Narrative Testimony for the M3 Eagle Water Right Application

Dennis Owsley

May 11, 2009

This narrative testimony was developed in response to the April 1st memo prepared by HLI in response to our March 2nd Staff Memorandum. I co-authored the March 2nd Staff Memorandum and appreciate this opportunity to provide testimony in response to the comments provided by HLI in the memo.

Our March 2nd Staff Memo was developed in request of the Hearing Officer. We provided a summary of the technical work submitted by M3 in support of this water right application. I feel the technical work completed for this investigation was of the high quality. However, some of the assumptions and conclusions related to the work leave me with some questions and concerns.

I would like to identify some specific questions that are due to inconsistencies in the data submitted by M3 and the testimony I have listened to in this hearing. But first, I'd like to start by showing the presentation of the submitted data, highlighting the review process we were challenged with.

Exhibit 2

Page 3

"A comprehensive report is anticipated to be completed in time to be presented in support of IDWR's review of M3 Eagle's water right application. HLI's comprehensive report will contain the supporting data files and findings based upon additional well tests, hydrological data collected from additional well studies and completion of a ModFlow numerical model. In the mean time, and the water study progress, additional reports will be issued to document and present refinements of the findings presented here."

-- Page 3, One-Year Progress Report

As in most large scale hydrogeologic investigations, a comprehensive summary report is completed at the end of a project to provide a summary and discussion of the work collected through the investigation including any conclusions drawn from the research. As quoted from page 3 of Exhibit 2, the HLI One-Year Progress report which is also included in the Second Amended Water Right Application, HLI states:

"{Quote}*A comprehensive report is anticipated to be completed in time to be presented in support of IDWR's review of M3 Eagle's water right application. HLI's comprehensive report will contain the supporting data files and findings based upon additional well tests, hydrological data collected from additional well studies and completion of a ModFlow numerical model. In the mean time, and the water study progress, additional reports will be issued to document and present refinements of the findings presented here."* {End Quote}

A comprehensive report would have been beneficial to the department's review. Multiple historic reports are presented in the supporting documentation for this water right and referenced in the April 1, 2009 HLI memorandum which appear to have a significant importance to HLI's conceptual model. However,many of these historic reports were not directly referenced in the HLI authored reports to support the data collected for this project.

