments (2)
109:24;204:20
arise (1)
10:22
around (8)
15:2;38:15;42:7;71:9;
100:16;115:18;152:20;
205:18
arrive (1)
116:8
arrived (2)
10:4;131:13
art (1)
130:11
artificial (2)
105:15,24
As-Applied (4)
21:10;36:17,21;142:15
aspect (1)
180:19
assess (2)
43:17;53:14
assessment (1)
53:15
assigned (1)
188:12
assigning (1)
178:20
assist (3)
17:12;33:5;78:9
associated (3)
75:11;118:25;203:14
assume (12)
26:6;74:8;76:4;83:9;
90:14;97:21;99:18;107:2;
123:8;184:4;185:15;194:11
assumes (3)
80:13;97:1;115:15
assuming (1)
114:10
assumption (3)
122:24;151:25;190:18
assumptions (1)
115:22
attached (3)
36:4;141:24;199:21
attainable (1)
191:2
attempt (5)
168:2;169:23;202:11;
203:24;206:24
attempted (1)
25:9
attention (4)
40:16;83:22;181:8;199:20
attorney (4)
76:16;98:21;158:14,15

attorneys (1)
201:8
attorney's (1)
137:11
attributable (1)
190:15
attribute (1)
118:24
audible (1)
71:2
audibly (1)
34:25
audio (1)
35:15
augmented (1)
48:24
August (1)
86:25
authorized (2)
23:23;74:19
authors (3)
103:5,7,10
automatically (2)
49:8;52:6
automation (1)
87:11
available (21)
82:20;104:11,15,19;105:1;
109:5,14;119:11;120:14;
121:16;143:19;144:21,23,
24;164:20,21;165:1;166:24;
167:7;191:2;197:7
average (26)
44:23;55:7;94:9,12,21;
97:15,17,20;113:23;114:2,
25;116:13,14;122:12,18;
131:8;143:20,24;144:14,18;
146:1;156:16,19;157:4;
177:9;178:1
averaged (3)
143:21;144:11,17
averages (1)
113:22
avoid (2)
18:8;66:15
awaiting (1)
30:7
aware (16)
16:24;25:12,25;26:3;29:4;
32:13;43:2;63:22;68:7;
69:22;84:25;86:7;89:20;
99:18;101:5;169:17
away (1)
49:24

B

back (49)
15:4;16:25;17:10;29:5,8;
31:8;32:15;34:8,9;40:14;
41:25;47:25;56:21;57:5;
64:19;66:16;68:17;79:24;
89:19;93:22;94:20,25;107:1,
7,8;113:7;123:12,14;125:17;
132:13;134:1;135:21;
144:25;149:24;158:9;
161:14;175:14,18;176:24,
24;177:4;180:7;182:25;
183:24;186:9;190:21;195:5,
8,10
backdoor (1)
168:2
background (2)
14:18;166:12
backwards (1)
91:23
bad (1)
164:3
balance (2)
31:20;32:7
balances (1)
32:5
ballpark (1)
116:7
banks (2)
41:19;91:2
bar (1)
201:9
barley (3)
86:21,24;146:2
Barlogi (10)
46:6;69:21;86:15;87:6;
89:18;135:2;145:18;153:21;
162:19;188:6
Barlogi's (4)
78:13;88:22;115:24;
157:10
base (1)
122:21
based (33)
18:13;28:7;29:14;33:3,16;
37:11;54:2,9;55:5;58:21;
76:24;88:22;97:8;104:10;
107:5;111:10,12,18;114:5,
20;115:22;127:14;139:19;
161:23;173:23;175:16;
179:9,15;180:17;185:1;
197:10;199:1,13
baseline (33)
36:23;51:21;54:14,16;
93:10;97:7,10,12,14,18,21;
107:25;110:13,15;112:15;
122:9,13,25;126:8,22;
130:18,21,25;133:22;
174:16;175:15,20,24;176:12,
19,20;177:25;178:10
basically (1)
110:9
Basin (5)
78:11;139:25;186:21;
187:4;202:6
basis (4)
72:17;93:10;124:10;204:4
Baxter (1)
19:12
Bear (1)
187:3
bears (2)
203:18;204:6
become (3)
32:13;128:13;144:21
becomes (4)
93:1;97:20;189:8,8
beds (1)
46:3
beet (2)
27:19,23
beets (1)
71:25
began (3)
48:20,20;112:20
begin (3)
16:22;99:11;124:22
Beginning (3)
23:15;50:18;55:16
begins (2)
42:1;112:10
behalf (2)
14:13;102:12
behind (1)
142:18
bell-shaped (1)
172:7
below (5)
44:23;94:13;113:23;
139:12;159:14
beneficial (1)
106:16
benefit (4)
63:17;67:8;155:16,21
besides (2)
68:6;147:17
best (15)
18:6;104:10,15,19;109:5,
13;120:14;154:23;164:18,
20,21;165:1;191:2;192:13,
15
better (10)
35:9;59:22;84:19;88:12;
90:15;142:12;161:9;163:4,5;
170:19
beyond (3)
50:8;79:2,7
Bias (1)
176:12
BID (1)
179:2
big (5)
46:5,15;49:10,10;111:3
binder (1)
28:22
bit (12)
14:23;35:15;37:21;54:2;
58:3;64:4;67:4;71:9;83:7;
167:4;201:4;205:7
black-and-white (1)
149:20
blanket (1)
96:24
blue (8)
39:2;60:15;62:15;150:14,
21,25;151:16;172:9
BLY (2)
112:16;126:17
board (1)
58:3
bold (1)
22:23
BONNEVILLE-JEFFERSON (2)
8:4;186:2
book (2)
12:19;13:3
booster (1)
53:10
both (8)
64:5;77:5;81:15;145:13;
149:1;158:13;167:12;201:8
bottom (12)
60:4;68:18;76:8,11;77:1;
88:1,5;95:6;121:5;157:24;
159:11,12
bought (2)
162:1,2
boundary (2)
18:18;149:4
box (1)
99:13
boy (1)
141:19
brain (1)
140:5
Break (8)
34:7;57:3,5,7;123:11,13;
195:5,9
brevity (1)
206:17
Bricker (16)
11:2,3;123:10;124:21,22;
125:2,5,8,23;126:2,5;132:6;
140:14,16;201:2;207:2
brief (3)
14:18;54:15,22
briefing (3)
200:19;201:5,21
briefly (4)
27:13;170:12;171:16;
186:11
briefs (4)
200:22,24;206:5,15
bright (2)
128:14,15
bring (4)
10:16;108:24;169:16;
187:9
bringing (1)
160:15
broad (3)
82:16,19;104:21
Brockway (43)
10:11;34:3,10,15,19;35:1,
17,23;36:1,16;44:3;52:14;
55:23;56:2,3,6;57:10;66:20;

82:17;99:25;102:8;103:13;
123:24;126:3;140:18;
148:15;151:5;152:6;157:18;
158:5,6,12;159:6;163:16,17;
170:11;186:12;187:17;
188:5;189:3;191:11,22;
192:18
B-r-o-c-k-w-a-y (1)
35:24
broken (1)
36:25
Bromley (8)
17:18;125:10;156:4,5,8,
10;162:14;165:2
Bromley's (1)
162:13
brought (3)
19:15;181:7;199:20
brush (1)
64:1
BRYCE (6)
7:8;170:10;171:24;
183:24;186:1,9
Budge (48)
7:6;57:13,14,17;67:7,18;
70:16,21,23;71:6;76:24;
77:9,10,19,22,23;79:11,12;
82:25;86:7;96:6;97:23;98:5,
10,18,21;100:6;101:16,19;
102:2;113:3;132:23;135:8;
136:12,24;138:10;147:10,13,
20,24;155:24;180:2,5;
182:24;183:5;199:18;200:8;
201:10
Budge's (1)
137:12
budget (1)
186:25
buffer (1)
118:6
buffering (1)
46:11
bugaboos (1)
95:19
buildings (1)
152:20
built (2)
127:10;202:19
bulk (1)
86:17
burden (5)
203:18,21,21,22;204:7
burdens (1)
203:15
Bureau (1)
199:22
Burley (7)
15:8,17,18,21;20:7;22:20;
24:9
business (1)
200:25
buy (1)
73:7

C

calculate (15)
51:4,7;54:4;66:7;67:2;
84:8;97:2,4;103:24;109:6;
112:7;114:25;133:20;134:3;
144:19
calculated (18)
43:16;50:22;75:23;78:6;
88:10;91:9;107:5,7;115:21;
116:9;119:25;131:16;
132:24;133:17;134:6;143:5;
144:13;157:13
calculates (2)
91:15;178:10
calculating (5)
81:22;108:10;109:9;
164:14;177:22
calculation (24)
66:9;67:6;75:23,24;76:1;
92:2;93:10;106:21;111:18;
115:11;122:22;129:13,21;
133:15;134:7,12,17,21;
173:6;177:21;178:4,4;190:8;
192:1
calculations (6)
79:21;111:7,11;120:1;
158:18;186:15
calculator (4)
144:7;173:18;181:6,15
call (29)
12:8;16:16;21:9;22:16,18;
25:12;26:14;34:2;37:14;
40:17;60:24;69:14;83:6;
99:14;102:14;132:2;140:25;
161:11;165:13,15;170:10,
14;174:1;181:6;183:24;
191:4;194:17;201:18,22
called (10)
12:13;26:20;34:1,20;
89:15;141:5;143:11;165:19;
171:4;186:2
calling (1)
12:3
calls (2)
144:7;161:6
came (4)
167:24;168:21;176:4;
187:16
can (119)
11:20;12:18;18:22,24;
20:21;21:2,6,11,19,23,25;
22:4,9,10,14;23:4,13;32:9;
34:16;35:6,7,11,16,21;36:13,
18;37:18,20;38:18,22;39:23;
41:1;43:9;44:13;46:20;
48:12;50:19;52:14;55:1,1;
59:10,20;60:20,21,25;66:24;
71:3;75:16;77:19;82:17;
85:23;89:4;93:23;94:16;
96:24;98:16,18;100:6,10;
102:9,9,11;105:3;107:20;
109:11;110:4;113:23;
114:17;117:1;118:6;122:20;
125:14;128:9;129:16,19,24;
132:3,14,22;133:3;134:19;
137:8;139:16,20,22;142:8,
12,23;145:5;148:24;157:3;
158:9;159:2;164:11,12;
166:25;167:3,17;171:13,16;
172:2,10,22;173:1;174:20;
176:8,14,21;177:1,14,19;
178:7,12,17;184:23;195:6;
198:1;201:20;205:21
Canal (142)
37:8;38:6;39:1;41:16;
42:13;43:12;44:20;45:4,5,6,
23;46:2,3,20;47:7,9,22,24;
48:4,19;49:6,10,22;50:8,11,
15;52:21,22;57:22;58:22;
60:3;61:3,25;62:4,9;65:8;
66:4,8,11,15;67:8,13;68:10,
21;69:2;70:1,12;72:15;73:5,
6,12;78:10;79:15;80:6,19;
81:8,13,16,20;82:6;83:1,4;
85:24;87:16,17,24;88:1,4,5,
8,11,14,20;89:6,19;91:1;
92:1,5,6;93:1;94:3;99:9;
100:14,15;105:13;110:24;
112:1;113:19;114:14;
115:16;116:1,4;117:5,15;
118:22;121:1;122:10,16;
129:22;130:17;131:2,21;
135:3,11,15,23;138:25;
139:7,8,9;145:8,11,18;146:9,
13,16;148:19;150:5;153:1;
155:3,6,16;157:12,19;
158:16;159:6,16,21;161:1,2,
9;163:10,12,19,21;174:25;
176:17;179:2;180:14;
181:21;190:12;193:5
canals (7)
39:21;49:14,17;135:4;
138:20,21;139:3
Candice (1)
14:13
canyon (2)
89:23;139:12
capable (3)
76:4;153:8,11
capture (3)
44:22;49:3;112:14
cards (1)
83:5
careful (1)
44:12
carefully (1)
149:7
Carryover (13)
176:12,17;177:8,23;178:5,
11,19,25;179:5,6,10,15,18
carve (2)
61:13;153:2
carved (1)
154:4
carves (1)
62:20
case (16)
16:9;68:15;73:13;82:13;
83:12;88:23;105:18;127:12;
137:23;138:23;141:25;
166:10;173:24;174:15;
176:7;179:12
cases (4)
36:11;120:13;138:2;142:6
case-specific (1)
48:18
catch (1)
67:23
categorize (1)
107:13
category (2)
38:14;42:5
cause (7)
12:14;26:21;34:21;141:6;
171:6;182:25;186:4
caused (4)
23:22;181:8;189:6,6
causes (1)
10:21
CDL (3)
143:16;145:8;157:5
cease (1)
130:4
center (4)
41:6;45:21;47:13;151:15
central (1)
153:22
certain (5)
84:23;96:3;105:9;129:15;
183:1
certainly (12)
48:3;55:7;59:10;61:18;
77:16;114:14;129:18;
136:20;181:14;204:25;
205:21;206:2
cetera (1)
71:25
challenges (3)
50:11;146:9,11
chance (5)
57:4;100:20;173:13;
175:7;198:20
change (20)
51:15;92:2,10,15,17;93:3,
4,7,19;96:2;111:12;129:25;
132:1,2;134:6;137:15;
164:12,16;176:2;205:20
changed (1)
66:10
changes (11)
50:14;72:7;111:6;116:23;
130:13;143:3;144:11;
159:14,25;160:5;182:17
characterize (2)
64:3;205:8
charge (1)
49:14

CHARLES (2)
34:19;35:23
C-h-a-r-l-e-s (1)
35:23
chart (4)
54:18;113:10,17;178:10
check (1)
181:24
checking (1)
114:9
chemicals (1)
162:2
chief (1)
166:10
chose (2)
55:2;130:21
Chuck (39)
10:11;34:3;35:5,21;38:18;
41:13;44:9;50:18;54:10;
55:15,20;57:18,21;64:6;
65:1,1;67:7,18;71:6;76:16;
77:23;78:8,9;79:12;80:9;
83:21;86:7;88:13;97:25;
98:7,21;99:2;100:17;102:14;
107:12;132:12;134:24;
138:8,16
chunk (1)
101:2
CIR (2)
143:11;144:13
circuit (1)
72:12
circulated (1)
197:25
circumstances (1)
10:22
citations (1)
106:12
cited (2)
131:6;181:2
CITIES (4)
7:21;42:9;195:22;198:6
City (6)
43:5;102:12;126:5;
158:14;195:21,21
City's (1)
166:15
civil (2)
14:20;36:3
claimed (1)
134:18
claims (3)
78:11;131:3;187:3
clarification (1)
190:4
clarify (7)
43:23;69:9,12;103:12;
118:15;138:23;149:18
clean (1)
198:2
clean-cut (1)
53:7
cleanup (2)
11:19;200:13
clear (15)
76:13,18;77:6,12,15;79:3,
21;111:17;124:25;140:6;
202:14,23;203:3,6,19
clearly (2)
44:7;190:14
clients (1)
187:3
clip (1)
118:5
close (4)
102:16;195:2;200:25;
207:4
closely (1)
80:16
closer (1)
142:12
Co (1)
157:12
COALITION (32)
7:21;13:22;16:16;21:9;
22:17;23:22;34:1,20;36:5;
52:20;56:25;65:23;66:2;
84:9,23;85:1;91:16;98:15;
103:25;106:20;113:18;
117:9;140:24;141:5;163:9;
184:4,11;189:17;195:22;
199:9;200:9;202:1
Coalition's (1)
26:4
collaboration (1)
68:4
collaborative (3)
67:25;155:10;182:7
collected (1)
89:14
collection (1)
84:22
collective (1)
116:16
color (1)
152:3
column (1)
113:19
comfortable (1)
59:7
coming (6)
22:1;147:23;174:2,3,10;
200:24
commensurate (1)
49:8
comments (7)
36:22;42:10;50:10;146:8;
180:10,17;193:21
COMMON (2)
9:4;196:22
companies (5)
45:5;88:14;139:5;161:10;
163:1
COMPANY (132)
8:16;26:13,20;27:14,17;
36:3;37:9;38:6;39:1;42:13;
43:13;44:20;45:4,6,18;46:5,
20;47:7,10,22;48:4,19;49:6,
11;50:8;52:21,23;53:1;
57:22,25;58:22;61:4,25;
62:4,9;65:9;66:5,8,12,15;
67:8,14;68:5,10,21;69:1;
70:1;72:15;73:7,8,13;74:13,
21,22,23,25;75:1,6,12,16;
78:10,14;79:15;80:13,19;
81:9,13;82:2,6,15;83:5;85:7,
12,24;87:3,7,24;88:20;92:1,
5,13;93:1,7;99:9;105:13;
112:1;113:20;114:14;117:5,
14,15;118:7;119:15;121:23;
122:11,16;131:3,21;135:3,
23;139:8,9;145:8,11;146:16;
149:17;153:1,19;155:3,7,16,
21;157:19;158:17;159:7,16,
21;161:1,1,18;162:15;
163:10,12,19,21;174:25;
176:18;179:3;180:14;
181:21;190:13;193:5
Company's (26)
60:3;61:11;67:14;68:6;
69:2;70:12;74:4,17;80:6;
81:16,20;83:1;86:19;94:3;
110:24;116:1,4,15;118:22;
121:1;130:17;145:18;
148:19;150:5;153:16;161:16
compare (2)
130:10;153:18
compared (5)
61:3;72:17,21;146:18;
161:2
comparing (1)
159:20
comparison (4)
37:7,13;38:25;63:23
compilation (1)
196:12
compile (1)
11:5
compiled (1)
11:6
completed (1)
135:7
completely (1)
169:2
complex (2)
32:4,5
compliance (11)
19:19,21,25;27:17,20;
31:4;33:7,9,14,15,18
complicated (1)
53:12
comply (1)
32:17
component (1)
107:15
comprehensive (3)
39:15;40:2;197:15
comprises (1)
115:25
compute (1)
111:1
computed (1)
159:24
computer (1)
102:16
concern (1)
20:11
concerned (1)
201:4
concerning (1)
180:18
concise (1)
185:22
conclude (1)
175:10
concluded (2)
174:5;207:6
conclusion (3)
173:16;179:9,14
conclusions (1)
126:14
condition (1)
162:5
conditions (4)
46:16;51:23;83:25;108:2
confidence (1)
154:13
confirm (2)
100:10;145:17
confirmed (1)
197:23
confounded (1)
134:9
confusing (1)
181:22
conjunctive (5)
79:4;161:11;203:16,18;
204:16
connection (1)
85:8
conservatism (2)
127:10,20
conservative (4)
55:8,12,14;127:15
conserved (1)
90:17
consider (5)
41:14;120:6;135:11;
150:14;168:11
consideration (2)
22:24;29:24
considered (6)
17:6;41:22;120:24;136:8;
168:4;201:12
considering (1)
110:25
consist (1)
71:20
consistent (3)
55:11;131:21;164:19
constant (3)
94:4;129:1;191:12

