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DEPARTMENT OF
WATER RESOURCES

Daniel V. Steenson, ISB #4332
Charles L. Honsinger, ISB #5240
S. Bryce Farris, ISB #5636
Jon Gould, ISB #6709
RINGERT LAW, CHTD.
455 S. Third St.
P.O. Box 2773
Boise, Idaho 83701-2773
Telephone: (208) 342-4591
Facsimile: (208) 342-4657
Attorneys for Blue Lakes Trout Farm, Inc.

IN THE DISTRICT COURT FOR THE FOURTH JUDICIAL DISTRICT OF THE

STATE OF IDAHO, IN AND FOR THE COUNTY OF ADA

BLUE LAKES TROUT FARM, INC.,	CASE NO.: CV-WA-2010-19823
Petitioner/Plaintiff,	**AFFIDAVIT OF S. BRYCE FARRIS**
vs.	
GARY SPACKMAN, in his official capacity as Director of the Idaho Department of Water Resources, and the IDAHO DEPARTMENT OF WATER RESOURCES,	
Respondents/Defendants.	

STATE OF IDAHO)
) ss.
County of Ada)

S. Bryce Farris, being first duly sworn upon his oath, deposes and says that:

1. That I am an attorney of record for Blue Lakes Trout Farm, Inc. In this matter and make this Affidavit based upon my personal knowledge and am competent to testify to the matters

contained herein.

2. Attached hereto as Exhibit A is a true and correct copy of the deposition transcript for Dr. Allan Wylie taken on November 13, 2009, without all exhibits.

3. Attached hereto as Exhibit B is a true and correct copy of Exhibit 40 (White Paper) to the deposition of Dr. Allan Wylie taken on November 13, 2009.

DATED this 14th day of October, 2010.

RINGERT LAW CHARTERED

S. Bryce Farris

Sworn to and subscribed before me this 14th day of October, 2010.

KIMI A. WHITE
NOTARY PUBLIC
STATE OF IDAHO

Notary Public for Idaho
Residing in Boise, Idaho
My Commission Expires: [illegible]

CERTIFICATE OF SERVICE

I hereby certify that on this 19 day of October, 2010, I served a true and correct copy of the foregoing **APPLICATION FOR PEREMPTORY WRIT OF MANDATE** by delivering it to the following individuals by the method indicated below, addressed as stated.

Director Gary Spackman. c/o Victoria Wigle Idaho Department of Water Resources 322 East Front Street P.O. Box 83720 Boise, ID 83720-0098 victoria.wigle@idwr.idaho.gov	( ) U.S. Mail, Postage Prepaid ( ) Facsimile (x) Hand Delivery (x) E-Mail

Courtesy Copies to the Following via E-Mail:

Randy Budge Candice M. McHugh RACINE OLSON P.O. Box 1391 Pocatello, Idaho 83204-1391 rcb@racinelaw.net cmm@racinelaw.net	( ) US Mail, Postage Prepaid ( ) Facsimile (x) E-mail
John Simpson Travis Thompson BARKER ROSHOLT P.O. BOX 2139 BOISE ID 83701-2139 (208) 244-6034 jks@idahowaters.com tlt@idahowaters.com	( ) US Mail, Postage Prepaid ( ) Facsimile (x) E-mail
Mike Creamer Jeff Fereday GIVENS PURSLEY P.O. Box 2720 Boise, Idaho 83701-2720 mcc@givernspursley.com jefffereday@givenspursley.com	( ) US Mail, Postage Prepaid ( ) Facsimile (x) E-mail
Michael S. Gilmore Attorney General's Office	( ) US Mail, Postage Prepaid ( ) Facsimile

P.O. Box 83720 Boise, Idaho 83720-0010 mike.gilmore@ag.idaho.gov	(x) E-mail
Justin May May Sudweeks & Browning LLP 1419 W. Washington Boise, Idaho 83702 jmay@may-law.com	( ) US Mail, Postage Prepaid ( ) Facsimile (x) E-mail
Robert E. Williams Fredericksen Williams Meservy P.O. Box 168 Jerome, Idaho 83338-0168 rewilliams@cableone.net	( ) US Mail, Postage Prepaid ( ) Facsimile (x) E-mail
Allen Merritt Cindy Yenter Watermaster - Water District 130 IDWR – Southern Region 1341 Fillmore St., Ste 200 Twin Falls, Idaho 83301-3380 allen.merritt@idwr.idaho.gov cindy.yenter@idwr.idaho.gov	( ) US Mail, Postage Prepaid ( ) Facsimile (x) E-mail

S. Bryce Farris

EXHIBIT A

BEFORE THE DEPARTMENT OF WATER RESOURCES

OF THE STATE OF IDAHO

IN THE MATTER OF DISTRIBUTION OF	)	COPY
WATER TO WATER RIGHTS	)	
NOS. 36-04013A, 36-04013B, AND	)	
36-07148	)	Docket No.
(SNAKE RIVER FARM)	)	CM-MP-2009-004
(Water District Nos. 130 and 140)	)	
Third Mitigation Plan	)	
	)	

DEPOSITION OF ALLAN HAINES WYLIE, PH.D.

NOVEMBER 13, 2009

REPORTED BY:

JEFF LaMAR, C.S.R. No. 640

Notary Public

BEFORE THE DEPARTMENT OF WATER RESOURCES
OF THE STATE OF IDAHO

IN THE MATTER OF DISTRIBUTION OF)
WATER TO WATER RIGHTS)
NOS. 36-04013A, 36-04013B, AND)
36-07148) Docket No.
(SNAKE RIVER FARM)) CM-MP-2009-004
(Water District Nos. 130 and 140))
Third Mitigation Plan)
______________________________)

DEPOSITION OF ALLAN HAINES WYLIE, PH.D.
NOVEMBER 13, 2009

REPORTED BY:
JEFF LaMAR, C.S.R. No. 640
Notary Public

THE DEPOSITION OF ALLAN HAINES WYLIE, PH.D., was taken on behalf of Clear Springs Foods, Inc., at the offices of Barker, Rosholt & Simpson, 1010 West Jefferson Street, Suite 102, Boise, Idaho, commencing at 10:35 a.m. on November 13, 2009, before Jeff LaMar, Certified Shorthand Reporter and Notary Public within and for the State of Idaho, in the above-entitled matter.

APPEARANCES:

For Clear Springs Foods, Inc.:
BARKER, ROSHALT & SIMPSON LLP
BY MR. JOHN K. SIMPSON
1010 West Jefferson Street, Suite 102
P.O. Box 2139
Boise, Idaho 83701-2139

For North Snake Ground Water District and Magic Valley Ground Water District:
RACINE, OLSON, NYE, BUDGE & BAILEY, CHTD.
BY MS. CANDICE M. McHUGH
101 Capitol Boulevard, Suite 208
Boise, Idaho 83702

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APPEARANCES (Continued)

For Blue Lakes Trout Farm:
RINGERT LAW CHARTERED
BY MR. DANIEL V. STEENSON
455 South Third Street
P.O. Box 2773
Boise, Idaho 83701

For Idaho Department of Water Resources:
OFFICE OF ATTORNEY GENERAL
BY MR. CHRIS M. BROMLEY
322 East Front Street
P.O. Box 83720
Boise, Idaho 83720-0098

Also Present:
John Koreny
Charles E. Brockway

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ALLAN HAINES WYLIE, PH.D.,
first duly sworn to tell the truth relating to said cause, testified as follows:

EXAMINATION
BY MR. SIMPSON:

Q. Good morning, Mr. Wylie.
A. Good morning.
Q. My name is John Simpson, and I'm here today representing Clear Springs Foods in regards to the third mitigation plan filed by the ground water districts.
And we're going to mark as an exhibit, the notice, if we could. I believe that will be 39.
(Exhibit 39 marked.)
Q. (BY MR. SIMPSON): And for the record, Mr. Wylie, can you spell your last name for the record, please.
A. W-y-l-i-e.
Q. And, Mr. Wylie, you've had your deposition taken in a number of proceedings regarding the delivery calls in the Thousand Springs reach; correct?
A. That's correct.

Q. Okay. And you're still an employee of the Department of Water Resources today?
A. That's correct.
Q. Okay. And have been continuously since your last deposition?
A. That's correct.
Q. Okay. And you recall your last deposition was taken October of 2008? Does that sound right?
A. That's plausible, yes. I didn't look it up.
Q. Okay. But last year you recall having your deposition taken?
A. That's correct.
Q. Okay. And that was in regards to another mitigation plan filed in the delivery calls in the Thousand Springs reach; correct?
A. That's correct.
Q. Okay. And if you could look at Exhibit No. 39, if you would, please. And that's the Notice of Deposition.
Have you seen that notice before?
A. Yes.
Q. And you've then reviewed that notice?
A. Yes.

Q. And on the second page of that notice, it identifies certain matters for which you're here today to testify on?
A. Yes.
Q. Okay. And with respect to that list of matters, are you presently able to testify as to those matters described in that document?
A. Yes. I looked through this -- the things you mention here.
Q. Okay. Fair enough. Are there any matters that are identified there which you don't believe that today you'll be able to testify to?
A. No.
Q. Okay. Some background information, Mr. Wylie.
Do you recall generally your testimony that you provided in the spring user delivery case? That is --
A. Yes.
Q. -- you recall giving testimony; correct?
A. Correct.
Q. And do you recall giving testimony regarding the boundaries of the ESPA?
A. Yes.

Q. Okay. And with respect to that testimony, do you recall describing the boundary between the ESPA and the Snake River in the Thousand Springs reach specifically? Maybe I should say, generally do you recall as part of that testimony describing the interface between the ESPA and the Snake River and the Thousand Springs reach?
A. Yes.
Q. And that similar to other areas of the Snake River Plain, the aquifer and the river interact; correct?
A. They do interact.
Q. That is, water discharges from the ESPA into the Snake River, and in some areas the river leaks into the aquifer; correct?
A. In some areas the river leaks into the aquifer. But in the Thousand Springs, the aquifer discharges into the river. We don't believe it goes back.
Q. So in that area there's just simply an elevation difference whereby the aquifer discharges into the Snake River?
A. That's correct.
Q. And there's a report called

Garabedian?
A. Yes.
Q. And it generally described the boundaries of the ESPA; correct?
A. Yes.
Q. Okay. And there's been some further development of the boundaries of the ESPA in the Oakley Fan area; is that correct?
A. Do you mean the Eastern Snake hydrologic modeling committee has different boundaries on the model than what Garabedian did?
Q. Yes.
A. That's correct.
Q. Okay. And is one of the primary areas that Oakley Fan area?
A. It's different in the Oakley Fan area, correct.
Q. Okay. But with respect to the reaches of the Snake River below Milner and its interface with the ESPA, that hasn't changed over time, has it?
A. How the river interacts with the aquifer below Milner is substantially the same with the Department's model and the Garabedian model.

Q. Okay. Both the model and the Department's understanding is that, as you described just a moment ago, that the ESPA discharges directly into the Snake River in the reaches below Milner Dam; correct?
A. That's correct.
Q. Okay. Mr. Wylie, in those areas of the ESPA that are connected to the Snake River below Milner Dam, are you familiar with the Banbury basalts?
A. Yes.
Q. And that terminology described as the Banbury basalts?
A. I'm familiar with the terminology. It's been remapped, and they're no longer called Banbury basalts.
Q. Okay. What are they now called?
A. There are different names. They were remapped recently by the Idaho Geological Survey.
Q. Okay.
A. They've broken them up into -- formerly most old basalts, tertiary-age basalts, were just classed as Banbury. And now they have different names for different groups of the older basalts.

Q. Okay. So the Banbury basalts have been recategorized into other names and further describing or breaking down the Banbury basalts into distinct groups?
A. Yes.
Q. Okay. But all those basalts are still recognized as part of the ESPA?
A. As Garabedian tried to define it, they're quaternary basalts are what he called the Eastern Snake Plain Aquifer, and the tertiary -- the older tertiary-age basalts were not. He believed there was very limited interaction between the quaternary-age basalts and the tertiary-age basalts.
Q. Uh-huh. The existing understanding by the modeling committee is that those basalts formerly recognized as the Banbury basalts are still recognized as part of the ESPA and considered such by the model?
A. Perhaps, is the best answer to that. When -- the committee has decided that the edge is at the rim, so below the rim the -- any basalts, tertiary or quaternary, below the rim are not part of the Eastern Snake Plain Aquifer.
The heads in -- below the rim, whether

they're in unconsolidated sediments, quaternary basalts, or tertiary basalts seem to reflect the elevation of the Snake River and not the elevation of the Eastern Snake Plain Aquifer.
Q. So in those lower basalts --
A. Uh-huh.
Q. -- formerly -- I'm having a problem, because I recognized them as the Banbury basalts.
A. We can call them the "Banbury."
Q. Let's just continue for ease of my lack of understanding to continue that.
Those Banbury basalts, water that discharges from those Banbury basalts, does it continue to discharge into the Snake River?
A. Yes.
Q. Okay. And so does some of that water have as its source the ESPA?
A. In a roundabout way. If it came from the discharge from the ESPA, went into the Snake River, and then moved from the Snake River into these basalts below the rim, if that's what you're talking about, then that's a distinct possibility.
But if these basalts below the rim had -- were flowing, had flowing wells, there was a tendency for them to be artesian where the water

came up above land surface, then the committee would have felt that that was water that was coming directly from the ESPA through these older basalts, and then discharging. And that occasionally happens. One example would be Blue Heart Springs.
There's another example that I'm aware of where there's a flowing well below the rim. But for the most part, wells below the rim have much lower heads. And the committee did -- looked at a study by Dr. Dale Ralston where he collected elevations of wells in the Hagerman Valley and water levels from wells in the Hagerman Valley. And they don't rise up to the level of the Eastern Snake Plain Aquifer. They are more reflective of the level of water in the river.
So the committee concluded that wells below the rim aren't reflective and don't deplete the Eastern Snake Plain Aquifer.
Q. Okay. When you say "the committee," that's the ESPAM technical committee?
A. Yes.
Q. Okay. Okay. And they reached that conclusion when? In 2009 or in prior years?
A. Oh, certainly 2008.

Q. Okay.
A. The summer of 2008.
Q. Okay. So the reflection of the ground water elevations in the basalts below the canyon rim is, in your view, more reflective of the river elevation than it is necessarily the elevation back in the aquifer?
A. Yes.
Q. Okay. Does that address whether or not there's an interface between the upper basalts and the lower basalts in the aquifer?
A. No.
Q. Okay. So then is there still an interface in terms of water flow from the upper basalts down into the lower basalts to some degree?
A. Yeah, the -- the lower basalts tend to have -- be -- have a much lower hydraulic conductivity, permeability, if you will, so there's a strong preference for water to stay in the quaternary basalts, the younger basalts.
And the interaction with the lower basalts is --
Q. Not as free as it is in the younger basalts, the upper basalts?

A. That's correct.
Q. Okay. But would you not conclude that there is still some interaction between the upper and the lower basalts, younger basalts and the lower basalts in terms of water flow?
A. It's -- it's probably also dampened because there's a significant age difference there. There's likely a sediment deposit between the younger basalts and the older basalts, also insulating.
There's some instances that I know of coming down the grade, to the Buhl grade, you can see that interface between the younger basalts and the older basalts. And there isn't much of a sediment layer there.
So we can't say conclusively that there's always a sediment layer. But in many instances there is.
Q. Uh-huh.
A. It's in most things -- like most things hydrogeologic, it's not a clean cut. But there's a great deal of evidence suggesting it's not a strong communication.
Q. Okay. And that work you identified references Dr. Ralston's investigation?

A. Yes.
Q. Okay. Is that a document that you have?
A. It's on the modeling committee -- the ESHMC web page.
Q. Okay. Fair enough. Dr. Wylie, I want to return now to some testimony that you gave in the spring case.
And with respect to a calculation that's been described as a spring percentage, do you recognize that?
A. Yes.
Q. Okay. I thought maybe you would.
Do you recall that you testified in the delivery call case regarding the spring percentage of the calculated percent of the Snake River Farms spring complex to the Buhl to Thousand Springs reach?
A. Yes.
Q. And do you recall your testimony wherein you testified that you participated in that analysis?
A. Well, that I supplied the director the analysis I thought he wanted.
Q. Okay. And Mr. Luke also participated

in that calculation or analysis?
A. Yes.
Q. Okay.
MS. McHUGH: I'm just going to object to this line of questioning as being not relevant for the December 7th hearing, understanding that maybe it's relevant for some future hearing.
Q. (BY MR. SIMPSON): Do you recall that your statement in that case was that that analysis was not rigorous?
A. Yes.
Q. Okay. And in fact, didn't you admit in that testimony that you could not defend it?
A. Yes.
Q. And based upon those statements, would it be fair to say that a more rigorous analysis might be one easier to defend?
A. Oh, I view that as a post-modeling administrative adjustment. And I don't think I'm required to defend it.
Q. Fair enough. I'm not here today asking you to defend it.
But what I am asking is that because of your acknowledgment that it wasn't a rigorous analysis, would you agree it was perhaps at that

point in time an analysis that had to be completed in terms of the administrative hearing process?
A. Director Dreher felt the need to supply that analysis.
Q. Okay. And if there was a different or a more rigorous analysis of the relationship between actions on the aquifer and the results showing up in individual springs, is that something that you would entertain and perhaps defend?
MR. BROMLEY: Calls for a legal conclusion.
THE WITNESS: Much of -- much of what I do is at the request of the director. And, you know, I might be able to dream up something, but it might not be acceptable to whoever the next director might be. So I'm reluctant to say something that might come up would be acceptable.
Q. (BY MR. SIMPSON): Okay.
A. But it's possible that something more technically defensible could be presented. But I can't say that the Department would adopt it.
Q. Would you not recognize that if there is something more scientifically defensible it should be considered, in your view?
MR. BROMLEY: Calls for a legal conclusion.

Q. (BY MR. SIMPSON): Well, let me just finish that.
In your view, since you identified that the existing spring percentage analysis was not rigorous, would you support a more rigorous analysis?
A. I'm quite content leaving it as an administrative decision, that as long as the committee feels the best thing to do is to predict to the reach, then the next director or the current director, or whatever, is -- has their discretion on how to predict to the spring, what kind of an adjustment necessary to go to the spring.
Q. Okay. Is it still your position that you wouldn't defend the spring percentage method?
A. I would not, no.
Q. Okay. Have you had an opportunity to review the regression analysis offered for review by Dr. Brockway?
A. Yes.
Q. Okay. Initially is that analysis more rigorous from your perspective than the spring percentage method?
A. It's -- we talked, I believe the last

hearing, about Laura Janczak's thesis. And Eric Harmon, yes, did a similar regression analysis. And that was presented to the hearing officer.

Q. Right. And the Laura Janczak analysis you referenced in your prior deposition taken a year ago?

A. Correct.

Q. Okay. And upon request by counsel for ground water districts, you provided them a copy of that analysis, if you recall?

A. I don't recall that, but...

Q. Okay. And is the point of your response that that analysis by Ms. Janczak was similar to what Dr. Brockway's regression analysis was?

A. The head in the aquifer versus discharge in the spring.

Q. Okay. And generally speaking, do you agree conceptually with that relationship?

A. Conceptually, yes.

Q. Okay. And with respect to Ms. Janczak's work, did you agree with the work that she completed?

A. Agree with? I --

Q. Well, you reviewed it?

A. Yes. I wasn't on her committee, so I didn't have any --

Q. But you reviewed the document that you had available to you of her work; correct?

A. Correct, yes.

Q. Okay. As you sit here, were there portions of that work that you did not agree with?

A. I didn't -- I don't have any problem with the regression analysis that she did. I thought there were stretches that she made that were unwise in other parts. But the regression analysis I thought was sound.

Q. Okay. Would you agree that this regression analysis that's been offered by others, including Dr. Brockway, more closely represents the relationship between spring flows and ground water levels, changes in the aquifer, than the spring percentage calculation?

A. Okay. So how would we get -- how would the director incorporate this?

Q. I'm just asking you in comparing, Allan, the spring percentage -- which was a linear relationship; correct?

A. Correct.

Q. And assume that that linear aspect

applied to all spring flows in relationship to the reach gains; correct?

A. Correct.

Q. Does that, in your view, more closely represent reality than the regression analysis that was proposed by Dr. Brockway or the work of Ms. Janczak's?

A. The one potential problem I see with the regression is that you have to have a well with a fairly decent dataset correlating head in the aquifer with the spring pretty near the spring.

If that well isn't nicely co-located, then the spring user could still get a -- still not get a fair shake if they're -- the well is closer to, say, the mitigation activities than their spring, then there would be more of a head change at the well then there would be benefit actually realized at the spring. Am I --

Q. I understand.

A. Okay.

Q. But just from a conceptual standpoint, would you agree that the regression analysis is a better approximation of the relationship between actions on the aquifer and spring flows than the

linear relationship described in the spring percentage offered in the administrative orders?

A. I will admit that there's a certain appeal. But I still see problems.

Q. Okay. But would you agree those problems might be fact specific in terms of at a particular location if you're going to apply the regression analysis, there would have to be certain criteria met, one of which you just described; that is, is there sufficient data with respect to ground water wells in order for you to adequately analyze that regression between the aquifer levels and the springs?

A. And the model would have to be demonstrated to adequately predict heads at that location.

Q. Right. And that would be dependent upon what information was available at that location in the aquifer in that particular cell, for example, or cells?

A. Yes.

Q. Okay. But that --

A. And --

Q. That's -- I guess I'm just trying to start at the top and then work my way down.

That's more applying the regression analysis to a particular set of facts --
A. Uh-huh.
Q. -- as opposed to the concept of the regression analysis as a better tool as compared to the linear relationship described in a spring percentage.
Would you agree with me that the regression analysis conceptually is a better tool to define the relationship between aquifer levels and spring flows?
A. It does have a certain appeal.
Q. Okay. We've gotten that far.
A. And I still have reservations. But it -- it has a certain appeal.
Q. Okay.
A. And --
Q. A certain appeal. But then you say you have reservations.
Are those reservations specific to its application in certain factual situations?
A. Reservations about the ability of the model to match heads in a target well. You know, the well that was chosen for the regression to Clear Lakes.