- Supporting Documentation for Water Right 63-32573
  Submitted November 2008:
- 00 INDEX.pdf
- 01 Drillers Logs Location Map for M3 Eagle 09-13-2007 small.pdf
- 02 M3 Eagle Regional Hydrogeologic Characterization Year One.pdf
- 03 Map of Protestants Wells101408.pdf
- 04 M3 Eagle SVR #6 Composite - FINAL.pdf
- 05 M3 Eagle SVR #7 Composite by Hydro Logic Inc 4-14-2008 - .pdf
- 06 M3 Eagle SVR #9 Test Well Composite Diagram by Hydro Logi.pdf
- 07 M3 Eagle Test Well #1 Composite by Hydro Logic Inc 4-23-2.pdf
- 08 M3 Eagle Test Well #2 Composite - FINAL.pdf
- 09 M3 Eagle Test Well #3 Composite Diagram by Hydro Logic In.pdf
- 10 M3 Eagle Test Well #4 Composite Diagram by Hydro Logic In.pdf
- 11 Magnetometer Report for M3 Eagle May 20_2007.pdf
- 12 DATA RE-Analysis of 16 Aquifer Tests in the Greater Eagle.xls
- 12 RE-Analysis of 16 Aquifer Tests in the Greater Eagle-Star.pdf
- 13 Seismic Reflection Profiling in the Big Gulch Area - Repo.pdf
- 14 Star Supply Well #3 Composite - FINAL smaller.pdf
- 15 SVR #10 Test Well Composite Diagram by Hydro Logic Inc 07.pdf
- 16 Modeling of Ground Water Flow in the Pierce Gulch San.pdf
- 17 Well Density by section and Quarter Section 09-13-2007.pdf
- 18 Water Level Measurement Survey Update to M3 Eagle Hydroge.pdf
- 19 Documentation provided by S H Wood PhD Professor Emeritus.pdf
- 20 Test Well #1 Plot M3 Eagle.pdf
- 21 Monthly Monitoring Hand Measured Water Levels.pdf
- 22 Figures and Tables to be included and described in upcomi.pdf
- 23 2007 Regional Ground Water Level Contour Map.pdf
- 24 Summary of Water Chemistry Data for M3 Eagle and Select R.pdf
- 25 Water Chemistry and Cross Section Wells Map.pdf
- 26 Cross Sections from wells with geophysical logs (four tot.pdf
- 27 Cross Sections of wells near M3 Eagle with well construct.pdf
- 28 Hydrographs of United Water Idaho's State and Linder Moni.pdf
- 29 Ground water gradient map in Eagle Idaho area (USGS 1980).pdf
- 30 Hydrograph of Vail and Miller domestic wells (1995-1998).pdf
- 31 Ground Water Gradient Map from Lindholm (USGS 1991).pdf
- 32 [List] Curriculum Vitae and Summaries of Facts and Opinio.pdf
  32A Edward Squires CV and Summary.pdf
  32B Mark Utting CV and Summary.pdf
  32C Loren Pearson Summary.pdf
  32D Dr James L Osiensky CV and Summary.pdf
  32E Dr Spencer Wood CV and Summary.pdf
  32G Roger Dittus Summary and CV.pdf
  32H Peter Schwartzman CV and Summary.pdf
  32I Richard Glanzman CV and Summary.pdf
  32K Scott Wonders Summary.pdf
  32L Steven E Holt CV and Engineering Report.pdf
  32M Dr John Church CV and Summary.pdf
- 33 [List] TVHP_Reports
- 33 [01] TVHP_ExecSummary-final.pdf
  33 [02] TVHP_Model-final.pdf
  33 [03] TVHP_PermitScenario-final.pdf
  33 [04] TVHP_Characterization-final.pdf
  33 [05] TVHP_Characterization_Appendix-C.pdf
  33 [06] Municipal-Park-Water-Chemistry-Data-Addendum.pdf
  33 [07] TVHP_Geochemistry-final.pdf
  33 [08] NYC_2002-final.pdf
  33 [09] TVHP_WaterBudget-1996-2000-final.pdf
  33 [10] TVHP_MW1.pdf
  33 [11] TVHP_MW2_Caldwell.pdf
  33 [12] TVHP_MW3_QuarryView.pdf
  33 [13] TVHP_MW4_MunicipalPark.pdf
  33 [14] TVHydroProj_OntParmaNotusBoi_1997.pdf
  33 [15] stratigraphic_studies_rpt_010801.pdf
  33 [16] Murphy_MtHome_basalt_map.pdf
  33 [17] West_Snake_mudstone_facies_map.pdf
  33 [18] CrossSec_1-5_NW_STARtoSNAKE.pdf
  33 [19] CrossSec_6_ENE_STARtoSNAKE.pdf
  33 [20] GM-18-M.pdf
  33 [21] tv_seismic_reflection.pdf
  33 [22] tvwssummrptfin.pdf
- 34 Map and composite diagram of Eagle Pines Water Association.pdf
- 35 Draft spreadsheet containing information currently known .pdf
- 36 November 6_2008 Memorandum from dale Ralston PhD and Prof.pdf
- 38 M3 Eagle Potable Water Facility Planning Progrees Update .pdf
- 39 Map of Preliminary Sewer Plan prepared by Stanley Consult.pdf
- 40 Demographic Forecast Economic & Fiscal Impact Analysis Oc.pdf
- 41 Development of a Numerical Ground Water Flow Model for th.pdf

As highlighted in our staff memo, HLI has completed a large amount of work in their efforts of characterizing the aquifers beneath the M3 site. This has resulted in a large volume of information being submitted in support of this water right application. However, the submittal of the information was lacking organization. I would like to present the list of submitted documents to highlight this point.

This slide shows the documentation in support of this water right application as it was presented to the department. The submittals are not organized chronologically or by category.