construct (1)
20:25
consult (1)
85:7
consultant (5)
15:12;17:3;24:3;59:2;
68:11
consultants (6)
58:23;65:19;67:14;68:6;
155:7;181:17
consumes (1)
71:23
consumptive (10)
41:15,19;42:16;45:9;51:5;
64:22;93:13;105:20;133:18;
143:12
contained (4)
166:22;177:19;178:17;
199:10
content (1)
168:11
contested (1)
138:2
context (3)
72:22;132:23;201:17
continual (1)
157:11
continue (7)
18:2;66:25;122:17,18,21;
128:25;158:19
Continued (7)
7:2;8:1;9:1;43:4;93:17;
144:19;157:14
continues (1)
122:11
continuing (2)
15:5;128:21
continuous (1)
47:21
CONTOR (11)
7:8;170:10;171:25;
183:24;184:1;186:1;190:3;
193:20;194:19,20,22
contribute (3)
91:10;103:8;120:18
control (3)
20:20;124:14;203:25
conversations (2)
17:5;184:12
conversion (3)
47:5,12;48:5
conversions (2)
128:20,25
converted (4)
41:5;71:13;72:4;89:9
converts (5)
89:1;90:2,6,8,21
convey (1)
49:22
conveyance (6)
45:23;50:9;88:11;91:25;
116:16;128:25
convincing (9)
76:13,18;77:6,12;202:14,
23;203:4,6,19
cool (2)
46:17,25
cooperation (2)
81:16;83:1
copies (1)
98:22
copy (3)
101:4;144:6;187:10
cords (2)
11:24;194:25
corn (9)
71:25;145:7,14,21;146:5,
6;159:15,21,25
corner (4)
99:13;137:18;190:13,21
corners (4)
38:13;100:8,24;101:14
corollary (1)
89:5
Corporation (1)
141:21
Corps (1)
199:22
correction (2)
14:8;91:24
corrections (1)
199:6
corrective (1)
33:11
correctly (4)
60:7;94:23;150:24;151:8
corresponded (1)
153:20
Corresponding (1)
125:7
corresponds (1)
125:19
corroborated (1)
61:5
counsel (3)
84:22;187:17;194:16
count (1)
188:12
counted (1)
190:11
counties (2)
119:8;143:22
country (2)
60:25;99:15
County (2)
43:2;143:21
countywide (1)
143:20
couple (9)
25:4;31:7;53:2;85:14;
94:16;98:22;138:12;187:16,
24
course (9)
33:4;45:19;48:18;51:21;
97:7;133:9,22;139:4;154:20
COURT (24)
11:10;14:23;32:9;37:17,
20;41:1;44:2;52:14;55:25;
66:20,24;67:16;79:3;82:17;
86:4,6;96:1;99:25;123:17;
162:9;184:20;195:12;
196:17;202:6
courts (4)
202:2,16;204:13;205:22
cover (2)
50:12;111:9
covered (7)
29:16;30:4,17;73:5;81:1;
109:7;161:19
covers (1)
50:13
create (4)
59:21;62:12;66:13;148:18
created (16)
37:24;48:25;49:1;58:22;
59:18;62:24;63:1,4,25;64:2;
101:8;109:4;143:23;155:5,6;
165:25
creating (3)
58:24;67:24;152:15
creek (1)
89:23
criteria (2)
54:21;110:17
critical (1)
164:13
crop (46)
45:9,17;49:18,21;70:9;
72:2,25;73:22;75:22;87:3;
91:12,20,21;93:12;96:13,22;
97:4;105:25;107:5;116:23;
131:9,16,20;143:8,9,13,15,
16,21;144:10,12,17,18,19;
145:3,22;156:17,19;158:22;
159:25;163:2,5;164:9,12,12,
14
cropping (2)
157:1;162:1
crops (12)
71:24;84:1;86:19;87:2;
105:16;108:3;144:14;
145:23;158:24;159:17;
162:17,23
cross (1)
158:13
Cross-Examination (24)
7:6,10,11;24:14,22;26:8;
33:20;57:13,16;98:2;102:6;
123:9,22;126:1;147:9,12;
156:2,7;165:4;180:4;183:7;
189:16;190:1;193:18
crude (1)
206:24
culinary (1)
99:22
current (17)
36:2;44:15;47:8;83:25;
108:1,1;112:14;130:10,11;
144:5;156:21;163:4;164:10;
192:8,9,12,14
currently (6)
14:20;15:18;16:11,12;
141:20;192:2
curtail (1)
75:15
curtailed (6)
16:4,7;20:1;33:1;75:18,18
curtailing (1)
69:6
curtailment (21)
16:16,24;17:10,13;18:8;
19:23;20:12;22:5,15,25;
24:1,6;29:2,4,8;31:5;32:13,
22;66:15;74:8;203:13
curved (1)
41:8
cut (1)
140:3
CV (2)
36:4;141:24
CWN's (1)
157:12

D

Dam (1)
139:12
dash (1)
43:19
data (59)
43:15,17,18,18,21,21;55:4;
63:16;82:5,6,9,14,21;94:22;
95:4,9;96:10;104:11,15,20;
105:1,8;114:20;118:25;
119:8;121:25;135:14;
138:19,25;143:16,16,19;
144:2,21,22,24;145:1,4,8;
149:10;154:15;157:5;163:5;
164:7,10,10,10;174:10;
179:5,7,10,16,18,19;180:13;
191:25;192:11,14;205:12
database (5)
81:5;85:11;119:18;154:18,
21
dataset (25)
37:12;43:24;44:4;54:24;
60:9;62:17,19,24;63:9,24;
64:1,18;65:9,16;77:24;78:1;
96:4;99:12;150:9;151:1,7,
13;163:18;187:2;190:19
datasets (1)
64:5
date (16)
16:24;17:8,13;18:11;
20:12;25:20,25;26:2;31:11,
14;32:14,22;39:4;95:19;
200:3;203:13
dated (1)
22:18
Dates (2)
22:16;26:4
Dave (13)

36:16;59:2,8,22;60:19;
103:14;140:25;141:16;
142:11;147:14,24;156:1;
193:2
DAVID (2)
141:4,18
D-a-v-i-d (1)
141:18
days (8)
23:18;47:1;49:15;79:20;
103:19;108:22;119:12;201:6
deadline (9)
17:8;18:6,7;20:15;21:1;
22:7;32:17,19;200:21
deadlines (1)
138:1
deal (1)
47:22
Dean (3)
26:14,19;27:9
D-e-a-n (1)
27:9
decade (1)
71:10
decades (2)
95:5;96:8
December (7)
16:25;20:3;22:17;29:5,9;
31:10;32:13
decide (2)
17:25;186:22
decided (2)
162:22;175:17
decimal (1)
132:3
decision (1)
113:1
decisions (3)
74:8;79:3;162:1
decline (1)
87:4
declined (1)
93:6
declining (1)
128:19
decrease (4)
72:3;88:4;90:19;131:23
decreased (2)
93:16;112:4
decreases (4)
46:18;88:11;90:18,18
decreasing (2)
106:15;136:19
decree (2)
79:1;155:23
decreed (3)
78:22;118:21;202:13
decrees (1)
202:5
deep (1)
90:20
defensible (3)
188:10;189:10,10
deficiencies (1)
204:12
define (2)
79:14;129:19
defined (2)
45:8;83:15
defining (1)
129:12
definitely (2)
39:14;188:18
definition (6)
84:5;105:17,21;109:21;
129:17;130:9
degree (1)
53:15
delineation (7)
40:10,11,13,13;41:12;
42:6;58:22
deliver (11)
46:8;69:7,7;74:5,14,14,18;
75:12,16;81:17;128:1
deliveries (2)
61:4;153:20
delivering (1)
66:1
delivers (1)
82:3
delivery (24)
21:9;22:18;25:12;42:12;
49:23;61:4;75:2;81:21;
82:22;86:8;143:22,24;
146:18,20,21;149:5;153:19;
160:5;161:6,11,20;162:24;
201:18,21
Delorey (6)
26:14,15,19;27:5,9,10
D-e-l-o-r-e-y (1)
27:9
delved (1)
134:11
demand (58)
41:16,22;42:14,17,22,24;
45:17;46:12,16,18,22,25;
47:20,21;50:3,22;51:8,14,17,
21;54:4;64:22;66:8;67:6;
72:21,23;75:24;84:8;93:3,8,
19;96:14,15,21;97:5,7;
105:20;107:9;110:15;111:5;
122:14;124:7,13;130:25;
132:4,24;133:15,21;134:4,5,
12,17,21;145:23;158:22;
173:20,21;177:25
demands (7)
41:20;44:20;51:1;52:2;
128:3;130:18;159:17
demonstrate (2)
66:5;129:21
demonstrated (1)
129:8
demonstrates (1)
115:12
Denied (3)
77:9,20;166:13
deny (1)
77:3
Department (48)
18:19;19:1,5;21:8;63:3,14,
19;66:10;67:25;69:5;76:3;
77:24;78:14,21;81:5;82:7;
84:17;85:2;97:13,21;119:19;
122:19;124:11;130:20;
134:10;143:17,21;149:20;
155:9;162:5,7;163:4;166:7;
167:14,15;169:25;171:19;
180:18;181:2,25;183:16;
191:25;197:3,6,7;202:15,18;
203:10
Department's (9)
62:16;143:18;150:9;
154:21;156:16,20;181:8;
203:7,20
depend (2)
51:22;188:14
depending (1)
137:8
depends (2)
136:20;202:1
depict (1)
39:20
depicted (2)
62:1;107:20
depicting (4)
40:24;41:3,10,11
depiction (1)
64:17
depicts (2)
60:7;145:6
depletes (1)
201:24
deposition (1)
157:10
deprived (1)
204:24
describe (21)
36:7,13,18;37:6;38:22;
39:10,23;43:9;45:1;50:19;
52:11;54:12;110:11;142:2,8,
23;144:4;145:5;188:15,16,
17
described (7)
51:18;67:11;101:13;
103:4;188:5;191:22;202:5
describes (3)
43:11;103:23;177:21
descriptions (1)
119:2
designed (1)
72:13
desire (1)
73:23
desiring (1)
137:22
desk (2)
11:13;98:6
detail (2)
167:17;199:11
detailed (2)
58:21;59:18
details (1)
25:18
detected (1)
44:14
determination (9)
68:20;91:8;111:16;
163:21;193:6;201:22,23;
203:9,13
determinations (1)
193:3
determine (11)
23:20;37:25;43:20;78:21;
122:2;135:11;139:25;
156:17;188:23;190:24;
202:12
determined (2)
110:13;127:8
determines (1)
22:8
determining (6)
53:3;81:22;143:14;193:8;
202:22;204:1
develop (9)
17:7;18:4;20:15,23;29:25;
65:19;86:1;148:25;205:11
developed (7)
38:15;42:6,9,15;43:3;
67:13;153:1
developing (5)
16:15;18:2;20:16;148:22;
171:17
development (5)
42:13;49:2;71:7;152:7;
171:20
developments (3)
42:19,20;43:1
deviation (1)
127:4
difference (6)
38:3;60:5;101:2;132:3;
151:4;157:3
differences (7)
37:25;38:4,8;39:2;40:4;
156:23;157:1
different (17)
16:5;54:25;55:2;76:14;
88:10;103:7,10;104:22;
134:3,10,15;139:16,19;
169:2;172:18;174:11;191:3
difficult (2)
116:21;154:16
difficulties (1)
10:21
Direct (14)
7:5,9;14:11;27:3;35:3;
64:19;66:16;78:7;124:9;
134:16;141:14;160:25;
171:8;186:7
direction (1)
155:18
directly (7)

45:16;91:11,17;92:9,23, 24;93:4
Director (42)
10:7;12:24;18:14;22:8; 23:5,17,19,24;27:15;28:1; 34:2;74:8;75:14;76:24; 78:24;84:23;98:5;103:24; 108:7;112:14,20,21;123:3; 124:23;125:11;140:13,20; 141:12;142:10;166:12; 167:23,25;168:1;169:10,25; 170:21;181:13;182:21; 184:3;185:21;197:20;199:18
Director's (2)
120:16,22
disappear (1)
190:22
discharge (1)
89:23
disclosed (2)
169:11;170:2
disclosure (1)
200:7
discrepancies (1)
156:25
discrepancy (2)
196:13,15
discretionary (3)
97:12;110:16;113:1
discuss (5)
10:6;59:8;60:18;80:4; 152:5
discussed (8)
17:5;94:1;143:9;148:14; 189:13;195:24;196:24;200:8
discusses (2)
21:15;68:25
discussing (3)
71:7;135:8;195:3
discussion (19)
54:22;56:20;96:12;122:9; 125:16;132:22;135:24; 143:13;160:4;167:22,25; 168:1,5;169:18,18;180:12, 23;188:8;195:14
discussions (7)
31:23;33:16;169:21; 175:16;186:14;187:17;205:6
displace (1)
98:8
dispute (2)
133:11;205:9
distinguishing (1)
77:18
distort (1)
189:2
distributed (2)
11:6,12
distribution (2)
55:2,3
DISTRICT (32)
8:4;17:19,20,22,23,24; 18:1,5,17;19:2,15,18,21; 25:1;29:15,23;30:6,9,15,18; 31:1,3;33:7,14;43:13;160:6; 173:5;174:3,12,24;175:13; 186:3
district's (1)
158:15
ditch (3)
41:17,19;75:8
ditches (13)
38:10;41:4,6,11;62:20; 64:10,21;69:10,15;89:15,19; 109:18;117:6
diversion (47)
41:20;45:11,25;46:20; 47:24;49:7;51:1,6;55:3;72:9, 23;81:6;89:10;91:11,20,21; 92:10,13,15;93:5,9,14,15,18; 97:9;107:3,3;111:5;112:2; 115:16;116:24;118:14,16; 119:3;122:1;126:8;133:10; 135:14,19;136:14;138:19, 25;143:9;145:4,15;173:11; 174:7
diversions (50)
23:22;43:12;47:2;51:3,9, 10,24;53:25;54:2;66:18,21; 67:2;94:4,8;95:1;96:15,20; 97:1,10,17;107:6;110:1,14, 25;113:4,18,24;114:14; 119:24;120:8;122:11,15,16; 126:21;130:18,24;131:23; 133:16,19;135:22;145:11; 157:19;158:17,21,25;159:7, 16,21;204:2,3
divert (7)
15:7;27:22;50:25;52:7; 74:25;75:2;131:3
diverted (4)
41:23;88:3;89:6,8
divide (1)
131:16
divided (6)
45:10;51:6;93:14;107:6; 133:19;143:8
divides (2)
91:19,21
document (27)
17:17;18:24;19:9,11;21:4, 6,7,13,15;22:12,22;30:21; 98:6;101:16,22,23;125:5; 169:16,17;172:17,20;181:2; 199:2,20;200:2,5;201:14
documented (1)
181:15
documents (19)
13:20,25;28:9,9;56:9,10; 167:20,21;168:10,11,23; 170:8;185:17;196:8,20; 197:1,2,12;198:20
Doggone (1)
205:18
domestic (4)
29:2;99:19,21;100:4
done (16)
28:2;32:1;58:7;65:21; 79:6;81:2;82:20;83:4;87:25; 99:7;101:1;117:23;149:2; 153:24;174:6;195:18
dots (1)
94:17
double-counting (1)
40:14
doubt (1)
63:18
down (17)
14:23;32:9;37:21;42:16, 17;48:15;73:1,2;96:23,23; 105:3;110:24;111:2;124:5,5; 172:11,23
downstream (2)
48:13;49:4
downward (3)
44:18;95:10;112:8
Dr (13)
55:23;56:3;157:18;158:5, 6,12;159:6;163:17;188:5; 189:3;191:11,22;192:18
draft (1)
182:1
drafting (2)
171:22;182:10
drain (5)
48:7,10,11,15;49:2
drains (2)
89:15,19
draw (1)
83:22
drawing (1)
59:24
dried (2)
69:22;70:2
driven (1)
96:15
driveways (2)
61:20;74:9
drought (1)
136:6
dry (1)
46:4
due (9)
16:16;52:24;69:19,22; 80:7;85:21;156:25;157:1; 204:20
duly (6)
12:13;26:21;34:21;141:6; 171:5;186:3
duration (1)
194:21
during (14)
22:24;46:2;49:17;72:8; 85:25;86:18;96:12,12;114:7; 144:7,8;186:11;187:16; 203:5
Dylan (1)
124:1
dynamic (3)
191:4,9;201:14

E

earlier (10)
10:20;43:23;46:7;85:20; 86:15;88:22;92:19;95:15; 145:18;148:15
early (3)
32:15;86:25;95:17
Eastern (3)
15:7;27:22;139:6
easy (2)
117:2;129:21
edges (1)
42:8
education (2)
36:8;142:2
effect (5)
50:20;53:3;157:20;159:8, 24
effectively (1)
182:19
effects (3)
10:13;116:22;191:24
efficiencies (30)
36:23;49:12;51:4,7,13; 54:3;67:3,3,5;87:7;91:25; 107:5,7,8;128:20,24;129:1, 23,24;132:2;133:17,20; 134:2,3;143:1,2,3,4;157:21; 159:8
efficiency (52)
45:4,8,13,19;47:4,13,17; 49:9,19;50:9,11,16;54:1; 88:8,9,19;89:4;90:24;91:1,7, 10,15;92:17,18,23;93:11; 96:13,23;97:3;111:1;115:16, 18;116:4,9,12;117:6,8,18; 124:5,6,14;129:8;131:9,13, 17,22;143:7,15;145:2;146:9; 158:23,25
efficient (3)
30:3;47:15;93:1
effort (2)
143:6;154:4
either (10)
11:15;100:24;116:16; 119:25;149:7;151:16; 152:23;169:15;182:6;201:20
element (2)
143:14;164:14
elements (2)
202:9;203:2
eliminate (1)
87:25
else (8)
13:24;39:8;44:8;50:24; 52:9;75:8;189:12;206:25
elsewhere (2)
190:16,19
email (5)
11:9;19:12,20;98:22;