Q. You're talking about the Brockway analysis; correct?
A. Yes.
Q. Okay.
A. So you'd have to find a well with a lot of -- sufficient dataset, and then you'd have to be able to have the model predict head changes at that well pretty accurately. And, you know, that would be -- that would be something I would want to be confident in before I would endorse -- endorse this.
Q. Okay. So you've identified a couple reservations.
I'll describe them as --
A. Yes.
Q. -- first being having a well with a sufficient dataset; correct?
A. Yes.
Q. And then having --
A. And co-located.
Q. Okay. And "co-located" meaning?
A. Close -- very close to the spring.
Q. Okay. And the second reservation was that the model had the ability to predict changes in head at that particular well?

A. Correct.
Q. Okay. And does the model have the ability to predict changes in head in particular wells within the ESPA as the model's calibrated?
A. Version 1.1?
Q. Well, the latest version.
A. Well, version 1.1 is what we're working on.
Q. Okay.
A. And there are some target wells close to the rim. Sand Springs well is one, and it predicts those head changes quite well.
Q. Okay. And the model was calibrated to the wells that are part of the database for the model; correct?
A. Correct.
Q. Okay. And so you identified Sand Springs well?
A. Yes.
Q. Okay. Other wells?
A. That's a problem for us. There aren't -- there just aren't a lot of wells with a rich time series along the rim.
Q. And by "a rich time series," you're talking about a historical database, if you will,

of well data regarding aquifer levels at that particular well?
A. Yes, lots of measurements.
Q. Okay. And by "lots," that's a pretty technical term, can you give me a little more definition?
A. Let's say at least quarterly measurements near the rim. The Department, has since calibration of version 1 of the model, has started collecting more water-level measurements along that Thousand Spring reach.
Q. Okay. But isn't it true that whatever data was associated with the wells for which the data was put into the model, the model was calibrated to that data?
A. The model was calculated to whatever data we had.
Q. Right. So if a well had 10 years of history on annual measurements, the model was still calibrated to that well with those annual measurements; correct?
A. Correct.
Q. Or if it had 20 years of history with measurements taken semiannually, the model was calibrated to that well; correct?

A. Correct.
Q. So whatever the dataset was, the model was calibrated to it?
A. That's correct.
Q. So that if there's a limitation in a dataset, perhaps that's simply the lack of data, but the model was still calibrated to the best dataset that you had available to you; right?
A. That's correct.
Q. Okay. And it sounds as if you've reviewed Dr. Brockway's regression analysis.
With respect to the well or wells associated with his regression analysis, was there sufficient data -- that is, was there a sufficient dataset -- in your view?
A. There was definitely sufficient data for Dr. Brockway's analysis, yes.
Q. Okay. And in terms of location or proximity to the springs -- that is, Snake River Farms springs -- did it meet that concern that you've raised?
A. I'm not -- not recalling that specifically where the -- where the wells were exactly that he talked --
Q. As you sit here today, you don't

recall specifically where those wells were in proximity to the Snake River Farm spring?
A. That's correct.
Q. Okay. So in terms of proximity, if they were in the cells immediately upgradient from Snake River Farms, would that, in your view, be a close enough proximity?
A. Yes.
Q. Okay. If they were in the next cell adjacent or next cells adjacent to those cells closest to the canyon rim, would that be in close proximity?
A. That's -- that would depend on where the junior users that might be curtailed would be and where mitigation would take place. So the closer you get to where these administrative actions take place and the farther you get from the spring, the more that analysis is going to -- it will give you inaccurate results.
Q. Allan, would you agree that the springs that discharge that constitute the source of water for Snake River Farms are a spring complex?
A. Yes.
Q. And given that they're a spring

complex, that affects the reliability of the linear relationship of the spring percentage calculation?
A. I don't know that the fact that it's a complex makes it any less reliable than other complicating factors.
Q. Well, if you had one spring, you had one outlet, as compared to a complex -- where there were multiple outlets; correct?
A. Uh-huh.
Q. And Snake River Farms is a complex, so it has multiple outlets that provide the source of water; correct?
A. Correct.
Q. Then the fact that it's got multiple outlets, would you agree, affects the linearity relationship between the spring flows in that complex and the reach gains in the river, that percentage?
A. I'm not seeing that.
Q. Would whether a source of water is a spring complex or a single spring affect the reliability or voracity of their linear relationship in that calculation regarding spring complex or spring percentage?

A. The -- their -- the existence of complex -- the existence of spring complexes is not one of my concerns for not -- not one of the reasons why I think the percentage analysis is not rigorous.
Q. Okay. But would you agree with me that that could be a factor?
A. I don't see how.
Q. Okay.
A. But maybe I'm just dense.
Q. So what were the factors that you considered in coming up to the conclusion that the spring percentage was not rigorous?
A. The conductants, the robustness with which the spring is connected to the aquifer controls the slope of that stage in the aquifer, and spring discharge responds.
And not all springs in a reach have the same conductants, so they respond differently. And there are various factors which are involved in the aquifer decline. And not all of these actions, be they actions by people or nature, are the same everywhere above the rim.
So the spring reaches and the individual springs in the reaches are all going to

respond differently to these activities.
Q. Okay. So that connection between a spring and the aquifer was a concern for you?
A. That's correct.
Q. And so would the characteristic of a spring being a spring complex as opposed to an individual spring be something then you'd consider?
A. There are very large individual springs, and there are very large complexes. And as best I can imagine right now, the connection potentially could be the same.
Q. And so with respect to springs responding differently, would that, in your view, give more reason to consider that regression analysis which looks at individual spring responses to aquifer changes?
A. That is part of why it has some appeal.
Q. And so then would it be fair to say that from your perspective that as an alternative to the spring percentage, the regression analysis should be considered?
MR. BROMLEY: Calls for a legal conclusion.
THE WITNESS: I'm -- I'm not inclined -- I

like my job. I'm not inclined to put a director, future director, in a box. Post-modeling analysis -- post-modeling administrative adjustments, in my view, are the job of the director.
Q. (BY MR. SIMPSON): Well, if asked to review the merits of a regression analysis by a post-administrative-order director, would you think that analysis has merit?
A. It -- as I said, it has an appeal, yes.
Q. Okay. With respect to Dr. Brockway's regression analysis at Snake River Farms and at that complex, does it, in your view, represent a relationship between spring flows at the Snake River complex and ground water level changes in the ESPA?
A. Yes.
Q. Okay. Is it one that's scientifically based?
A. I didn't see a problem with that.
Q. Okay. Is it based upon sound science?
A. I thought it was okay, yes.
Q. You didn't find any problem, from your perspective, with that analysis?

A. No.
Q. Okay.
MR. BROCKWAY: Do you want me to leave?
MR. SIMPSON: No. I'm hoping he'll tell the truth about it.
MS. McHUGH: I think you were trying to get him to adopt it.
Q. (BY MR. SIMPSON): In reviewing that analysis, do you think that analysis adequately represents a relationship in spring flows and changes in the ESPA ground water levels?
A. Adequately represents changes in spring flow and changes in the aquifer?
Q. Yes. And the relationship between those.
A. Over a -- the range of -- for the data that he had, yes.
Q. And did you identify any shortcomings or problems with the data that he had?
A. Just limitations, you know, the -- it would be nice if 40 years ago we were taking monthly water levels and in an unpumped well there, yeah. But the Department hasn't. Nobody has been. But that -- that's not a fault of Dr. Brockway's. It's...

Q. So would it be fair to say the only limitation in that analysis that you observed, in your review of it, was that it had a limited time frame in terms of the data collected?
A. And -- yes.
Q. Okay.
A. Yes. And that's just the way the data is.
Q. That's fairly consistent with all the data on the ESPA, where you'd always like to have more data to put into the model; correct?
A. Yes, generally modelers would like more data.
Q. Okay. If you know, Dr. Wylie, are there any other procedures that have been identified to compute individual flow impacts?
A. There are analyses -- analytical solutions.
Q. Okay. Have you attempted to use any of those other procedures?
A. Not -- not for Snake River Farms. I've done them in other instances.
Q. Okay. Have you used a similar regression analysis that Dr. Brockway identified at any other complex or in any other reach of the

Snake River?

A. I've -- I've used the staging aquifer spring discharge. With wells when I was at the University of Idaho, I had a series of transducers in wells along the rim. And we had -- we gauged some springs and used USGS gauge data. And that was either shortly before or shortly after Laura Janczak did her thesis.

Q. Okay.

A. And collected very careful elevations on the wells and the springs and developed these linear regressions.

Q. Okay.

A. Figured out which wells worked best with which springs.

Q. And was that in the Thousand Springs reach?

A. Yes.

Q. Okay. And did you find that analysis acceptable?

A. Yes.

Q. And did that result in a paper that you wrote at that time?

A. No.

Q. Okay.

A. It was after Laura's thesis, because I then went to work for the Department.

Q. All right.

A. But I still probably somewhere have that data.

Q. Okay. Well, if you could find that for us, that would be great.

A. My main interest was which wells worked best with which springs, and in an attempt to figure out which part of the aquifer was influencing which springs.

Q. Okay. And so when you said you wanted :o find out which wells were influencing which springs -- and you completed the regression analysis?

A. Yes.

Q. In order to help you make that letermination, did you have a certain criteria with respect to that relationship that indicated o you there was, you know, a good relationship or . very good relationship between the well and the pring? What numbers were you looking at, I uess?

A. You could very plainly see a ysteresis develop. That stage in the aquifer

didn't do a very good job forecasting discharge in the spring.

In some instances discharge in the spring would lead to change in the aquifer, and that doesn't make any sense. And in some cases stage in the aquifer would forecast discharge in the spring by unacceptable periods of time.

And you could see that hysteresis develop in the regression analysis because the R-squared would become quickly unacceptable.

Q. Okay. And just so that I understand, what R-squared values were acceptable in that analysis you completed?

A. Oh, they were -- the good wells were typically at least .8.

Q. Okay.

A. And there were many that the R-squared was well above .9.

Q. Okay. So if you had an R-squared value above .8, that indicated to you you had a good relationship between that well and the spring flow?

A. That portion of the aquifer, right.

Q. And the spring flow; correct?

A. Correct.

Q. And I think you just identified that portion of the aquifer, that portion of the aquifer where that well was located; correct?

A. Correct.

Q. Okay. And so with respect to those wells that you were utilizing, did you have a history of data associated with those wells?

A. Pretty short history. Two, three years.

Q. Okay. But in terms of for that study, that was an adequate dataset for you to complete that regression analysis that you were working on?

A. Yes.

Q. Okay.

A. One of the limitations of a regression analysis is that it's not a physically based model. So you become very nervous if you're extrapolating much beyond your dataset.

Q. We don't want to be nervous.

Doctor, what do you believe is the uncertainty in the ESPAM relative to simulations of Snake River reach gains?

A. The river?

Q. Yeah, reach gains of the river.

A. The analysis that I gave to former

director Karl Dreher says 10 percent.
Q. Okay. And you still believe that today?
A. That's as good a number as we have right now.
Q. Can it be calculated?
A. Yes.
Q. Okay.
A. Well, a more rigorous analysis could be done. And the only way to know the true uncertainty is to have a series of observed responses that are not in the calibration dataset, and then predict those.
So if you already know the answer, then you can determine model uncertainty with great precision.
Q. Would that be a similar regression analysis, instead of to a spring, to the river, to the reach gain, comparing changes in the aquifer elevations to the reach gain directly?
MS. McHUGH: I'm going to just object again on relevancy for the December 7th hearing to this line of questioning.
THE WITNESS: So can you on the basis of head measurements in the aquifer predict the gains

in a reach? Certainly if the reach is small enough and the stage in the river is fairly constant.
Q. (BY MR. SIMPSON): And so those are the very same reasons why it's applicable as between a spring and aquifer level changes?
A. Yes.
Q. Okay. Do you believe that the accuracy in the simulation of water levels in the ESPA is greater or less than the accuracy in the simulations of the Snake River reach gains?
A. I used to know this. They -- the output from the calibration run gives you the statistics. And I'm not -- I'm not recalling -- I believe that the statistics for the head matches were better. It makes sense. There's a lot less noise in the head data than in the reach gains.
Q. Well, what is the accuracy of the measurements of water levels in the ESPA which were used to calibrate the model?
A. The water-level measurements by convention are widely believed to be within a hundredth of a foot. The elevation of the wells is less certain. The wells that weren't surveyed, we picked elevations off of digital elevation

models.
And we did an analysis where we compared surveyed wells with the elevations obtained from the digital elevation models. And they were within 2 feet, 2.3 feet, I believe.
And then there's the issue of well trueness, which is -- I've seen where a well -- wells are rarely perfectly straight down. They typically wander around in kind of like a corkscrew. And if the driller isn't very careful, those vertical corrections, I've seen them around 8 feet.
So throwing all of that together, the estimate on water levels would depend on how deep the well is. The deeper the well is, the more problem you have with the trueness, and whether or not the well was surveyed or elevation was picked off the digital elevation model.
Q. In terms of the accuracy of the water levels in the ESPA to calibrate the model, was that accuracy identified as a tenth of a foot, plus or minus a tenth of a foot?
A. I don't think that the committee discussed that.
Q. Well --

A. That would be -- to have it be plus or minus a tenth of a foot, you would have to have pretty shallow wells, and they would have to all be surveyed.
Q. Was that accuracy better than plus or minus 10 percent?
A. Probably.
Q. Better than plus or minus 5 percent?
A. I would guess more like plus or minus 2 percent.
Q. Okay. Fair enough. You identified some work that you did after Ms. Janczak completed her work, and regarding the relationship or correlating between individual spring flows and water levels.
Are there other examples in which you've completed that work, other than what you've just described for us?
A. I don't believe so.
Q. Okay. Other than reviewing Dr. Brockway's regression analysis and Ms. Janczak's analysis, do you know of other regression analyses that were undertaken?
A. Eric Harmon's.
Q. Okay. And other than Mr. Harmon's,

any others?

A. Presumably, since that very equation is used in McDonald and Harbaugh Modflow -- I'm sorry, Modflow, the -- it's been -- and Modflow and written in the '80s.

1989?

MR. BROCKWAY: Around there.

THE WITNESS: You know, that must have come from somebody's observations, so the technique --

Q. (BY MR. SIMPSON): It's pretty widely accepted?

A. Correct.

Q. Okay. If you were told that a correlation between a historical target spring flow and a USGS observation well had a linear R2 of .91, would that be a good correlation?

A. Yes.

Q. And that would be consistent with your previous statement that an R2 above .8 would be a good correlation; correct?

A. Correct.

Q. Do you believe it would be possible to estimate individual spring-flow impacts using the ESPAM-simulated ground water levels at specific USGS well locations and then using regression

equations between water levels in spring discharge to estimate discharge impacts?

A. We've discussed my unease with certain aspects of that.

Q. The two items that you identified?

A. Correct.

Q. Right. Okay. Other than those two items, you believe it would be possible?

A. Certainly, other than those two things, it has an appeal, yes.

Q. And if those two items are reconciled, then would your appeal be even stronger?

A. Perhaps. It may never override my appeal for this job, though.

MR. SIMPSON: With that, let's take a lunch break.

(Lunch recess.)

MR. SIMPSON: Back on the record.

Q. Allan, I'm glad you had a good sandwich at lunch.

I'll have you look at what is Appendix 2 to Dr. Brockway's report that he filed in this matter. And it's the regression analysis.

And just, is that the regression analysis that you've seen with respect to

Dr. Brockway's work? Does that look familiar?

A. Yes.

Q. Okay. So that appears to be the document that we've been referring to this morning?

A. That's correct.

Q. Okay. And then with respect to that same appendix, Appendix 2 to Dr. Brockway's report, and this is figure 2.

And can you see on there where it's identified the well that Dr. Brockway reviewed in terms of his regression analysis and its relationship to the Snake River Farms springs? Do you recall that figure?

A. I don't recall this figure, but it looks as if the well is very close to the spring.

Q. Okay. So in terms of proximity and the discussion we had this morning, the R2 -- the "R2"? -- R-squared value --

MR. BROMLEY: D2.

MR. BROCKWAY: R2D2.

Q. (BY MR. SIMPSON): We'll stick with R-squared for a while.

But the R-squared value would definitely be an indicator of how close the well

was to the spring as well? Isn't it true the time R-squared value is the primary indicator of the relationship between the well and the spring flow?

A. The R-squared tells you how well the, in this case, aquifer had explained the discharge of the spring.

Q. Okay. And this morning we discussed one of the reservations or concerns you would have with respect to the regression analysis was how long of a dataset did we have available to us; isn't that right?

A. That's correct.

Q. And if you had, say, a 24-year dataset available on a USGS observation well, would you consider that a pretty good dataset? Was that an adequate length of period of time for it?

A. Is it an unused well, unpumped well, I guess?

Q. Irrespective of whether it's a pumped well or a nonpumped well, given that it's an observation well, USGS observation well, would that be a good dataset?

A. The time span is good.

Q. Okay.

A. If it was an unpumped well, I'd be

very comfortable with that. And if it has a good R-squared, then it's likely an unpumped well.

Q. Now, this morning you explained that on at least one occasion you had an opportunity to use the regression analysis on the evaluation you did on certain wells to spring flows.

Do you recall that?

A. That's correct.

Q. Okay. And do you recall generally the time frame that would have been? Would that have been 2004? 2005? 2006?

A. I went to work for the Department in 2004. So it would be somewhere between the late '90s and 2004.

Q. Okay. Okay. And, Allan, if you personally felt there was a scientifically justifiable procedure which might better estimate the spring flows resulting from actions on the aquifer, would you take that procedure or that analysis to the Department for consideration?

A. I would -- I don't know.

Q. Well, that -- excuse me. Go ahead.

A. In -- I try to not get involved in what I consider administrative decisions. And there are administrative decisions that are made

that I think could be made better, I guess. But they're administrative decisions, and if they want my input, they know where to find me.

And I think my job is to do -- answer the technical questions that they ask me, and they ask me plenty of technical questions. I have --

Q. You have plenty to do?

A. I have plenty to do.

Q. Okay.

A. I don't --

Q. Well, with respect to the spring percentage, is that one of those decisions that you feel could be made better?

A. I don't know. You've obviously thought about it a lot more than I have. I know it's a concern for the spring users.

Q. Well, would you agree that in any work done by the Department, the Department endeavors to use the best science available?

A. As with a lot of legal and policy things, I think a lot of decisions get made because that's the way they've been made before.

Q. So your answer to that is sometimes yes, sometimes no, with respect to using the best science; is that correct?

A. I try to use the best science I know how to do to answer the questions that I'm asked.

Q. Okay. So if I were to ask you to refine or continue to develop the relationship between the aquifer levels and spring flows at Snake River Farms, would you use the regression analysis, based upon the information that you've reviewed in coming to this deposition today?

A. The -- if the question was and my job was to correlate a stage in the aquifer and discharge at Clear Lakes, I would use a regression analysis.

Q. Well, if I were to come to you and say, "Allan, I want you to estimate the spring flows or the change in spring flows to Snake River Farms as a result of actions taken on the aquifer," would you utilize the regression analysis?

A. I might. I would have to look at how well the model did at predicting heads at one of the wells, probably one of the wells Dr. Brockway used.

One thing I could do is recalibrate the model with the added weight on water levels in that specific area. And that might increase my

confidence. Probably look at more than one well.

Q. But that --

A. As with intercontinental ballistic missiles, space flight, firearms, darts, the smaller the target, the greater the uncertainty. So I would -- if it were really important, I would probably look at more than one thing.

Q. Do the R-squared values, does that raise the level of confidence?

A. Assuming the model were able to -- I was convinced the model were able to predict the head change in that area, then I would be very comfortable given the R-squareds that I've seen.

Q. Okay. And have you looked at all to determine with respect to the model, the model's ability to determine changes in head in that area?

A. No.

Q. Okay. So as you sit here today, you haven't addressed that question?

A. No.

Q. Okay. And do you have any reason to believe that the model doesn't reflect accurately the head changes in that area of the aquifer?

A. It's certainly possible that it doesn't. I -- I can't tell you whether it does or not. But the model is better in some places than others. If you need it to do one thing, it's possible to make it really, really good at doing that one thing.

Q. Allan, are you generally familiar with the shortfalls being observed in a number of the water rights, spring water rights in the Thousand Springs reach, from purely a numbers standpoint, the volume of water that's short?

A. No.

Q. The discharge amounts that are short?

A. No. I am aware that they're short and they're still going down.

Q. That the aquifer levels are still going down?

A. Yes.

Q. And the corresponding spring flows are still going down?

A. (No audible response.)

Q. So we still haven't reached equilibrium; would that be a true reflection?

A. I wouldn't -- in one sense we have to be in equilibrium all the time.

Q. Daily at the particular moment we're in equilibrium; correct?

A. Correct.

Q. But given the fact that the spring flows --

A. They haven't stabilized.

Q. Right. Then the general trend in the aquifer is still in decline; correct?

A. Correct.

Q. And is that what the version 1.0 version of the model would have predicted?

A. Yes.

Q. That we would still concede declines?

A. Yes, we did a drought scenario.

Q. Uh-huh.

A. And in that drought scenario, it said that if we continued to be in a drought that water levels would continue to decline.

Q. Okay. Are we still in a drought?

A. We had a good year.

Q. Last year?

A. Yes.

Q. How about the year before?

A. It was average.

Q. Okay. And the year before that?

A. Drought.

Q. So we've had one dry year in the last three; correct?

A. Yes.

Q. Okay.

A. Seven dry years in the last ten or something like that.

Q. Was that reflection of the last three years, was that in the drought scenario --

A. No.

Q. -- as the model described it?

So in the drought scenario, as you've described, did this drought scenario identify year after year of drought?

A. Yes.

Q. Okay. So the drought scenario isn't reflective of what we've observed with respect to weather patterns over the last period of time; correct? At least over the last three years.

A. The drought scenario, I believe, was three additional years of drought. The model finished in -- our calibration data set went to 2002.

So that scenario said that with three additional years of drought, water levels would decline. And we did one with if we had a wet year, how would that impact it. And I don't --

I'm a little less clear recollecting what that showed.

But I don't think it showed that one wet year was going to turn it around. There's a lot of water lost in storage when you get these kinds of declines. So replenishing the aquifer is not a trivial thing. There's a lot of water lost in storage.

Q. Same could be said for pumping, isn't that true, that through pumping there's a lot of water lost to storage?

A. That's -- that's how -- one of the primary ways it gets lost, yes.

Q. Okay.

A. There's less recharge and more pumping.

Q. You've, have you not, reviewed the IDWR hydrographs that show continuing ground water level declines in the ESPA; correct?