Maps
- 01 Drillers Logs Location Map for M3 Eagle 09-13-2007 small.pdf
- 03 Map of Protestants Wells101408.pdf
- 17 Well Density by section and Quarter Section 09-13-2007.pdf
- 23 2007 Regional Ground Water Level Contour Map.pdf
- 25 Water Chemistry and Cross Section Wells Map.pdf
- 29 Ground water gradient map in Eagle Idaho area (USGS 1980).pdf
- 31 Ground Water Gradient Map from Lindholm (USGS 1991).pdf
- 33 [20] GM-18-M.pdf
- 33 [16] Murphy_MtHome_basalt_map.pdf
- 33 [17] West_Snake_mudstone_facies_map.pdf

Well logs/Composite Diagrams
- 04 M3 Eagle SVR #6 Composite - FINAL.pdf
- 05 M3 Eagle SVR #7 Composite by Hydro Logic Inc 4-14-2008 - .pdf
- 06 M3 Eagle SVR #9 Test Well Composite Diagram by Hydro Logi.pdf
- 07 M3 Eagle Test Well #1 Composite by Hydro Logic Inc 4-23-2.pdf
- 08 M3 Eagle Test Well #2 Composite - FINAL.pdf
- 09 M3 Eagle Test Well #3 Composite Diagram by Hydro Logic In.pdf
- 10 M3 Eagle Test Well #4 Composite Diagram by Hydro Logic In.pdf
- 14 Star Supply Well #3 Composite - FINAL smaller.pdf
- 15 SVR #10 Test Well Composite Diagram by Hydro Logic Inc 07.pdf
- 20 Test Well #1 Plot M3 Eagle.pdf
- 34 Map and composite diagram of Eagle Pines Water Association.pdf
- 33 [10] TVHP_MW1.pdf
- 33 [11] TVHP_MW2_Caldwell.pdf
- 33 [12] TVHP_MW3_QuarryView.pdf
- 33 [13] TVHP_MW4_MunicipalPark.pdf

Modeling Reports
- 16 Modeling of Ground Water Flow in the Pierce Gulch San.pdf
- 41 Development of a Numerical Ground Water Flow Model for   th.pdf
- 33 [02] TVHP_Model-final.pdf

Aquifer Test Reports
- 12 RE-Analysis of 16 Aquifer Tests in the Greater Eagle-Star.pdf

Geophysics Reports
- 11 Magnetometer Report for M3 Eagle May 20_2007.pdf
- 13 Seismic Reflection Profiling in the Big Gulch Area - Repo.pdf
- 33 [21] tv_seismic_reflection.pdf
- 33 [07] TVHP_Geochemistry-final.pdf

General/Hydrogeologic Reports
- 02 M3 Eagle Regional Hydrogeologic Characterization Year One.pdf
- 18 Water Level Measurement Survey Update to M3 Eagle Hydroge.pdf
- 19 Documentation provided by S H Wood PhD Professor Emeritus.pdf
- 36 November 6_2008 Memorandum from dale Ralston PhD and Prof.pdf
- 33 [01] TVHP_ExecSummary-final.pdf
- 33 [03] TVHP_PermitScenario-final.pdf
- 33 [04] TVHP_Characterization-final.pdf
- 33 [05] TVHP_Characterization_Appendix-C.pdf
- 33 [08] NYC_2002-final.pdf
  33 [09] TVHP_WaterBudget-1996-2000-final.pdf
- 33 [22] tvwssummrptfin.pdf
- 33 [14] TVHydroProj_OntParmaNotusBoi_1997.pdf
  33 [15] stratigraphic_studies_rpt_010801.pdf

Cross Sections
- 26 Cross Sections from wells with geophysical logs (four tot.pdf
- 27 Cross Sections of wells near M3 Eagle with well construct.pdf
- 33 [18] CrossSec_1-5_NW_STARtoSNAKE.pdf
- 33 [19] CrossSec_6_ENE_STARtoSNAKE.pdf

Data/Misc.
- 12 DATA RE-Analysis of 16 Aquifer Tests in the Greater Eagle.xls
- 21 Monthly Monitoring Hand Measured Water Levels.pdf
- 22 Figures and Tables to be included and described in upcomi.pdf
- 24 Summary of Water Chemistry Data for M3 Eagle and Select R.pdf
- 28 Hydrographs of United Water Idaho's State and Linder Moni.pdf
- 30 Hydrograph of Vail and Miller domestic wells (1995-1998).pdf
- 35 Draft spreadsheet containing information currently known .pdf
- 33 [06] Municipal-Park-Water-Chemistry-Data-Addendum.pdf