102:24
emailed (2)
83:18;84:21
emails (4)
168:16,17;169:22;170:1
emergency (1)
10:24
employ (1)
108:20
employed (3)
14:20;53:16;66:18
end (15)
11:20;22:22;23:6;46:9;
49:22,23,24;71:13;95:8,19;
106:24;122:14;127:16;
144:22;197:20
ends (3)
46:14;127:21;128:4
enforce (1)
42:23
engineer (3)
14:20;36:3;141:23
Engineering (5)
14:21;15:1;36:1,16;103:13
Engineers (2)
102:21;199:22
engineer's (1)
137:12
enough (9)
46:24;65:10;73:18;77:4;
107:25;112:8,9;128:17;
204:21
enrollment (1)
30:15
ensure (2)
11:17;50:2
enter (1)
129:5
entered (1)
38:8
entire (2)
44:20;73:24
entities (3)
86:8;113:18;121:10
entitled (5)
42:11;176:11;202:4,8;
203:2
entity (1)
106:20
environmental (3)
27:15,16,20
equal (4)
50:25;52:6;130:18;131:18
equals (1)
131:9
equation (6)
42:25;91:19;92:11;93:2;
97:6;107:9
equations (8)
51:19;52:3;54:9;66:17;
93:20;107:2;110:7;111:19
equilibrium (1)
191:5
equivalent (1)
53:21
Erick (2)
36:15;103:13
ERO (2)
36:16;141:21
errata (3)
197:25;198:10,18
error (4)
108:7;174:15;181:12,17
errors (1)
107:17
ESPA (3)
63:5,7,10
ESPAM (1)
187:1
essentially (8)
45:14;47:24;60:15;83:5;
90:4;104:3;109:23;194:2
establish (2)
169:6,15
established (1)
203:3
establishes (1)
203:5
establishing (1)
203:19
estimate (7)
117:2;145:2,7;154:11;
192:11,13,15
estimated (1)
47:8
Estimates (1)
106:14
estimation (1)
191:12
et (12)
25:2;71:25;72:2;73:1;
75:23;76:1;77:24;91:12;
143:11;144:13;156:20,25
evaluate (7)
31:20;32:6,21,23;81:25;
142:15;202:11
evaluating (2)
53:3;63:15
evaluation (11)
24:1;54:21;58:14,15;91:8;
105:12;147:25;148:12;
153:15;187:19;190:9
evaluations (1)
58:2
evaporate (1)
41:17
evapotranspiration (1)
41:18
evapotranspirative (1)
45:17
even (21)
41:21;42:14,21;74:21;
82:13;105:21;116:6,21;
119:3;120:23;128:8,20;
146:6;158:19;164:24;167:1;
168:11;169:5;170:3;177:9;
192:9
event (1)
55:17
everybody (4)
195:6;196:17;200:17;
207:1
everyone (3)
11:13;143:7;166:5
evidence (20)
11:18;14:2;28:10;56:11;
76:13,19;77:6;101:19,25;
124:24;125:21;167:7;
168:12;185:19;196:9;
197:12;202:23;203:4,4,19
evidentiary (1)
169:3
exact (2)
135:9;192:22
exactly (5)
62:25;65:20;134:8,13;
191:14
Examination (15)
7:5,9;14:11;27:3;28:2;
35:3;59:23;124:22;132:20;
141:14;171:8;179:24,25;
186:7;194:18
examine (5)
57:14;64:4;80:15;123:15,
19
example (19)
39:12;40:1;44:14;46:17;
51:11;64:20;71:12;72:11;
86:3;111:8;115:11,15;130:6;
131:12,14;146:5;158:20;
190:13,14
examples (2)
99:10;167:12
except (2)
29:1;99:2
excerpt (3)
60:3;62:8,9
excessive (1)
128:13
exclude (3)
64:14;152:16,19
excluded (20)
60:23;61:16,17,21;64:8,
11,21;150:18;151:20,22;
152:2,4,10,22;153:4;169:2,
20;188:25;190:6,6
excluding (4)
59:25;153:7;189:1,9
excuse (4)
94:20;139:5;146:25;
177:14
excused (1)
10:25
exhibit (92)
11:16;12:19,19,23;13:2,9,
10,13,13,25;14:2,3,5;15:10,
16,23;17:15;18:22;19:7,14;
21:2;22:10;28:22,25;29:17;
30:12,14,20;31:8;36:5,13;
38:19,24;39:7,8,10,12,20,23,
25;40:17;41:8,25;58:10;
60:2;62:12,15;83:17;84:21;
85:16;98:14,16,17;101:17,
20,24;102:1,17,19,21;103:5;
113:12;124:24;125:9,19,21,
22;136:25;137:3;139:15;
141:25;142:9,18;148:4;
166:15;172:4,5,16,19;176:9,
21;177:12;187:10,11;
195:20;196:9;198:11;199:4,
9,10,14,16
EXHIBITS (38)
9:4;11:5,15,17;12:22;13:1,
1;14:9;28:3,4,6,10,11;55:22;
56:9,12;166:14,15,17,20,23;
167:5,12,20;184:6,14;
185:10,18,20;195:3,17,25;
196:10,12,22,22;197:13,17
exist (2)
48:25;118:22
existed (1)
154:6
existing (1)
48:24
exists (1)
95:10
expect (1)
116:3
expedited (1)
200:17
experience (11)
52:24;53:6;78:1,2,7;86:13;
100:5;140:1;146:12;161:23;
162:4
expert (27)
29:12,12;36:10,14;55:23;
56:3,6;58:9;59:12;77:11;
79:24;85:16;93:22;98:22;
99:4;102:20;113:7;142:5;
146:23;147:2,5;148:6;172:3;
180:10;197:24;198:17;
206:21
expertise (2)
154:25;187:6
experts (1)
201:9
explain (8)
27:13;30:14;59:20;85:23;
148:24;167:3;177:19;178:17
explained (4)
124:4,8;189:4;192:18
explanation (1)
50:6
exploration (1)
79:9
explore (1)
181:9
explored (1)
38:4
exposition (1)
45:3
extent (6)

13:18;38:3;48:3;82:21;
92:9;154:24
extra (2)
185:6,6
extreme (4)
55:8,14;75:4;126:18
extremely (1)
72:19
eye-balling (1)
113:4

F

face (1)
98:19
facilities (2)
27:19,23
facility (13)
15:8,17,18,21;20:7;22:20;
24:9;27:25;28:14,18,20;
31:21;32:4
fact (9)
106:8;108:19;113:2;
120:3;134:9;164:21;192:13;
195:16;204:20
factor (14)
46:5,15;47:4;48:2;49:5,10;
50:15;126:10,17,23;127:3,6;
135:10;188:10
factors (14)
38:8;45:3;50:7;68:20;
90:25;91:5,10,14;97:5;
107:21;116:20;129:5;
186:15;202:19
factory (2)
13:3;29:1
fair (6)
63:24;70:15;88:16;
110:21;128:17;163:6
fairly (4)
52:24;119:11;192:22,24
faith (2)
169:14;170:2
fall (1)
144:8
fallback (2)
202:25;203:7
falling (1)
196:4
fallow (10)
73:4,16,23;190:5;191:6,7,
8;192:7;193:9,9
fallowed (9)
186:19;188:2,13,21;189:1,
4,8,12;190:13
fallowing (8)
70:6,8,13,24;73:15,21;
186:14;189:6
fallows (2)
191:18,19
FALLS (99)
7:21;37:8;38:6;39:1;43:2,
5,12;44:19;45:5;47:7,9;48:3,
4,19;49:6;52:21,22;57:21;
58:22;60:3;61:3,25;62:4,9;
65:8,18;66:4,8,11,15;67:8,
13;68:10;69:2,7;70:1,12;
71:9;72:15;73:6;78:10;
79:15;80:6,19;81:20;82:5,
25;85:24;86:2;88:19;92:1,5;
93:1;94:3;99:9;102:13;
105:12;110:24;112:1;
113:19;114:14;116:1,4;
117:15;118:22;120:25;
122:10,16;130:17;131:2;
135:3,23;139:9;145:8,11,18,
25;146:16;148:18;149:3;
150:5;153:5;155:3,6,16;
157:12,18;158:16;159:16,
21;161:1;163:10,12,19,21;
176:17;179:2;190:12;195:22
Falls' (3)
71:24;78:22;93:16
familiar (23)
15:6;27:18,21,24;28:13;
59:3,6,11;63:7;77:23;83:11;
87:18;101:5;108:11;118:1,5;
119:17,18;121:2;138:24;
139:2;154:18,20
familiarity (1)
146:12
FAQ (1)
21:7
far (4)
25:20;149:24;166:5;
168:22
farm (10)
47:19;53:6,18;73:16,18,
23,25;89:2;90:12,16
farmer (14)
70:1;73:10,11,15,17,21,23;
90:2,6,8;191:18,21;193:2,8
farmers (2)
81:18;161:24
farmland (3)
72:3;74:24;82:2
farmstead (2)
99:14;100:14
farmsteads (11)
60:24;62:20;99:18;100:9,
24;101:14;152:6,10,18,20;
154:4
fashion (2)
53:12;82:1
favor (1)
202:7
feeds (1)
106:20
feel (1)
205:7
feeling (1)
10:13
feet (3)
12:5;48:22,22
felt (2)
44:18;55:13
Ferguson (2)
173:18;181:9
few (13)
86:16,20;88:18;90:23;
108:22;113:7;122:12;126:6;
132:2,13;156:5;158:12;
180:9
fewer (1)
50:24
field (12)
39:18;42:12;58:6;61:7;
70:2;81:3;89:2,6,7,9;186:22;
188:20
fields (11)
38:11;39:13;40:21;53:10;
62:21;69:18,19,22;70:5;
146:24;188:1
fieldwork (1)
58:5
fifth (40)
23:6,10;36:17,20;37:9;
45:11;50:1;51:20;58:19;
76:12;83:7,19;102:17;
103:23;104:13;106:8,21;
108:8;109:13;112:13;126:8;
130:19;136:2;171:17,21;
175:25;176:3,4,5,19,22;
177:7,11;178:9,20;179:5,20;
182:1,8;183:1
Figure (25)
43:15;58:20;67:10;76:14;
81:9;93:25;94:14,18,19;
99:3,3,11;101:1,2;145:5;
156:11,24;159:14,19,19;
172:7;176:15,16;177:10;
205:4
figuring (1)
17:12
file (3)
21:20;25:6,9
filed (6)
24:5;37:15;161:10;
199:18;200:11,22
files (5)
37:17,18,19,23,24
filing (1)
23:19
fill (1)
49:14
final (2)
177:1,2
finalization (1)
168:19
Finally (2)
49:10;137:21
find (7)
30:7;170:4;172:2,10,22;
176:14;205:15
fine (5)
35:10;67:22;79:23;
123:25;169:13
finish (1)
188:22
firm (2)
62:5;108:23
first (20)
12:13;15:14;20:17;26:20;
34:20;58:13,18;80:4;140:3;
141:5;144:23;157:8;170:16;
172:11;180:1,12,20;185:2;
186:3;188:1
fit (2)
55:3,4
fits (2)
55:2;110:17
fix (4)
124:13,14;181:18,18
flat (2)
128:19;129:1
Fletcher (32)
7:10;13:18,21;24:15;
56:17;57:1;125:3,9,11,14;
134:22;147:19,22;166:5,25;
167:18,19;184:15,23;185:2,
4,11,14;189:19,21,22;190:2;
193:11;194:13,15;196:1;
198:21
Fletcher's (1)
193:21
flip (5)
68:17;79:25;83:21;
159:18;161:14
flip-flops (1)
12:2
flood (5)
89:1,12;90:2,8,21
flow (3)
48:15,24;72:19
flowing (1)
48:23
flowmeters (1)
119:25
flows (5)
48:7,10;201:24,25,25
flux (1)
182:11
focus (5)
27:16;117:14;183:10,11;
206:19
focused (2)
38:2;143:5
folks (2)
184:5;205:13
follow (2)
46:22;138:17
following (1)
190:20
follows (6)
12:15;26:22;34:22;141:7;
171:6;186:5
follow-up (2)
180:9;193:14
food (2)
21:16,17
FOODS (15)
8:10;12:8,13;14:14;15:4,

15,17;18:20;19:1,14,25;20:8,19;24:4;25:9
Foods' (1)
20:16
footer (1)
60:5
footnote (2)
178:7,8
force (1)
72:20
forces (1)
97:18
forecast (8)
55:18;127:3,7,15,20;199:19,21,24
forget (1)
34:14
forgot (1)
98:7
form (1)
166:18
formerly (1)
74:24
formula (1)
104:3
forth (2)
37:11;93:21
forward (8)
12:10;26:16;57:13;124:21;141:2;144:2;147:18;170:23
found (10)
31:4;38:1,7;40:2;43:21;51:19;172:25;173:19;174:1;175:21
foundation (4)
70:14,22,25;129:15
foundational (2)
138:17;139:1
four (5)
19:13,22;28:6;164:8;201:6
Fourth (4)
104:7;109:12;114:12;176:18
fraction (1)
192:17
fractured (1)
133:6
frame (2)
95:22;114:8
frames (1)
114:5
framework (3)
204:13;206:22,24
frankly (2)
84:6;203:1
frequently (1)
61:22
Friday (1)
166:1
fringe (2)
38:15;42:7
fringes (1)
149:16
front (9)
12:21;21:8;28:3,23;106:9;121:7;152:13;167:2,23
full (8)
34:12;44:19;74:1;157:8,25;162:24;199:23;200:1
fully (1)
73:5
fun (1)
180:6
function (4)
42:18;118:10;133:22;182:18
functions (2)
83:15;118:6
further (19)
24:11;33:19;56:22,24;88:16;97:23;98:2;140:11,14;147:7;155:24;156:2;165:2;167:17;179:23;181:9;183:5;194:10,18
future (6)
122:20;130:4;182:18;188:20;200:2;201:13

G

gallons (1)
72:13
garden (1)
99:23
gardening (1)
100:15
gardens (1)
71:21
Garrick (1)
19:12
gather (1)
205:12
gathering (1)
167:14
gave (6)
105:4;110:22;111:8,9;115:10;188:8
general (14)
45:3;47:14,18;50:23;58:3;78:6;117:20;126:25;133:8;135:17;136:11;139:4;152:15;186:24
generally (28)
28:16;36:7,13,18;38:22;43:9;45:1;50:19;52:11;57:24;80:7;83:14;85:21,25;88:17;89:3,9,13;130:11;133:10;138:24;140:2;142:2,8,21;145:5;153:7,12
generate (2)
60:17;108:14
generated (1)
119:8
generation (1)
107:17
GIS (28)
37:13;59:3,24;60:10,13,18;61:22;63:24,25;64:7,16;65:7,19;67:12;79:13;108:12,21;109:4;118:2;148:18;150:8,13;151:6,20;152:8,11,16;153:18
gist (1)
167:16
given (10)
51:2,10;54:1;66:19,22;82:20;97:2;111:1;133:16;192:13
glad (1)
12:5
glitch (1)
67:20
goal (3)
55:11;149:21;192:10
goes (11)
47:25;48:15;64:19;66:16;73:1,1,2;75:8;97:10;107:1;158:18
Good (30)
14:13;24:24,25;25:3;27:5,6;35:5,7;57:12,18,20;81:22;102:8;105:4;124:1;125:23;126:3,4;129:14;132:12,15,16;146:20;147:14,15,16;169:14;170:2;171:11;184:16
goodness (2)
57:23;104:21
gosh (1)
147:22
Gotcha (1)
23:8
governed (1)
74:21
grain (1)
146:6
grains (2)
146:2,4
graph (2)
95:13;96:7
graphs (1)
145:17
grass (2)
71:20,23
gravity (4)
45:20;47:15,21;48:8
gravity-irrigated (1)
41:5
gray (1)
94:11
great (4)
48:3;103:3;113:16;114:12
greater (7)
66:5;97:20;114:23,24;116:17;117:17;127:7
green (4)
139:20,23;140:4;186:23
Greg (2)
102:20;113:6
Greg's (1)
114:10
GROUND (18)
8:4;29:15,22;30:6,8,15,18,25;31:3;33:7,13;53:17;122:5;137:16;162:23;173:5;175:13;186:3
groundwater (66)
15:7;20:22;22:16;23:22,23;24:13;27:22;29:12;32:7;48:20;52:17;53:4,5,16,22;54:8;61:11;68:5;69:6;75:15;77:5,11;80:1,5,10,19;81:2,5,9,23;82:1,10,13,15;85:15,21;86:2,9;98:3;117:24;118:7,21;119:15,24;120:8,17,23;121:11,21;122:1,3,23;127:13;132:9;153:15;154:9,24;155:12;158:15;174:24;179:25;184:5;201:24;204:1,2,3
group (10)
54:19;132:9;144:6;175:16,17,24;176:3;196:21;197:4,6
grow (2)
105:16,25
growing (2)
139:21,21
grown (2)
71:24;86:19
guaranteed (1)
182:12
guess (21)
25:22;33:12,16;40:17;54:11;55:15;58:13;78:25;135:10;136:16;139:1;146:8;160:19;170:2,15;183:9;192:6;194:14;204:6;205:7,17
guts (2)
51:16;134:12
guys (1)
32:9

H

half (2)
71:14;93:17
half-an-acre (1)
100:4
half-pivot (1)
39:17
halfway (4)
23:15;172:11,23;176:14
hand (3)
26:17;34:16;79:20
hands (1)
165:5
happen (10)
19:18;20:6;21:16;31:3,12,17;71:9;107:17;164:18;192:15
happened (9)

17:21;18:18;30:5;47:6;
87:16;97:19;149:6;180:24;
192:16
happening (1)
44:19
happens (3)
72:8;137:16;162:25
harbinger (1)
204:25
hard (5)
53:14;101:4,5;180:8;
181:23
hardened (3)
106:6,17;152:19
Harris (31)
7:11;98:4,9,11;102:4,7,12;
103:3,4;113:13,16;123:3,6;
129:14;136:1;137:21;
138:11,12,15,16;140:7;
142:10;158:13;193:13,14,
19;194:10;206:5,6,9,12
harvested (2)
86:25;87:3
hay (1)
71:25
HDR (3)
14:21;15:1,5
headgate (2)
74:19;75:8
heading (6)
80:3;95:7;147:25;148:3,
10;187:19
heads (1)
194:24
health (1)
70:9
hear (13)
35:6,7;44:3;67:20;88:14;
102:9,11;135:2;142:12;
162:9;184:20,22;196:3
heard (11)
46:6;47:8;63:6,11;70:20;
86:17;145:17;146:11;152:5;
157:11;158:12
HEARING (165)
10:3,9,17,20;11:14;12:3,9,
17;13:15,19,23;14:4,6;15:3;
22:7,8;23:19,25;24:12,18;
26:8,11,15,24;28:7;33:20,24;
34:5,8,24;35:12,16,20;41:2;
56:5,10,13,14,16,19,21,24;
57:2,8,12;68:14;70:18,20;
71:1,5;77:3,16;79:8;98:2,8,
12;101:21,23;102:4;106:14,
16;113:12,14;123:6,8,11,14,
18;124:20;125:1,6,13,17,24;
132:8;138:10;140:9,11,14,
17,22;141:1,9;146:25;147:4,
9;156:2;165:3,8,15,18,23;
166:2,7;167:1,18,23;168:7,
15;169:4,13;170:7,13,18,22;
171:1;172:14,21;179:24;
182:7,14,16,23,25;183:4,6,
15,19,23;184:1,8,10;185:1,9,
12,15;189:16,21;193:12,15;
194:11,14,17;195:4,10,13,
19,23;196:3,6,8,11,25;197:9,
10;198:4,12,15,19;199:1,6,
13,17;200:4,12,19;201:3;
203:5;204:24;205:16;206:8,
11,13;207:3,6
held (4)
56:20;82:5,6;125:16
Hello (1)
171:10
help (2)
182:18;207:1
helping (1)
187:3
herein (1)
129:8
Hey (4)
57:20;65:1;98:5;132:14
Hi (1)
156:9
high (8)
49:16;72:19;87:17;116:6;
127:6;135:7;142:4;192:25
high-efficiency (1)
45:21
higher (9)
42:21;66:7,12;67:4;72:9;
97:18;111:16;122:13,13
highest (1)
55:9
highlighted (6)
54:21;62:14;100:7;101:6;
151:16,23
highlighting (7)
98:23;99:2,7;150:6,15,15,
20
hindcast (2)
176:15,16
hire (1)
33:4
hired (1)
29:11
historic (3)
110:14;113:17;133:17
historical (5)
120:8;134:1;149:3,19;
188:16
historically (1)
134:10
history (3)
36:8;142:3;149:5
hit (1)
42:3
hits (1)
142:4
hold (2)
23:19,25
holder (1)
202:7
holders (3)
55:13;126:11;202:4
holding (1)
200:18
holds (1)
83:5
home (1)
147:17
homes (2)
60:24;101:8
homesteads (1)
64:11
honest (1)
31:19
honestly (3)
201:14;202:21;203:23
hopefully (1)
206:23
horizontal (3)
40:21;94:11;151:15
hot-button (1)
117:14
hour (1)
10:3
hours (1)
195:6
house (2)
99:14;100:16
houses (1)
153:3
human (1)
140:5
hundreds (2)
49:2,2
hydraulically (1)
53:8
hypothetical (12)
71:17;110:22;111:3;
115:10;116:3,8,18;122:17;
129:13;131:14,15,21
hypothetically (1)
131:7