A. I have, yeah.

Q. Okay. And what's your opinion for the reasons for the these continued declines?

A. Primarily drought, and there's changes in irrigation practices. The farmers have to get by with less water, so they have to change their

irrigation practices.
Q. And would that also mean increased pumping as well in changing irrigation practices?
A. It's a combination of increases in pumping and less incidental recharge. You got to fix the leaky canals if you're going to get water to the last guy on the ditch. And if you're flood irrigating and there's less water, you got to learn how to get by with less water, convert to sprinklers. All these things conspire to result in declines in the aquifer.
Q. And you identified changes in surface water practices.
And you would agree, wouldn't you not, that increasing in ground water pumping would also be a factor?
A. Oh, yes.
Q. Okay. Do you believe that aquifer levels are going to continue to decline?
A. Well, there has to be an end to it. I mean --
Q. When there's no more water? Is that what you mean?
A. Well, let's say for the foreseeable future, yes.

Q. And by "foreseeable," you mean 5, 10, 15 years?
A. Five years, let's say.
Q. Okay. A minimum of five years?
A. I would expect them to continue declining for something like five years.
Q. Okay. And have you expressed that opinion to your supervisors at the Department?
A. I've said that it looks to me like we have to do something or the springs are going to go dry.
Q. Okay. And what's been the response to that?
A. I guess an agreement that it looks bleak.
Q. Uh-huh. Kind of a "So be it"?
A. No.
MR. BROMLEY: Objection. Form.
THE WITNESS: My supervisors aren't in a policy-making position.
Q. (BY MR. SIMPSON): So in response to you raising that issue or that discussion with you and your supervisors, after that it goes up to a policy decision? Is that what you're saying?
A. Perhaps one response to this would be

a concerted effort to increase the recharge that happened this year and getting more recharge, not only in the spring, but in the fall. The water boards paying canal companies money to run water on the shoulders of the season. And there was -- I know there was an effort to try to get more of the -- a higher percentage of the late-season recharge in the lower part of the aquifer.
So I don't know -- certainly a "so be it" attitude is not -- not what I would expect. I expect that people are taking notice and trying to do things.
Q. Is more water leaving the aquifer than what's coming in, as reflected by the declining trends?
A. That's what the declining trends show, yes.
Q. Okay. So are we mining the aquifer? If more is going out of the aquifer than what's coming in, are we mining it?
A. If more is going out than what's coming in, I guess that's a reasonable definition of "mining."
Q. Okay. Dr. Wylie, you testified in the spring user hearing on the basis for the

implementation of a trim line.
Do you recall that testimony, generally?
A. I recall testimony on the trim line, yes.
Q. And that it was a reflection of model uncertainty?
A. That's the way the director defined it, right.
Q. And would you define it that way? Is the trim line a reflection of model uncertainty?
A. That's -- that's the way it's defined, so yes.
Q. Okay. Earlier you talked about recharge, you know, recharge efforts. And those recharge efforts, you identified the fall recharge and those efforts.
Would those be artificial recharge efforts, that is, they're not naturally-occurring recharge, are they not?
A. That's correct.
Q. Okay. So also would seepage losses through canals, that likewise would be artificial recharge, as opposed to natural recharge; correct?
A. Those are recharge due to man's

activity.

Q. Right.

A. Is that what you mean by "artificial"?

Q. Would that be fair to say, artificial would be the result of man-induced recharge as opposed to precipitation or tributary underflow or river losses or those activities which would be natural recharge?

A. Recharge -- if we're going to call recharge due to man's activities artificial, then it would be artificial recharge.

Q. Okay. Well, would you agree that artificial recharge would be recharge induced by man's activities? It's not something naturally occurring but for man's movement of water and putting water at a point where it will seep into the ground; correct?

A. The -- I could see how a person could define recharge on the shoulders of the season as artificial and recharge -- incidental recharge that happens during the irrigation season as natural.

But, you know, if you want to define it as strictly recharge due to man's activities, then irrigation during the -- incidental recharge

during the irrigation season would be due to canal losses during the irrigation season would be artificial, and I agree.

Q. Okay. Okay. With respect to the model uncertainty and the calculation of the trim line in relationship to the river gauges --

A. Yes.

Q. -- was that a rigorous analysis, in your view, similar to what you described the spring percentage as not being a rigorous analysis?

A. The -- my analysis that I provided to Director Dreher on uncertainty for version 1 of the model was not rigorous.

Q. Okay. So likewise, then, because it wasn't rigorous, are you willing to defend it?

A. I'm willing to defend it as a placeholder.

Q. Okay.

A. As soon as -- in this instance, as soon as the committee's ever able to provide a better analysis, then I will adopt that one.

Q. Okay. And by "committee," you mean the ESPAM committee?

A. Yes.

Q. Okay. And have you been at ESPAM committee meetings where Sean Vincent and other Department employees have recognized that there's no relationship between model uncertainty and the river gauges?

A. No, I have not.

Q. You haven't been to those meetings?

A. I've heard Mr. Koreny claim that, but I've not really --

Q. You haven't heard Sean say that directly?

A. No.

Q. Okay. Isn't it true that the trim line as used in the order is not scientifically based, but based upon the fact that, scientifically speaking, the model isn't 100 percent accurate?

A. Well, it's true that the model is not 100 percent accurate.

Q. Then is the calculation of the trim line scientifically based or is it just a calculated representation of uncertainty at the river gauges?

A. Director Dreher tied the trim line to uncertainty. And the model is -- without question

has uncertainty.

Q. But wouldn't it be fair to say that you identify a calculated method for taking into account model uncertainty which was and still today is unknown?

A. And will be. There are ways to get a reasonable -- get a more defensible estimate for uncertainty, but it will never be --

Q. You'll never know exactly the degree of uncertainty?

A. You'll never know exactly what the uncertainty is --

Q. Right.

A. -- until you don't need the model.

Q. Would you agree that the effect of pumping from each well in the ESPA on a particular reach has the same level of uncertainty under your calculated method?

MS. McHUGH: I'm going to object again on relevance for this hearing, this line of questioning on model uncertainty and all of that.

MR. SIMPSON: Well, I guess at this point I'll just say that the hearing officer opened up discovery on IDWR employees. And that's why we're here today. So...

MS. McHUGH: I just want to make sure that my objection with regards to relevancy to the December 7th hearing is on the record.
MR. SIMPSON: Okay.
Q. Did that give you some time to think about it, or do you want to offer an opinion on that issue too?
A. Could you restate your question? I can't understand it the way you state it.
Q. Okay. Would you agree that the effect of pumping from each well in the ESPA on a particular reach has the same level of uncertainty under your calculated method?
A. So are you asking that this simplistic uncertainty analysis is not spatially or temporally varying, and that a more rigorous analysis would be spatially and temporally varying uncertainty?
Q. Well, with respect to your present analysis, the 10 percent, isn't it true that each well and the effect of each well and the pumping at that well is either plus or minus at the river gauges because of the lack of complete certainty as to the reading at the particular river gauge?
A. Well, there are two possibilities that

you're trying to drive at, and I'll try to answer both. One is that if the river reach is expanded, if the reaches are combined so they're all one reach, then the impact of a well on the river is going to be 100 percent. All depletions are eventually realized in the river. Okay? That's one possibility --
Q. Okay.
A. -- that your question might be going at.
And two, if and when we do a rigorous uncertainty analysis, it should show that uncertainty is both spatially and temporally varying.
So if we look at reach A, some portions of the aquifer will -- the impact on that reach will be more certain than others. And if we look in time, over time that uncertainty will vary how those impacts are realized at the reach.
Q. Okay. You're identifying the fact if your placeholder is replaced with a rigorous analysis of uncertainty --
A. Uh-huh.
Q. -- it will look at the spatial and temporal effects; right?

A. Right.
Q. With respect to the 10 percent model uncertainty that you've identified through your reference to the river gauge and the river gauges' ability to measure changes --
A. Uh-huh.
Q. -- is that temporally and spatially accurate?
A. No, it's simplistic.
Q. Simplistic?
A. It's a simplistic, nonrigorous. I think we've identified that.
Q. We've agreed on that point. Sure.
So in that respect if you have a well that's, say, 2 miles away from a spring reach and you're looking at the effect of that pumping on a river reach, the certainty of the effect of that well on the river reach will have a plus or minus 10 percent attached to it; correct?
A. Correct.
Q. And if you're looking at a well that's 5 miles away from the river reach, it will have the same plus or minus 10 percent; correct?
A. That's correct.
Q. And if you have a well that's 20 miles

away, it will likewise under the present analysis have a plus or minus 10 percent?
A. That's correct.
Q. Okay. So that plus or minus 10 percent, as you've described it, is really applicable throughout the whole Eastern Snake Plain; correct?
A. Correct.
Q. Okay.
A. It's not spatially or temporally varying.
Q. Right. Would you agree that each well pumping on the ESPA has had some or will have some depletive effect on the reaches of the Snake River, including the Buhl to Thousand Springs reach?
A. Each well pumping on the ESPA has an impact. 100 percent of its impact's realized on --
Q. One of the reaches?
A. -- one or all of the reaches.
Q. Okay.
A. They -- there are responses carried out to five decimal places. There are cells that have zero impact on some reaches. So not every

reach is impacted by every cell. Most cells do impact within five decimal places.

Q. Every reach?

A. Every reach. Not all.

Q. And so within any particular cell, the number of wells in there, when added together, would likewise have a depletive effect on some or all of the reaches?

A. That's correct.

Q. Based upon what you've just described, with respect to each well pumping in the ESPA, wouldn't it be a more accurate reflection of uncertainty if each well in the ESPA were assigned the same level of uncertainty as opposed to assigning uncertainty based solely upon the distance from a particular reach?

A. They are assigned a constant uncertainty at the current time.

Q. Okay. So isn't that a reflection of the uncertainty of the river gauges?

A. That is a reflection of the uncertainty of the river gauges, correct.

Q. Right. So then with respect to the trim line, is that an additional uncertainty that's then assigned to those wells outside of

that trim line?

A. No.

Q. Do you understand my question?

A. The way I see it is that I told Director Dreher that if he was going to deploy the model, he had to acknowledge uncertainty somehow.

Q. So did you make that policy decision?

A. I told the director that it was important to acknowledge uncertainty --

Q. Okay.

A. -- if he was going to deploy the model. And Director Dreher chose to do it with the trim line.

Q. Okay. I have a follow-up to a question I asked you.

Have you been at any ESPAM technical committee meetings where Mr. Vincent identified that the trim line is not based upon model uncertainty?

A. No, I don't recall that at all.

Q. Okay. Mr. Wylie, did IWRRI or IDWR perform a sensitivity analysis of the model to determine uncertainty?

A. As a result of a calibration run with the software we use, there's a sensitivity

analysis printed out. And I don't believe that that played much of a role in my -- when I came up with the 10 percent.

I did some other analyses, and they consisted mostly of where I would ask -- try to recalibrate the model and see how much I could change what model cells were contributing mostly to the reach to try to change the response functions, ask the model to change the response functions.

And the result of that, that there was an average -- kind of an average of right around 10 percent. Of course, it was spatially variable, and I was just looking at steady-state response functions, not transient.

But the fact that I could only change them -- well, my recollection is some of them were changing around 20 percent, but they weren't in areas that there was much irrigation. But most of the cells that were -- where there was much irrigation, it was around 10 percent.

Q. Okay. If you were using the model to predict water-level changes in a certain cell or cells on the ESPA as a result of actions taken on the ESPA as opposed to looking at changes in the

reach gains, would the model uncertainty be different if the model were calibrated to those wells in those cells, that uncertainty is much less, say 2 percent, as you described previously?

A. So if instead of predicting reach gains --

Q. Right.

A. -- we were predicting water level in the aquifer, what would the uncertainty be?

Q. Wouldn't that uncertainty be the accuracy of the water levels in those observation wells or that well data?

A. I don't know. It's certain that the water levels would play a key role since that's the metric that we're trying to predict.

When we are trying to predict reach gains, the uncertainty in the gauges plays a more key role.

Q. Well, you wouldn't try to assert that the accuracy in measuring water-level changes in those wells was plus or minus 10 percent, would you?

A. I haven't.

Q. But would you agree that that would be unreasonable, that is, you wouldn't use the same uncertainty attached to the river gauge as you would to a water-level change?

A. So if we're in a situation where water levels are the key and we need to get uncertainty for water levels, I would do -- and I believe you pressed me on this in the A & B hearing, and I -- I would do different analyses than I have, and I'm sure I would come up with different conclusions.

And I would bring these conclusions to the director, whoever that would be, and because presumably I would have implored the director "We need to address uncertainty in this matter if the model's going to be used this way." And then some kind of a decision would be made by the director.

Q. Well, if in fact --

A. But it would, in fact, no doubt reflect more of the uncertainty in water levels than the uncertainty in river gains.

Q. In fact, didn't Gary Johnson look at if you recharged in certain counties what the effect would be in other counties?

A. Yes.

Q. Yeah. And that was using the ground water model from a countywide perspective, actions taken in one county -- i.e., recharge -- and what

the effect would be in other areas of the aquifer in other counties; correct?

A. Correct.

Q: And just looking at that analysis, the uncertainty of those results that were described through the modeling of those actions, would it be reasonable to conclude that those were at a level of certainty plus or minus 2 percent because that's the uncertainty of the ground water level measurements?

A. If I were going to declare an uncertainty for water levels, the model's ability to predict water levels, I would do some model runs, I would try to ask the model to change things, and see how well it could still match water levels in river gains. And how it had to change water -- how it had to -- what adjustments it had to make in order to do that.

And there's -- in the analysis, it gives a standard deviation and a mean for how well it matches all the water levels. And you can look at that. And you can ask it to recalibrate and see how well it continues to match those statistics.

And from that I could come up with --

that's one possible way, just one possible way I could do that. I haven't done any of that yet.

Q. Okay. Dr. Wylie, is all of Water District 130 included within the trim line area for Clear Springs?

A. I don't believe so.

Q. Okay. Why not?

A. Because some of it falls out of the -- some of it is less than 10 percent response on the Devil's Washbowl to Buhl reach.

Q. Would the model simulations of differences in reach gains due to changes in pumping be less than the simulation of absolute values?

A. Can you try that one again?

Q. Would the model simulations of differences in reach gains due to changes in pumping be less than the simulation of absolute values? Let's try this one more time.

Would the uncertainty in the model simulations of differences in reach gains due to changes in pumping be less than the simulation of absolute values?

A. Can I look at that?

Q. You want to look at that for the

answer? Sure. You can look at it, because it's got the answer at the bottom.

MR. BROCKWAY: Does that become an exhibit?

Q. (BY MR. SIMPSON): The last one.

A. Yeah.

MS. McHUGH: And just for the record, Dr. Wylie is looking at a handwritten note from Dr. Brockway to Mr. Simpson.

THE WITNESS: Okay. So as best I can figure, the question is, if you run a simulation, say a baseline dataset, and then you run a simulation with some kind of a treatment that would result in a change in, in this case, pumping stress on the aquifer, and you difference those two simulations, then the question is is there less uncertainty in that difference than there is in the prediction? Is that the question, Mr. Simpson?

Q. (BY MR. SIMPSON): Well, that may have been the question, but I have moved on from that for obvious reasons, some of which being the author of it.

A. Models are generally better at predicting differences than --

MR. SIMPSON: Okay. I'm going to mark what

will be the next exhibit, 40.
We can go off the record for a few minutes.
(Recess.)
(Exhibit 40 marked.)
MR. SIMPSON: Back on the record.
Q. Allan, you've been handed Exhibit No. 40.
Do you recognize that document?
A. Yes.
Q. Okay. And have you seen that document in committee meetings for ESPAM?
A. Yes.
Q. Okay. And prior to today and prior to this week, have you reviewed that document?
A. Yes.
Q. And is it true that at least a part of that document is what you've discussed earlier today, the basis for some of the answers and some of the questions that were posed to you earlier today?
A. This document hasn't changed my mind on anything.
Q. Okay. Well, let's just go through it. On the second page of this document, it has a

reference to the director's letter. And I think that that's included in the packet back there. If you thumb through it, you would have found it.
A. Yeah, I found it.
Q. And does that letter identify that the purpose of the trim line or the clip was to avoid curtailing ground water users who may have no effect on enhancing reach gains?
A. Would that be in the quotes from the hearing officer?
Q. Well, if you look on page 2 of the document. All right. And if you look up towards the top there, do you see the first full paragraph -- or excuse me, it looks like it is the second paragraph that starts with "The Director's letter explains that"?
A. Yes.
Q. And do you see the sentence in italics here in quotes?
A. Yes.
Q. And do you recall that that was the purpose of the trim line or the clip, as it's called there? And if you want to look on the letter, it's on the second page of the letter on the top of the page.

A. The second page?
Q. Right.
A. Okay.
Q. And you see the reference now to that sentence, do you not?
A. Yes.
Q. Okay. And it's on the second page of the letter --
A. From Director Tuthill?
Q. -- from Director Tuthill at that time to members of the committee; correct?
A. Correct.
Q. All right. And as we've discussed this morning, you identified that there were a few cells in the ESPA in which those cells and pumping in those cells would have no effect on some reaches of the Snake River; correct?
A. Well, to six significant digits, no effect, yes.
Q. Right. And no means no, right, in terms of this statement in Mr. Tuthill's letter identifies that the purpose of the trim line or the clip was to avoid curtailing ground water users who might have no effect? Is that what it says?

A. That's what it says, yeah.
Q. So would it be fair to say that where the "no effect" standard was used, that would be identified by the ground water model and the running of the ground water model?
A. Well, to five or six significant digits, sure.
Q. Right. But that's what the model would show is if that were the standard to five or six significant digits, those cells would have no effect on certain reaches of the river; correct?
A. Correct.
Q. And otherwise, every cell would have an effect on reaches of the Snake River; correct?
A. If the reaches are big enough, every cell has an impact, correct.
Q. Okay. And in the Buhl to Thousand Springs reach, is that a big enough cell, as you described -- or big enough reach? Excuse me.
A. It's one of the smaller reaches.
Q. Okay. And so what you're saying is that there would be cells in the ESPA model for which going out five or six digits would not show an effect?
A. It's -- I would expect, yes, that

there would be cells in the model that would have no effect but six significant digits.

Q. Okay. Otherwise, those cells would show an effect if you ran the model on the Buhl to Thousand Springs reach?

A. They would show an effect.

Q. Okay. And with respect to the trim line and the placement of the trim line, would you agree that if you added up the depletive effects of ground water depletions from wells outside of the trim line on the ESPA that those effects would not be de minimis?

A. We would have to define "de minimis."

Q. Well, why don't you give me your definition, and I'll ask the question again.

A. Okay. I could define it as, for instance, if it has less -- if a cell has less than 10 percent of an impact on a reach, then it's de minimis. And then we would --

Q. Okay. Let's add up all the cells outside of the trim line --

A. Uh-huh.

Q. -- and their depletive effect from pumping within those cells on the Buhl to Thousand Springs reach, would that total effect be

de minimis?

A. More than 90 percent of their impact would, by definition, be on other reaches, so, by my definition, it would be de minimis.

Q. Okay. But is that 10 percent in terms of the volume pumped, is that de minimis on the reach? Is it a measurable amount?

A. It depends on how you define "de minimis."

Q. Well, you just defined it as 10 percent.

So if we took all the pumping outside of the trim line --

A. Uh-huh.

Q. -- and looked at 10 percent of that pumping --

A. Uh-huh.

Q. -- and its effect on the Buhl to Thousand Springs reach --

A. Uh-huh.

Q. -- is that 10 percent de minimis? Is that a small amount?

A. It's -- it would be less than 10 percent of the total impact.

Q. Okay.

A. So then by my definition, which might not be valid, but it's how I chose to define it, it would be de minimis.

Q. But let's just look at the total volume, though.

A. Okay.

Q. From a volumetric standpoint --

A. Uh-huh.

Q. -- if you added up all the pumping that occurred outside the trim line --

A. Uh-huh.

Q. -- and took 10 percent of that --

A. Uh-huh.

Q. -- do you have any estimation of what that amount would be?

MR. BROMLEY: Objection. Asked and answered. This line of questioning was pursued at the delivery call hearing in 2007. I believe, with curtailment scenario, it identifies these amounts. We've plowed this ground well before.

THE WITNESS: I -- if I recall, I think it was around 600,000 acre-feet. And so then 10 percent of that would be 60,000 acre-feet on the Buhl to Thousand Springs reach.

Q. (BY MR. SIMPSON): Okay. And that

60,000 you'd still call de minimis?

A. It depends on how you define "de minimis."

Q. Allan, if there were no model uncertainty attached to the use of the model, who would bear the risk of the model not being 100 percent accurate?

MR. BROMLEY: Calls for a legal conclusion.

MS. McHUGH: And I'll object to foundation.

THE WITNESS: That would depend.

Q. (BY MR. SIMPSON): So if you just took the model results and applied them without attaching a model uncertainty.

A. I suppose the entity bearing the largest risk would be the Department.

Q. And why is that?

A. Because it could be easily shown that the model does have uncertainty.

Q. And so was that the basis for your recommendation to Director Dreher that the model, if it were going to be used, had some uncertainty attached to it?

A. Somehow. It was important for the Department to somehow address uncertainty.

Q. And so the method that you recommended

was, in your view, a placeholder until some better analysis could take place?
A. That's correct.
Q. Allan, with respect to the current third mitigation plan filed by the ground water districts, have you reviewed that plan?
A. Are we leaving this?
Q. For a bit.
A. For a bit.
Q. Is there something you'd like to comment on it about?
A. It shows that the Department trims to Water District 130 and all the tables and in the text, and the Department does not trim to Water District 130.
Q. And you're looking at a particular table?
A. Yeah, all the tables: table 1, table 2, table 3, table 4.
Q. With respect to table 1, you're looking at the two separate --
A. Yeah, what is it? The fourth line down.
Q. Right.
A. And then the bottom line.