CV's
- 32A Edward Squires CV and Summary.pdf
  32B Mark Utting CV and Summary.pdf
  32C Loren Pearson Summary.pdf
  32D Dr James L Osiensky CV and Summary.pdf
  32E Dr Spencer Wood CV and Summary.pdf
  32G Roger Dittus Summary and CV.pdf
  32H Peter Schwartzman CV and Summary.pdf
  32I Richard Glanzman CV and Summary.pdf
  32K Scott Wonders Summary.pdf
  32L Steven E Holt CV and Engineering Report.pdf
  32M Dr John Church CV and Summary.pdf

Demographic reports
- 38 M3 Eagle Potable Water Facility Planning Progrees Update .pdf
- 39 Map of Preliminary Sewer Plan prepared by Stanley Consult.pdf
- 40 Demographic Forecast Economic & Fiscal Impact Analysis Oc.pdf

This slide shows how I organized the submittals based on similar categories . I would just like to re-emphasize that without a comprehensive report and the sheer volume of documents submitted, this lack of organization created some confusion at times during the review.

Late Submittals.

Ground Water Geochemistry of Wells in North Ada County Area of Idaho, dated January 20, 2009.

A Nine-Day Constant Rate Discharge Aquifer Test of the SVR#7 Test Well in Big Gulch, North Ada County, Idaho, dated January 20, 2009.

Two documents in support of this water right were submitted after the November 26,2008 deadline for submission of supporting documentation. These two documents provided important information regarding the hydrogeologic conditions beneath the M3 site and represent a significant portion of the work completed by HLI. The timing of these reports resulted in the department requesting an extension in time for our deadline of the Staff Memorandum. The timing of these reports also did not allow the department an opportunity to discuss our questions and concerns with these documents with HLI prior to releasing the Staff Memorandum.

Organization of technical discussion:

1) North Ada County stratigraphy
2) Faulting
3) Aquifer continuity between the Boise and Payette
4) M3 Eagle's aquifer testing
5) Aquifer Boundaries
6) Recharge sources
7) Water levels and trends in the aquifer
8) M3 Eagle's Modeling
9) Geochemistry Analysis
10) Aquifer Sustainability

I would now like to focus this testimony on my response to Exhibit 45, HLI's April 1st Memorandum, and where applicable, incorporating the testimony I have listened to in this administrative hearing. The remaining testimony points out inconsistencies within the technical information presented to date. I have organized this presentation with respect to general hydrogeologic categories .

The topics of interest I would like to cover that include : 1) North Ada County stratigraphy; 2) Faulting; 3) Aquifer continuity between the Boise and Payette; 4) M3 Eagle's aquifer testing; 5) Aquifer Boundaries 6) Recharge sources; 7) Water levels and trends in the aquifer; 8) M3 Eagle's Modeling; 9) Geochemistry Analysis; and 10) Aquifer Sustainability.

Exhibit 45

Page 2

“*The stratigraphy in this area is not particularly complex, although it may appear so on a cursory look*.”

And

“*In any event, we do not consider the stratigraphy in this area to be overly complex, although it may appear so on a cursory look*.”

The first topic I would like to discuss is the stratigraphy of North Ada County.

I would like to re-emphasize HLI’s response to our description of the area’s geology as complex. On Page 2 of Exhibit 45, the HLI Response to the Staff Memorandum, HLI states:

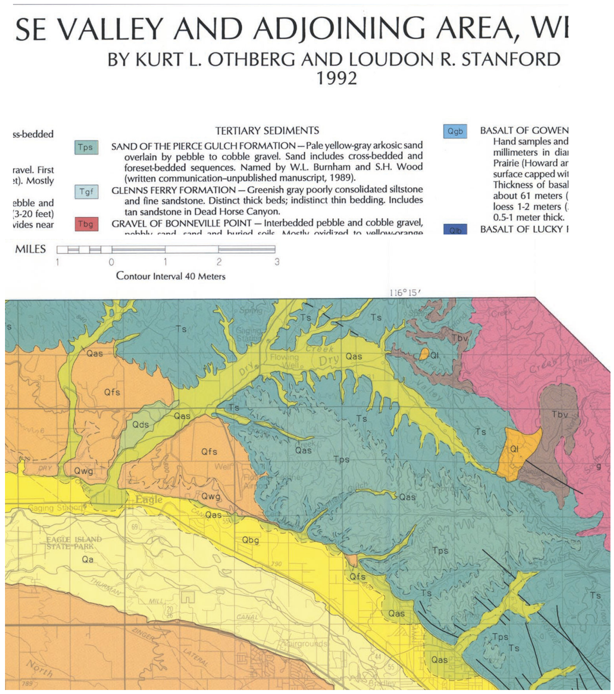
“*The stratigraphy in this area is not particularly complex, although it may appear so on a cursory look*.”