I

IDAHO (11)
7:21;28:21;102:13;
135:15;138:20;139:6;
146:13,19;161:2;171:19;
195:22
idea (2)
41:9;80:22
identical (1)
38:2
identification (1)
112:15
identified (11)
99:7;100:11;142:9;150:13,
16,25;151:5;152:1;155:17,
22;166:14
identifies (1)
105:15
identify (11)
17:17;18:24;54:8;68:20;
78:15;149:7,21;150:7;152:6;
155:18;206:24
idle (2)
69:19;70:6
idled (1)
70:13
IDWR (15)
19:13;30:17,24;36:11;
37:11,16,23;55:6;119:3;
142:6;144:7,16;154:12;
171:4;174:12
IDWR's (2)
176:15,16
IGWA (8)
8:21;65:22,25;66:13;82:9,
12;101:17;196:19
IGWA's (3)
98:17;174:21,22
illustrate (1)
39:16
illustration (2)
157:2,6
image (8)
34:12;60:4,8;61:1;62:8;
150:5;151:15;186:23
imagery (6)
59:19,19;61:5;78:21;
149:13;186:22
images (2)
152:23,24
immediately (1)
182:4
impact (4)
31:21;32:21;135:11;
145:23
implementation (1)
142:16
implemented (4)
87:7;88:8;157:11;182:3
implicit (1)
80:16
important (10)
42:24;44:12;47:11;82:2;
84:11,14;110:6;135:10;
143:4,14
impose (1)
206:13
imposed (1)
202:15
impossible (1)
128:4
impression (1)
185:3
improve (2)
89:4;92:1
improved (2)
158:22,25
improvement (2)
92:8,14
improvements (4)
157:11,13,20;159:8
improves (1)
88:8
inability (1)

205:6
INC (2)
8:10;14:21
inch (1)
61:19
inches (4)
72:14,14;146:1,2
incidental (1)
48:6
include (4)
105:19;106:5;109:14;
153:3
included (8)
13:8;15:23;59:12;153:12;
169:23;181:23;188:18;192:8
includes (1)
12:23
including (6)
47:7;61:20;86:20;91:1;
189:11;196:17
income (1)
73:11
inconsistency (1)
40:9
incorporate (1)
50:1
incorrect (3)
16:7;112:22;179:16
increase (17)
47:13,17;49:9;88:18;
89:10;92:20;114:6;122:11,
12,17,19;128:24;145:14;
146:3,4,7;159:15
increased (8)
48:21;113:5;114:15,21;
115:3;129:2;158:19,22
increases (3)
145:20,22;158:21
increasing (5)
96:8,20,21;136:13;145:13
incredulous (2)
205:15,25
independent (1)
68:8
indicate (4)
108:19;132:1;139:21;
190:14
indicated (4)
54:19;108:8;113:2;129:6
indicates (1)
107:16
individual (7)
53:17;77:8;81:18;118:17;
137:9;139:16;191:21
individuals (2)
167:13,15
industry (2)
129:19;130:10
infiltration (1)
48:9
influence (2)
44:13;68:20
inform (2)
168:19;182:17
information (27)
65:10;82:24;84:16;
119:22;120:7;143:19;
149:17;164:20,21;166:21;
167:13,14;168:13,21,25;
169:11,14;177:19;178:17;
180:18;182:16;183:12,16;
199:10;201:16,17;203:23
infrared (1)
140:4
in-house (1)
100:2
initial (7)
29:10,13,14;46:3;49:16;
118:20;141:18
injured (1)
204:23
injury (6)
23:21;103:25;106:24;
111:16;201:23;203:9
input (2)
59:1;92:15
inquiry (1)
117:22
in-season (25)
50:2,21;51:8,14,17;54:4;
67:5;92:2;93:3,8,18;96:14,
15;97:5;107:9;124:7,13;
132:24;133:15,21;134:4,5,
12,17,21
insert (1)
145:1
insinuate (1)
170:3
inspection (2)
58:21;59:18
installed (1)
92:5
insufficient (1)
20:14
intend (1)
165:15
intended (3)
165:12,12;201:14
intending (1)
169:9
intends (1)
166:8
intent (2)
169:16;170:1
intentional (1)
181:12
intentionally (1)
181:12
interconnected (2)
53:8,11
interdecadal (1)
95:23
interest (3)
20:16;117:13;204:25
interests (3)
11:1;16:10;204:23
interpretation (8)
104:22;126:25;137:7,11;
139:16,23;173:10;175:4
interrupt (1)
65:3
intersect (1)
118:6
intersected (1)
37:25
into (58)
11:18;14:2;18:20;19:2,15;
28:10;37:1;38:8;49:5;50:7;
51:16;53:2;56:11;59:1;
61:10;71:8;72:4;76:1;79:6;
88:3;89:19,23,23;91:6,14;
92:15;97:5;101:19,24;
106:20;107:7,8,21;124:24;
125:20;127:10,10;129:5;
134:11,20,21;139:12;145:1;
149:10;160:15;165:22;
167:17;173:1;185:19;
186:15;188:10;195:17;
196:9;197:12;199:3,14;
202:19;205:16
investigate (2)
173:13;175:7
investigation (1)
81:3
involved (13)
29:11;59:23;60:22;61:8;
78:9,17,19;79:12;87:22;
137:9;155:9,13;205:9
involving (2)
79:25;181:21
irrelevant (1)
79:7
irrespective (1)
96:22
irrigate (6)
73:18,24;100:3;120:25;
121:16;162:23
irrigated (144)
36:23;37:8,12;38:12,13;
39:13,14;41:21;42:15;45:10;
50:14,21,24;52:5,18;53:24;
54:8;59:25;60:1,9,10,11,23;
62:1,16,16,19,21,23;63:15,
21;64:18,18;65:8,9;66:5;
67:10;69:18;71:15;74:10,15,
24;75:9,25;76:5,6;78:16;
79:14;80:13;81:10;84:1,4,8,
15,15;85:2,8,12;92:21;93:6,
13,16;99:8,11;100:14;
105:14;106:14,15,18,20,23;
107:14;108:3,7,11;109:15,
17,20,25;110:12;111:14;
121:10,22;124:4,12;132:23;
133:9,11,12,18;137:8,19;
140:1;148:19;149:8,9,22,22;
150:7,8,9,13,16,21,25;151:6,
7,12;152:8;153:8,11,12;
155:17,19,22;161:19,25;
162:7,16;163:9,11,17;
164:15;186:24;187:2;
188:19,24;189:5,8;190:8,10,
18,24;191:5,6,7,10,14;192:8,
9,12,19,21;193:22
irrigates (1)
74:20
Irrigation (63)
17:19,22;18:1,5,17;19:2,
15,18,21;22:2;25:1;43:4;
45:9;47:6,9,15,19,21;48:5,6,
9,19,20;49:11;51:5;69:3,6,
10,11,15,15;71:19;72:7;
75:19;88:19;89:1,1,12,12;
90:3,9,21;91:2;93:13;
105:23;108:1;112:15;
115:25;116:1;121:15;133:8,
18;137:18;143:12;154:25;
160:6,20;161:25;178:2;
188:16;190:19,20,25
irrigator (1)
53:13
irrigators (4)
46:12,17,19;128:3
issue (4)
167:24;181:21;198:22;
205:21
issued (6)
22:5;104:8;114:13;182:3,
9;202:5
issues (5)
15:4;31:25;182:8;206:2,19
issuing (1)
181:25
Item (7)
73:4;184:3;187:21,22,22,
23;197:19
IWRRI (1)
186:25

J

Jackson (3)
165:11,13,16
January (1)
144:24
Jay (5)
46:6;69:21;86:15;135:2;
145:18
Jennifer (1)
108:20
Jennings (1)
108:20
job (1)
146:20
Johns (21)
7:9;170:9,10,17,20;
183:21,22,24;184:3,9,13,17,
25;185:21;186:8;187:9,12,
14;189:15;193:12,16
join (4)
17:20,24;29:14,22
joint (3)
199:19,21,23

judgment (2)
83:6;91:9
judicial (1)
27:11
junior (10)
16:8;22:16;23:23;25:22;
31:6,14,16,18;75:15;203:21

K

Kara (3)
173:18;175:21;181:8
keep (9)
37:20;42:10,25;47:11;
73:24;74:1;110:25;154:13;
185:7
keeping (1)
196:18
K-e-n-d-a-l-l (1)
43:19
Kent (1)
147:21
kept (1)
70:21
kind (13)
19:5;33:1;37:17,18;94:17;
96:1;101:4;113:3;134:19;
143:23;151:10,13;153:23
kinds (1)
181:16
King (8)
12:8,9,12;14:17;24:12,18,
24;26:11
K-i-n-g (1)
14:17
Kinyon (1)
87:11
Klahn (1)
10:24
knew (2)
51:12;133:25
knowing (3)
25:17;119:6;161:18
knowledge (5)
63:12;69:25;78:6;117:18,
20
known (2)
53:13;74:21

L

label (1)
198:2
labeled (3)
95:8;98:19;141:24
lack (1)
69:23
land (25)
43:3;52:22;53:22;60:14;
62:14,15;71:8,14;73:4,5;
74:2,6,15,23;75:9,24;81:10;
92:21;105:15,24;119:9;
140:4;151:5;153:7;161:19
lands (23)
37:12;52:19;60:9;62:16,
19,23;64:18;65:8,9;89:8;
99:12;121:9;148:19;149:6;
150:7,8,9,16,25;153:12;
161:24;163:18;187:2
landscaping (2)
71:21;100:15
large (19)
45:5,18;46:5,20;47:17;
50:8,11;67:9;68:21;87:15,
20;117:5;129:22;135:15;
138:20,25;146:9,13;152:20
largely (2)
96:15;156:25
larger (6)
66:13,14;67:1;86:9;
204:15;206:22
last (27)
10:14,23;19:4;21:12,19,
23;23:8,13;54:10;71:9;76:9;
96:8;116:19;122:9;144:8,20;
157:25;159:2,12;160:4;
164:10;171:14;179:14,21;
185:5;197:19;199:18
late (4)
15:15;17:11;49:20;94:5
later (2)
48:11,14
lateral (1)
41:17
laterals (4)
41:12;64:21;117:6;135:4
latest (2)
154:7;185:5
latter (1)
107:19
law (2)
17:18;201:18
layer (1)
143:16
laying (2)
151:10;193:8
lead (3)
46:18;49:8;195:14
leads (2)
47:12;48:7
learn (1)
17:9
learned (4)
17:3;29:8;182:16,24
lease (1)
174:3
leases (2)
174:4,13
least (14)
11:18;43:2;58:7;111:10;
114:5;115:2;118:20;152:11;
154:6;166:8;201:18;202:3;
204:4;206:23
leave (2)
42:3;89:22
leaves (1)
73:22
left (5)
40:16;69:19;70:6;98:6;
137:18
legal (6)
29:10;76:19,22;77:18;
84:22;119:2
legally (1)
202:25
legend (1)
151:3
length (2)
135:6,9
lengthy (1)
50:5
less (10)
50:25;52:1,3;63:20;86:12;
89:2,6,11;95:5;194:4
letter (9)
17:18,21;18:1,16;22:20;
24:8;29:18,21;30:5
letters (4)
37:1;84:22;85:5,9
levels (2)
48:21;129:15
licensed (1)
76:16
light (2)
12:5;60:20
liked (1)
103:20
likely (9)
33:4,10;40:25;41:3,11;
44:16,17;113:4;192:19
likes (1)
200:21
limit (3)
206:4,7,14
limited (3)
69:19;112:16;136:8
line (13)
39:1;43:16;78:25;87:17;
128:14,16;135:7;145:10;
151:10;156:24,24;175:3;
196:4
lined (1)
87:25
lines (7)
22:24;39:2;40:7,20;41:8;
59:24;94:11
lining (6)
87:12,16,21;88:7;92:6;
135:6
list (5)
11:5,15,17;118:21;165:11
listen (1)
171:24
listened (2)
201:6;202:20
listening (1)
115:24
little (23)
14:23;15:13;35:15;37:21;
46:22;54:2;58:3;67:4;83:7;
116:6;142:11,12;146:1;
159:19;160:18;167:3;
199:11;201:3;205:7,15,25;
206:20,21
locate (1)
200:1
located (3)
28:17,20;143:23
locations (3)
82:22,22;192:22
lodge (1)
78:23
long (11)
19:20;57:21;78:18;79:16;
93:17;103:17;122:10;
132:22;153:4;200:6;204:5
longer (2)
108:23;130:14
look (41)
15:10;17:15;18:22;21:2;
23:10;28:22;29:17;30:1,2,
12,20;31:8;50:18;51:16;
54:12;55:1,1;61:19;64:9;
95:16;100:7,17;104:13;
107:10,11;108:7;109:17;
112:6;113:6;117:11;139:3;
140:5;142:14;143:4;151:9,
14;157:24;186:21;187:15;
204:11,12
looked (12)
45:2;50:20;59:9;120:17;
135:14;138:19;149:1;
173:18,22;196:15;197:22;
198:21
looking (27)
23:8;40:18;60:2,13;64:6;
80:3;93:25;95:7;96:6;99:10;
122:14;126:14;133:13;
136:2,21;138:22;140:3;
142:25;143:1;147:18;148:4;
164:20;165:10;175:12;
177:15;187:19;204:14
looks (9)
36:25;57:12;62:19;95:1;
100:25;101:6,7;114:21;
150:17
loss (6)
45:23;88:11;90:3,9,11;
115:16
losses (5)
50:9;116:16,16;128:25;
129:16
lost (5)
31:13,17;88:5;89:25;
144:12
lot (9)
47:5;48:8,9;64:10;72:12;
143:9;154:13;158:17;163:3
lots (4)
74:9;88:10;106:6;153:9
low (12)
48:21;49:12,18,19;52:24;

80:7;85:21;129:23;146:2; 174:17,18;192:23
lower (9)
49:3,21;51:12,13;54:3; 111:1,2;126:22;146:5
lumped (1)
45:13
lunch (2)
123:12,13
lunchtime (1)
11:16

M

Magic (15)
29:15,22;30:1,6,8,15,18, 25;31:3;33:7,9,13;173:5; 175:6,13
magnitude (2)
131:23;132:4
main (2)
135:4;169:18
maintain (4)
47:23;70:9;85:11;93:17
maintained (3)
46:10;119:18;128:2
maintains (1)
146:16
maintenance (1)
146:20
major (2)
49:13;61:20
makes (2)
92:2;193:2
making (7)
74:8;75:17;91:8;107:14; 175:5;186:20;193:5
mall (6)
74:25;75:3,11,13,16,20
managed (1)
161:9
Management (4)
119:21;128:9;161:11; 203:18
manager (3)
31:23;145:18;157:10
M-a-n-n (1)
43:19
manner (1)
133:6
Mann-Kendall (1)
43:18
many (10)
11:24;22:9;74:20;80:18; 90:25;155:16,21;169:24; 179:20;201:7
map (7)
39:2,18;40:18;59:24;62:1; 150:8,12
mapping (2)
61:22;108:21
March (2)
16:19,20
MARKED (20)
7:14;8:3;9:3;13:25;28:9; 36:4;56:9,10;60:8;100:21; 101:17,20,23;125:20; 185:18;196:8;197:12; 198:11,15;199:3
Mat (2)
166:13;167:6
matched (1)
121:25
material (7)
77:5;103:25;106:24; 111:16;168:5;201:22;203:9
math (1)
114:10
mathematical (1)
104:24
mathematically (1)
122:18
mathematics (2)
133:13;134:14
Matt (9)
54:17;166:8;170:22; 171:10,15;172:2;176:8; 180:6;182:24
M-a-t-t (1)
171:15
matter (11)
107:15;109:25;110:5,12; 117:15;133:13;168:9,24; 171:13;185:2;204:18
matters (6)
10:5;11:22;109:25;133:9; 163:1;201:9
MATTHEW (2)
7:4;171:3
Max (1)
126:5
maximum (6)
177:23;178:5,10,25;179:6, 10
may (57)
10:22;18:12;22:18,23; 23:19;24:8,10;32:15;33:17; 35:1;40:24;42:16;45:24; 49:15;51:2,18;53:11;57:14; 58:1;59:1;66:19,23;68:3; 69:19;71:13;72:13;73:17,17, 23;74:1,1;79:19,20;81:17; 89:7,22,25;92:9;116:6; 119:15;120:17,18;122:5; 123:19;134:8;140:6;164:15; 166:3;182:8,17,18,25;189:4; 191:1;197:8,8;200:2
maybe (16)
16:4;37:21;47:1;71:20; 72:9;75:8;95:2;100:19; 116:7;120:7;158:2;175:13; 195:7;205:20;206:4,19
McCAIN (36)
8:10;12:8,13,19;13:1,3; 14:14;15:4,12,15,17,20;16:1, 18;17:4,12,24,25;18:8,17,20; 19:1,14,25;20:2,6,8,10,16,19, 21;22:20;24:4,9,10;25:9
McCain's (6)
15:7;16:9,14;18:5;24:4; 25:6
McHUGH (31)
11:24;12:1,6,7,18;13:16; 14:3,5,12,13;15:6;17:18; 23:4,6;24:11;25:5;26:9,10, 13;27:1,4;28:1,12;32:12; 33:19;166:19;195:2,15,20; 196:4,7
McHugh's (2)
28:7;194:25
mean (22)
19:25;40:6;46:19;68:10; 69:9;72:16;75:5,7;90:11,14; 96:17;104:19;105:8;110:23; 116:15;124:14;129:2;130:7; 140:2;181:14;191:19;203:24
means (2)
39:15;66:13
meant (4)
39:14;40:1;173:9;175:2
measure (2)
33:11;93:14
measured (2)
119:25;204:3
mechanism (1)
191:22
mechanisms (3)
189:6;191:11;192:20
meet (14)
17:7;18:6,8;20:15;42:14; 46:24;48:13;49:23;91:12; 105:21,21;158:22;159:16; 161:20
meeting (2)
45:16;169:6
meetings (2)
58:3;144:8
member (2)
29:23;103:25
members (8)
37:10;66:2;84:9,23,25; 91:15;117:9,16
members' (1)
52:20
mentioned (6)
87:11,15,20;88:20;120:24; 121:3
merge (1)
118:6
merged (2)
15:1;151:13
met (5)
17:5;41:20;54:20;64:22; 124:2
metal (1)
119:3
meteorological (2)
46:16,22
method (1)
171:21
Methodology (119)
21:10;36:17,20;37:9,14; 38:5,25;39:3;40:5,11;45:11; 50:1,22;51:1,20;52:3;54:4,9, 17;55:6;58:19;66:6,7,9,12, 17;67:9;76:6,12;80:9,12,15; 83:8,11,15,19;84:7,16;85:3; 91:13,19;92:1,6,16,22;93:2, 7,10,20;96:17,21;97:1; 102:17;103:23;104:7,14; 105:18;106:9,21;107:2,11, 21;108:8;109:12;110:7,18; 111:7,19;112:13;114:12; 116:11;126:8;130:19; 132:25;133:14,24;134:14; 136:2;142:15;144:2,5; 156:21;157:21;158:18; 159:9;163:22;167:10,13; 168:14,20;169:1;171:17,22; 176:1,4,5,18,19,22;177:7,12; 178:9,20;179:5,20;180:19; 182:1,9,18;183:1;186:16; 188:10;193:23;194:1,7; 201:13;202:10,19;204:15
methods (3)
45:20;48:8;171:21
METRIC (1)
77:24
metropolitan (1)
153:5
mic (1)
195:2
microphone (1)
142:11
middle (4)
101:3;115:10;141:18; 151:11
might (7)
25:16;34:3;41:9;129:5; 134:6;188:20;206:15
Mile (1)
173:5
miles (3)
117:6;135:3,4
Milner (1)
139:12
mind (5)
42:2,10,25;47:11;98:5
minds (1)
154:16
mine (1)
194:13
miner's (1)
72:14
Mini-Cassia (6)
27:24;28:14,18,20;29:1; 31:13
minimize (1)
87:25
minor (1)
132:1
minus (6)