Q. "10 percent trim line not clipped to Water District 130" and then "10 percent trim line clipped to 130."
So you're testifying that the Department doesn't clip to the boundary of Water District 130?
A. That's correct.
Q. Okay. That with respect to either the :rim line identified for Snake River Farms or the :rim line identified for Blue Lakes, it wasn't :lipped to the boundary of 130?
A. No.
Q. Specifically or factually?
A. Factually.
Q. Okay.
A. For a while Water District 140 didn't xist. With no mailbox, there's no point in ending a bill.
But after 2007, and in the 2007 rders, the orders specifically say that Water)istrict 140 is being organized. And since then, Vater District 140 has been involved in both alls.
Q. Okay. And with respect to the oundary between Water District 130 and Water

District 120, is that the eastern boundary of the trim line?
A. No. The trim line crosses that. It so happens that there's no irrigated acres.
Q. East of the Water District 130 boundary?
A. Right. So there's nobody to curtail.
Q. No mailbox?
A. Yeah.
Q. Okay. Any other comments that you would have on this document?
A. The -- if we take that out, then the new information in here is the 1 percent trim line.
Q. Uh-huh.
A. Everything else has already been covered. This fails to take into account the common ground water. And they are trimmed to the area of common ground water. That has to be. That's in the rules.
Q. Well, back then to my other questions on the ground water districts' mitigation plan.
Have you reviewed that mitigation plan?
A. Yes.

Q. Okay. Are you familiar with how the figure of 2.6 cfs of replacement water was identified?
A. That was from a scenario that I ran.
Q. Well --
A. Okay. The 2.6, that's from the 6.9 percent.
Q. Okay. And so you have an understanding of how the 2.6 cfs of replacement water requirement was calculated?
A. Yes.
Q. Okay. Are you comfortable with the manner in which that number was calculated; that is, does it reflect the best scientific understanding of the relationship between the pumping that's occurring and the effect on the spring flow?
A. That's -- the way I see it, that's two questions. It's a -- in my opinion, that's an administrative, post-modeling adjustment. And I'm comfortable with that. It's arguably not the best available science. But we let teenagers drive, and it's clearly not the best available science.
Q. So you think it would be better to keep the teenagers off the road?

A. I do.
Q. Okay. Likewise --
A. I have one.
Q. Yeah. Likewise, would we be better off to use a different method to determine the calculation?
A. It's possible that a better method could be come up with. The hearing officer and two directors are comfortable with the percentage.
Q. Is it true that they're comfortable with the percentage, or did both the hearing officer and Director Dreher in his approval of the hearing officer's determination acknowledge that additional work needed to be done?
A. My recollection is that the additional work needed to be done on uncertainty.
Q. Not on spring-flow calculations?
A. Not on spring-flow calculations. I could be wrong.
Q. Okay. But if that were the recommendation by the hearing officer, would you support that, based upon what you know?
A. If a director came to me and asked me to come up with something better, I would.
Q. And do you think you could?

A. I'd certainly try.
Q. Do you think it's possible, based upon the tools that you have available to you?
A. I have some ideas.
Q. Okay. Are those ideas consistent with the work that you've done in the past on regression analysis?
A. That would be one.
MR. SIMPSON: Let's go ahead and mark this as the next exhibit.
(Exhibit 41 marked.)
Q. (BY MR. SIMPSON): Do you recognize Exhibit 41, Mr. Wylie?
A. I suspect I was asked to review part of this.
Q. Well, did you have any part in the drafting or review of this transfer memo?
A. I -- like I said, I suspect I was asked to review part of it. There was a part on using the transfer tool.
Q. If you'd look at page 12.
A. Yes, some part of this.
Q. Paragraph 12 or subsection 12 on page 12, is that part of the area that you were asked to review?

A. I think so.
MS. McHUGH: Sorry. Was that page 12?
MR. SIMPSON: Page 12.
THE WITNESS: Page 12, paragraph 12, yeah.
MS. McHUGH: Okay.
Q. (BY MR. SIMPSON): So that's part of the transfer memo that you reviewed?
A. Yes, that part.
Q. And you reviewed that not in preparation for this deposition, but at the time this memorandum was created?
A. Yes.
Q. Okay. And what were you asked to comment on with respect to page 12?
A. I tried to clean up the language. And then I suggested that they stick with 5 percent instead of 10 percent, but it doesn't look like that.
Q. Why did you suggest sticking with 5 percent instead of going with 10 percent?
A. Because that puts the risk of losing water on the person doing the transfer.
Q. Right. Rather than the other water right holders?
A. Yeah, all the other water right

holders on the ESPA.
Q. Right. So then do you have an understanding that the purpose of not only section 12 that you reviewed but also the water-right transfer memo was to provide guidelines for ensuring that other water rights weren't injured as a result of a proposed transfer?
A. I suspect that that's why they have the transfer process.
Q. And from your perspective, when you advocated for keeping the 5 percent threshold instead of 10 percent, it was to ensure that the other water rights would not be injured as a result of that transfer?
A. To decrease the risk of having the other water rights injured, yes.
Q. Do you believe that if the threshold were kept at 5 percent, it would further decrease that risk that you identified?
A. So if they couldn't increase depletions in a reach by more than 5 percent, that would decrease the risk of causing injury to others? 10 percent increases the risk of causing injury to others.

Q. So would the answer to my question be yes, then?
A. I got -- kind of got lost in your question, so I tried to restate it.
Q. I got lost in your answer, so I thought I'd try to help you out.
But so is it true that you're advocating for the keeping of the 5 percent threshold was to further minimize the risk that other water right holders would be injured as a result of a proposed transfer?
A. That's correct.
Q. Apparently you didn't prevail on that thought?
A. Apparently not.
MR. SIMPSON: Well, let's take a break for a minute. I think I'm done.
(Recess.)
(Mr. Simpson and Ms. McHugh not present.)
MR. STEENSON: Let's go on the record.

EXAMINATION
BY MR. STEENSON:
Q. Good afternoon, Dr. Wylie. As you

know, I'm Dan Steenson representing Blue Lakes Trout Farm in this matter. We have had conversation before.
So do you mind if I at times call you Allan?
A. Go ahead.
MR. STEENSON: Okay. I think I'd first like to mark the next exhibit, 42. It's a one-page document. And there are extra copies.
(Exhibit 42 marked.)
Q. (BY MR. STEENSON): Allan, do you recognize what's been marked as Exhibit 42?
A. Yes.
Q. Okay. Do you recognize that to be your written explanation of the basis for the 10 percent error factor that you have been describing during your testimony today?
A. That's correct.
MR. STEENSON: Okay. Mark an Exhibit No. 43.
(Exhibit 43 marked.)
Q. (BY MR. STEENSON): Allan, would you read that. This is not something that you've seen before. Take a moment to read that, and then I'll ask you a question or two about it.

A. (Reviews.)
Okay.
Q. Allan, I'll represent to you that this is a description of the scientific method that I downloaded from a source on the Internet.
And my question to you is whether you agree generally with this description of the scientific method, as you understand that method?
A. I do.
Q. Okay. Would you add anything to it that is not contained in the document, from your own perspective?
A. I don't think of anything right now.
Q. Okay. And is it fair from my layman's perspective to describe the ESPA model and models of its kind as an effort to apply the scientific method to a problem?
A. Yes.
Q. Okay. And if I understand the model in, again, very basic layman's terms, it's a mathematic representation of what is happening for the ESPA in terms of ground water interactions with surface water, and depletions and additions to those sources; is that generally very vaguely correct?

A. Yes.
Q. Okay. And so as I understand it, you go through a process called calibration to tune the model to reality, that is, to align the model's predictions with measured phenomenon; is that correct?
A. To adjust the model so that model outputs, as best they can, match observed field measurements.
Q. And this is why, as you said before, modelers like data, because it's an opportunity to find out how well you did with the model and, in addition to adjust the model, to better reflect what you find through observable data; is that correct?
A. That's correct.
Q. Okay. Now, the two issues that Mr. Simpson's been asking you about that I'm here interested in today have to do with the 10 percent uncertainty and trim line on the one hand and the use of the spring percentage on the other, as you probably imagined.
Now, the question of model uncertainty is directly related to, if not synonymous with, the question of obtaining model accuracy; is that

correct?
A. They're related.
Q. Okay. In other words --
A. It's not true that all inaccuracy is uncertainty.
Q. Okay. Explain that for me, would you.
A. If you know that the model's going to be inaccurate, you can compensate for that. But uncertainty is inability to quantify that inaccuracy.
Q. Okay. And in any case, uncertainty is an issue for scientific or technical inquiry and resolution; isn't that correct?
A. Yes.
Q. It is not an issue in terms of use of the model that is subject to legal or policy considerations; correct?
A. I don't know that for a fact.
Q. Okay.
A. I am not keenly tuned into policy and legal. All I know about legal I learned by watching Perry Mason.
Q. And perhaps some of your interactions with some of us in this room? Perhaps we've disappointed you. I don't know.

But in any case, in terms of evaluating model outputs and the confidence we can have in them, uncertainty is a technical or scientific question subject to the scientific method; correct?
A. It -- there certainly are a lot of different ways people have used to try to evaluate uncertainty in computer models. And they've generated a great deal of papers in the scientific press.
Q. In other words, defining uncertainty is not really affected by the question of who one thinks ought to be curtailed or who ought to bear the burden of curtailment or a policy question such as the economic effects of curtailment, uncertainty really has nothing to do with those considerations that I mentioned, does it?
A. Well, in my naive opinion, I think that the policymakers should take into account model uncertainty when they're making their policy decisions. And I am not in any position to tell them how it should be done.
Q. But the reverse is not true, that is, when you're asked to define uncertainty, your inquiry shouldn't be affected by who you or

someone else might think ought to be curtailed or the economics of curtailment or the burdens of curtailment? Your inquiry, then, should be a purely scientific one based on the scientific method; isn't that correct?
A. Yes. And I think that's one of -- going to be one of my challenges working with the committee on getting a rigorous uncertainty analysis.
Q. Right.
A. Because most of the other people -- well, I represent the Department, John represents you, Dr. Brockway represents Snake River Farm, and getting all these competing interests to come up with an unbiased, thorough, rigorous uncertainty analysis is going to be an exciting and challenging endeavor.
Q. For the moment, I have the luxury of speaking just to you.
And so when either myself or someone like the director asks Allan Wylie the question, Allan Wylie's analysis is purely supposed to be for the Department of Water Resources' objective and unaffected by policy considerations, that is, when examining this question of model uncertainty?

It's purely a mathematical phenomenon-based analysis subject to the scientific method; correct?
A. Hopefully repeatable.
Q. Then I want to look back at the white paper with you. That's Exhibit No. 40, I think, or is it 41?
A. 40.
Q. 40. My understanding is that at least in your view the model is the best scientific tool available to us to evaluate the impacts of ground water pumping on spring flows and spring rights; is that correct?
A. On reaches, yes.
Q. Okay. And it is the tool that the Department uses to evaluate the impacts of ground water withdrawals and additions on springs as well; correct?
A. The -- the output then undergoes a post-modeling administrative adjustment, yes.
Q. And the post-modeling administrative adjustment, is that process a scientific method process, or is that a policy process, or do you know?
A. That's a -- in my opinion, it's a

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policy.
Q. Driven process; correct?
A. Correct.
Q. It's not a technical process; correct?
A. Not a technical process.
Q. Okay. Now, the Department has relied upon you as stating that the purpose of the trim line was to avoid curtailing ground water users who might have zero effect on reach gains. Now, you've talked about this with John Simpson. I just want to confirm.
Is that your opinion of the purpose of the trim line?
A. It does have that effect, but I'm not sure that that's the purpose of the trim line.
Q. Okay. Then let's look at page 2 of Exhibit 40, the first numbered paragraph there. My understanding of the analysis from the experts signed on to this white paper is that it is not correct to assert using the best tool available -- that is, the model -- to assert that a well that is located on the other side of the trim line could have zero impact on reach gains. And in fact, your testimony today, from my understanding, confirmed that that's correct, that this critique,

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that this observation is correct.
So my question is, do you agree with the observations and analysis in the first paragraph at page 2?
A. (Reviews.)
Well, the first sentence there, it says, "The inference that ground water withdrawals outside the 10 percent trim line might have no effect on reach gains based on an assumed model uncertainty of plus or minus 10 percent is incorrect."
Well, as I've testified, there are some cells that, based on limitations of the number of significant digits, have no observable impact. And they're all outside the trim line. The trim line, the curtailment scenario demonstrates quite conclusively that the cells outside the model, outside the trim line, do have a measurable impact. So --
Q. So it's true with respect to those wells --
A. There are --
Q. Let me just finish.
A. Okay.
Q. It may not be true with respect to

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those six-digit wells, if you will, that you mentioned previously, this statement?
A. Very clearly there is a measurable impact from pumping that happens outside the trim line.
Q. Okay. Then with the caveats you mentioned, the rest of this paragraph, I assume you would agree is also correct, that is, paragraph 1 at page 2?
MR. BROMLEY: Dan, if I could just note, could you please let Allan finish his responses. Thanks.
THE WITNESS: Well, I understand the second sentence.
Q. (BY MR. STEENSON): And do you agree with it?
A. Yes.
Q. Okay.
A. I do have unnaturally long pauses. I apologize.
Q. That's okay.
A. The third sentence there, I'm not exactly sure what it's driving at, but clearly all wells, as I've said, on the ESPA, 100 percent of their impact is realized in the river somehow

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somewhere. And I'm not sure what else they might be driving at with that third paragraph.
Q. Let me try to paraphrase it and see what you think. In other words, if you want to apply a 10 percent error factor for some other reason, if you just like 10 percent as a number, but you accept the model as the best science available, then the way to apply that 10 percent error factor would be that the model's results might be 10 percent, might have 10 percent uncertainty, plus or minus, with respect to any well for which the model makes predictions anywhere, that would be consistent rather than to draw a line in the sand and say wells beyond that line may have no impact, which, as you've testified, is incorrect and can't be true, whereas wells on this side of the line closer to the rim are treated as if there's no uncertainty associated with them?
A. Ah.
Q. As I paraphrased it, would you agree with that statement?
A. Okay.
Q. Is that a "yes"?
A. That's a "yes."

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Q. Okay. Thank you. See, we get there.
Now, the second paragraph addresses really a separate issue, the question of whether an impact is de minimis.
Wouldn't you agree that whether an impact of de minimis really is a different independent consideration of whether uncertainty applies to a withdrawal from the aquifer?
A. Whether -- de minimis could be defined in a number of different ways. And I understand after reading Dr. Scheüder's paper, expert report, how it's not been entered in, how de minimis is defined in Colorado. But I don't know that it's been defined in terms of water rights in the state of Idaho.
Q. Sure. And you're referring to Dr. Willem Scheüder, is that how you --
A. He says Scheüder.
Q. Okay. Scheüder. But in any case, if I asked you, Allan, if I say "What's a de minimis impact?" that's really an entirely different question than "Allan, what's the uncertainty associated with this model?"
A. That's correct.
Q. And if I then went further to say

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"Allan, how should we apply uncertainty in using the model?" that's really a different question than what's "Allan, what's a de minimis impact?"; correct?
A. That's correct.
Q. Now, quickly, and maybe you're familiar with it, but take a glance through paragraph 2 and then I want to ask you whether or not you dispute any of the factual assertions or the conclusions in paragraph 2?
A. (Reviews.)
Well, I would agree that the spring users -- the junior ground water wells outside the 10 percent trim line reduce spring flow by one-half to one-third. But de minimis could be defined in many different ways.
Q. Okay. Do you think half of the impact on a spring reach is de minimis, a de minimis -- let me make sure I get the question out -- is a de minimis portion of the impact?
A. It -- I -- I think it could be defined that way, but I don't know. The best I know, it hasn't been defined in Idaho.
Q. As a scientist or a human being having a conversation with me here, I'm asking you what

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is your opinion? Do you think 50 percent of an impact is a de minimis portion of that impact?
A. I could see how a director could decide that if 90 percent of the impact -- 90 percent or more of the impact of a pumping is going elsewhere, that that is de minimis on the reach in question.
Q. I'm asking for Allan Wylie's opinion.
And my question is, does Allan Wylie think 50 percent of the impact on a reach is a de minimis portion of that impact?
A. Well, clearly 50 percent to one-third of the impact is undeniably significant, and so not likely to be de minimis.
Q. Clearly it's not de minimis; right, Allan? That magnitude of impact is clearly not de minimis; isn't that correct?
A. Well, it's clearly significant. And I -- I hesitate to use "de minimis" because I've read Dr. Scheüder's paper and realize that there's legal implications. So I don't know whether there is or is not, so I'm not going to...
Q. Okay. Without asking you to offer a legal opinion, in your work as a scientist in evaluating quantities of whatever you might be

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evaluating, do you ever encounter the term "de minimis" as a scientific term? Is it one you are familiar with and use as a scientist?
A. No.
Q. None at all. Okay. Is there one similar to that that you would use?
A. "Significant," "not significant."
Q. Okay. All right. I want to ask you a little bit more about calibration and go into some detail with respect to Blue Lake spring flow, and this will relate to the use of the concept of spring percentage.
I'd like to hear from you your description of model calibration, what it is, what that process is.
MR. BROMLEY: Objection. Asked and answered. All of this ground was plowed at the 2007 hearing.
THE WITNESS: In brief, it's a process of adjusting certain model parameters to maximize the match between model outputs and field observations.
Q. (BY MR. STEENSON): And why does one calibrate a model?
A. Your hope is to convince yourself and

others that the resulting model predictions are meaningful.

Q. And that they match observed measurements of reality?

A. By matching observed measurements of reality, you convince people and yourself.

Q. Okay. And what is steady-state calibration?

A. That's often used in modeling. It's rarely seen in the real world. But it's taking average conditions and average measurements and trying to match those. That's a condition that, if it existed, there could be continuous stresses and inputs and outputs from the model.

Q. Okay. And what is transient calibration?

A. That matches more real-world situations where there are seasonal changes in aquifer use and spring flows and river flows.

Q. As you've described it, is there a preference in your mind for transient calibration over steady-state calibration, or do they serve different purposes?

A. They serve different purposes. Steady state is often used in ground water modeling.

It's -- particularly if the calibration dataset isn't long, it almost has to be used to constrain a short transient time period.

If the transient time period is long enough, you can often not use in calibration the steady state.

Q. So where you have the data, is it preferable to do transient calibration over steady state?

A. It's preferable, yes.

Q. And could you explain how the automatic calibration software PEST works? That's P-E-S-T as an acronym.

A. Yes.

MR. BROMLEY: Same objection.

MR. STEENSON: I'd be happy to note a continuing objection if you'd like.

MR. BROMLEY: That's fine.

MR. STEENSON: Okay.

THE WITNESS: The software does that comparison between observed measurements and model output. And it makes adjustments in the parameters that you allow it to to maximize those alignments in the observed-in-field observations. It prints out a wealth of statistics throughout

the whole process.

Q. (BY MR. STEENSON): Now, can you explain the procedure used to calibrate the ESPAM model results at the below Milner springs and river reaches? How was the model calibrated below Milner?

A. The same way it was everywhere else.

Q. Using what data?

A. Okay. For the below Milner reaches, the only data were steady-state data. And then there were a few springs that we had data for in the transient.

Q. And one of those springs was in the Devil's Washbowl to Buhl reach, namely, Blue Lakes Springs, for which you had the sufficient data to do the transient calibration; correct?

A. That's correct.

Q. So the model is calibrated in transient form or state to Blue Lake Spring flows?

A. That's correct.

Q. And the source of the measurements at Blue Lakes Springs, do you know where those measurements came from?

A. USGS gauges.

Q. And is that the gauge up at Upper Blue

Lake? I think there's a bridge or something at the downstream end of the upper lake. Is it that USGS gauge?

A. It was -- if memory serves, they -- between 1980 and 2002, somewhere in there they moved the gauge, which is why I said "gauges." But there was some analysis they did to correct the data after they -- between when they moved the gauge.

MR. STEENSON: Okay. I'm going to mark the next exhibit.

(Exhibit 44 marked.)

Q. (BY MR. STEENSON): Allan, do you recognize Exhibit 44 to show what is sometimes called the fit or show -- compare the measured data at Blue Lakes to the modeled data, and by virtue of its calibration?

A. This is from the final report for calibration of the ESPA model. And it's a comparison between the measured, that's the blue, and the model data in the pinkish color.

Q. Does what looks like a fairly tight overlap between the model and measured lines there, does that indicate that the model has been calibrated by PEST so that it is predicting Blue

Lakes flows with a relatively high degree of confidence?

A. It does a very well -- it does a good job on Blue Lakes.

Q. Okay. And the dataset at the Blue Lakes gauge, do you deem it to be adequate for the purpose of the transient calibration, robust enough?

A. It's got a -- in its favor, it has a long time series. A shortcoming is that there are fairly significant gains between Blue Lakes and the time it reaches the river. So it doesn't capture all the flow.

Q. The calibration might be improved by some modifications to the data that's evaluated in the transient calibration mode; correct?

A. Yeah, if -- if the purpose of the gauge were for model calibration, the gauge would have been located in a different place. But --

Q. Right.

A. -- given that shortcoming, it's one of the better datasets that we have.

Q. Now, doesn't this indicate that the model can be used itself indirectly to evaluate and determine the impact of ground water pumping

on Blue Lakes Spring flows?

A. This is certainly a compelling graph. And, you know, if I were able to go to a conference and present a modeling report, I would certainly include this graph in my presentation.

Q. This is like striking the mother lode vein, isn't it, for modelers?

A. The problem is that there aren't enough -- there are far more springs than there are springs with data. And there's nothing to force the model to extract to use the right part of the aquifer to get water to this spring, because not enough of the springs have data. It's not constrained.

So in other words, if we used -- if the committee were to conclude that we can use it for Blue Lakes Spring, use the model for Blue Lakes Spring, the way the trim line is currently defined, you could be in a really bad way.

Q. Now, the trim line, as we've discussed, has its own mortal flaws.

But this avoids the issue, using the model directly because it's been calibrated to predict Blue Lakes' flows, avoids the need to consider reach gains; isn't that correct? It

avoids the issue of the 10 percent uncertainty at the river gauges because you don't have to go down to the river to figure out the relationship between what's happening in the aquifer and Blue Lakes Springs, that is, because the model has been calibrated to predict flows at Blue Lakes Springs?

A. Well, like I said with firearms, horseshoes, darts, the smaller the target, the greater your uncertainty. And the target Buhl -- Devil's Washbowl to Buhl is a much bigger target. You got to have lower uncertainty than 2- to 300 cfs at Blue Lakes. 1500 cfs is bigger. The reach -- what is it? -- 15 miles long, is a bigger target. There's a lot going for the reach.