And

“*In any event, we do not consider the stratigraphy in this area to be overly complex, although it may appear so on a cursory look*.”

As Mr. Vincent testified, there multiple lines of evidence to indicate the hydrogeology of the area is complex. We have also heard testimony from Mr. Squires in which he referred to the hydrogeology of the area as “complicated”. We also heard testimony from Mr. Glanzman that the study area was a “complex ground water basin”. HLI’s claim that the stratigraphy is not complex is inconsistent with lines of evidence Mr. Vincent pointed out as well as previous testimony fromM3’s expert witnesses.

Exhibit 33T



These two images are clips are from the geologic map included by M3 in the submittal of supporting documentation for this water right (Exhibit #33T). We referenced this map when describing the Pierce Gulch Sand in our staff memo. In response to our description and citation of this map, HLI states on page 3 of Exhibit 45
"{QUOTE}*Othberg and Stanford (1992) compiled some of the mapping done earlier by S.H. Wood and W. Burnham, but did not define or investigate the PGS. Othberg and Stanford did not even map the Pierce Gulch Sand in the Eagle USGS quadrangle, although it outcrops there. Rather, their work focused entirely on the terrace gravels, which lie above the PGS and are not involved in M3 Eagle's application."{END QUOTE}*

The staff referenced the Othberg and Stanford map as it was the only published geologic map submitted in support of this water right. The PGS is shown as an outcrop on this map and is specifically defined in the legend of this map.

Also on page 3 of the response, HLI states "{QUOTE}*we do not believe it technically correct to refer to the PGS as a Formation at this time."{END QUOTE}*

Again, the staff referred to the PGS as a Formation based on the description on the geologic map HLI provided to the department. In addition, it is inconsistent for HLI to claim the Pierce Gulch Sand is not a Formation, when we heard Dr. Wood's April 24th testimony referring to the Pierce Gulch Sand as a formation.

Exhibit 44

Figure 4

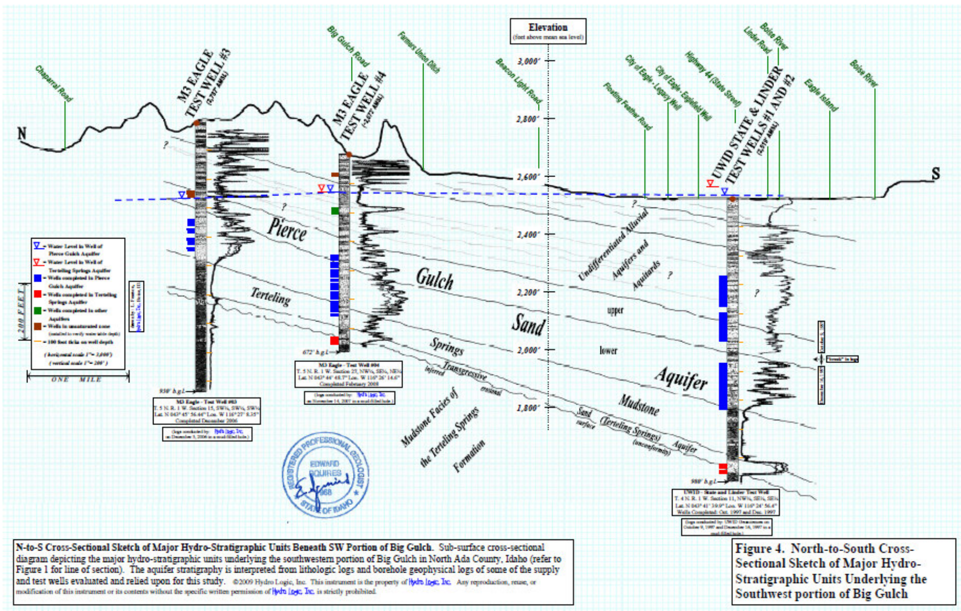


Figure 4. North-to-South Cross-Sectional Sketch of Major Hydro-Stratigraphic Units Underlying the Southwest portion of Big Gulch