94:8,13,19,21;95:2;127:3
minute (4)
13:2;34:3;35:12;72:13
minutes (1)
147:21
mishear (2)
159:4,4
mislead (1)
181:13
missed (4)
66:21;173:11;175:5,22
mitigate (2)
20:22;23:21
mitigating (1)
25:19
mitigation (52)
15:25;16:6,15;17:6,20,24;
18:2,21,25;19:3,16,19,22;
20:15,17,20,23,25;21:17,18,
20,25;22:4,25;23:16,20,24;
24:2,5;25:6,10,17;26:1;
29:16,25;30:3,4,17,19;31:4;
32:21,23;33:5,8,10,11,14;
66:1,13;122:21;127:14;
205:11
mitigation-only (1)
29:23
mix (8)
143:13,21;144:10,17;
145:3,22;156:17,19
mixes (2)
144:18;164:12
model (5)
63:5,7,10;187:1;203:12
moment (6)
34:6;56:15;96:13;100:7;
105:22;189:18
moments (1)
86:16
months (1)
22:9
more (41)
26:8;42:3;44:7;47:14,19,
20;48:22;60:20;63:20,25;
64:2,9,13,14,17;65:7,15;
84:18;93:1;103:20;104:5;
117:22;122:8,12,23;123:8;
128:9;137:22;138:17;
158:23;159:17;160:19;
163:4;182:18;183:7;189:10,
11,15;194:4,25;195:17
morning (11)
10:6;12:6;14:13;24:24,25;
25:3;27:5,6;35:5,7;57:18
most (5)
30:3;120:12;182:14;
188:7;198:22
mostly (1)
149:4
motion (6)
77:3;199:19,21,24;200:2,
11
move (5)
44:9;55:21;76:25;101:16;
167:19
moved (1)
190:21
moving (2)
185:7;198:12
much (22)
42:21;50:8,12,13;64:9;
71:24;78:2,6;81:9;117:17;
122:2;127:20;137:10;
143:10;174:15;180:6,23;
201:11;202:20;203:9,12;
206:20
multiple (3)
53:9,10;136:6
multiplier (1)
147:22
multiplying (1)
131:8
municipalities (2)
38:15;42:7
must (7)
22:6;49:8;107:25;116:17;
128:1;129:2;161:20
mute (2)
134:22,25
myself (2)
36:15;103:13
mysterious (1)
53:12

N

name (6)
14:15;27:7;35:22;126:5;
141:17;171:13
narrow (3)
105:17,21;183:11
naturally (1)
49:12
nature (4)
42:18;61:15;72:10;99:23
near (1)
46:9
nearly (1)
38:2
necessarily (5)
47:16;105:8;130:7;
191:19;203:17
necessary (6)
22:9;23:20;46:7;127:25;
128:8;158:21
necessitated (1)
49:1
need (69)
10:5;11:22;16:2;25:17;
31:19;32:6;33:10;34:13;
45:9;49:18,21;50:25;58:1;
59:8;73:1,10,17,24;74:14;
75:22;86:1;87:3;91:11,20,
21;93:12;96:14,22;97:4;
100:1;105:18;106:12;107:6;
116:23;124:13;125:10;
131:9,16,20;143:8,10,15;
144:12,19;145:3;158:19;
160:1;163:3,5;164:9,14;
168:11;169:7,7,24;177:23;
178:6,11;179:1;188:25;
189:12,18;190:3;204:10,12,
14;205:22;206:16,22
needed (12)
17:25;32:17;45:15;49:14;
52:7;58:1;67:20;73:11;
82:14,22;175:17;206:9
needing (1)
83:25
needs (6)
74:13;134:22;200:20;
201:12;202:16,18
nefarious (2)
169:16;170:4
negatives (1)
196:3
negotiated (1)
194:25
negotiations (3)
168:18,21,23
neither (1)
82:12
net (4)
84:1,3,5;108:2
new (5)
26:2;122:24;160:12;
162:20;178:10
newly (1)
101:8
next (19)
11:23;18:18;26:12;33:24;
34:3;73:3;101:17;123:15;
124:20;140:23;157:4;
159:18;165:9;174:20;189:5,
8;191:6,7,19
nice (1)
53:7
night (3)
10:14,23;199:18
nine (1)
201:1
nobody (1)
200:21
none (2)
152:10,22
nonused (1)
16:4
Nope (1)
140:16
normal (1)
55:3
north (10)
40:18;86:3,5;139:5,8;
151:22;174:24,25;180:14;
181:21
north/south (1)
151:10
note (7)
77:10;172:12,24;173:3,19;
174:13;181:5
notes (2)
13:6;195:7
notice (6)
18:25;22:15;23:17;30:17;
197:8;199:19
notified (1)
18:19
notify (2)
162:6,15
November (2)
54:18;127:8
nuance (2)
206:20,21
nuances (1)
204:11
number (35)
38:7;40:20;47:1;53:23;
66:5;70:11;76:9;78:15,22;
95:7;98:17;103:25;106:19,
23;107:4;111:14;113:12;
115:22;116:21;117:2;
124:15;131:5;133:9;136:20;
145:1;152:6;158:16;172:19;
188:5;192:18,20,24;198:4;
206:8,15
numbered (6)
58:13;68:19;98:15;187:18,
22,23
numbering (1)
98:14
numbers (13)
111:13;117:1,12;119:3,3;
154:17;172:18;176:2,5;
178:4,24;179:1;184:8
numerical (1)
112:6

O

oats (1)
146:2
object (2)
182:21;200:6
objected (1)
70:22
objection (12)
10:17;13:23;56:8,10;
70:14,16;78:23;79:9;101:21,
23;183:3,10
objections (1)
185:16
objectives (1)
88:6
obligation (3)
74:4,18;161:20
obligations (4)
48:13;49:23;66:13;122:22
observation (2)
44:11;86:13
observed (7)
51:10,23,24;93:15;107:3;
133:16,19

observing (1)
134:14
obtain (1)
199:23
obvious (1)
96:7
obviously (5)
50:23;85:25;104:21;
111:3;126:24
occasions (1)
67:19
occupation (2)
36:2;141:22
occur (7)
46:2;52:19;104:23;
106:16;128:21;157:3;188:6
occurred (4)
87:19;160:5;177:9;192:14
occurs (6)
42:20;48:3,10;75:19;
86:11;118:11
o'clock (1)
10:3
October (2)
49:20;50:4
off (10)
34:3,5;46:19;56:17,19,20;
125:14,16;134:25;161:8
offensive (1)
170:4
offer (9)
11:20;165:22;166:18,18,
20;167:16;184:6;195:15;
199:12
offered (6)
11:18,19;13:1;52:12;
54:13;142:24
offering (4)
166:19;167:5;168:8,24
office (5)
17:19;108:11;109:1;
118:4;153:22
OFFICER (143)
10:3,9,17;11:14;12:3,9,17;
13:15,19,23;14:4,6;24:12,18;
26:8,11,15,24;28:7;33:20,24;
34:5,8,24;35:12,16,20;56:5,
13,14,16,19,21,24;57:2,8,12;
70:18,20;71:1,5;77:3,16;
79:8;98:2,8,12;101:21;
102:4;106:16;113:12,14;
123:6,8,11,14,18;124:20;
125:1,6,13,17,24;132:8;
138:10;140:9,11,14,17,22;
141:1,9;146:25;147:4,9;
156:2;165:3,8,15,18,23;
166:2,7;167:1,18;168:7,15;
169:4,13;170:7,13,18,22;
171:1;172:14,21;179:24;
182:23;183:4,6,15,19,23;
184:1,8,10;185:1,9,12,15;
189:16,21;193:12,15;194:11,
14,17;195:4,10,13,19,23;
196:3,6,8,11,25;197:10;
198:4,12,15,19;199:1,6,13,
17;200:4,12;201:3;206:8,11,
13;207:3
official (1)
199:19
often (2)
131:5;139:19
old (4)
149:20;164:6,8;192:14
oldest (1)
149:25
omits (1)
39:13
omitted (2)
39:17,19
on/off (2)
47:20,23
Once (6)
18:16;22:5;87:2;182:10;
194:25;195:3
on-demand (1)
139:8
one (54)
10:7,10;24:17;25:4;27:23;
42:3,5,11;44:15,16;47:19;
52:5;53:5;54:10;64:20,23;
67:23;76:10;77:18;87:15;
93:17;94:12,12;95:19;101:2;
103:4;105:2;107:13,14,19;
117:22;122:8,9;126:13;
127:3;129:4;130:3;159:1,3;
166:15,15;171:14;172:9,18;
174:20;183:9;184:3;185:5;
187:18;191:8,18;197:19;
204:18;206:18
one-for-one (2)
54:7;111:18
one-fourth (1)
73:16
ones (1)
15:24
one's (6)
191:5,6,6,6,7,7
on-farm (10)
45:19;46:16,18;47:13;
50:8;89:3,9;115:15;116:4;
128:24
ongoing (2)
189:7;191:9
online (1)
34:14
only (19)
25:16;30:1;43:25;44:5;
46:25;50:15;53:12;54:20;
64:7;93:4;102:9;116:25;
124:17;129:20;136:18;
147:20;173:6;189:9;206:7
on-screen (1)
34:12
open (6)
50:11;104:22;109:18;
135:15;146:9,13
operate (5)
20:9,24;45:15;117:17;
191:23
operates (3)
28:14;146:16;204:15
operation (2)
31:13;130:14
operational (11)
45:14;46:6;48:1;91:2;
115:17;116:17;127:25;
128:8,12;129:2,5
operations (2)
32:22;130:3
operator (1)
53:18
opinion (16)
37:5;41:13;50:19;55:15;
64:16;65:7,14;74:10;75:1,
17;105:19;112:9;127:23;
135:19;164:15;200:18
opinions (4)
54:12;76:22;142:23;
146:15
opportunities (3)
205:11,12,13
opportunity (3)
205:17,19,23
opposed (2)
47:20;172:19
option (1)
30:1
orange (1)
94:17
oranges (1)
159:20
order (106)
18:8,13;22:5;24:1,6;36:17,
17,21,21;43:17;44:18;45:11;
46:8,10;49:22;50:1,22;
51:20;54:17;58:19;66:7,7,9;
67:9;76:6;80:10,12,15;
81:25;83:8,12,15,19;84:8;
85:3;91:14,19;92:1,7,22;
93:2,7;96:17,21;102:17;
103:23;104:8,12,14;106:9;
107:2,11;108:8;109:13;
110:18;111:7;112:13;
114:13;116:11;120:17,22;
121:3,14,20;127:25;128:2;
130:19;136:2;142:15,15;
158:19;163:22;167:10,13;
168:14,20;169:1;170:15;
171:18,22,23;176:1,5,18,19,
22;177:7,12;178:9;179:5,20,
25;180:19;182:1,2,9;183:2;
186:16;188:10;192:1;
193:23;194:1,8;201:13;
202:11,19
Orders (2)
21:10;36:22
ordinance (1)
43:6
ordinarily (1)
48:24
ordinary (1)
46:23
organization (3)
143:22,25;149:5
organizations (1)
146:18
organize (2)
195:6,7
original (2)
101:6;158:9
originally (2)
13:7;16:10
others (8)
11:2;68:5;89:22;100:8;
109:1;143:1;155:12;199:17
otherwise (2)
106:17;134:2
ought (1)
52:2
out (32)
17:12;30:8;37:10;38:11;
39:21;45:12;55:18;58:6;
60:24;61:13;62:20;73:19;
78:5;81:9;86:16;88:1;94:24;
99:15;136:1;137:18;153:2;
154:4;166:17;176:4;177:7;
179:14,20;181:13,17;205:1,
4,5
outdated (1)
130:14
outliers (2)
94:17,24
outline (3)
165:25;166:17,22
outlined (3)
38:9;110:17;133:14
outside (5)
28:21;68:5;167:14,15;
182:22
outstanding (1)
74:5
over (25)
15:13;27:17;41:2,7;42:21;
52:15;100:1;111:6;112:4;
114:6;135:3;143:3;144:11,
15;146:1;150:17;159:18;
162:16;163:2,18;164:16;
187:15;188:16;203:25;204:5
overall (11)
32:6;40:1;47:17;49:18;
52:25;54:23;80:8;85:22;
115:17;120:18;135:11
overcome (1)
49:17
overestimated (1)
50:3
overlaid (3)
39:5;137:4;163:18
overlap (2)
118:7,11
overly (1)
127:14

overmitigating (1)
127:16
Overruled (1)
71:5
overstating (1)
111:14
overview (1)
50:6
own (13)
18:2,5;20:15,17,19,22,24,24;21:20;29:25;30:2;32:21;193:2
owned (2)
69:1,10
owner (1)
36:3
ownership (1)
119:9
owns (1)
119:6

P

page (70)
21:8,12,12;42:1;43:7;44:25;50:19;52:12;58:13,13;59:14,15,17;62:7;68:17,18;73:3;76:8,8;77:1;79:25;80:3;83:21;85:16;93:23;104:13;105:11;106:9;107:10;112:14;115:8,9;121:5;142:18;145:6;147:25;148:2,3,9;150:2;156:13,15;157:8,25;159:11,13,18;160:3;161:14;172:4,5,5,6,17,18,19;176:8,10;177:4,14,17,18;178:13,16,23;187:15,22;206:4,7,13
pages (6)
58:12;98:23;113:7;142:20;178:21;187:18
paid (2)
65:18;185:6
paragraph (43)
19:4;21:19,23;23:7,9,10,16;58:18;68:25;71:7;74:3;76:10;77:1;80:4;83:22,24;85:19;106:11,11;107:11,22,24;115:11;116:25;121:6;160:3,4;161:15,17;172:11;176:11;177:2,15,18,20,21;178:12,18,19;179:6,7,10,19
paragraphs (2)
68:19;109:24
parallel (3)
94:12;151:23;152:1
parameter (1)
45:13
parcel (6)
71:13;72:18;119:8;189:4,7,8
parcels (2)
82:2;186:22
Pardon (2)
14:4;185:12
parking (3)
74:9;106:6;153:8
part (47)
15:25;19:20;30:8,25;37:6,7;38:17;41:25;42:3;43:7,10;44:8,25;45:3;50:18,20;52:9,12,16;54:10,12,14;59:9;61:22;70:6,9,13;73:12,22;79:14;86:18,22;87:9;111:25;115:5;117:23;142:20;148:6;153:14;155:9;163:8;169:11,20,23;188:7;193:23;197:7
Partially (1)
84:13
participate (2)
10:15;58:24
participated (2)
148:21;171:22
participating (1)
140:19
participation (2)
10:19;201:7
particular (11)
16:9;45:5;53:6;74:18;89:6,7,8;137:15;144:13;186:23;193:9
particularly (2)
46:9;163:10
parties (25)
10:13,18;11:14;12:25;13:11,17;28:5,8;56:7;57:4;68:15;124:23;125:18;147:4;165:12;182:2;195:24;196:11,20;197:1,8,25;198:19;199:8;200:7
parties' (1)
13:6
parts (5)
37:1,4;59:11;103:9;183:1
party (1)
68:9
past (6)
25:10;134:11;149:22,23;158:2;159:3
patience (1)
207:3
PATTERSON (10)
101:18;196:14,15;197:5,16,19;198:5,14,17;199:5
Paul (1)
28:21
PCC (1)
119:25
PE (2)
34:19;141:4
pending (2)
16:25;24:1
people (8)
104:23;161:8;201:20;204:20,24;205:11,12,16
per (5)
72:13;114:7;135:18;146:1,2
per-acre (1)
72:17
percent (29)
45:20,21,24;47:10;51:12,13;52:1,2;73:22;88:21,21;92:21,21;105:9;111:2,4;115:15,16,17,18,21,25;116:5,9,12;117:3,7;146:3,7
percentage (4)
47:9;52:22;80:7;85:20
percentages (1)
86:9
percentile (6)
55:7,9,10,13;126:9,22
percolation (1)
90:20
perennial (1)
48:24
perfect (4)
105:9;120:7,11,12
perform (1)
118:10
performance (1)
174:23
performed (2)
68:8;186:18
perhaps (2)
34:11;104:5
period (21)
42:21;44:12,15,17,20,22;46:17,25;72:8;95:12,16;112:22;114:17,19,22;134:11;136:2;144:9,15;145:8;188:16
periodic (1)
191:16
periods (2)
72:19;96:4
permissible (3)
162:4,11;188:15
permission (1)
10:15
permit (1)
160:12
person (1)
124:2
personal (2)
63:12;69:25
personally (2)
78:2;108:25
personnel (2)
67:14;155:7
perspective (2)
170:3;202:10
pertaining (1)
186:19
Pete (2)
11:4,7
petition (1)
17:23
petitioning (1)
17:19
PG (2)
7:4;171:3
PhD (1)
34:19
photo (9)
38:12;39:4,6;40:7;58:21;59:18,23;79:18;109:10
photograph (1)
150:20
photography (8)
149:2,3,11,14,15,19,25;154:7
photos (2)
139:20;149:20
phrase (1)
104:14
pick (2)
112:22;193:20
picked (1)
92:11
picture (1)
44:19
pin (1)
105:3
pipeline (2)
160:14,22
pivot (8)
38:12;41:6;45:21;47:13;100:8,24;101:14;190:14
place (4)
79:4;162:11;188:15;205:24
placed (2)
161:6;162:12
place-of-use (1)
154:12
places (6)
81:6;122:1;132:3;162:4,6;174:11
Plain (3)
15:8;27:23;47:6
plan (49)
15:25;16:6,15;18:3,5;19:19,22;20:15,17,20,24,25;21:17,18,20,25;22:4,5,6,7,25;23:16,21,24;24:2,5;25:6,10,15,18,23;26:1;29:16,25;30:3,4,19;31:4;32:21,24;33:5,8,10,11,14,18;75:1;93:5;146:21
plans (2)
17:6;205:11
plant (2)
31:23;162:21
planted (1)
162:17
play (2)
134:20,20
played (1)
171:17
Please (25)
12:17;14:15;23:25;26:16,