Q. In the abstract. But here don't we have a graph that is showing us -- you said you would like to present this at a conference if you had the opportunity. Feel free to take it with you and do so as an exemplar example of a model predicting with high level of accuracy and a low level of uncertainty the relationship between the aquifer and Blue Lakes Springs.

Doesn't this graph address the abstract concern about a small target?

A. No. Since most of the adjacent

springs don't have data, I could calibrate this model a multitude of different ways and match these flows and steal water from the adjacent springs upstream or down, and PEST wouldn't know the difference because there's no data constraining it on the adjacent springs.

So in the end, even though the model matches this shockingly well, in reality the underlying uncertainty is huge.

Q. But it is this very same calibration that you used to calibrate the model? Are you then suggesting that the uncertainty in the model itself is huge?

A. Not at the reach.

Q. It seems to me you're pointing out a flaw if you use this spring to calibrate the model, which you said you did, it seems to me, then, the same reason you're thinking you can't use it for Blue Lakes, is the same reason you can't use the model for broadly below Milner?

A. We have targets for all of the reaches. So we can't steal water from the upstream reach because it has to match the upstream reach also. We can't steal water from the downstream reach because we have to match the downstream reach also. So there's very little wiggle room for the reaches.

Q. Now, for the Devil's Washbowl to Buhl reach, the source of the data is Covington and Weaver, correct, that was used for calibration?

A. For version 1, we used Covington and Weaver to apportion the gains computed by Kjelstrom. So Kjelstrom gives an annual flux for the gains below Milner, and then we apportion those by calculating the percentages in the reach in Covington and Weaver.

Q. So which is the better database to rely on, the Covington and Weaver for the reach or this database at Blue Lakes?

A. If all we had were the springs with gauges, then we wouldn't be able to have a model.

What we use the springs for was to force the model to match the seasonal amplitude, which is why Blue Lakes and Box Canyon work so well for us, because they have a nice, long time series. They miss some of the gains that happen below the reach, below the gauge, but that doesn't matter.

What we were looking for was a seasonal amplitude. If we only had steady-state

targets, we didn't have much data to show PEST what the seasonal change in flux was. So that's why we went to the springs. And they provided us with that data.

I trust nobody, on the committee anyway, thought that -- that that would work for going to the springs because there's absolutely nothing to force the model to get it -- the water from the right area in the aquifer.

Q. So do you then believe that this insupportable 20 percent allocation method is preferable to the use of the model itself to predict the impact of ground water withdrawals on Blue Lakes Springs?

A. So are you suggesting that as a post-modeling adjustment that the director could choose to use what happens to be coming out at the spring cell?

Q. And why would it need to be a post-model adjustment? Can't you use the model itself?

A. No.

Q. Okay.

A. No, there's nothing to force it to get the water from the right area in the aquifer. A

rigorous analysis on uncertainty for the spring would result in a huge uncertainty.

MR. STEENSON: Okay. I'm just about done, I think, but I need to take a little break.

THE WITNESS: Okay.

(Recess.)

Q. (BY MR. STEENSON): Okay. Now, I'm trying to understand what you're telling me, and I think I'm getting closer, so bear with me.

We're talking about the Devil's Washbowl to Buhl reach; correct?

A. Correct.

Q. Okay. And your concern is that within that reach we have calibration and good fit for Blue Lakes Springs?

A. Uh-huh.

Q. But that there may not be the same level of data for the other springs within that reach; correct?

A. Correct.

Q. And so in the absence of that data for the other springs, you think we can't rely on the model's predictions for Blue Lakes Springs; correct?

A. The upstream spring, let's say it

should be flowing at 100 cfs, but in order to match this (indicating), it's flowing at 5.

Q. Okay. Now, what are the other springs that you can think of in that reach? There's Crystal; correct? Major spring within that reach.

A. Springs that I'm familiar with in that reach are Devil's Washbowl, Devil's Corral. There's Allison, there's Crystal, and there there's Niagara. That's the ones that I know.

Q. Okay. And those are major ones within that reach; correct?

A. Uh-huh.

Q. Okay. I'm going to hand you four pages to be marked as the next exhibit.

(Exhibit 45 marked.)

Q. (BY MR. STEENSON): So right now this analysis you can't defend uses this percentage spring allocation based on this linear analysis that really has absolutely nothing to do and reflects in no way what is occurring in the aquifer; correct?

A. Correct.

Q. Correct. So at least with regard to Blue Lakes Springs, the model does connect what's happening at the springs to the aquifer; correct?

A. It matches the observations.
Q. Right.
A. We don't know what it does to some of the other springs.
Q. And the other springs you do have data. I want you to go through each of the ones that are indicated in the exhibit I gave you.
Devil's Corral, there is data?
A. Uh-huh.
Q. What has been the analysis, or has there been calibration there at Devil's Corral?
A. Yes.
Q. Calibration similar to what's been done at Blue Lakes Springs; correct?
A. Similar, yes.
Q. Okay. And then the next one is Devil's Washbowl.
Does that indicate that the Devil's Washbowl has been calibrated to the model, as was the case with Blue Lakes?
A. Yes.
Q. And the next one is Crystal.
Is the case true there that Crystal has been calibrated through the model?
A. Yes.

Q. And with regard to Briggs, does that sheet there indicate that that's been calibrated through the model?
A. Briggs is not in this reach.
Q. Not in the reach. Let's remove that from this exhibit.
So then there's Niagara Springs.
Has there been an effort to calibrate Niagara Springs, or is there data that could be used to calibrate Niagara?
A. According to Cindy Yenter, the watermaster for Water District 130, no.
Q. Now, you know, there are two facilities there. There's the Idaho Power facility and there's the Rimview facility.
Has Cindy indicated to you that there's no way to measure the water, or the data hasn't been collected for purposes of calibration?
A. If memory serves, there's a third water user. And I've -- at the request of John Koreny, I've gone there twice and met with Cindy. And she has convinced me that -- both times that there are so many adjustments based on time of the year, where the water goes, who gets it, and what happens with it that it's difficult -- difficult

to truly quantify it. And if the purpose is to get the seasonal, then she says it's not a proper dataset to use.
Q. Okay. So if we could get a proper dataset for Niagara, what percentage of the spring flow would we have to have calibrated, in your view, to be able to use the model to predict impacts at Blue Lakes Springs using the calibration data I showed you, would we have to have 100 percent of the spring flow in this reach measured and calibrated, or would some lesser percentage be adequate?
A. I suspect we could get by with some lesser percentage.
Q. Okay. And is that an area of inquiry that you're willing to take a look at?
A. We're always striving to get more of the springs included.
Q. In fact, this will be the last exhibit.
Please mark that as 46.
(Exhibit 46 marked.)
Q. (BY MR. STEENSON): Are you familiar with Exhibit 46?
A. I believe so.

Q. Could you describe to me what it is.
A. It's a presentation I made at the last ESHMC modeling committee meeting on calibration targets for version 2.
Q. Okay. And give me an executive summary of your presentation.
A. The executive summary is that I decided to do away with the steady-state targets, and we included gauged reaches below Milner. And we added one -- we added Rangen to the calibration target for the springs.
Q. So is part of your executive summary that you are proposing further transient calibration in the updating of the model, such as is done at Blue Lakes Springs?
A. We're going from 1980 to 2006. There are -- Rangen is another fairly rich dataset that we're getting, go from 1980 to 2006. And we'll be able to get Blue Lakes and Box. And John Koreny updated the Snake River Farm, and so we're including that. I trust John will be able to get Crystal data, so we'll be able to update that. And Box and Blue Lakes are USGS, so we'll have those updated, and Devil's Washbowl is USGS also. So longer time series and an additional spring.

And we're also in the process of installing gauges using the CAMP money on some additional springs.
Q. Back to Exhibit 45, the prior one, in addition to those springs that are indicated there and Niagara, are there any other springs in the Devil's Washbowl to Buhl reach for which you think there has to be data and calibration before the Blue Lakes data and calibration can be used as a basis for determining the impacts of ground water pumping on Blue Lakes Springs using the model?
A. I would have to look at the Covington and Weaver and probably even make another tour through the reach --
Q. Would you --
A. -- before I could do that.
Q. Sorry. Would you agree that if your concern about the lack of data for some of the other springs in the reach can be resolved and the calibrations that need to be done and haven't been done do get done, that it would be preferable to use the model to predict the impact of ground water pumping on Blue Lakes Springs, as opposed to this 20 percent allocation method that's been adopted?
A. So if I could be convinced that enough

of the flux was accounted for in that reach?
Q. Yes.
A. Then -- then the model could be used to directly determine the flow at Blue Lakes.
Q. And it could then be used with less uncertainty, correct, than is currently imputed as a result of the 10 percent error in the river gauges, since the river gauges would no longer be a factor?
A. Well, with any luck at all, the current uncertainty definition would -- is going to go away. We're going to -- I'm very excited about going and doing a rigorous uncertainty analysis. So that placeholder is, I hope, going to go away.
Q. And I'm sorry if you discussed that during this deposition already, but when is your analysis that you're excited about doing going to begin?
A. As soon as we finish calibrating version 2.
Q. Okay. And what are you going to do? How will that analysis proceed?
A. We've been talking in the ESHMC modeling committee meetings about how -- exactly

how to go about that. We've talked about various sources of uncertainty, and we've talked about two different techniques. And one possibility would be using both of the techniques, which would be a third alternative.
One alternative is that instead of coming out of the modeling process with a model, you come out with a suite of models, one of them being the favorite, and the other models are used to get a picture of what the uncertainty looks like.
So maybe you have six, one is your favorite, the others are used as -- to get a picture of what the uncertainty distribution might look like.
Another technique is to do kind of what I did before, which is to stretch the model every which way you can and see what the extremes of the predictions might look like. And by stretching it, you still force it to be calibrated.
And so it's possible to see how you can merge those two. You would stretch every one of the perhaps six models, and that would give you a broader picture of what the uncertainty might

look like.
Q. What's the time frame for that work?
A. Well, version 2 is supposed to be done in July of 2009.
Q. Yeah. Okay. Beyond that facetious response, Allan, what really is your --
A. I think the uncertainty analysis would certainly take three modeling committee meetings, so that would be six months after we finish version 2.
Q. Which may be when?
A. Well, when we pushed it back in July, we were going to get done in December. But I haven't got a calibration dataset yet. So I don't think there's any hope of being done in December.
Q. So in the meantime, if your concerns about I guess what you are thinking is an incomplete dataset for the other springs in the Devil's Washbowl to Buhl reach can be resolved, then I take it you would be certainly willing to talk with Blue Lakes' expert or others about the possibility of using the model directly here, given the calibration of the model? You're a scientist?
A. Uh-huh.

Q. Is that a "yes"?
A. Uh-huh.
MR. STEENSON: I think that's all I have. Thank you, Allan. I appreciate it.
MR. BROMLEY: So the question becomes, now what do we do? I've got some questions I want to ask. But Candice, I'm sure, has some questions that she wants to ask. So --
MR. STEENSON: I'm going to have to go get a daughter here, I think, pretty soon.
(Recess.)
(Mr. Simpson present.)
MR. BROMLEY: Back on.

EXAMINATION
BY MR. BROMLEY:
Q. Allan, Chris Bromley for the Department of Water Resources, I guess to start off with.
Allan, we've sat through discussions with John Simpson and Dan Steenson primarily about methods concerning the 10 percent uncertainty and then spring apportionment to Blue Lakes and Clear Springs respectively.
Was any of the information presented

to you today new to you?
A. No.
Q. Was the information presented today discussed at the 2007 hearing?
A. Most of it, yes.
Q. Do you know what wasn't?
A. There were different expert reports presented, but much of the information in the expert -- the new expert reports were in previous expert reports.
Q. The information that was in Dr. Brockway's expert report concerning spring apportionment to Clear Springs that was discussed this morning, was that in an expert report or discussed at the prior hearing in 2007?
A. Yes. In Eric Harmon's report there was -- a very similar sort of analysis was presented. I believe Dr. Brockway used some different -- different wells. And my recollection is that Mr. Harmon did not use Clear Lakes Spring as one of his springs.
Q. Has anyone previously used Clear Lakes Springs with this regression analysis that was talked about?
A. I suspect that Laura Janczak did.

Q. And are you aware approximately when the Janczak paper or thesis was published or known to people?
A. 2001.
Q. So that was before the hearing, then?
A. Yes.
Q. The information in the white paper -- I can't remember what exhibit it was tagged at.
MR. STEENSON: 40.
MR. BROMLEY: 40. Okay.
Q. Exhibit 40, the white paper that was submitted to the modeling committee by Koreny and Brockway, what's your opinion of the white paper?
A. I felt it was a waste of committee time. The -- in my opinion, the trim line is a policy. And I don't believe that that's committee business. Much of the material there is already presented in -- between Ms. McHugh's examination of me and Mr. Simpson's examination of me in the hearing.
(Ms. McHugh rejoins the proceedings.)
Q. (BY MR. BROMLEY): The 2007 hearing?
A. The 2007 hearing, much of that information was covered there. The new thing in there is the -- that they present the results of a

1 percent, the -- Mr. Simpson and I discussed the errors in there, so if we exclude those errors of trimming the data to the Water District 130, then -- and we exclude what was covered in the 2007 hearing, then the 1 percent information is what is new.
Q. This is the 1 percent uncertainty that the white paper assigns to the model?
A. Well, the 1 percent trim line.
Q. The 1 percent trim line. Is that getting at what a de minimis impact would be; is that your understanding?
A. It could be. I -- I'm uncomfortable with what a true definition of "de minimis" might be.
Q. Do you have any opinion as to where that 1 percent may have come from?
A. I believe that what Mr. Koreny was trying to do was split the difference between the 10 percent and what's used in Colorado.
Q. And do you know what's used in Colorado?
A. No. I did read Dr. Scheüder's expert report, but I don't remember.
Q. Somewhere in the neighborhood of

1 percent?
A. It's less than 1 percent.
Q. Okay. Mr. Steenson provided you with Exhibit 43, which was a definition of the scientific method.
A. Yes.
Q. And I believe you read that and agreed with what it stated.
Was the information presented to you in Exhibits 44 and 45 consistent with the scientific method as Mr. Steenson was asking you to apply them?
A. Exhibit 44 and 45 were taken from the report, the final report that IWRRI published on calibration of version 1.1 of the model. And we tried to be very scientific and rigorous in calibration of the model.
What Mr. Steenson was trying to drive at was using the model to calculate what the -- directly determined the flux at Blue Lakes Springs. That may or may not be scientifically defensible. I will -- I would want to look at quite a bit more data, much more carefully.
Q. For what reasons would it not be defensible?

A. I would want to make sure that enough of the flux in that reach is accounted for with viable calibration targets before I would be comfortable using the model to predict flow at the Blue Lakes Spring. Without sufficient data, the model could be stealing water from up or downstream springs to help it match Blue Lakes so shockingly well.
Q. By that do you mean that there aren't any other parameters that these other springs that the model tries to replicate what's measured at Blue Lakes Spring, and could take water from a different location that doesn't necessarily match reality?
A. That's right. It could be doing unspeakable things to match this so well. And the fact that it matches it so shockingly well, it's seductive to a nonmodeler. To modelers, it makes you suspicious that you're joining the liar's club.
Q. The measurements in Exhibits 44 and 45, did you say that these were from IWRRI?
A. IWRRI's report on the -- final report on the model calibration.
Q. Okay. And that, again, was available

prior to the 2007 hearing?
A. That's correct.
Q. And was any of this information presented at the 2007 hearing?
A. The final report is in the record. I don't recall talking about these graphs.
MR. BROMLEY: Okay. I have nothing further.
MS. McHUGH: Okay.

EXAMINATION
BY MS. McHUGH:
Q. I just have a few questions for you, Dr. Wylie. I'm Candice McHugh, representing the ground water districts.
Could I have you look at Exhibit 41, I believe it is. It would be the transfer guideline.
A. Yes.
Q. Okay. And if you'd turn to page 12, paragraph 12.
A. Okay. I'm there.
Q. And it deals with changing the points of diversion, is that correct, on a proposed transfer?

A. Yes.
Q. And --
A. Within the Eastern Snake Plain Aquifer.
Q. Right. If a transfer proposed to not actually move a point of diversion, would paragraph 12 be applicable?
A. Could you ask that again, please?
Q. If the transfer was only proposing to change the season of use or the nature of use but not to actually change points of diversion, would paragraph 12 be applicable?
A. I don't know. I know a lot about the model. I don't know anything about transfers, really.
Q. Okay. And you may have covered some of this with Mr. Bromley. I apologize for walking in late, so I don't mean to be redundant. But I wanted to follow up on some of the statements you stated about the ESPA and things looking bleak.
A. Okay.
Q. Do you recall that?
The assumption when you made those statements was that the drought would continue; is that correct?

A. One of the scenarios we did was a continuing drought, yes.
Q. So if the drought were to end or if there would be a series of wet years, that could affect your statement?
A. Yes.
Q. And you haven't done any analysis on what specific springs are most affected by drought, have you?
A. No.
Q. And are you generally aware of the size of the ESPA and the amount of water generally known to be available in it?
A. The press frequently states that it's the size of Lake Erie.
Q. Okay.
A. Whether that means the same footprint as Lake Erie or the same amount of water, I don't know.
Q. Okay. So is it your understanding that the ESPA water levels are still higher than they were in like 1900, for example?
A. That was true five years ago. I don't know whether that's true today or not.
Q. Okay. Have you seen any graphs of

spring output from the Thousand Springs --
A. Yes.
Q. -- relating to the current spring discharge and over time?
A. Yes.
Q. And do you recall what that shows?
A. The graphs produced using the Kjelstrom model?
Q. Yeah.
A. It shows that spring discharges are still above what they were in 1900.
Q. Are you aware of how much inflow there is to the aquifer from precipitation and tributary underflow, generally?
A. Precipitation, tributary underflow, incidental recharge, and river seepage total up to about 7 1/2 million acre-feet per year.
Q. And are you familiar with the amount of water that is consumed by ground water pumping?
A. About 2 million acre-feet per year.
Q. Let me just look through my notes.
Are you aware of what direction the flow of water takes in the aquifer, generally?
A. Generally, from the northeast to the southwest.

Q. Are you familiar where the Pioneer Mountains are in Idaho?
A. They are on the western edge of the plain.
Q. Near Sun Valley?
A. Yeah. I was going to try to reference them to the Lost River Range, but Sun Valley is good.
Q. And you answered that question. And that's where the Lost River is located?
A. Yes.
Q. On the western side of the Eastern Snake Plain?
A. That's correct.
Q. Okay. The regression analysis that I believe Mr. Simpson questioned you about that Dr. Brockway had performed, do you recall that line of questioning?
A. Yes.
Q. Do you know, was that regression analysis presented by Clear Springs in the Thousand Springs hearing?
A. No. There was one similar by Eric Harmon.
Q. Okay. And Mr. Harmon's regression

analysis, did it actually attempt to explain or increase the actual amount of water that flows out of the Snake River Farms spring complex?
A. I don't know if this is what you're asking or not, but my recollection, I don't recall that Mr. Harmon used -- did a regression analysis for Snake River Clear Lakes Spring. My recollection is that he did Blue Lakes and Box Canyon, but I -- it's been a couple of years since I've read his report.
Q. When you read Mr. Harmon's report, was it your impression that he was attempting to come up with a different percentage that the springs should be considered to enjoy if a reach of a river was increased?
A. My understanding was that Mr. Harmon was presenting a different technique to use in lieu of the percentage method to calculate to determine the -- to apportion the reach gains to the spring.
Q. And -- I'm sorry.
A. Did that make any sense?
Q. Yes, absolutely. Thank you.
And was his analysis the same as Dr. Brockway's or a little bit different?

A. My recollection is that they're very similar. He used different wells and different springs, but the technique is very similar.
MS. McHUGH: I don't have any further questions. Thank you.
MR. SIMPSON: I just have a couple follow-ups.

FURTHER EXAMINATION
BY MR. SIMPSON:
Q. Allan, do you recall your testimony at that hearing where you observed that the conceptual concept testified to by Mr. Harmon regarding the correlation between aquifer levels and spring flows should be looked at?
A. I recall, yes.
Q. And you identified that that's something the Department should continue to look at, is that not true? Well, do you believe that the Department should continue to look at those sorts of methods in order to better describe the relationship between the aquifer and spring flows, or is that something we should just put on the shelf and never look at again?
A. I don't -- I'm not the director.

It -- as I've said, it has a certain appeal. There are reservations, and we've talked about my reservations. And those could be looked at, but it's --
Q. Well, just as a hydrogeologist, do you believe that that method should continue to be analyzed?
A. Continue to be analyzed? I think it's known that it works, and has been known for more than 20 years.
Q. Okay. But the problem's been in some cases we just didn't have adequate data to take what we know that works to apply it on the ground; would that be fair?
A. That might be why Director Dreher didn't do it. I don't know.
Q. Well, if you knew about it in 2001 or shortly thereafter, the Janczak --
A. Janczak.
Q. -- Janczak investigation, and then you did your own investigation shortly after 2001, then can you explain to me why you didn't look at that analysis when you were involved in the spring percentage calculation?
A. I did what the director asked me to.

Q. So the director asked you to compare Covington and Weaver to spring flows to come up with that percentage?
A. The director asked me to calculate that percentage.
Q. In the manner that you did?
A. And I had no idea how it was going to be used.
Q. Okay. But he didn't give you the flexibility to come back and say "What about this alternative method, the regression analysis?"
A. My recollection -- and it -- it happened over a fairly long period of time, so it wasn't one single conversation -- was the director asked me about calculating flow at springs.
I said the dataset just wasn't rich enough in spring data to do that. And I explained to him, like I have here, why that is. And then some weeks later the director asked me to calculate the ratio for Blue Lakes.
Q. Using the Covington and Weaver?
A. Yes.
Q. Okay.
A. And then it showed up in an order, and I told the director that that wasn't

scientifically rigorous, that I couldn't support it. He assured me that it was a post-modeling administrative adjustment. And I said okay.
Q. Okay. At that time did you describe to him that you had in your mind alternative methods for making that determination, such as the regression analysis that you had completed on wells and springs shortly before that time?
A. No.
Q. Were you not given that opportunity, or did you just not take advantage of it?
A. I generally -- I avoid getting involved in administrative decisions. I have plenty to do without taking on additional responsibilities.
Q. That's because you like your job?
A. I like doing science.
Q. Okay.
A. I don't like making administrative decisions. I really like doing science.
Q. Do you ever have concerns that if you get involved in administrative decisions or making administrative suggestions that your job would be in jeopardy?
MR. BROMLEY: Objection. Form.