The base of the aquifer is one of the two boundaries that HLI states they have currently defined. However, Figure 4 of Exhibit 44 does not indicate the base of the aquifer is fully defined beneath the M3 property. For example, look at Test Well #4, specifically at the lower completion of the well. Terteling Springs Mudstone is drawn through the bottom of the aquifer in this well. Test Well #3 and Test Well #4 are the two wells in which we heard Mr. Squires testify that they had "{QUOTE} great certainty"{END QUOTE} in the correlation of geologic units between them. Even with what is considered '*great certainty*' in correlating units under the M3 property using the high quality borehole data that exists on the property, some inferences and interpretations must be made to correlate the geologic units. These interpretations get larger as you move further away from the M3 property due to the lack of high quality borehole data.

Exhibit 44

Figure 4

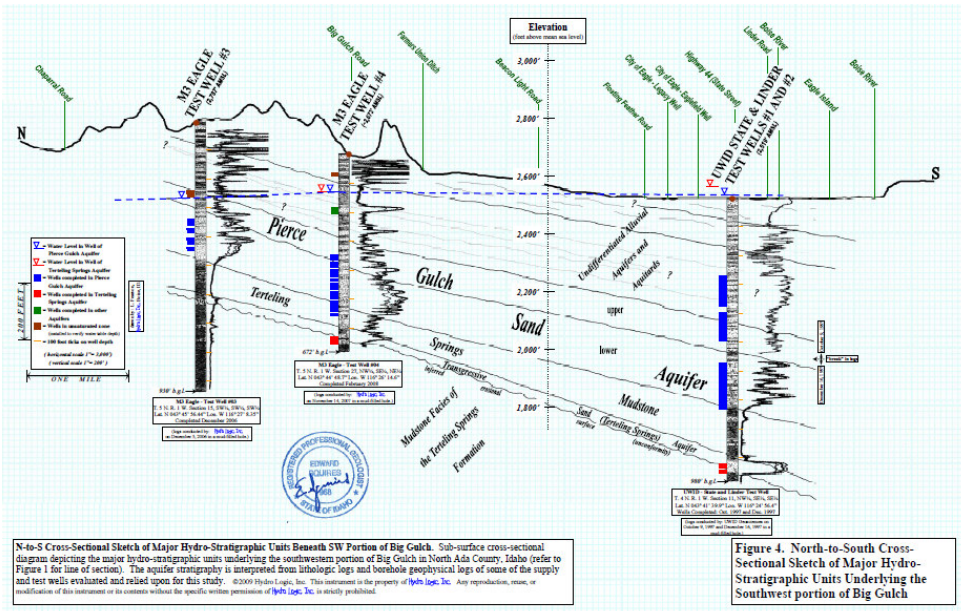


Figure 4. North-to-South Cross-Sectional Sketch of Major Hydro-Stratigraphic Units Underlying the Southwest portion of Big Gulch

This is the same slide again, however, I would like to point out two additional items related to this slide. First is the identification of the target aquifer in the UWID State and Linder Test Wells. The top of the Pierce Gulch Sand Aquifer in this picture is hard to distinguish in the geologic and geophysical logs between what is identified as the overlying "Undifferentiated alluvial aquifers and aquitards." The fact that a screened portion overlaps the boundary line drawn further supports this observation.

The depiction of the thickness of the Pierce Gulch Sand Aquifer in this figure is inconsistent with other HLI documents. For example, Exhibit 12, The Re-Analysis of 16 Aquifer Tests Report, identified the Pierce Gulch Sand to be 525 feet thick at this location. However, this figure shows the Pierce Gulch Sand Aquifer to be only approximately 300 feet thick at the same location.