24;27:8;32:9;34:15;35:11,21;37:5;39:10,24;77:21;141:2,9,16;147:24;159:2;171:1,13;172:2,10;173:1;174:20
plus (6)
94:8,13,19,21;95:1;201:1
pm (1)
207:6
POCATELLO (3)
7:21;126:6;195:21
Pocatello's (1)
158:14
podium (2)
195:14,15
point (19)
53:19;57:3;76:9;93:14;116:25;117:4;119:14;120:16;122:2,4;127:20;128:12,15;129:20;130:3,4;181:17;200:1;205:5
pointed (1)
136:1
pointing (1)
181:13
points (7)
43:15;81:6;118:14,16;122:1;169:18,18
policies (1)
73:14
policy (1)
127:22
polygon (1)
109:7
polygons (1)
109:4
Pond (1)
87:11
ponds (7)
38:10;41:14;68:25;69:8,10,14;109:19
poorly (1)
181:14
portion (5)
60:3;85:15;98:20;150:5;197:21
portions (1)
171:23
position (9)
27:13;54:23;108:6;110:2;112:3,6,21;203:7,8
possibility (3)
129:4;205:1,24
Possible (7)
22:15;63:16;67:10;126:21;155:17,22;182:11
Possibly (4)
128:11;130:16;158:15;182:10
Post (1)
173:5
post-hearing (2)
200:15;206:5
potatoes (1)
162:22
potential (5)
22:4;29:8;31:5,24,25
potentially (5)
33:2;47:2;48:13;53:23;75:15
Powell (2)
36:15;103:13
power (1)
140:5
PPUs (1)
162:6
practices (4)
108:1;112:15;116:1;121:15
preceding (1)
156:17
precise (3)
62:1;64:9,13
precisely (1)
105:3
predecree (1)
79:6
prefer (1)
170:15
pre-GIS (1)
79:20
preliminary (1)
10:5
preparation (1)
83:12
prepare (13)
57:4;62:1;103:7,11,17,21;137:22;161:20;187:3;204:21;205:7,14,19
prepared (10)
36:14;42:14;47:22;74:5,14;75:12;103:12,14,14;163:19
preparing (3)
79:13;85:8;187:2
pre-partial (1)
79:1
present (3)
41:4;167:24;186:11
presentation (1)
170:15
presented (8)
11:21;54:18;68:14;196:21;197:3,5;201:12,17
presumption (3)
202:3,7;203:1
pretty (6)
32:4;50:12,13;92:20;109:9;146:3
prevent (2)
25:14,16
previous (6)
53:20;77:4;107:1;127:17;175:3;178:22
Previously (7)
14:21;66:6;97:20;171:5;172:3;186:3;196:23
primarily (5)
36:22;37:10;38:10;117:14;143:5
primary (6)
27:16,19;30:16;38:14;42:5;59:2
principle (2)
50:23;133:8
prior (14)
25:15;36:11;42:13;65:22;83:12;142:6;143:18;144:16;149:2;161:25;191:25;192:3,11;204:23
priorities (1)
169:6
prioritize (1)
169:24
prioritizing (1)
35:15
priority (9)
16:8;20:17;22:16;23:23;25:20,25;26:4;31:11;63:15
private (6)
52:17;61:14;69:1,8;118:17;174:4
privately (2)
69:10;118:21
privilege (1)
168:22
probability (3)
55:2;192:21,23
probably (10)
28:1;35:9;57:23;80:16;82:20;95:1;96:10;103:19;111:4;200:21
problem (2)
40:2;177:6
procedure (1)
10:11
proceeding (3)
14:19;27:11;79:2
process (25)
20:10,11;22:9;32:2,25;59:20;60:17;64:12,13;67:24,25;78:14,17;79:1,6;139:24;148:17,24;155:10,13;182:6,7;200:17;202:22;204:20
processes (1)
200:15
processing (2)
27:19,23
produce (1)
96:21
produced (1)
180:18
producer (2)
21:16,17
product (1)
142:21
products (1)
37:11
professional (1)
61:23
program (6)
70:6,13,24;73:15,21;174:11
project (65)
36:23;37:8;41:20;45:4,8,13,16,24,24;46:3;47:2,4,17;48:12;49:9,19;50:11,16;51:3,4,6,12;54:1;58:14;67:3,3;87:16,21;90:23;91:1,6,15;92:6,17;93:11;96:13;97:3;105:13;107:5,6,8;111:1;115:17;116:9;117:8,17;128:19;129:1,8,24;130:2;131:8,13,17,22;132:2;133:17,20;134:1;135:7;145:24;146:9;148:1,12;187:20
projected (8)
177:23,24,24;178:1,5,11,25;179:6
projecting (1)
106:24
projects (5)
87:12,15;88:7,15;116:11
proof (8)
165:22;166:18,20;167:16;168:9,24;202:17;203:15
proper (1)
179:19
properly (1)
109:10
properties (2)
119:7;152:17
property (2)
204:23,25
proportional (1)
134:16
proportionate (1)
124:9
proposed (6)
16:24;17:9;23:16,20,24;29:4
protect (3)
20:13;55:12;126:10
protected (1)
19:23
protecting (1)
55:16
protest (1)
22:7
protested (2)
22:8;23:24
protests (1)
23:19
protocols (2)
104:24,25
provide (8)
14:18;36:21;66:14;121:21;122:23;126:23;127:14;133:3
provided (8)
37:16,18,23;66:1;85:21;

109:21;144:6;182:2
provides (2)
126:9,17
providing (1)
16:13
provisions (1)
50:2
prudent (1)
128:9
public (3)
64:8;82:20,23
publish (1)
23:17
pull (1)
142:11
pulled (4)
39:15,25;102:22;103:1
pumping (2)
20:22;201:24
pumps (2)
53:10,10
purely (2)
131:14;168:5
purpose (2)
30:16;188:14
purposes (11)
17:20,24;18:21;52:18;
69:15;78:16;80:5;100:3;
157:2,6;167:21
push (1)
97:17
put (9)
25:23;33:10;75:11;
116:21;154:13;165:22;
166:17;183:17;205:24

Q

qualified (3)
36:10;76:21;142:5
qualifies (1)
109:17
quantify (1)
53:21
quantities (1)
202:8
quantity (3)
188:24;191:16;192:11
quarter (2)
123:12;195:8
quarter-acre (1)
72:12
quibble (2)
64:23,24
quick (7)
46:24;124:3;142:10;
165:22,25;166:1,12
quickly (2)
187:15;206:16
quite (4)
71:9;86:20;109:11;146:3
quote (1)
108:20
quoted (1)
85:19
quoting (1)
104:12

R

rainy (1)
46:17
raise (3)
26:17;34:16;206:2
raised (2)
144:14;182:8
raising (1)
158:23
ramp (1)
46:24
random (1)
192:17
range (4)
45:24;94:22;111:9;116:5
ranges (1)
45:19
ranking (1)
55:1
rapid (1)
46:18
rarely (1)
53:6
Raster (3)
37:19,23;163:17
r-a-s-t-e-r (1)
37:19
Rasters (1)
37:15
rate (5)
42:21;49:16;72:19,23;
135:19
rates (2)
72:9;129:2
rather (3)
18:1;35:17;204:10
rationale (1)
190:22
reach (1)
94:17
react (1)
33:1
read (18)
21:23;23:2,13;71:4;83:9;
106:11,12,13;157:9;158:1,9;
159:11;160:18;173:1;
174:20;177:1,2;178:7
read] (1)
58:20
readily (1)
119:11
reading (1)
49:25
readjudicate (1)
79:5
reads (1)
172:11
ready (2)
34:10;205:17
real (5)
41:19;64:22;105:20;
142:10;205:2
realize (2)
171:12;174:14
realizing (1)
172:17
really (9)
53:14,16;58:7;81:21;
107:15;117:2;124:7;189:19;
206:22
realm (1)
204:15
reask (1)
180:21
reason (10)
25:23;38:4;67:11;117:11;
120:23;169:16;201:15;
202:14,18;206:7
reasonable (54)
50:2,21;51:7,14,17;54:4;
55:4,18,19;67:5;76:7,12;
77:13,16;92:2;93:3,8,18;
96:14,14;97:4;105:5;107:8;
124:7,12;126:10,17,23,24;
129:9,12,17;130:3,4,7,8,9,
14;132:24;133:15,21;134:4,
5,12,17,21;135:18;146:21;
157:14;162:14;176:12;
178:19;188:1;191:9
reasonableness (1)
91:9
reasonably (6)
55:8,14;105:1;117:1;
120:12;129:16
reasons (5)
47:18;183:9;188:6;
192:18;206:18
rebut (1)
170:11
REBUTTAL (10)
7:4,8;166:3,6;170:9;171:4;
183:17,20;185:22;186:2
recalculate (1)
134:1
recall (19)
25:7;78:20;86:22;87:13;
91:3;133:1;135:24;136:5;
137:1,5,24;139:17;148:17;
149:25;165:11;166:8;
180:15;186:14;197:20
recapitulation (1)
54:15
receipt (1)
23:16
receive (6)
28:9;81:23;197:12;199:2,
14;206:15
RECEIVED (24)
7:14;8:3;9:3;10:23;11:17;
14:2,9;22:20;24:9,10;28:11;
56:11,12;101:24;102:1;
125:20,22;185:19,20;196:9,
10;197:18;199:4,16
receives (1)
81:10
recent (9)
87:7;95:5;107:25;113:4;
145:20;149:9,23;164:10;
194:4
recently (1)
58:8
recess (1)
11:16
recharge (20)
43:14,25;44:5;48:6;90:20;
145:12;173:4,7,21,23,24,25;
174:7,11,24;175:6;180:13,
23;181:4,21
recharging (1)
173:4
recite (1)
14:1
recognition (1)
78:5
recognize (5)
10:21;29:18;99:3;101:10;
147:5
recognized (4)
56:6,7;147:1,6
recognizing (1)
79:10
recollection (5)
79:17,19,22;143:20;
160:12
recommendation (1)
163:20
recommendations (2)
144:1;186:20
reconciliation (1)
127:9
reconsider (1)
205:22
record (36)
10:4;14:16;27:8;34:4,5,8,
9;35:22;38:23;39:11,23;
44:21;56:17,19,20,21;57:8;
71:4;77:2,11;123:15;125:12,
16,17;141:17;165:22;168:4;
171:14;173:2;195:10,17;
198:9;199:3,15;200:10;
207:4
recorded (1)
175:15
records (3)
61:4;81:21;153:19
recover (1)
10:12
Recross (5)
138:10;140:17;194:11,12,
13
RECROSS-EXAMINATION (1)
138:14
rectification (1)

40:6
rectified (1)
109:10
red (8)
39:1;98:23;99:2,13;100:7,17,21;101:3
redacted (1)
77:1
redelivery (1)
48:8
Redirect (6)
26:9;132:11,13,20;165:6;193:12
redivert (1)
49:4
rediverted (2)
48:12,16
redline (1)
198:1
red-shaded (2)
137:4;139:15
reduce (9)
46:20;53:23;54:1;111:4;116:23;157:19;158:17,25;159:7
reduced (4)
92:13;111:5;128:9;158:20
reduction (7)
48:6,7;50:21;52:6;54:7;116:24;134:16
reevaluate (1)
97:22
refer (3)
69:17;72:22;121:5
reference (6)
77:4,12,13;156:20,25;198:9
references (2)
77:7;185:2
referred (4)
58:18;152:17;177:22;206:6
referring (11)
72:23;77:6;84:3;95:12;102:21;173:19;174:8,13;175:23;181:5;198:10
refers (1)
151:24
refile (1)
200:2
refine (1)
201:13
reflect (2)
94:13;142:21
reflected (1)
124:12
regard (2)
154:1;186:19
regarding (2)
78:25;186:14
regardless (1)
74:6
registration (2)
40:4,6
regression (1)
135:22
regroup (1)
57:4
regulating (1)
69:14
reissuance (1)
201:15
related (4)
16:14;46:1;180:10,13
relates (3)
14:19;15:3;36:22
relating (6)
12:14;26:21;34:21;141:6;171:5;186:4
relative (9)
16:9;20:11;30:14;36:16;37:9;42:10,25;58:2;66:17
relatively (3)
49:18;94:4;191:12
released (1)
48:11
relevance (1)
204:8
relevant (3)
14:19;79:2;167:10
reliability (3)
52:25;80:8;85:22
reliable (6)
82:1;85:25;86:12;120:6,12;122:2
reliably (2)
46:13;128:4
relied (1)
48:7
rely (1)
200:5
remained (1)
94:4
remaining (2)
71:19;74:2
remember (10)
18:11;78:18;87:9;95:25;96:4;153:4,6;161:3;180:25;201:19
reminded (1)
154:13
remote (1)
10:19
remotely (2)
10:15;34:22
remove (1)
41:14
removed (6)
13:8;40:11,12,15;41:12;42:6
removes (3)
197:24;198:10,18
removing (1)
52:5
render (3)
76:22;112:9;130:14
rendering (2)
65:14;74:10
renting (1)
66:1
renumber (1)
98:16
repeat (4)
37:18;67:21;184:23;188:8
replies (1)
200:23
report (60)
36:14,19,25;38:9;43:15;52:12;55:24;56:4;58:9;59:12,15,17;62:7;68:18;69:12;75:12;76:25;79:25;85:16;93:22;94:3,7;95:7;98:22;99:4;102:19,20;103:18;104:10;105:12;107:16;110:2;111:25;113:7;115:6;126:7;127:24;128:18;131:12;137:22;142:9,21;146:24;147:3,25;148:6;150:2;156:12;163:8;172:3,5;174:23;180:10;181:13;197:22,24;198:2,7,10,17
reported (4)
143:20;185:7;204:4,4
REPORTER (23)
11:10;14:23;32:9;37:17,20;41:1;44:2;52:14;55:25;66:20,24;67:16;71:4;82:17;86:4,6;96:1;99:25;123:17;162:9;184:20;195:12;196:18
reports (3)
77:8,11;206:21
represent (7)
42:7;59:25;99:6;101:13;108:1;109:5;126:5
representation (4)
65:8;124:8;191:9;192:23
represented (9)
11:1;13:16;83:25;108:2;184:10;197:11,11;199:2,14
representing (1)
100:23
represents (1)
94:22
reproduction (1)
54:17
request (5)
30:16;60:18;169:12;183:19;184:6
requested (1)
166:13
requesting (2)
19:4;29:21
require (3)
26:1;82:25;122:22
required (4)
46:1;85:1;133:14;138:2
requirement (8)
45:10;48:1;51:5;93:13;133:10,10,18;143:12
requirements (4)
25:18;43:3;45:15;54:16
reread (1)
121:4
research (1)
171:20
residential (5)
42:18;71:8;72:4,11;152:17
residentials (1)
72:18
resist (1)
180:8
resolving (1)
78:10
resource (2)
127:21;157:15
Resources (9)
18:20;19:1,6;21:8;68:1;82:7;141:21;164:16;171:20
respect (1)
201:8
respond (1)
30:10
responding (1)
34:25
responds (1)
34:11
response (8)
17:4,13;29:7,10,13,14;30:7,24
responses (1)
200:22
responsibilities (1)
169:25
responsibility (1)
205:14
restate (2)
45:7;120:21
result (11)
89:11;92:14;106:24;111:15;116:24;122:14;134:16;142:25;179:15;184:12;200:19
resulted (3)
48:23;177:8;179:21
results (5)
40:9;48:5;88:4;95:25;96:5
retain (1)
43:3
returned (1)
46:23
returns (1)
46:25
review (8)
11:16;36:20;100:20;117:8;153:23;175:21;182:2;198:20
reviewed (4)
43:9;196:11;197:1,2
reviewing (1)
78:20
revisit (1)
183:1

right (90)
14:7;15:4;26:17;34:16;35:18,20;37:22;39:18;53:16;55:12;57:5;70:13;71:10;73:1;76:2,16,17;78:10;79:5;81:5;83:3,4;89:16;91:17,18;95:7,18;98:12;105:25;106:7;108:21,22;109:2,9;110:15;114:11;115:18,23;116:9,10;118:12;119:12;120:14;121:23,24;122:6,7,8;123:18;124:10;125:4;126:11,12,19;128:22;129:3,10,25;130:8,15;131:10,13,24;133:15;136:4;137:20;139:21;140:18;157:24;162:12;164:23;166:4,11;167:21;170:25;178:5;179:16;182:3;185:17;188:22;192:7;195:4;196:4;200:14;202:4,7,9;203:2;206:1,25
rightly (2)
40:11,12
rights (45)
13:3,4,8;15:7,17,20;16:1;19:14,22;20:2,6,7,13;22:16;23:23;25:22;26:2,5;27:22;28:13;29:1,2,12;31:6,7,14,18;33:4;55:17;58:2;61:11;69:3,6;78:22;80:20;81:2;118:21;122:1;153:15;154:21;160:9,20;162:6;195:22;203:11
ring (1)
188:7
River (15)
41:23;46:21;48:17;52:7;66:18,21;75:2;78:11;139:12,25;160:14;186:21;187:4;201:25;202:6
roads (13)
61:14,14,17,20;62:20;64:8;74:9;101:7,8;106:5;153:2,9;154:4
roadway (4)
151:19,24,25;152:1
roadways (4)
38:16;40:10,12;61:20
Rob (11)
102:12,24;103:2;105:2;112:5;114:17;116:7;120:12;123:7;138:16,23
role (1)
171:17
rotation (5)
42:23;70:9;72:20;73:22;189:7
rough (2)
63:23;80:22
roughly (9)
15:13;45:20,20;131:3,10,18,23;135:4;146:6
round (1)
131:5
rule (2)
152:15;169:3
ruled (1)
168:1
rules (2)
161:11;203:18
ruling (2)
77:14,20
Run (2)
73:19;95:21
runoff (4)
89:12;90:11,16,18
rural (5)
42:8;60:24;99:18;100:24;101:13

S

safeguards (1)
205:24
safety (6)
126:10,17,23;127:2,6;202:19
same (24)
42:12,14,22;47:24;66:10;67:2;89:7;93:9;101:1;118:14;125:3,5,9;127:17;136:16;139:24;174:14;181:20;183:3;187:1,4;192:20,20,22
Sarah (4)
10:24;11:4,8;196:18
sat (2)
182:14,15
satellite (4)
59:18,19;78:20;149:13
satisfaction (1)
76:22
save (1)
162:22
saved (4)
90:4,10,17;133:6
saying (16)
28:12;31:15,17;72:25;88:12;90:15;107:14;109:23;110:12;114:20;168:10,12;173:10;190:23;191:1,3
scalpel (1)
64:2
scenario (3)
72:21;73:19;75:5
science (5)
104:11,15,19;109:14;191:2
scope (5)
79:2,7;182:22;183:12;197:9
Scott (4)
12:8,12;14:13,17
S-c-o-t-t (1)
14:17
scrutiny (1)
68:15
season (7)
18:9;22:2;48:11;49:20;161:25;190:25;204:5
seasonal (1)
116:21
seasons (1)
178:2
seat (2)
98:10;184:2
seated (4)
12:17;26:25;141:10;171:1
second (11)
48:2;53:19;56:18;58:13;110:2;125:15;126:13;148:3;161:17;175:21;176:25
section (16)
39:16;40:7;43:11;45:1;53:20;54:13;58:14,16;85:17;95:6;103:14,15;105:12;121:14;152:11;163:2
sections (3)
103:8,10,11
seed (1)
162:1
seem (1)
164:19
seems (2)
170:18;204:8
seep (1)
49:3
seepage (5)
45:23;49:16;88:1;91:1;135:12
seeps (1)
48:25
select (1)
95:18
selected (3)
44:13;55:6;122:25
selection (5)
51:22;54:15,16;97:13;110:17
self-interest (1)
63:20
sell (3)
73:7,10,12
semirural (1)
42:8
send (2)
11:8;17:25
senior (14)
20:2;26:4;31:8,10,16;55:12,17;126:10;160:20;202:4,7;203:2,21,25
seniors (1)
202:12
sent (4)
17:21;18:16;30:5;197:24
sentence (17)
76:10;85:23;116:19;157:9,25;159:12,12;161:17;172:10,22;173:1,9;174:20;175:2;176:14;177:1,3
sentences (1)
23:14
series (1)
68:19
serve (3)
15:8;46:13;128:4
served (1)
52:23
service (21)
39:1;52:20,21,23;60:4;61:11;62:9;70:12;74:24;80:6;86:20;118:22;121:1,9,17;150:5;152:12;153:1,16,19;188:17
set (9)
34:4;37:11;52:3;93:21;95:10;127:11;128:15;129:17;138:1
settlement (14)
65:22;167:20,22,25;168:1,5,13,22,22,23,25;169:20;174:21,22
several (2)
49:15;180:10
shaking (1)
194:24
shape (4)
118:11;150:21;163:18;164:23
shaped (1)
101:3
shapefile (45)
37:24;38:3,5,5;39:13,16,18;40:1,5;58:25;59:4,12,21;60:10,14,18;63:24,25;64:7,17;65:7,15,19;67:13,24;107:17;148:18,22;150:14,16;151:6;152:8,11,16;153:18,20;155:5;163:11,13,14,23;164:17;193:25;194:1,4
shapefiles (15)
37:14,24;38:1,9;40:3;79:13;107:21;108:14;111:12;118:2,7,8,24;154:12;192:3
shapes (1)
119:7
share (3)
42:12;82:22;161:20
shareholder (2)
75:7;88:25
shareholders (1)
162:15
shares (20)
72:15;73:5,7,10,12,18,24;74:2,5,18,20;75:7,10;80:8;85:22;89:7;100:5;161:19;190:15,18
Shaw (19)
36:16;59:2;60:19;103:14;140:25;141:1,4,19;146:23;