THE WITNESS: No.
Q. (BY MR. SIMPSON): Okay.
A. I don't think my job would be in jeopardy. I think I would be sucked up with administrative decisions instead of doing science. I want to minimize the administrative decisions and maximize the science.
Q. One last question, perhaps. You indicated just a few minutes ago that with respect to the trim line document that Dr. Brockway and Dr. Koreny submitted to the technical committee, is it fair to say you objected to that document being discussed at the committee, or that it wasn't the proper location for that committee to consider the trim line document?
A. It wasn't the proper venue for the trim line to be discussed.
Q. Okay. Because the trim line, as you described it, was a policy decision?
A. Yes.
MR. SIMPSON: Okay. Okay. That's all I have.
MR. STEENSON: Yeah.
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FURTHER EXAMINATION
BY MR. STEENSON:
Q. I have one more question from the liar's club.
The exhibit that you were referring to is the graph you produced, was it not?
A. Yes.
Q. And it's a reflection of calibration that you perform in service of a model that you have at least had a significant hand in constructing; correct?
A. Correct.
Q. Okay. And so as we discussed, it may be very appropriate to utilize the calibration of the model to Blue Lakes Springs, in your mind, if any gaps in spring-flow data and calibration in the Devil's Washbowl to Buhl reach can be filled; correct?
A. Yes. If sufficient percentage of the flux, the discharge in that reach is accounted for.
Q. And as we discussed, there are perhaps two major springs of five where additional data could be collected, but three of the five there has been calibration by you through the model;

correct?
A. Correct.
Q. So the gap may not be very large, and we may not be very far away from being able to use the calibration of the model to Blue Lakes Springs to evaluate the impact of ground water withdrawals on Blue Lakes Springs; correct?
A. It -- we may not be very far from me being comfortable to do that. I -- that would be a director's -- would make the final call on that.
Q. So you weren't trying to indicate by your testimony that the proposal didn't have some merit, were you?
A. Pardon?
Q. You weren't trying to indicate by your characterization of this concept that it didn't have merit?
A. No. I'm just pointing out that I am not going to be the one that makes that final call.
MR. STEENSON: Okay. Thank you.
MR. BROMLEY: One or two follow-ups.
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FURTHER EXAMINATION
BY MR. BROMLEY:
Q. Dr. Wylie, Allan, Mr. Simpson was asking you about the forum in which the white paper was presented.
Irregardless of the forum, what's your opinion of the technical information that's contained in the white paper, Exhibit 40?
A. Most of it is not new. The new part is their proposal or illustration of the impact of a 1 percent trim line, as opposed to a 10. That's new information.
Q. Okay. And the regression analysis, if you could just explain to me briefly, what is a regression analysis?
A. It's a mathematical procedure where you establish a relationship between two variables, in this case one being the elevation of the water level in the aquifer observed in a well, and a discharge at a nearby spring.
And it turns out that that tends to be -- that's a linear relationship. The elevation to water level does a very good job of explaining the discharge in the nearby spring.
Q. And this is a technique. Is this a

new technique? an ancient technique? a more modern technique? I'm just curious when it was developed, who developed it, if you have any idea?

A. It's used -- it's one of the equations used in Modflow, so it's been around -- Modflow was published in 1989. So it's been around for 20 years.

The linear regression techniques no doubt have been around for a hundred or 200 years.

Q. And these regression techniques, were they used by Mr. Harmon in his report and Ms. Janczak?

A. Yes.

MR. BROMLEY: Nothing further.

(Deposition concluded at 4:43 p.m.)

(Signature requested.)

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REPORTER'S CERTIFICATE

I, JEFF LaMAR, CSR No. 640, 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 23rd day of November, 2009.

JEFF LaMAR
NOTARY PUBLIC
STATE OF IDAHO

JEFF LaMAR, CSR NO. 640
Notary Public
Eagle, Idaho 83616

My commission expires December 30, 2011

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EXHIBIT B

White Paper
Technical Evaluation of Trim Line

Submitted by the following members of the Eastern Snake Hydrologic Modeling Committee:

John Koreny, HDR, Inc.
Charles E. Brockway, Brockway Engineering, PLLC.
Willem Schreuder, Principia Mathematica
John Bowling, Dave Blew, Idaho Power Co.
Jim Brannon, Leonard Rice Engineers, Inc.

June 5, 2009

1.0 INTRODUCTION

1.1 Background

The authors of this White Paper have completed a technical analysis of the 10 percent trim line concept developed by the Idaho Department of Water Resources (IDWR). The trim line delineates the area within the Enhanced Snake Plain Aquifer Model (ESPAM) boundary where individual aquifer depletions by junior-priority ground water pumping are assumed to result in less than 10 percent depletion to an identified spring reach at steady state. Pumping outside of the trim line is not included in the model impact simulation and is incorrectly assumed to have no effect on spring flow. IDWR uses the 10 percent trim line to: 1) determine areas where junior-priority ground water users are no longer responsible to mitigate for the impacts of their aquifer depletions on individual springs; and 2) identify acceptable forms of mitigation based upon geographical location either within or outside of the 10 percent trim line. Our analysis is submitted at the invitation of Director David Tuthill to members of the Eastern Snake Hydrologic Modeling Committee (ESHMC), as described in the Feb. 25, 2009 letter in **Attachment A.** The letter states the following topic for ESHMC consideration: "*As part of the uncertainty analysis, should the ESHMC address the technical aspects (not policy issues) of a trim line as a function of uncertainty.*" The underlying issue is how to correctly determine and utilize model uncertainty in evaluating ESPAM outputs.

Exh. No. 40
Date 11/13/09
Name Wylie
M & M Court Reporting

The ESPAM model is used to quantify the relationship between withdrawals from and additions to the Eastern Snake Plain Aquifer (ESPA), and ESPA groundwater levels and spring flows emanating from the ESPA. Although model uncertainty has not been quantified, IDWR has assigned 10 percent uncertainty factor and incorrectly linked model uncertainty to a trim line. In his February 25th letter, the Director states that "*The development of a more scientifically based error factor should be a priority in improvement.*" The Director recommends further analysis and data collection, "*to minimize uncertainty in future versions of the ESPAM Model*", and states that, "*The investigation of uncertainty should be accomplished through regular committee analysis and discussion.*"

The Director's letter explains that: "*The purpose of the trim line or clip was to avoid curtailing ground water users who might have no effect on enhancing reach gains.*" The letter also suggests that the trim line delineates ground water withdrawals that have a *de-minimus* effect on spring and surface reach gains.

Based on our analysis, we have reached the following conclusions:

1. The inference that ground water withdrawals outside the 10 percent trim line might have no effect on reach gains based on an assumed model uncertainty of +/- 10 percent is incorrect. A 10% error factor does not mean that ESPAM outputs could be 100% inaccurate with respect to ground water withdrawals that occur beyond the trim line. The correct interpretation and use of model uncertainty is that each withdrawal and addition of water to the ESPA will have the ESPAM-predicted effect on reach gains, subject an error factor, which may or may not be +/- 10 percent.

2. Ground water withdrawals beyond the 10% trim line do not have a *de-minimus* effect on spring and surface reach gains. The cumulative impact of the pumping by junior-priority ground water wells located outside of the 10 percent trim line reduces the spring flow by between one-half to one-third of the total flow impact. A reduction of the senior's supply by one-half to one-third is obviously significant and is well above a *de-minimus* impact. The 10 percent trim line is clearly excluding a large majority of the ground water pumping that does in fact have an impact on spring flow.

3. The uncertainty of the ESPAM model has not been determined.
4. The uncertainty of most of the model calibration data, especially the data used to calibrate the below-Milner spring reaches is much less than 10 percent.
5. The trim line has nothing to do with model uncertainty. The trim line is simply the boundary identified by the Director of the Department of Water Resources that designates those wells where individual aquifer depletions by junior-priority ground water pumping are assumed to result in less than 10 percent depletion to a spring reach. The trimline as used by the Director is not justified. Some other procedure needs to be developed that more closely identifies those ground water users that collectively have a *de-minimus* impact on spring flow.

As discussed in Section 3.0 of this White Paper there is a continuing need for improved methods to simulate spring flow and to evaluate impacts at individual springs. The authors of this White Paper would like to submit information for consideration of these topics for additional discussion.

Tables and figures are presented at the conclusion of the text. A PowerPoint presentation prepared for the Eastern Snake Hydrologic Modeling Committee (ESHMC) is presented as **Attachment B**. An email from Dr. Richard Allen is cited in **Attachment C**.

2.0 TRIM LINE

2.1 What is the Trim Line?

The 10 percent trim line defines the area within the Eastern Snake Plain Aquifer (ESPA) model boundary where individual aquifer depletions by junior-priority ground water pumping are assumed to result in less than 10 percent depletion to an identified spring reach. The location of the area within the trim line for the Devils Washbowl to Buhl and Buhl to Thousand Springs reaches is shown on **Figures 1** and **2**.

IDWR's technical basis for the 10 percent trim line is that some of the model calibration data, specifically the Snake River gage data, is only accurate to within 10 percent. The 10 percent uncertainty in the model is therefore assumed to be the same as the error in the Snake River gage data used as part of the calibration data in the model. The errors in this and other assumptions regarding the trim line are explained below.

2.2 The Trim Line is an Incorrect Interpretation and Use of Model Uncertainty

The following issues with the model uncertainty rationale for the trim line were identified during our review.

a) **The uncertainty of the ESPA model has not been established.** Model uncertainty is based on a combination of uncertainty in the conceptual model, the input data, calibration targets and numerical error. These errors can compound or cancel each other out. Specifying a single uncertainty value to the entire model based on the accuracy of a single parameter is not technically valid.

b) **Model uncertainty is not addressed by a trim line. The 10 percent trim line criteria is not related to model uncertainty.** The trim line has nothing to do with model uncertainty. The trim line is simply the boundary identified by the Director of the Department of Water Resources that designates those wells where individual aquifer depletions by junior-priority ground water pumping are assumed to result in less than 10 percent depletion to a spring reach.

   Model uncertainty is the error of the model output caused by uncertainty in the model input data, calibration data, failures in the conceptual model or numerical error. In the case of the ESPA model, the uncertainty in the output applies to junior-priority ground water pumpers both <u>inside and outside of the trim line</u>. Also, the model uncertainty is plus or minus the model-calculated impact. For example, if 10 cfs of consumptive-use pumping by a junior-priority ground water user reduced flow at a spring reach by 1 cfs, then a 10 percent model uncertainty factor would mean that the junior-priority ground water user had a 1 cfs impact plus or minus 0.1 cfs. Therefore, there is no justification to only apply model uncertainty to wells within a certain area of the aquifer or to reduce the calculated impact due to model uncertainty. **The measurement error of many of the model calibration targets is much less than ±10 percent.** The reason cited for the 10 percent trim line is the error in the Snake River gage data used for model calibration. This is not justified for several reasons. First, the individual and reach gain spring flow data (not Snake River gage data) is used for model calibration in the below Milner reaches. Second, it is factually incorrect to assume that the uncertainty in simulated model output is the same as Snake River gage data, which is the least-accurate calibration data. The model uncertainty is a function of the uncertainty in all the calibration data, and most of the model calibration data are more accurate than 10 percent, as described below.

Ground Water Level Calibration Data The largest calibration dataset for the model is field-measured ground water levels in wells. Ground water levels are usually measured to an accuracy between 0.01 to 0.1 feet, which is less than a 1 percent uncertainty for the vast majority of wells measured when compared to the total ground water surface elevation across the aquifer or the seasonal vertical change in ground water levels at a well.

Spring Flow Calibration Data The model calibration in the west half of the ESPA at the below-Milner spring reaches uses spring flow measurements for model calibration. The steady state spring flow calibration data was compiled from measurements at flumes, weirs or pipelines and reported in the 1991 USGS report by Covington and Weaver.[1] The transient calibration was performed using data from individual springs. The flow measurements at many of the individual springs (such as Blue Lakes Spring and Clear Lakes Spring) were

[1] Covington, H.R. and J.N. Weaver, 1991. Geologic Maps and Profiles of the North Wall of the Snake River Canyon Thousand Springs and Niagara Springs Quadrangles, Idaho. USGS Misc. Investigations Series, Map 1-1947-C. U.S. Geological Survey, Boise, ID.

collected from facility diversions with measurement structures (weirs or flumes in pipelines, canals and open ditches) used for administration and delivery of water.

The spring flow data used for model calibration was measured more accurately than river gage data. Spring flow measurements are collected using a standard weir or flume and are more accurate because both the cross-sectional area and water stage is known and the total flow can be calculated using standard equations to a precision of about 2 percent.[2] Where pipe flow meters are used for measured spring flows, the accuracy is also about 2%. Measurements in pipes or canals without weirs or flumes using a flow meter are also more accurate than a river gage because the cross-sectional area of flow is regular and defined. The precision of a flow meter for these types of measurements is generally considered to be 95 percent or less. Therefore, the accuracy of the calibration data for the below-Milner springs is probably from 2 to 5 percent.

c) **The breakdown of river reaches inappropriately influences the 10 percent trim line area.** The determination of the trim line area is largely dependent on the size of the reaches specified in the model. Although there are other factors that influence the trim line area (like the water right priority), if these factors are held constant, then larger river reaches will have larger trim line areas and smaller river reaches will have smaller trim line areas. This is part of the reason for the difference in the trim line developed for the Devils Washbowl to Buhl reach (**Figure 3**), Buhl to Thousand Springs reach (**Figure 4**) and Thousand Springs to Malad Gorge reach. The impacts analysis quantity should not be determined by the spatial assignment of the spring reaches.

[2] U.S. Bureau of Reclamation, 2001. Water Measurement Manual, U.S. Bureau of Reclamation, Denver, CO, pg. 7-1.

2.2 The Trimline Does Not Delineate De-minimus Impacts

The use of a 10 percent trim line does not account for the cumulative depletion from wells located outside of the trim line and drastically under-predicts the actual impacts to spring flow. The data on **Tables 1** and **2** show that a 10 percent trim line clipped to WD 130 excludes 89 percent of the ground water irrigated acres on the ESPA and 46 percent of the total impact of junior-priority ground water pumping on the Buhl to Thousand Springs reach. **Table 3** and **4** show that a 10 percent trim line clipped to WD 130 excludes 79 percent of the ground water irrigated areas on the ESPA and 35 percent of the total impact of junior-priority ground water pumping on the Devils Washbowl to Buhl reach. The data in **Table 3** and **4** shows that junior-priority wells with a known and quantified impact to a senior spring user are being excluded from administration. There is no reasonable technical justification to disregard the cumulative impacts from individual ground water depletions located outside of the trim line if they are a major portion of the total impacts to spring flow. This procedure essentially discounts depletions outside the trim line and, if a trim line boundary is to be employed, it could be argued that similar contributions to the aquifer outside the trim line should also be discounted. For instance, any known changes in input such as crop consumptive use changes, changes in tributary underflow or conversions over the remainder of the aquifer might be considered as non-contributory and not considered in the evaluation of changes in spring flow. If they are considered non-contributory they are then defacto non-tributary which hydrologically is simply not correct.

In our experience applying hydrologic models for water right or water supply impact determinations for transfers or new water right applications, a trim line is not used to exclude the cumulative impacts from individual wells on a river or spring. Water users are typically required to provide mitigation for the extent of their impacts as determined by a calibrated model or another analytical procedure. The State of Colorado has established a threshold for administration of impact of a well on a surface water body that cannot exceed one tenth of one percent of the amount of production of the well. This standard accounts for the cumulative significant depletive effects from many wells on pumping surface water.

Tables 2 and **4** show that IDWR's use of the 10 percent trim line disregards the cumulative depletion from individual ground water wells outside of the trim line and thus reduces the determination of impacts from junior-priority ground water pumping to about 54 to 65 percent of the actual predicted impact to the spring reaches. A procedure that fails to identify 35 to 46 percent of the total impacts to spring flow is not reasonable or justified and does not correctly identify pumpers with less than a de-minimus impact on the spring.

As a point of comparison, we selected a 1 percent trim line area using the same method in the 2005 Order for the 10 percent trim line. The 1 percent trim line was only used as an example to show that the 10 percent trim line fails to identify junior-priority wells that cause a large percentage of the impacts to spring flow. The 1 percent trim line (see **Figure 3**) identifies the area where individual aquifer depletions by junior-priority ground water pumping will result in less than 1 percent depletion to the spring reaches. **Tables 2** and **4** show that a 1 percent trim line identifies most of the impacts by ground water pumping on the spring reaches as compared to the 10 percent trim line. For example, assuming a 1971 priority date, the 1 percent trim line provides 95.5 cfs at the Devils Washbowl to Buhl reach which is almost as much as all of the pumping in the entire ESPA (96.3 cfs), as shown on **Figure 4**. Use of a 10 percent trim line reduces the determination of impacts to the Devils Washbowl to Buhl spring reach to 63 cfs, which is only 65 percent of the full impact to the spring from junior-priority ground water pumping, simply due to the position selected for the trim line.

3.0 NEED FOR IMPROVED METHODS TO SIMULATE SPRING FLOW AND TO EVALUATE IMPACTS AT INDIVIDUAL SPRINGS

The ESHMC is currently involved with development and calibration of Version 2 of the ESPAM model. We believe that the representation of individual springs and spring reaches in the model needs more improvement, with respect to both spring flow calibration dataset and the details of the drain boundary.

The ESPAM model results have been used to predict the impacts from ground water pumping to spring flow reaches. This is accomplished by using the model to determine the impacts at a reach and then assigning a portion of the impact to an individual spring based on the measured amount of flow arriving at the spring as compared to the reach. This method introduces many potential errors and the results are highly dependent on the discretization of the spring reaches and the assumptions used to estimate the spring flow occurring at an individual spring as a percentage of the total spring flow in a reach. If there are multiple users from a spring, the method also has to assign the percentage of flow between users.

Recognizing the necessity for use of the ESPAM model in both planning and administration these issues should be addressed by the ESHMC and recommendations provided to the Department.

4.0 REFERENCES

Covington, H.R. and J.N Weaver, 1991. Geologic Maps and Profiles of the North Wall of the Snake River Canyon Thousand Springs and Niagara Springs Quadrangle, Idaho. USGS Misc. Investigations Series, Map 1-1947-C. U.S. Geological Survey, Boise, ID.

US Dept. of the Interior, Techniques of Water-Resources Investigations of the USGS, Discharge Measurements at Gauging Stations: Book 3, Chapter A8 pg 3, 1984.

US Dept. of the Interior, Techniques of Water-Resources Investigations of the USGS, Computation of Continuous Records of Streamflow : Book 3 Chapter A13 pgs 45-52, 1984.

Table 1 **Areas associated with priority dates junior to 1955 and 1964 for trim lines over the entire ESPA and using a 1% trim line and a 10% trim line for the Buhl to Thousand Springs reach.**

[illegible]	[illegible]	[illegible]	[illegible]
September 15, 1955 Priority			
All Rights Junior to 1955	717,428	4,070	1,434,570
1% trim line	288,577	1,797	632,033
10% trim line, *not* clipped to WD130	85,059	649	202,375
10% trim line, clipped to WD130 (IDWR trim line)	75,509	614	181,328
February 4, 1964 Priority			
All Rights Junior to 1964	506,265	3,815	1,008,541
1% trim line	193,508	1,702	423,404
10% trim line, *not* clipped to WD130	56,852	611	136,066
10% trim line, clipped to WD130 (IDWR trim line)	51,071	594	123,326

Table 2 Impacts from ground water pumping (at steady-state) with priority dates junior to 1955 and 1964 for trim lines over the entire ESPA and using a 1% trim line and a 10% trim line for the Buhl to Thousand Springs reach.