These inconsistencies create challenges when trying to distinguish the Pierce Gulch Sand Aquifer from the "undifferentiated alluvial aquifers and aquitards" that comprise the Treasure Valley aquifer system.

Exhibit 44

Figure 4

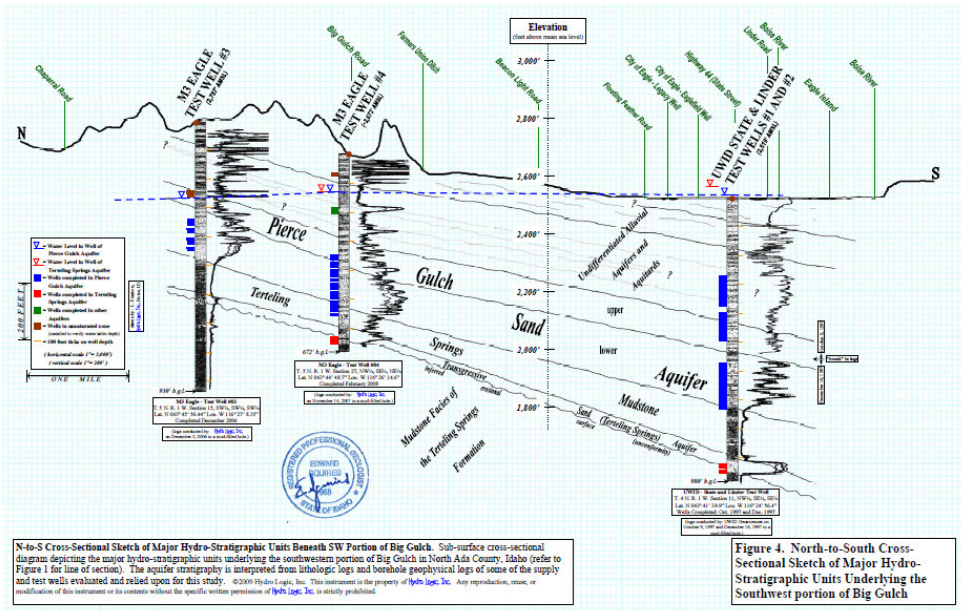


Figure 4. North-to-South Cross-Sectional Sketch of Major Hydro-Stratigraphic Units Underlying the Southwest portion of Big Gulch

One last point with this slide, then we will move on.

Looking now at Test Well #3 and the completion intervals within it. The elevations of the saturated intervals of this well range from 2453 feet above mean sea level to 2,355 feet above mean sea level. Ground surface identified on this map near Linder Road and the Boise River is labeled at 2,518 feet above mean sea level. Therefore, the elevations of the water bearing zones in Test Well #3 are equivalent to the elevations of water bearing zones that are approximately 65 feet to 165 feet below the Boise River near Linder Road.

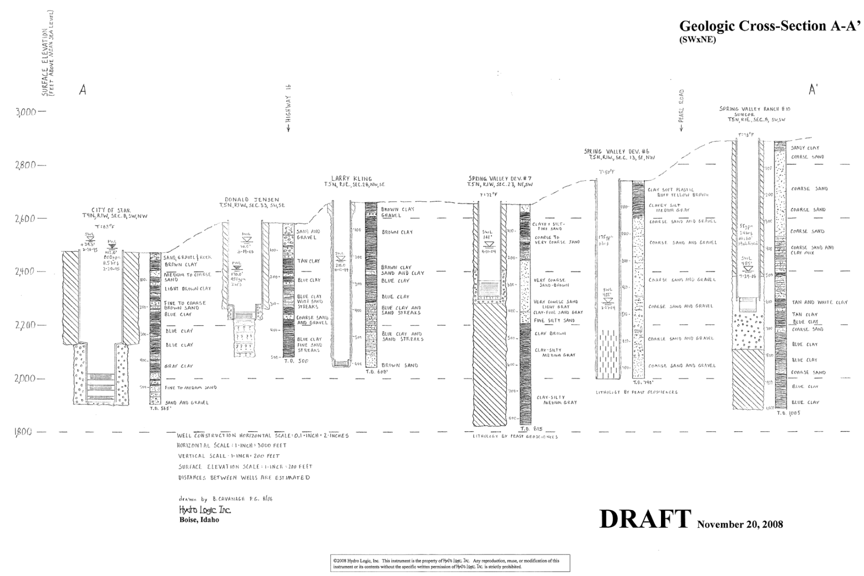
Exhibit 68 --
Page 7

Hydrogeologic Framework of the Boise Valley of Southwest Idaho by Spencer Wood, April 21, 1997

"One should view with distrust, cross sections attempting to correlate over distances of several miles, unless the section is along strike, and the sedimentary facies is identified."