147:1,5;156:3,9;157:25; 160:3;161:24;163:3;165:8; 186:12
S-h-a-w (1)
141:19
Shaw's (3)
170:11;187:17;193:2
shed (1)
60:20
shift (1)
40:8
shifting (1)
33:25
shop (1)
163:17
short (4)
33:3;72:19;114:17;162:20
shortage (3)
127:7,8,15
shortages (1)
85:25
shorter (4)
42:21;72:8;95:16,21
shortfall (3)
177:9;179:15,21
shortfalls (1)
16:15
short-term (1)
116:22
shoulder (1)
116:22
shoulders (1)
49:11
show (24)
15:16;28:25;44:16,18; 66:12;95:17,22,24;96:11,20; 106:15;111:5,6;118:6,11; 119:8;136:17;157:3,5,14; 158:19,24;167:12;168:24
showed (3)
92:10;140:4;181:3
showing (5)
60:5;62:8;63:20;136:13; 176:17
shown (7)
62:15;95:13;115:1;150:7, 8;151:6,7
shows (16)
38:24;43:15,21;60:9,10; 93:4;94:3;145:13;150:6; 151:12;152:7;159:14;173:6; 174:23;178:3;192:7
shut (1)
161:8
side (14)
39:18;40:16,18;41:8; 42:24;86:3,5;139:5,8; 151:10;174:2,25;180:14; 181:21
sidewalks (1)
106:6
signal (1)
35:14
signature (1)
140:4
significant (7)
43:20;45:22;95:9;112:8; 132:3;145:16;146:4
Sigstedt (9)
171:25;173:9;175:2,22; 179:13;180:11;181:2; 197:23;198:18
Sigstedt's (5)
172:2;173:17;179:9,14; 180:17
Similar (5)
175:3;186:19;191:23; 198:3,6
Similarly (4)
49:16,20;53:19;127:13
simple (2)
50:8;115:11
simplistic (1)
49:7
simply (9)
39:15;46:20;51:22,25; 54:1;91:19;110:16;157:6; 169:23
SIMPSON (6)
24:16,19;56:13,14;185:13; 196:2
simultaneous (1)
200:22
situation (2)
47:23;140:21
situations (1)
120:4
Six (1)
179:22
size (1)
109:6
slated (2)
87:21;165:19
slight (1)
145:14
slightly (1)
112:7
sliver (3)
151:15,22,23
Slow (3)
14:23;32:9;37:21
slowly (1)
184:24
slow-moving (1)
129:22
small (8)
29:1;39:18;42:18;72:11, 18;146:1,4,6
smaller (1)
64:10
Snake (11)
15:8;27:22;41:23;75:2; 78:11;139:12,25;174:24; 186:21;201:25;202:6
snapshots (2)
191:8,16
snippet (2)
39:16,25
software (1)
108:12
soil (1)
70:9
sole (1)
63:15
solely (4)
60:13;67:13;69:14;80:14
solution (1)
164:18
somebody (5)
83:1;90:20;134:22,25; 154:23
somehow (4)
53:9;124:13;133:25; 190:23
someone (2)
33:4;190:24
Sometime (1)
17:11
sometimes (8)
53:12;70:5,8;88:14;89:15; 100:3,4;162:6
somewhat (6)
63:8;77:25;78:19;83:13; 134:9;154:19
somewhere (3)
48:17;75:8;198:24
sooner (1)
182:6
Sophia (4)
171:25;180:11;181:11; 198:18
Sophia's (1)
197:21
Sorry (29)
11:24,24;14:6,25;23:4; 32:11;44:7;50:5;51:24; 55:25;66:20;70:19;73:19,20; 79:21;81:13;84:14;88:9; 90:6;99:25;100:18;108:24; 120:21;161:16;164:3; 172:15;177:5;188:23;190:7
sort (2)
133:6;145:22
source (3)
120:7,24;121:22
southeast (1)
41:7
southern (2)
135:15;138:20
Southwest (11)
17:19,22;18:1,5,16,21; 19:2,15,18,21,24
speak (1)
44:7
speaking (1)
57:24
specialist (1)
108:20
specific (1)
134:7
specifically (1)
138:21
specifics (1)
117:21
spell (5)
14:15;27:7;35:22;141:16; 171:13
spells (1)
45:12
spend (1)
206:20
SPF (5)
14:21,22;15:1,2,5
spill (9)
46:6,10,13;48:1;115:17; 127:25;128:1,3;129:2
spills (4)
91:2;116:17;128:8,13
spoke (1)
92:11
spoken (1)
184:11
spot (1)
142:4
spreadsheet (2)
51:17;134:13
spring (3)
25:6,15;46:2
springs (1)
48:25
sprinkler (18)
47:5,9,12,19;48:5;49:8; 72:12;88:19;89:1,12;90:3,8, 21;91:2;92:20;115:25; 128:20,25
sprinklers (1)
158:23
Spronk (1)
102:20
square (1)
61:19
SRBA (1)
79:1
stab (1)
59:10
stable (1)
93:18
staff (4)
63:3,14,19;169:6
stand (3)
34:15;183:25;186:9
stand-alone (1)
53:7
standard (8)
76:19;77:12,18;104:24,24; 127:3;202:15,17
standards (4)
76:22;129:19;130:10; 204:14
standpoint (3)
74:17;104:18;111:15
start (13)

16:17,20;34:10;41:1;
45:19;52:14;77:7,17,17;
82:17;99:12;100:1;195:3
started (5)
14:7;15:14;28:2;140:2;
182:6
starting (6)
95:18;119:14;122:2,4;
144:16;174:21
starts (2)
172:23;176:15
startup (1)
46:3
state (13)
14:15;27:7;35:21;95:8;
126:7,16;127:24;128:18;
129:7;130:11;141:16;
171:13;205:20
stated (3)
45:8;131:6;200:16
statement (8)
28:8;47:14;51:19;70:15;
79:10;92:4;94:7;96:25
statements (1)
158:16
states (3)
19:20;85:20;112:14
static (1)
124:14
stating (1)
30:24
statistical (2)
43:11,16
statistically (3)
43:20;95:9;112:8
status (1)
74:6
stay (4)
42:22;129:1,1;131:20
stayed (3)
22:25;24:1;66:9
steady (1)
205:20
Step (2)
85:2;86:16
steps (1)
103:24
still (8)
10:12;24:5;41:22;49:21;
102:9;126:23;134:24;160:3
stipulate (3)
10:14;12:25;13:11
stipulated (8)
13:14,22;28:5,8;124:23;
125:18;147:5;199:9
stipulating (1)
184:14
stipulation (12)
13:15,16;56:7;125:6;
184:7;185:9;195:16,25;
196:19;197:11;199:2,14
stockholders (1)
73:7
storage (3)
48:9;66:1,14
streams (1)
48:25
stretch (1)
88:15
stricken (1)
168:3
strict (2)
42:23;72:20
strictly (2)
72:17;155:6
strike (2)
76:25;167:19
striking (1)
77:7
string (3)
168:15,17;169:22
strip (6)
74:25;75:3,11,13,16,20
strong (1)
44:13
structure (1)
47:20
subdivision (11)
42:25;61:14;71:13;72:4,7;
101:7,8,12;152:7;153:3;
154:4
subdivisions (5)
42:8,11;71:8;152:25;153:6
subject (9)
22:6,7;24:6;29:2;43:18;
68:15;73:13;122:5;139:23
subjects (3)
55:24;56:4;147:2
submit (3)
21:25;25:17;85:1
submitted (4)
13:7;22:5;77:5;148:7
submitting (1)
25:15
subsequent (1)
112:16
substantial (1)
92:20
subsurface (1)
48:9
subtract (2)
174:6;177:25
subtracted (2)
174:9,14
subtraction (3)
173:25;175:25;176:1
successive (1)
23:17
sufficient (2)
18:4;73:24
sufficiently (1)
59:6
SUGAR (8)
8:16;26:13,20;27:14,18;
28:4,14;71:25
Sugar's (1)
27:21
suggest (3)
127:19;206:8,16
suggested (1)
206:9
suggesting (1)
181:11
suggestions (1)
163:3
suggests (2)
168:18,20
Sullivan (4)
102:20;143:1,11;198:7
Sullivan's (1)
113:6
summaries (1)
195:21
summarize (2)
37:5;133:7
summarizes (1)
113:17
summary (3)
133:3;134:20;163:6
supplemental (24)
52:16,18,24;53:4;80:1,5,
10,19;81:23,25;82:15;85:15;
86:2,9;117:23;120:17,23;
121:11,21;122:3;153:15;
154:9,24;204:1
supplied (2)
53:22;169:14
supply (20)
44:23;52:25;53:5,9;58:2;
69:20;80:7;85:20,24;86:12;
120:19,25;121:16,22;127:3;
136:9;161:8;178:1,1;202:1
suppose (1)
32:2
sure (26)
33:17;56:16;59:10;60:6;
63:16;64:3;68:2;71:1;82:23;
84:5;96:24;100:3;110:10;
114:9,11;131:15;136:10;
153:6,25;158:11;159:3;
167:3;170:7;171:15;175:18;
179:11
Surface (43)
13:21;16:16;21:9;22:17;
23:21;26:3,4;33:25;34:20;
36:5;41:18;43:3;52:18,19,
25;53:8,24;55:12;56:25;
65:23;66:2;80:8,14;81:10;
82:3;84:9,25;85:22;86:8,11;
91:16;100:5;140:24;141:5;
160:10,15;163:9;184:4,11;
189:17;199:9;200:9;201:25
suspect (1)
204:19
sustain (1)
71:3
sustained (4)
47:1;48:10;182:23;183:4
sustaining (1)
183:9
SWC (5)
7:15;23:21;121:10;
169:18;185:14
swear (1)
34:13
switched (1)
198:23
switching (1)
198:23
sworn (8)
12:13;26:21;34:21;141:6;
170:24;171:5;184:2;186:4
system (41)
45:22;46:2,8,9,12,14;
47:14,15,18,21;48:4;49:12,
14,22,23;53:17;59:24;64:23;
69:11;72:12;89:19,22,25;
90:3,4,9,10,11;105:20;
111:12;119:22,24;127:10;
128:5;129:16,22;139:9,11;
145:2;146:17,21
systems (16)
50:12;53:5,7,9,11;72:11;
128:1;133:8;135:15;138:25;
139:7;146:10,13;161:2,5,7

T

tab (1)
173:20
table (8)
49:3;113:8,15;115:1;
178:3,22;179:1,2
tag (1)
119:3
tail (5)
46:9,13;49:23,24;128:4
tailwater (1)
139:11
talk (8)
11:22;73:4;110:4;200:14;
201:3,16;204:19;206:18
talked (9)
47:5;92:19;135:21;
136:12;143:7;182:11;184:4;
191:11;198:25
Talking (10)
32:18;69:13,13;75:10;
94:14;134:7;151:4;158:2;
159:3;204:9
talks (3)
52:16;54:14;83:24
task (2)
16:17;117:13
tasked (2)
16:10,13
tax (1)
119:7
technical (16)
16:13;36:21;54:19;67:19;
104:18;111:15;127:22;
144:6;175:16,17,23;176:3;

186:18;196:21;197:3,6
technically (2)
188:9;189:10
technology (2)
109:6;130:13
ten (4)
15:13,13;23:18;147:20
tend (1)
49:12
tender (2)
56:2;146:23
tendered (1)
55:23
tens (1)
132:4
term (3)
32:7;129:12,18
terms (9)
31:24;41:16;60:17;74:13;
105:23;108:10;119:6;
201:18;205:3
test (1)
145:15
testified (19)
12:14;26:22;34:22;69:21;
87:6;88:25;89:18;90:25;
91:5;95:15;118:1;141:7;
146:24;147:3;157:18;159:6;
171:6,12;186:5
testifies (1)
170:14
testify (5)
46:7;103:9;158:12;
165:12;167:8
testifying (2)
59:7;74:7
TESTIMONY (46)
7:4,8;11:20;47:8;63:6,11;
64:20;65:6,13;66:17;67:20;
71:23;72:6;75:14;76:25;
78:13;86:14,18,22;87:9;
88:23;91:3,18;92:25;94:2;
107:1;109:22;111:22;113:3;
115:24;133:12;135:2;
138:24;139:17;170:11;
171:24;173:17;175:11;
186:12;189:20;192:6,10;
193:2;197:21;201:6;202:21
TFCC (5)
58:14;148:1,12;157:12;
187:19
thanks (11)
11:3;34:24;78:8;97:25;
98:1;111:23;124:19;127:1,
19;156:1;207:1
theme (1)
205:5
Theoretically (1)
134:5
theory (1)
51:14
therefore (1)
49:19
thin (1)
40:20
thinking (3)
161:5;204:10;206:23
third (2)
68:8;145:10
THOMPSON (62)
10:7,8,10;11:25;24:17,20,
23;25:1;26:7;34:2,11,13;
35:1,4,18,19,21;38:18;41:7;
44:8;54:10;55:21;56:3,15,
22,23;70:14,19,22;71:3;
78:23;83:18;94:1;98:13;
102:24;132:11,12,13,16,21;
134:24;138:6;139:14;
140:24;141:11,12,15;
142:17;146:22;147:2,7,8;
160:25;165:6,7;184:19,21;
199:7,8;206:3,4,6
Thompson's (1)
138:18
though (8)
35:8;42:14;105:21;
128:20;163:8;164:5,24;
192:9
thought (2)
10:11;143:3
thoughts (1)
195:7
thousand (1)
117:5
thousands (1)
132:4
three (13)
13:7;23:13;37:13;103:5,7,
10,19;136:18;144:16;
156:17;179:1;195:16,24
three-page (1)
21:13
three-year (1)
157:3
throughout (1)
20:10
tidy (2)
133:5;134:19
tiles (2)
49:2,3
timely (1)
205:3
times (7)
45:10;51:5;72:16;93:13;
133:18;143:8;158:13
timing (2)
25:5;72:6
Titled (1)
148:12
TJ (18)
57:20;63:18;65:11;73:19;
78:3;79:16;80:16;81:24;
88:9;96:25;98:1,13;100:12;
110:22;147:15,19,22;153:4
today (17)
10:25;11:1;59:7;64:16;
65:6;83:18;84:22;96:8;
102:14;114:18;116:1;130:8;
140:19;148:15;200:25;
201:12,20
today's (1)
14:19
together (5)
25:23;33:10;78:15;97:3;
144:11
told (2)
202:16;204:13
took (5)
61:10,13;94:24;144:16;
163:16
top (5)
85:19;148:9;150:18;
157:8;172:8
topics (2)
166:16;167:25
total (6)
45:25;88:4;189:2;192:11,
24;203:25
totally (1)
179:11
toward (1)
45:16
towards (1)
22:22
track (1)
196:18
tracks (1)
119:24
tract (8)
48:19;49:6;71:24;72:3;
74:23;86:2,3,4
trained (1)
109:1
transfers (3)
108:16;120:4;160:10
transient (1)
205:21
translate (1)
47:16
Travis (9)
10:8;25:1;35:7;42:2;
44:10;70:17;111:8;132:13,
14
treat (2)
76:5;188:13
treated (1)
48:12
trend (21)
43:16,17,20,22;44:11,14,
16,18;95:9,10,11,17,20;96:9;
106:15;112:1,7;136:12,13,
21;143:2
trends (3)
135:22;144:11;145:13
tried (5)
46:21,21;149:6;152:19;
181:12
trouble (1)
41:2
true (18)
51:11;52:1;67:1;88:17;
89:3;92:3;122:10;128:7;
130:17,23;131:2;134:8;
145:2;156:23;176:6;179:13;
181:20;188:7
truth (7)
12:14;26:21;34:21;53:17;
141:6;171:5;186:4
truthing (1)
122:5
try (7)
37:3;133:5,7;169:9;
185:22;205:4;206:19
trying (13)
17:7;29:25;143:2;167:24;
169:6;185:7;188:15,16,17,
23;191:13;204:11;206:24
TSCHOHL (2)
11:12;35:14
Tuesday (2)
10:11;180:6
turn (35)
19:7;21:11;22:10;38:18;
39:7;40:16;41:25;43:7;
44:25;46:19;52:9;55:18;
58:9,12;59:14;62:7;73:3;
79:24;83:17;93:23;105:11;
111:25;115:5,9;142:17;
147:24;150:2;172:4;176:8,
21;177:11,14;178:12;
187:14;205:18
turned (1)
49:13
TWG (1)
144:8
twice (1)
71:23
Twin (99)
37:8;38:6;39:1;43:2,5,12;
44:19;45:5;47:7,9;48:3,4,19;
49:6;52:21,22;57:21;58:22;
60:3;61:3,25;62:4,9;65:8,18;
66:4,8,11,15;67:8,13;68:10;
69:2,7;70:1,12;71:9,24;
72:15;73:6;78:10,22;79:15;
80:6,19;81:20;82:5,25;
85:24;86:2;88:19;92:1,5;
93:1,16;94:3;99:9;105:12;
110:24;112:1;113:19;
114:14;116:1,4;117:15;
118:22;120:25;122:10,16;
130:17;131:2;135:3,23;
139:9;145:8,11,18,25;
146:16;148:18;149:3;150:5;
153:5;155:3,6,16;157:12,18;
158:16;159:16,21;161:1;
163:10,12,19,21;176:17;
179:2;190:12
Two (17)
11:25,25;12:1,1;23:17;
38:9;47:18;64:8;71:10;96:8;
159:23;166:14,19;172:18;

174:3,10;195:6
twofold (1)
107:13
type (6)
57:24;83:1;85:11;145:23;
149:17;181:12
types (4)
69:13;86:19;88:15;182:7
typical (2)
72:11;162:5
typically (14)
42:8;45:22;71:20;72:8;
86:11,25;87:25;89:14;99:19,
21;139:20;161:24;162:3;
200:5
typo (2)
197:22,23