[illegible]		
Scenario	Modeled Buhl to Thousand Springs Reach Gain (cfs)	Assuming 6.9% of Flow in Buhl to Thousand Springs Reach as in Order (cfs)
Full curtailment	98.22	6.78
1% trim line	94.08	6.49
10% trim line *not* clipped to WD130	56.32	3.89
10% trim line clipped to WD130	53.27	3.68
[illegible]		
Scenario	Modeled Buhl to Thousand Springs Reach Gain (cfs)	Assuming 6.9% of Flow in Buhl to Thousand Springs Reach as in Order (cfs)
Full curtailment	66.52	4.59
1% trim line	63.59	4.39
10% trim line *not* clipped to WD130	39.29	2.71
10% trim line clipped to WD130	37.42	2.58

Table 3 **Areas associated with priority dates junior to 1971 and 1973 for trim lines over the entire ESPA and using a 1% trim line and a 10% trim line for the Devils Washbowl to Buhl reach.**

[illegible]	[illegible]	[illegible]	[illegible]
November 17, 1971 Priority			
All Rights Junior to 1971	361,600	3603	721,818
1% trim	260,955	2661	547,933
10% trim, with out clip to WD130	116,711	1473	261,562
10% trim, clipped to WD130 (IDWR trim line)	74,936	1068	173,241
December 28, 1973 Priority			
Al Rights Junior to 1973	290,655	3481	577,642
1% trim	207,148	2560	433,813
10% trim	88,878	1427	198,130
10% trim, clipped to WD130 (IDWR trim line)	58,364	1046	134,091

Table 4 **Impacts from ground water pumping (at steady-state) with priority dates junior to 1971 and 1973 for trim lines over the entire ESPA and using a 1% trim line and a 10% trim line for the Devils Washbowl to Buhl reach.**

[illegible]	[illegible]	[illegible]
November 17, 1971 Priority		
Full curtailment	96.28	19.26
1% trim line	95.46	19.09
10% trim line clipped to WD130 (2005 Order trim line)	62.96	12.59
December 8, 1973 Priority		
Full curtailment	73.52	14.70
1% trim line	72.84	14.57
10% trim line clipped to WD130 (2005 Order trim line)	48.58	9.72

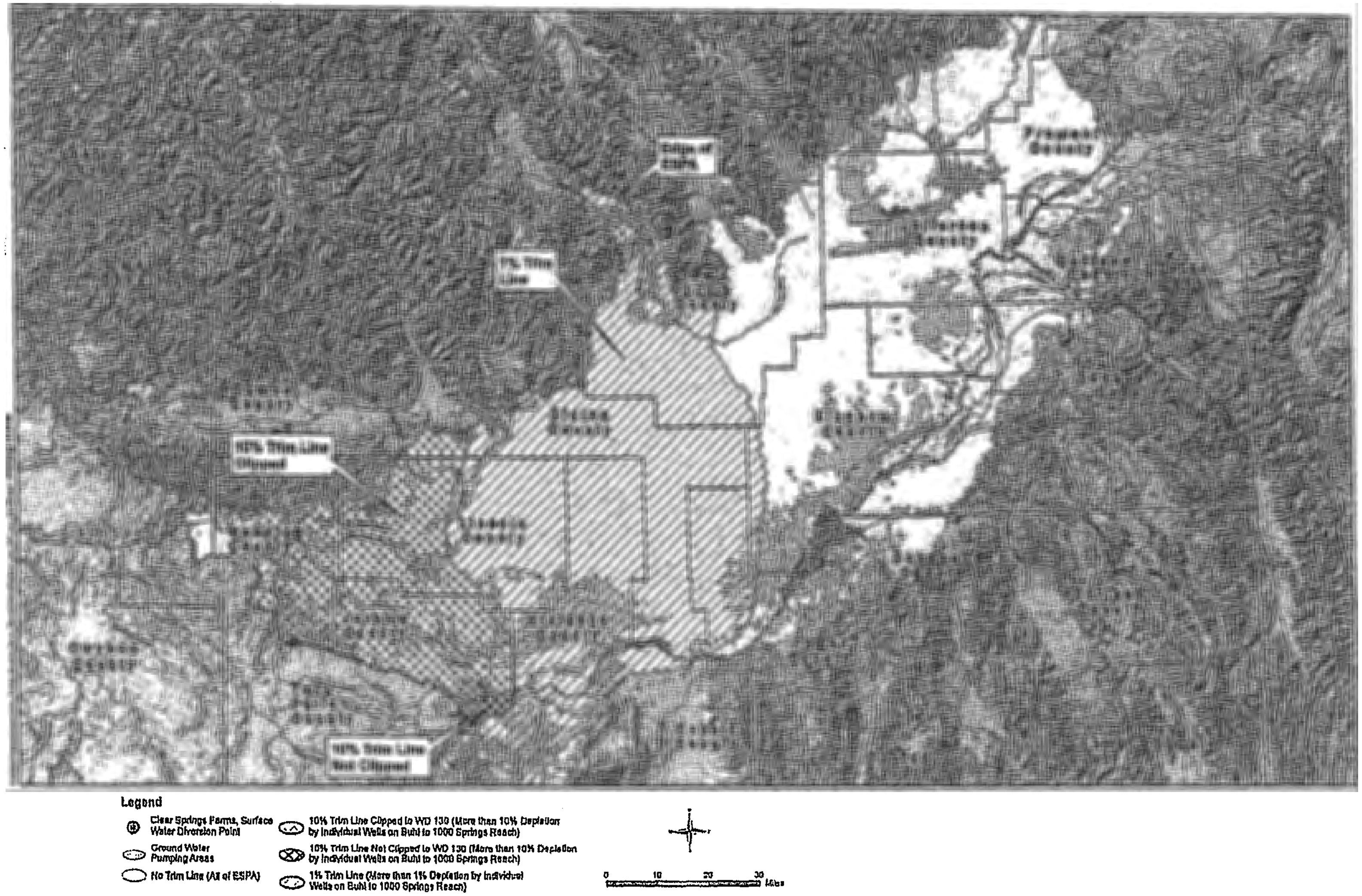


Figure 1 Map showing the Snake River Farms 10% trim line clipped to the Water District 130 Boundary (used in the SRF Order) and a 10% trim line (not clipped), 1% trim line and entire Eastern Snake Plain Aquifer.

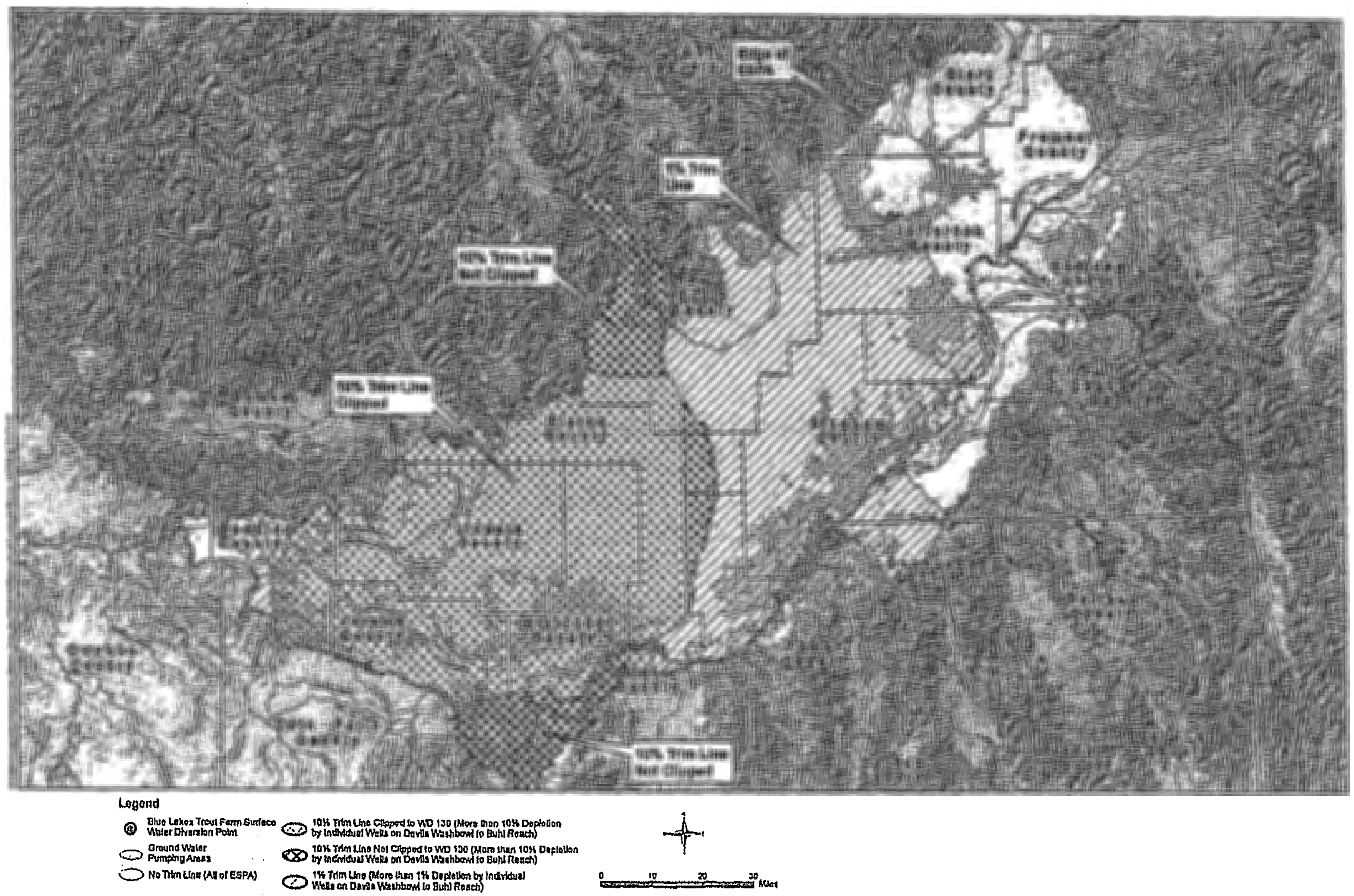


Figure 2 Map showing the Blue Lakes Trout Farm 10% trim line clipped to the Water District 130 Boundary (used in the BLTF Order) and a 10% trim line (not clipped), 1% trim line and entire Eastern Snake Plain Aquifer.

Attachment A

February 25, 2009 Letter from Director Tuthill

State of Idaho
DEPARTMENT OF WATER RESOURCES
322 East Front Street • P.O. Box 83720 • Boise, Idaho 83720-0098
Phone: (208) 287-4800 • Fax: (208) 287-6700 • Web Site: www.idwr.idaho.gov

C. L. "BUTCH" OTTER
Governor

February 25, 2009

DAVID R. TUTHILL, JR.
Director

To the members of the ESHMC:

I appreciate the hard work and significant contributions the modeling committee is making toward updating and improving the ESPA Model. On January 15th, 2009, the committee sent me the following question:

As part of the uncertainty analysis, should the ESHMC address the technical aspects (not policy issues) of a trim line as a function of uncertainty?

Please note that the subject of the trim line was addressed by the Hearing Officer's January 11, 2008 Opinion in the Spring Users case (Blue Lakes Trout Farm, Inc. and Clear Springs Foods, Inc.). The Hearing Officer stated that:

4. It was proper for the Director to determine a margin of error which resulted in the so called "trim line." *The 10% margin of error factor assigned by the former Director was not the result of a perfect protocol that might render a different figure or range of figures. No such protocol was in place and there was none forthcoming in a reasonable time when the decisions on the Spring Users' calls had to be made. There is common sense to the 10% error factor assigned by the former Director, based on the assumption that the model cannot be better than the input of a key component. The evidence is clear that the model is not perfect and should have an error factor developed to utilize. It may be simple but true - a 10% factor is closer to accurate than no error factor, once the scientists agree, as they do, that an error factor is desirable. Until a better factor is established, the Director in his best judgment may use 10%. The development of a more scientifically based error factor should be a priority in improvement.*

More recently, the trim line was discussed in the Hearing Officer's April 29th, 2008 Opinion in the Surface Water Coalition case:

7. The former Director utilized a 10% margin of error that is appropriate until a more scientifically based margin is established. Development of a more scientifically, peer reviewed, margin should be a priority. *Development of the model has not proceeded to the point of establishing a margin of error. Those involved in the development of the model agree that it is not 100% accurate and that it is desirable to determine an error factor. The calls that have been made have necessitated decisions before the next stage in model development. The former Director recognized that there had to be a margin of error in the application of the model and assigned a 10% error factor. This conclusion was based on the fact that the gauges used in water measurement have a plus or minus error factor of 10%. The former Director concluded that the model could be no better than the measuring gauges used and used the 10% margin absent a better figure developed through further testing of the model. No party offered credible evidence of a better margin of error.*

*8. **The former Director used the 10% margin of error as a trim line, excluding ground water users from curtailment who were in that margin.** The purpose of the trim line or clip was to avoid curtailing ground water users who might have no effect on enhancing reach gains. Application of the trim line was proper to avoid a significant probability that curtailment would extend to ground water users who would suffer significantly without contributing water where necessary to remediate the material injury to the surface water users.*

Based on these opinions, I believe there is sufficient guidance and a basis for the use of a trim line. The trim line is related to my determination of injury in that it defines users whose contribution to the shortage suffered by a calling party is de *minimus*. However, during the next ESHMC meeting (March 31st – April 1), members of the committee are welcome to bring a write-up and make a 10 to 15 minute presentation regarding the technical aspects of the use of a trim line. The write-ups and meeting minutes will become part of a white paper that is an ESHMC publication similar to the previous white paper on the "ESHMC Member Opinions of the ESPA Model" (January, 2007).

The white paper does not supersede the need for the ESHMC to address uncertainty associated with Version 2.0 of the ESPA Model as it pertains to predictions of river and spring reach gains. The associated level of uncertainty will be most useful in determining where and what type of data to collect to minimize uncertainty in future versions of the ESPA Model. The investigation of uncertainty should be accomplished through regular committee analysis and discussion.

Thank you again for your efforts.

Sincerely,

David R. Tuthill, Jr.
Director

Attachment B
PowerPoint Presentation

Technical Analysis of the "Trim Line"

John Koreny, HDR, Inc.
Charles E. Brockway, Brockway Engineering, Inc.
Willem Schreuder, Principia Mathematica
John Bowling, Idaho Power
David Blew, Idaho Power

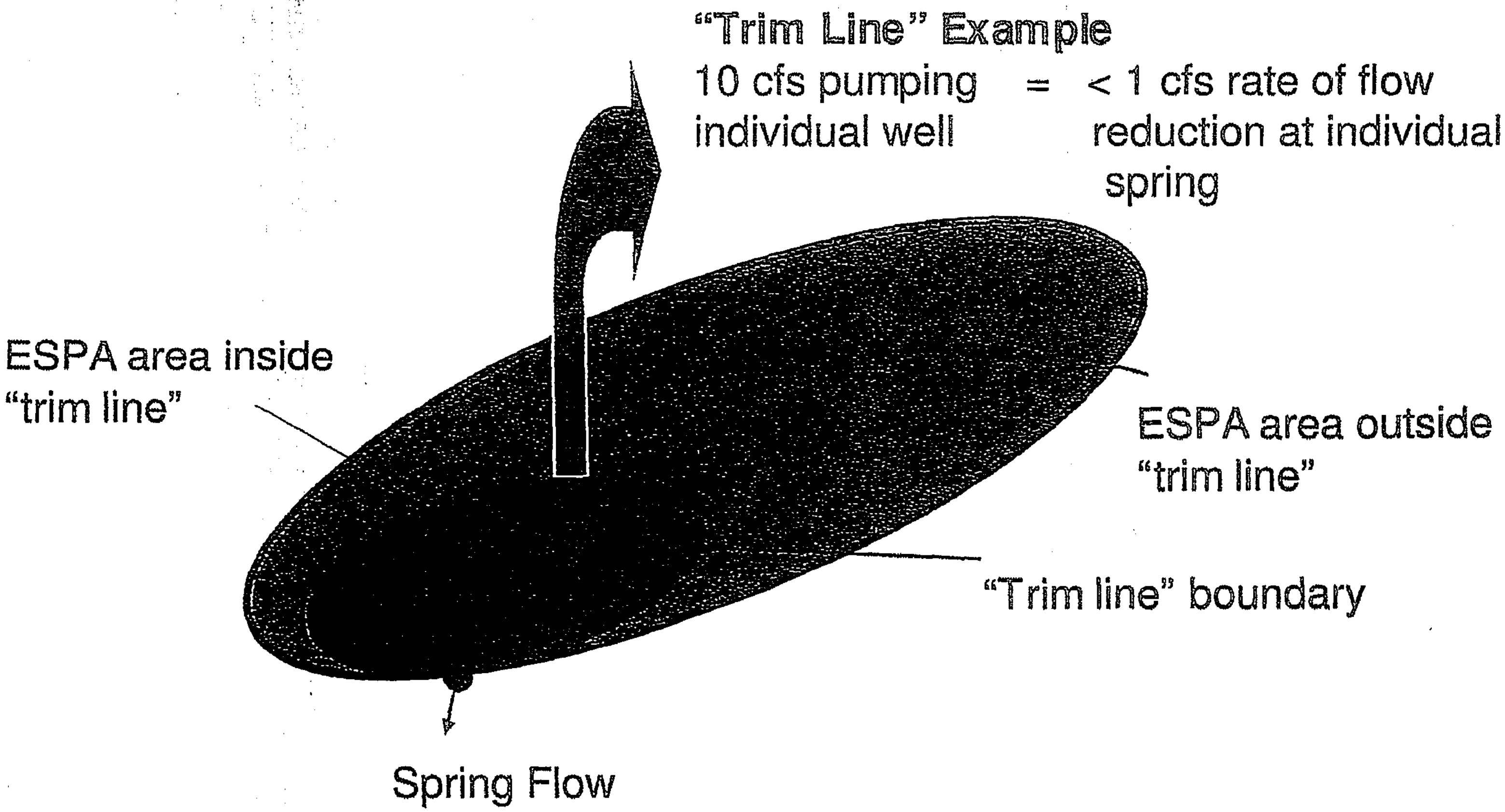
Outline

- What is the "trim line"?
- What is model uncertainty? Is the "trim line" a function of model uncertainty?
- How has the trim line been used for the Blue Lakes Trout Farm (Blue Lakes Spring) and Snake River Farms (Clear Springs) delivery call? Is it technically justified?
- If we are going to use a "trim line"- what should it try to accomplish?

What is the “Trim Line”?

- Area of ESPA where ground water pumping will deplete flow at individual spring by less than 10 percent of total consumptive use. Determined by ESPAM.
  - Example: Ground water pumping (consumptive use) of 10 cfs outside the trim line would deplete flow at the individual spring by less than 1 cfs.
- “Trim line” also includes a clip to the WD 130 boundary.

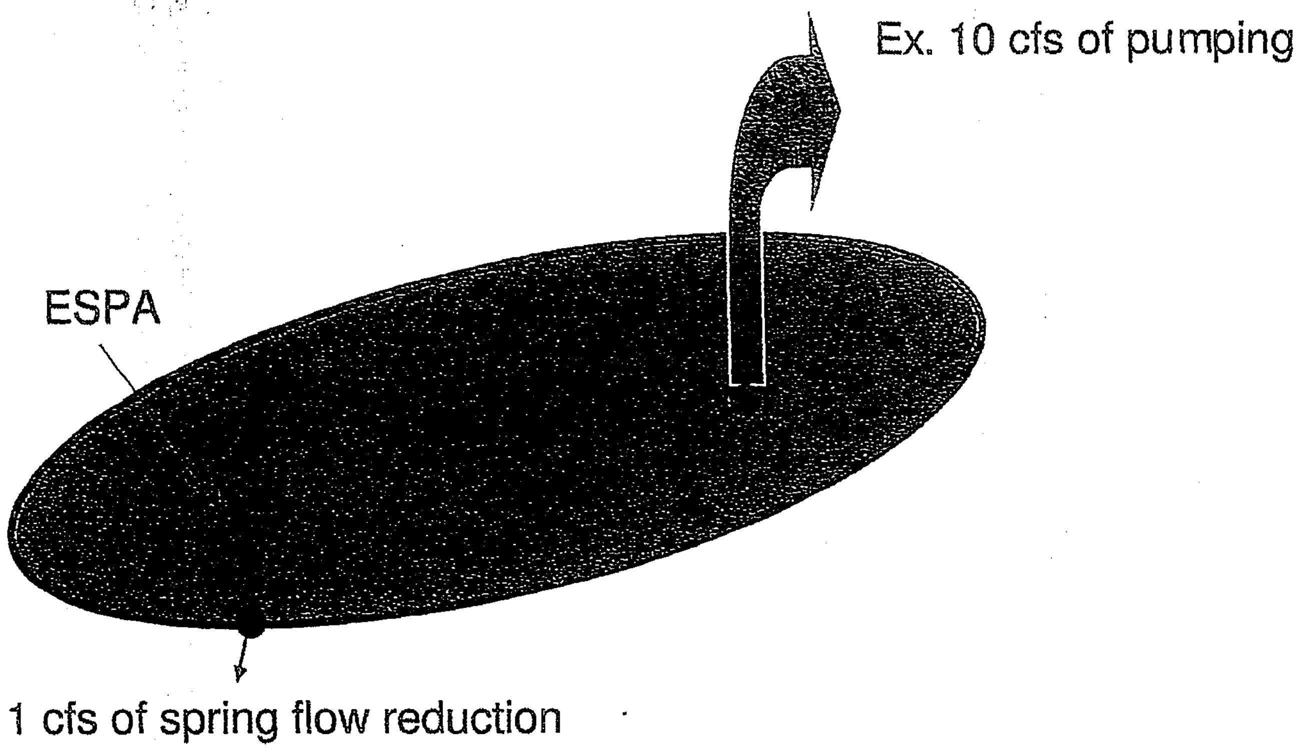
What is the "Trim Line"?



Incorrect Assumption that 10% Uncertainty in Calibration Targets Justifies "Trim Line"

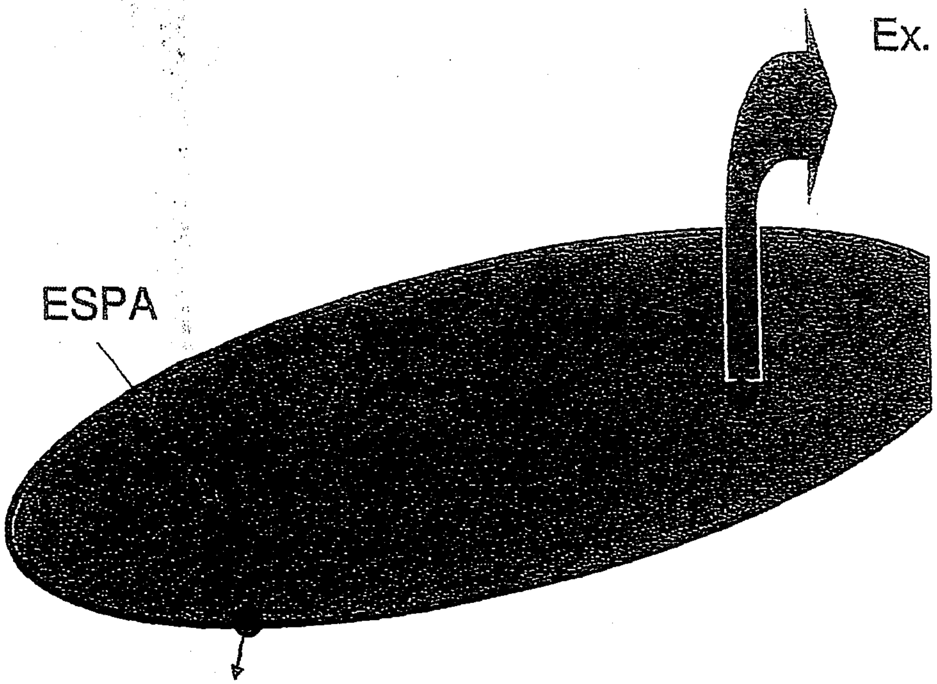
- Uncertainty in model calibration targets:
  - Ground water levels (± 1-10 ft, <1% accuracy, *hundreds of targets*)
  - Spring flow (varies, ± 2 to 5% as high as 10% depending on measuring device- weir, flow meter in canal, ___ *targets*)
  - River reach gains (varies, ± 5 to 10 percent or greater, _ *targets*)
- There is no reasonable justification to assume that the model calibration target accuracy is limited to river gage accuracy or that it is 10 percent.

What is a technically justified method to calculate the effects of 10% model uncertainty on the impacts of an individual well pumping on a spring?



10% model uncertainty = ± 10% at spring flow or 0.1 cfs spring flow reduction

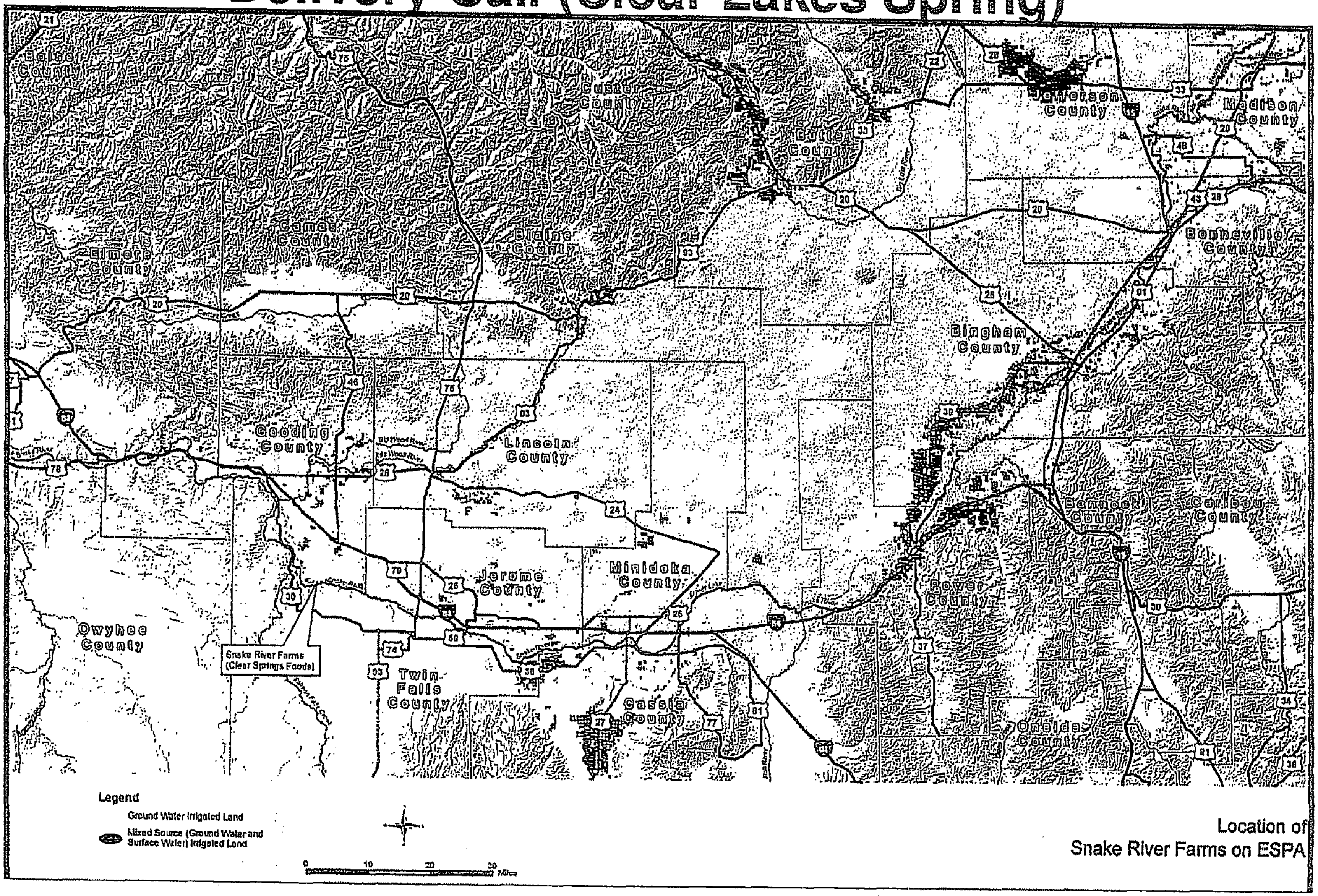
What is a technically justified method to calculate the effects of 10% model uncertainty on the impacts of an individual well pumping on a spring?



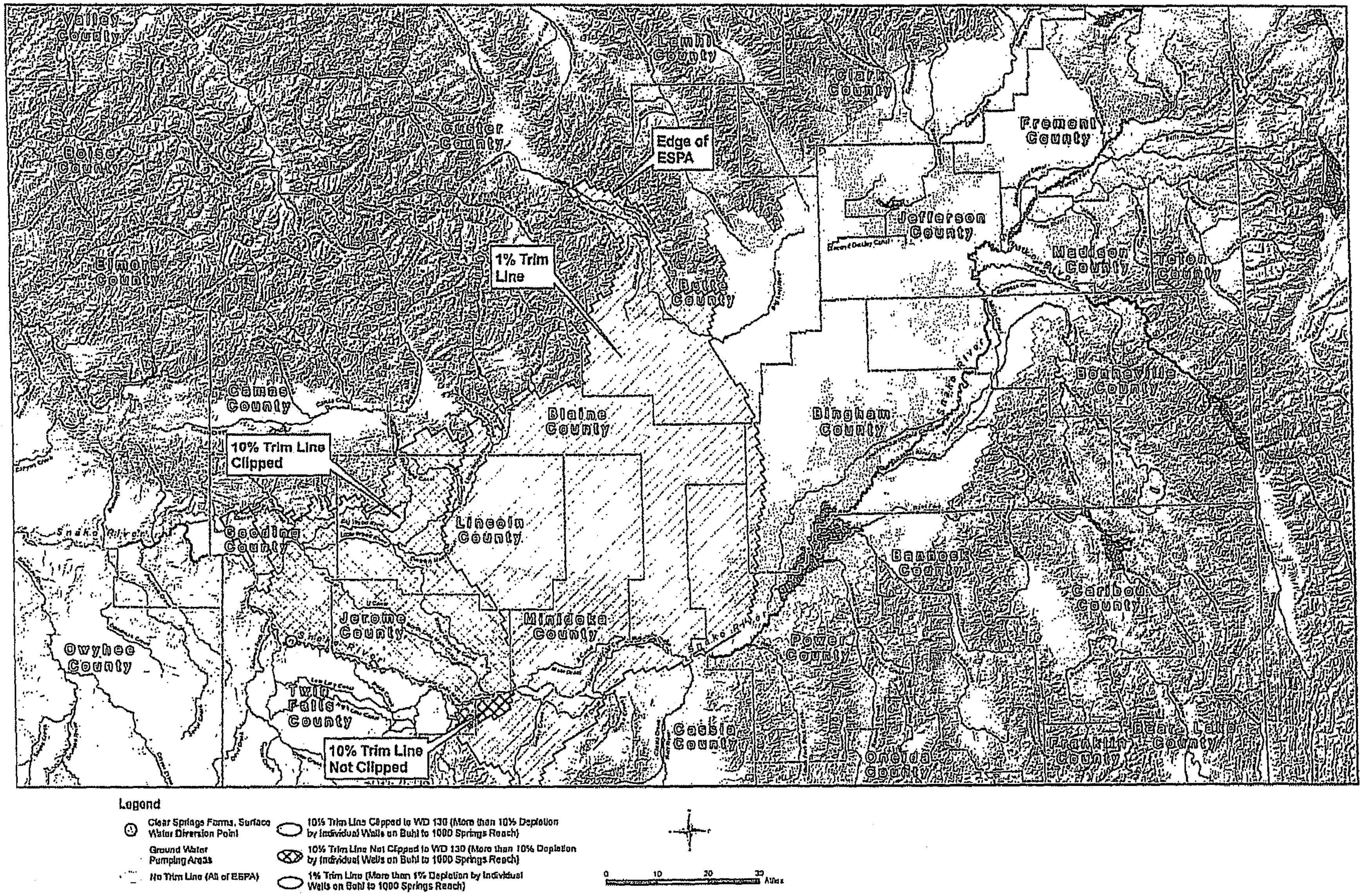
Model uncertainty can not be used as a justification to disregard known impacts by juniors against a senior supply unless there is a futile call determination. Curtailment of juniors outside of trim line would increase spring flow and is not futile.

10% model uncertainty = ± 0.1 cfs spring flow reduction

Use of "Trim Line" for Snake River Farms Delivery Call (Clear Lakes Spring)



Use of "Trim Line" for Snake River Farms Delivery Call (Clear Lakes Spring)



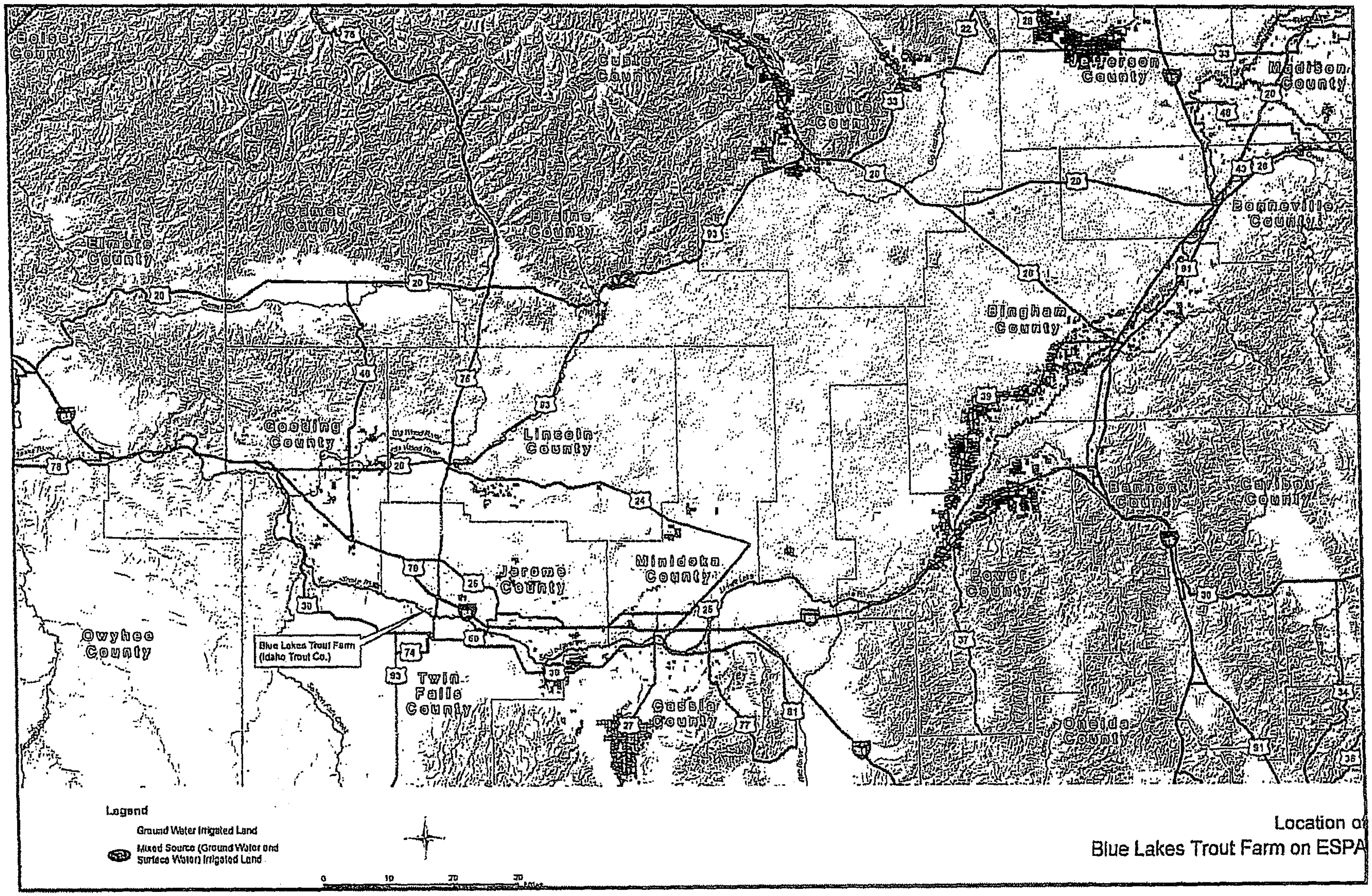
Use of "Trim Line" for Snake River Farms Delivery Call (Clear Lakes Spring)

	[illegible]	[illegible]	[illegible]
September 15, 1955 Priority			
Full Curtailment of Junior Rights	717,428	4,070	1,434,570
1% trim line	288,577	1,797	632,033
10% trim line, *not* clipped to WD130	85,059	649	202,375
10% trim line, clipped to WD130	75,509	614	181,328
February 4, 1964 Priority			
Full Curtailment of Junior Rights	506,265	3,815	1,008,541
1% trim line	193,508	1,702	423,404
10% trim line, *not* clipped to WD130	56,852	611	136,066
10% trim line, clipped to WD130	51,071	594	123,326

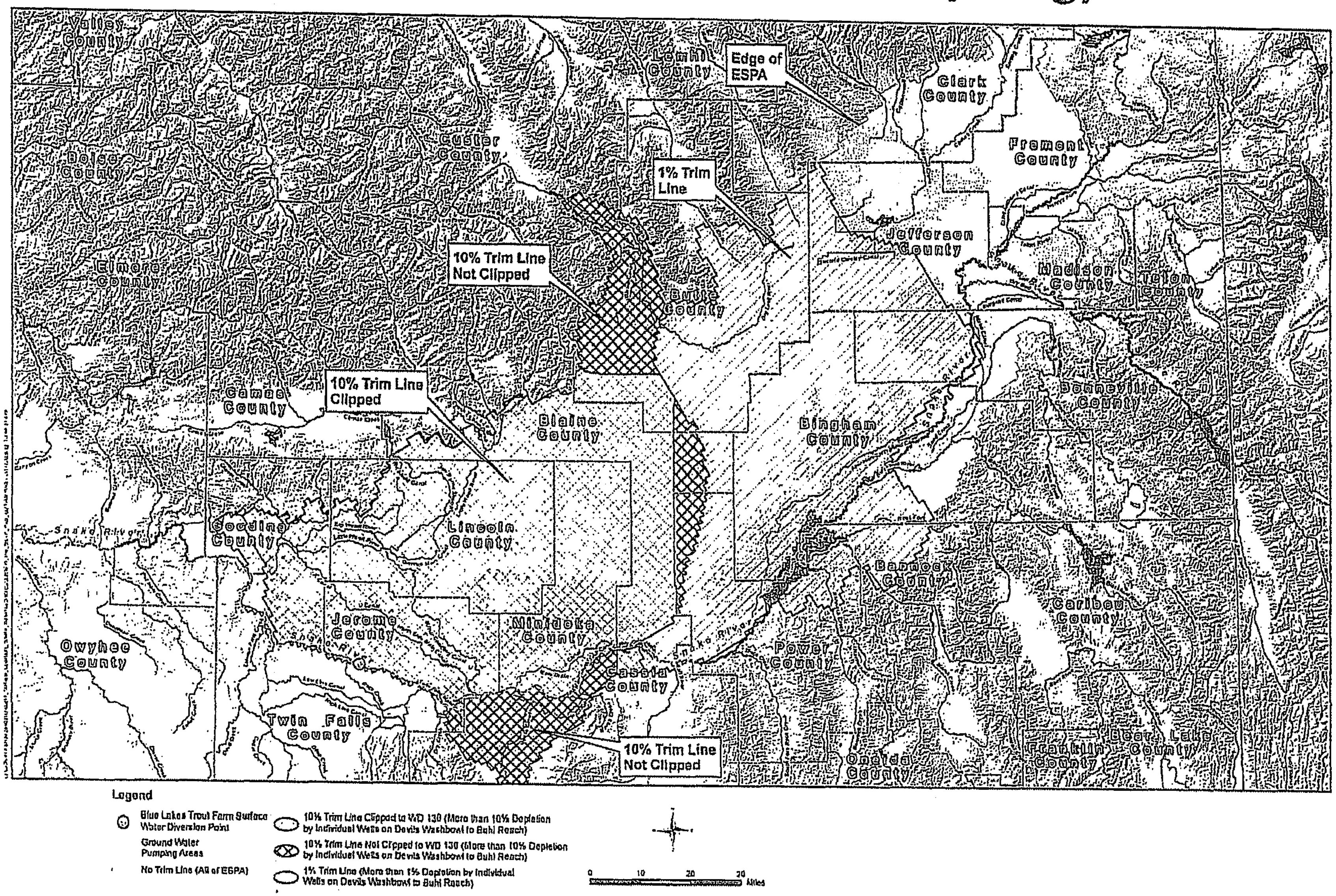
Use of "Trim Line" for Snake River Farms Delivery Call (Clear Lakes Spring)

[illegible]			
Scenario	Modeled Buhl to Thousand Springs Reach Gain (cfs)	Assuming 6.9% of Flow in Buhl to Thousand Springs Reach as in Order (cfs)	Modeled Clear Lakes Spring Drain Flow (cfs)
Full curtailment	98.22	6.78	22.90
1% trim line	94.08	6.49	21.90
10% trim line *not* clipped to WD130	56.32	3.89	12.79
10% trim line clipped to WD130	53.27	3.68	12.05

Use of "Trim Line" for Blue Lakes Trout Farm Delivery Call (Blue Lakes Spring)



Use of "Trim Line" for Blue Lakes Trout Farm Delivery Call (Blue Lakes Spring)



Use of "Trim Line" for Blue Lakes Trout Farm Delivery Call (Blue Lakes Spring)

	Curtailed GW Irrigated Area (acres)	# of Model Cells	Curtailed Groundwater Withdrawal (ac-ft)
November 17, 1971 Priority			
Full Curtailment of Junior Rights	361,600	3603	721,818
1% trim	260,955	2661	547,933
10% trim, with out clip to WD130	116,711	1473	261,562
10% trim, clipped to WD130	74,936	1068	173,241
December 28, 1973 Priority			
Full Curtailment of Junior Rights	290,655	3481	577,642
1% trim	207,148	2560	433,813
10% trim	88,878	1427	198,130
10% trim, clipped to WD130	58,364	1046	134,091

Use of "Trim Line" for Blue Lakes Trout Farm Delivery Call (Blue Lakes Spring)

Scenario	Devils Washbowl to Buhl Reach Gain (cfs)	Director's Order (20%)	Blue Lakes Springs
11/17/1971 priority, full curtailment	96.28	19.26	33.08
11/17/1971 priority, 1% trim line	95.46	19.09	32.76
11/17/1971 priority, 10% trim line clipped to WD1	62.96	12.59	19.77

Scenario	Devils Washbowl to Buhl Reach Gain (cfs)	Director's Order (20%)	Blue Lakes Springs
12/28/1973 priority, full curtailment	73.52	14.70	25.83
12/28/1973 priority, 1% trim line	72.84	14.57	25.56
12/28/1973 priority, 10% trim line clipped to WD1	48.58	9.72	15.87

Conclusions

- Many model calibration targets (gw levels, spring flow measurements) are more accurate than 10 percent.
- No reasonable justification to use model uncertainty as basis for "trim line".
- No technical or admin. basis for WD 130 clip to "trim line".
- If model uncertainty is to be considered- it should be done calculating the impacts of individual wells on individual springs- not using a trim line.
- The "trim line" disregards the impacts from many wells that cumulatively reduce up to ½ of the senior's spring flow.
- There is no evidence of a futile call for these individual impacts.
- Mitigation for these impacts would restore the senior's supply and can be ordered at the same quantity of impacts.

Conclusions

- If a "trim line" is to be used, the basis for selection should be to identify those wells that impact the senior's supply above a *de-minimus* impact.
- Selection of a "trim line" that reduces the senior's supply by one-half obviously does not identify the wells causing more than a *de-minimus* impact.
- More work should be done to identify a "trim line" that focuses the mitigation requirements on the junior pumping causing an impact while at the same time restoring the senior's supply. A 1% "trim line" is an option that meets this goal. More evaluation needed.
- There is an option to order mitigation by junior's to the extent that they are causing impacts. There is no need for "full curtailment". The current IDWR orders within the trim line do not require full curtailment and allow mitigation to the extent of impacts.

Attachment C
Email from Dr. Richard Allen

From: Richard G. Allen [mailto:rallen@kimberly.uidaho.edu]
Sent: Wednesday, February 25, 2009 1:24 PM
To: Allan Wylie; Anderson, Hal; bcontor@if.uidaho.edu; Bryan Kenworthy; Chuck Brockway; cmb@hydrosphere.com; Dar Crammond; Dave Blew; Dave Tuthill; Greg Clark; greg@spronkwater.com; Gregg S. Ten Eyck; hyqual@cableone.net; J. D. May; JBowling@idahopower.com; Jennifer Johnson; Jim Taylor; Koreny, John S.; johnson@if.uidaho.edu; Jon Gould; jrbartol@usgs.gov; Leslie Stillwater; Linda Lemmon; Lindgren, John; Mike Beus; Raymondi, Rick; Sean Vincent; Sharon Parkinson; Stacey Taylor; Swank, Lyle; Tom Wood; Willem Schreuder
Cc: Olenichak, Tony; Karen Wogsland (E-mail); Morse, Tony; Kramber, Bill; Marilyn Bragg
Subject: Re: Director's response to the committee question

Rick R.,

I have one comment on the Hearing Officer's statement that:
...the guages used in water measurement have a plus or minus error factor of 10%.

and the use of this 10% to suggest uncertainty in GW pumping impacts on spring flows. I believe that general consensus among water analysts is that the 10% (or other value) associated with surface measurement accuracy has a strong random error component, perhaps as much as half of the total error value. The other part is systematic or bias error.

Given the large number of measurement sites and repeated measures at specific sites, the random error term decreases with the square root of the number of measures and may even tend toward zero for the ESPA. Thus, some part of the 10% should not carry into the water balance accuracy of the ESPA model.

Another comment is that I have difficulty seeing a strong connection between uncertainty associated with the GW water balance (stemming from water measurement inaccuracies) and prediction of impact on spring flow by GW pumping. Clearly there is some connection, but impacts are more dominated by hydraulic gradient (and aquifer levels) and transmissivities rather than by water balance. The relation is there, but I am not sure it is strong enough to warrant a direct transfer of uncertainty terms (even if all error were systematic).

My sense is that some other measure (or justification) of uncertainty should be explored for establishing a trim line.

Rick A.

On 25 Feb 2009 at 10:22, Raymondi, Rick wrote:

>
> Hi everyone,
>
> Please note the Director's response to the question submitted by the
> committee after the January meeting. I will follow up after you've
> had time to review the response. Also, I've developed a folder on
> our web site for documents related to model uncertainty.