U

uncertainties (3)
202:21,22;203:5
uncertainty (2)
203:10,12
unclear (2)
160:18;190:7
under (25)
16:4;21:17;25:12;29:16;
30:4,18;74:5;78:22;89:12;
109:21;117:23;121:14,15,
15;122:17,24;150:8;152:8;
161:11;176:18;177:7;178:3;
187:19;192:19;203:17
underestimated (1)
50:3
underlined (1)
22:23
underlying (7)
74:6;104:11,15,20;105:1;
189:5;190:17
understands (1)
19:13
understood (6)
78:13;91:18;92:25;94:2,
23;155:15
Unfortunately (1)
157:5
unique (1)
48:2
Unit (2)
160:11,16
unless (3)
72:20;100:14;188:19
unlikely (1)
22:3
unreasonable (2)
117:5;128:19
unused (2)
16:1,7
up (50)
10:16;34:4;36:25;46:24;
48:16,22;52:3;69:22;70:2;
71:13;72:21;73:1;92:10,12;
93:4;94:20;96:22,23;97:10,
11,17,18;98:11;102:23;
103:1;108:22,24;111:5,6;
114:20;124:6,6;126:24;
127:16,21;133:5;138:17;
147:19;151:12;158:24;
162:18;167:24;175:14;
176:24,24;186:9;187:9,16;
192:7;193:20
upcoming (1)
87:20
update (4)
104:7;109:12,14;164:16
updated (8)
107:18;160:10;197:24;
198:1,2,7,10,17
updates (1)
178:9
updating (1)
171:21
upfront (1)
122:23
Upon (5)
23:16;48:7;137:8;200:5;
202:1
upper (1)
146:5
upper-right-hand (2)
99:13,13
upward (2)
44:16;95:17
urgency (2)
168:19;200:18
USA (1)
8:10
usage (7)
32:7;52:17,17;53:4,16;
85:15;117:24
use (52)
16:14;32:3;33:2;41:15,22;
42:16,20,23;43:4;44:15,17;
63:4;67:9;72:7;74:2;80:1,10;
81:6,23;82:1,15;84:16;85:2;
99:22;100:5;104:25;106:16;
118:5;120:17,23;122:1;
143:14;144:2;145:3;150:12;
154:9;157:14;160:10;162:5,
12;163:4,11;164:20,21;
175:19;177:22;188:15;
192:10,13;197:8;202:11;
204:1
used (52)
15:24;44:20;51:3,7;53:11;
55:16;58:19;59:20;63:9;
66:6;67:2,5;69:10;70:9;
76:12;77:24;79:13;80:5;
93:2;96:7;97:2,3,20;108:16;
119:15;120:3;122:3;129:19,
19;133:20;134:3,10,15;
139:24;143:10,18,24;
144:18;148:18;149:25;
157:21;159:9;164:15;
168:13,25;178:4;179:5,19,
19;190:15;193:25;194:7
useful (1)
182:17
user (4)
74:19;81:14;162:18,19
users (16)
24:13;46:8;61:8;68:5;
75:15;77:5,11;82:10,13;
98:3;122:23;127:13;128:1;
155:12;180:1;204:3
user's (1)
74:18
uses (7)
15:17,18;84:8;91:19;
104:14;143:17;150:6
using (18)
93:1;99:21;100:2,15;
104:24;108:21;117:1;
126:16;127:3;145:4;156:16,
20;160:19;163:14,22;164:1;
191:25;192:3
usually (3)
42:17;53:9;74:21
utilize (1)
61:22
utilized (6)
37:9;54:3;73:15;110:6,7;
119:7
utilizes (2)
73:21;118:4

V

valid (3)
20:6;51:25;54:6
Valley (15)
29:15,22;30:1,6,8,15,18,
25;31:3;33:7,9,13;173:5;
175:6,13
value (2)
94:21;112:6
values (5)
111:1;117:18;143:11;
178:11,20
variability (1)
95:4
variation (1)
46:22
variations (3)
46:11,15;128:2
varies (1)
45:23
vary (2)
137:8,12
vegetation (2)
41:18;139:20
verification (1)
61:8
version (2)
101:4;198:1
versus (2)
63:24;150:8
voice (1)
70:20
volume (13)
12:23;55:3;91:20,22;
92:10,14,15;93:8,9,15,18;
114:10;126:8
volumes (4)
107:3,3;138:25;176:17

W

wait (6)
13:2;44:2,2;66:20;162:9;
170:13
walk (1)
37:3
warm (1)
46:23
waste (5)
41:3;89:15,19;127:21;
129:20
wastewater (2)
89:11,14
WATER (236)
8:4;13:2,4,7,21;14:21;
15:1,4,16,20;16:1,5,14,16;
18:20;19:1,5,14;20:2,6,7,9,
13;21:8,9;22:17;23:21;26:2,
3,5;28:13,25;29:12,15,22;
30:6,8,15,18;31:1,3,6,7,14,
18,20;32:3,5,7;33:1,4,7,13,
25;34:20;36:5;41:17,23;
42:20;43:4,12,13,14;44:23;
45:9,15;46:8;48:10,11,12,16;
49:3,4,13,13,18,21,21,22;
52:6,18,19,25;53:8,24;55:12,
17,17;56:25;58:2,2;61:4,8;
65:23;66:2,2,8;68:1;69:3,7,
19,23;70:3;71:24;72:7,25;
74:5,14,14;75:1,2,13,16,22;
78:10,22;79:5;80:7,8,14;
81:10,14,17,21;82:3,7;84:8,
9;85:1,20,22,24;86:8,12;
87:3;88:3,5,16;89:2,6;91:11,
16,20,21;93:2,12;96:14,22;
97:4;99:8;100:5,14,15;
102:20;104:11,15,20,25;
105:16,24;107:5;108:16;
109:18;116:23;119:21;
120:18,25;121:16;122:23;
126:10;127:14;128:1;131:9,
16,20;140:24;141:5;143:8,
10,14,15,24;144:12,19;
145:23;146:18;153:19,20;
154:21;157:14;160:1,9,10,
15;161:8;162:12,18,19,22,
24;163:3,5,9;164:9,12,14;
171:19;173:5,21;174:3,12,
14;175:13;184:4,11;186:3,
25;189:17;195:22;199:9;
200:9;201:8;202:1,1,4,4,7,9,
11;203:2,11;204:16,16;
205:3,3,24
water-intensive (2)

158:24;159:17
waterways (9)
38:10;39:21;41:14;48:23;
68:25;69:8,13;105:19;
109:19
way (15)
30:3;52:4;64:4;65:25;
81:22;88:11,12;90:15;
100:25;101:15;124:16;
134:6;161:18;173:24;204:24
ways (2)
54:25;88:10
weak (2)
35:15;95:10
wearing (1)
12:2
weather (3)
46:23;116:22,23
Weaver (2)
166:13;167:6
website (1)
108:19
week (4)
86:15;145:19;200:20,25
weeks (2)
23:18;47:1
welcome (2)
186:9;206:2
well-managed (2)
146:19;161:1
wells (8)
52:17,24;80:5;86:9;99:19,
22;118:16,17
weren't (1)
25:25
west (1)
40:17
wetting (2)
46:1;91:1
What's (11)
33:12;36:4;78:1;89:15;
100:18;141:24;169:22;
179:24;184:11;198:4;205:4
wheat (4)
86:21,24;146:2;162:21
wheeled (4)
43:13,25;44:5;173:21
whereas (2)
64:1;118:19
whole (5)
43:24;44:4;65:4;73:18;
153:5
whose (1)
130:2
winter (3)
144:8;162:16,21
withdraw (1)
199:24
withdrawing (1)
200:10
within (38)
18:17;46:8;52:19,20;53:1;
54:23;61:11;68:21;70:1,12;
73:8;80:5,13,18;82:15;
85:12;86:19;87:3;88:19;
94:8;96:4,21;118:22;119:15;
120:25;121:9,16,23;128:1;
138:1;145:23;153:1,15;
154:25;155:23;160:5;
200:20;204:15
without (6)
20:9;21:18;81:3,20;
126:17;128:3
witness (52)
11:23;12:4,18;14:25;23:5;
26:12;27:10;32:11;33:23,24;
35:18;36:10;37:19,22;41:3;
44:6;52:16;57:11;66:23;
67:1,17;70:15;82:19;86:5;
96:2;98:1;100:2;103:1;
113:15;123:7;132:14,18;
138:9;140:10,20,23;142:5,
14;162:11;165:9,10;166:13,
24;167:7;169:10;170:25;
171:4;183:14;185:6;186:2;
187:13;189:17
witnesses (7)
10:10;34:1;165:19;166:3;
170:9;194:23;201:7
witness's (1)
76:24
WMIS (5)
119:3,18;121:25;154:15,
18
wonder (2)
98:16;102:22
Wood (12)
7:5;11:4,8;171:9;172:16,
22;179:23;180:13;182:21;
183:3,18;187:11
word (3)
10:23;96:2;126:24
words (2)
198:23;203:16
work (29)
18:2;20:18;27:19;35:25;
36:8;57:24;58:1;61:23;
79:17;81:8,13,17;138:1;
139:4;141:20,21;142:3,21;
144:6;149:2;169:7,7,24;
170:18;171:16,19;186:18;
187:3;201:9
worked (9)
15:3;27:17;29:11;57:21;
78:15;153:22;154:11,15;
186:25
working (15)
11:10;15:14;16:17,20,22;
54:19;78:21;153:22;175:16,
17,23;176:3;196:21;197:3,6
works (2)
36:15;170:17
worksheet (1)
144:7
wrestle (2)
187:1,4
wrong (3)
13:4;133:25;134:2
wrote (1)
103:10

Y

yard (2)
99:14,22
y-axes (1)
159:23
year (96)
15:2;16:19,21;25:24;
36:24;51:21,23;54:14,16;
55:5,9,9,16,17;70:11,24;
73:17,18,23,25;97:7,10,12,
14,18,19,21;107:25;110:13,
15;112:15;114:7;122:9,13,
25;126:8,22;130:7,18,21,24;
133:16,21,22;134:4,7,18;
137:15;144:13,20,22,24;
145:3;146:1,3;156:21;157:4;
161:8;162:20,25;164:13,13,
17;174:16;175:15,20;
176:12,19,20;177:25;
178:10;188:20,25;189:4,5,9;
190:9,10,20,23;191:5,6,7,13,
13,15,18,20,23,24,24;192:8,
9,12,14;193:9
years (33)
15:13,13;27:18;43:14;
44:22;54:20;69:18;87:8;
95:13;112:16;122:12;136:6,
8,18,20;144:10,17;149:9,22,
23;156:17;157:1;164:8;
177:8,10;179:15,20;188:2,
17;192:1,4;205:9,18
year's (1)
164:10
yellow (16)
40:20;41:8;54:22;60:8,14;
150:15,17,19;151:3,5,10,13,
16,23,23;152:1
Yep (3)
140:22;172:9;181:10
yesterday (4)
171:25;173:17;175:12;
200:11
yield (1)
118:11

0

02-'04 (1)
178:2
06/08/12 (1)
176:19

1

1 (10)
22:18;43:13;59:17;68:25;
85:2;105:11;111:9;174:3,12;
193:9
1,000 (1)
135:4
1,045,120 (1)
113:24
1,098,477 (1)
114:3
1,100,000 (2)
131:3,8
1:00 (1)
123:12
10 (6)
106:9;121:5;157:8,25;
159:11,13
10,000 (3)
173:4;174:4,6
10:30 (1)
57:6
100 (4)
48:22;105:9;135:3;146:3
100,000 (2)
110:25;111:9
101 (1)
8:23
102 (1)
8:23
11 (4)
44:25;142:20;145:6;160:3
11th (1)
54:18
12 (2)
72:16;144:17
125 (1)
9:16
12th (1)
24:10
13 (3)
50:19;115:9;144:17
13970 (1)
13:5
14 (11)
7:22;8:11,12,13,14,15;
52:12;79:25;80:3;85:16;
144:17
15 (3)
57:3;115:17;195:5
15,000 (2)
174:9;185:6
15,000-acre (1)
111:11
150,000 (5)
94:9,14,18,19,22
16 (2)
172:5,20
16th (1)
201:1
17 (3)
38:11;39:17;40:4
171 (1)
7:5
18 (3)
72:13;178:8;205:10
180 (1)

7:6
185 (5)
8:5,6,7,8,9
186 (1)
7:9
19 (5)
83:22;107:11,24;177:7;
179:14
190 (1)
7:10
1910 (1)
130:7
193 (1)
7:11
194,000 (1)
164:2
194,732 (1)
194:2
194,732-acre (1)
58:20
1953 (11)
17:1,10;20:3;22:17;26:2;
29:5,9;31:10,14,18;32:13
196 (3)
7:23,24,25
197 (12)
9:5,6,7,8,9,10,11,12,13,14,
15,17
1970s (1)
94:5
1977 (3)
43:24;44:4;112:10
198 (1)
8:22
199 (2)
7:16;8:22
1990 (1)
44:17
1995 (1)
176:18
1999 (2)
112:17;136:2
1st (2)
24:8;127:8

2

2 (20)
7:16;68:17,18;69:17;
72:14,14;76:8;77:1;99:3,11;
104:13;109:24;147:25;
148:9;161:14;187:15,23;
199:9,14,16
2.4.4 (1)
176:11
20 (12)
45:24;48:21;71:19;111:2;
115:16;146:2;172:4,5,6,17,
19;205:9
200,000 (1)
131:24
2000 (10)
43:14;44:1,6;94:25;96:7;
112:20,22;113:24;114:24;
144:9
2000s (1)
95:17
2000-to-2014 (1)
144:15
2001 (1)
136:5
2004 (1)
15:2
2005 (4)
44:15,17;94:25;136:5
2007 (4)
143:18,19;145:9;159:15
2011 (7)
37:10,15;38:1;40:3;149:1,
8;150:1
2013 (40)
40:11;58:23;59:21;60:6,
10,13,17,22;63:23,25;64:7,
16;65:7,15,19;67:12,24;
148:18;149:1,8;150:7,13,16;
151:6,12,20;152:2,4,8,11,16;
153:18;154:6;155:5;163:18;
164:2,6,23,24;194:1
2014 (6)
15:15;16:11,11;113:24;
114:24;144:10
2015 (7)
65:22;114:3,19;115:2;
136:13;144:16,19
2015-to-2021 (1)
114:7
2016 (7)
104:8;109:13;114:13,14,
20,22;115:1
2017 (41)
37:11,15;38:1,2,4,12,25;
39:3,12;40:3,12,13;41:12;
42:6;60:6,9;62:16,23;63:24;
64:1,9,12,18,24;65:9,15;
99:11;150:9,21;151:1,4,7;
163:11,13,14,16,17,20,22,23;
164:6
2018 (16)
54:20,23;55:5;126:9,16;
130:18,21;156:24;172:11,
23;173:3;174:7;175:19;
176:12,20;177:25
2019 (3)
87:16;92:6;135:7
2020 (4)
54:20;94:25;136:17;
156:24
2021 (14)
39:6;43:14;44:1,6;114:3,
19,21,22;115:1,2;136:3,13;
137:18;156:24
2022 (10)
43:24;44:4;54:18;136:17;
145:9;164:25;176:18;
192:16,17,23
2023 (8)
21:10;22:18;109:13;
114:13;137:19;144:24;
192:15,21
2024 (2)
87:21;144:24
20s (1)
146:5
21 (2)
106:11,11
2-1 (4)
113:8,15;115:1;177:10
2-10 (2)
176:15,16
21st (1)
182:3
23 (6)
121:6;177:15,16,17,18;
178:23
25 (3)
73:22;88:21;92:21
2747 (1)
13:5
2748 (1)
13:5
2749 (1)
13:4
2758 (1)
13:5
28 (8)
8:17,18,19,20;176:8,10;
177:4,14
29 (3)
178:13,16,23

3

3 (6)
21:12;99:3;101:1,2;
109:24;112:14
3.2 (1)
72:14
3:36 (1)
207:6
30 (7)
27:18;45:24;48:22;146:6;
177:8;179:15,21
300 (4)
83:17;102:17;176:21;
177:12
30th (1)
22:17
31 (1)
173:5
316 (5)
124:24;125:1,7,10,20
317 (6)
7:22;12:23;13:13;14:2,9;
21:2
31st (6)
16:25;20:3;29:5,9;31:10;
32:13
337 (1)
84:21
340 (1)
166:15
347A (2)
102:21;113:13
348 (5)
7:23;195:20,23;196:9,10
349 (4)
7:24;195:20,23;196:9
35 (3)
116:12;117:7;131:9
350 (5)
7:25;195:20,23;196:9,10
354 (1)
166:15
385,000 (2)
131:10,17

4

4 (27)
7:17;36:5,13;41:25;43:15;
55:22;56:9,10,12;58:10;
60:2;62:7,12,15;71:7;85:16;
93:25;98:23;102:19;103:5;
141:25;142:9,18;148:4;
187:10,11;199:10
4,000 (2)
174:23;175:22
40 (3)
146:1;162:21,24
40-acre (2)
71:12;72:3
42 (7)
115:18,21;116:9;117:3;
131:13,17,22
46 (1)
95:13

5

5 (21)
7:18;38:19;39:8;51:12,13;
52:1,2;56:11;59:15;73:4;
98:23;109:24;135:18;150:2;
156:11,24;163:2;187:21,22,
22,23
5,000 (6)
173:4,6,12,23;174:16;
175:5
5,010,000 (1)
181:4
50 (7)
45:20;47:10;88:21;92:21;
111:4;115:25;146:7
50- (1)
95:2
50,000 (1)
114:7
502 (7)
8:5;184:6,9,17,25;185:18,
20
504 (7)
8:6;184:6,9,17,25;185:18,

20
505 (6)
8:7;184:6,9,17,25;185:18
506 (7)
8:8;184:6,9,17,25;185:18,20
515 (7)
8:9;184:6,9,18,25;185:18,20
53 (1)
25:22
56 (5)
7:17,18,19,20;115:15
5th (2)
18:12;21:10

6

6 (13)
7:19;39:7,10,12;42:1;43:7;56:11;109:24;135:18;145:5;159:14,19,19
60 (4)
47:10;88:21;92:21;115:25
600 (13)
8:11;13:1,2,9;14:3,5,7,7,9;15:10,16,23;19:14
601 (5)
8:12;13:10,25;14:1;17:15
602 (4)
8:13;13:10;14:1;18:22
603 (4)
8:14;13:10;14:2;19:7
604 (6)
8:15;13:10;14:1,2,9;22:10
65 (1)
116:5
68 (6)
177:15,18,20;179:1,7,10

7

7 (13)
7:20;39:23,25;55:22;56:9,11,12;74:3;93:23;142:18,20;161:15,17
700 (6)
8:17;28:4,10,11,22;31:8
701 (4)
8:18;28:4,10;29:17
702 (5)
8:19;28:4,10;30:12,14
703 (5)
8:20;28:4,10,11;30:20
7130 (1)
13:4
75,000 (1)
95:2
78 (9)
178:12,14,15,16,18,19;179:2,6,19

8

80 (2)
45:21;162:20
837 (6)
172:4,5,16,19;176:9;198:9
837A (8)
8:22;198:3,5,11,13,16;199:3,4
838 (8)
8:23;101:18,19,20,24;102:1;136:25;139:15
84 (1)
126:9
84th (3)
55:6,13;126:22
85 (1)
45:21

9

9 (3)
83:21;107:10;156:15
9:00 (1)
10:3
900 (4)
9:5;196:22;197:13,17
901 (3)
9:6;196:22;197:13
902 (3)
9:7;196:22;197:13
903 (3)
9:8;196:22;197:13
904 (3)
9:9;196:23;197:13
905 (3)
9:10;196:23;197:13
906 (4)
9:11;196:23;197:13,17
908 (4)
9:12;196:23;197:13,17
909 (3)
9:13;196:23;197:13
90s (1)
57:23
910 (4)
9:14;196:23;197:14,17
912 (4)
9:15;196:23;197:14,17
914 (8)
9:16;125:3,5,7,19,21,22;196:23
917,000 (1)
131:18
928 (4)
9:17;196:24;197:14,17
95th (1)
55:9
99th (1)
55:10