This quote is from Exhibit 68, a report prepared by Dr. Wood. Based on the interpretations pointed out in the previous cross section that was developed using high quality data, I agree with his statement that says "{QUOTE One should view with distrust, cross sections attempting to correlate over distances of several miles, unless the section is along strike, and the sedimentary facies is identified." {END QUOTE}

EXHIBIT 27



Some final comments I'd like to make regarding the stratigraphy of the area are related to the documents in Exhibit 27, titled Cross-sections of wells near M3 Eagle with well construction and lithology (thirteen total). On page 10 of Exhibit 45, HLI states :"{QUOTE}*M3 Eagle submitted 16 sub-surface cross-sections with its materials on November 26, 2008 and an additional four cross-sections on January 29, 2009*." {END QUOTE} and continues with "{QUOTE}*It is unclear whether Staff evaluated the originally submitted 16; the Staff Memo does not discuss them. They are all significant to our analysis; and support our conclusions about the nature of the hydrogeology in this area and the lack of any PGSA-truncating faults here other than the WBE fault.*" {END QUOTE} I would now like to point out a few issues related to these submittals. This slide shows an example of one of the submitted figures in Exhibit 27. Note that there is no attempt in correlating geologic units between wells. All of the figures included in this exhibit are labeled draft with an original date of August 2006. Also, as we saw during this hearing, the map to accompany these diagrams was not presented until half-way through this hearing. These diagrams were not previously reference in any HLI authored documents prior to Exhibit 45. In addition, these diagrams were not previously available to the Department, although they are dated back in 2006.

Exhibit 45

Figure 2 Faulting

Figure 2. Subsurface Seismic Reflection Profiles (from Wood)

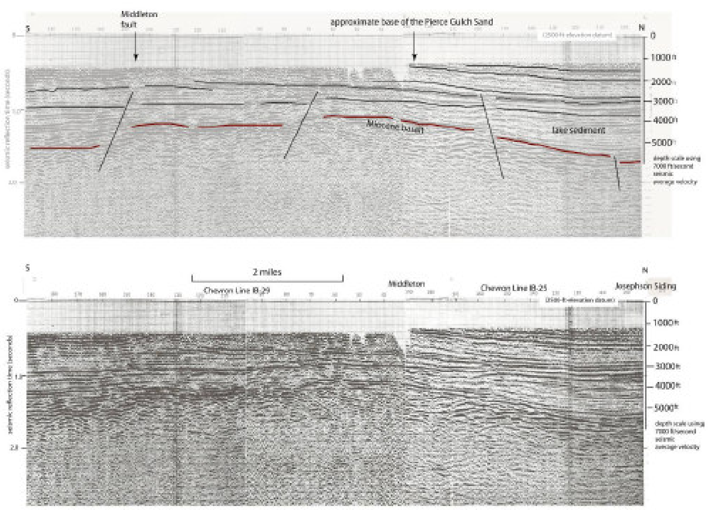


Figure 3. Interpretation of a north-south seismic reflection line through Middleton, Idaho to Josephson siding. Seismic section shows the deep basin north of Middleton that likely extends to the Eagle area. Faulting does not extend to the level of the upper sedimentary section where the Pierce Gulch Sand regional aquifer is situated. Location of seismic line shown on figure 1 of this report.

The next topic I would like to cover is faulting. This issue has been discussed significantly in this hearing, however, I would like to briefly discuss it.

This figure is Figure 2, from Exhibit 45. As Mr. Vincent pointed out in his testimony, the upper 1,000 feet of data for these profiles is not provided, limiting the use of this data to make assumptions regarding the upper 1,000 feet.

We have heard testimony that geologic surface features in the area are rare, limiting the ability to identify or map faults at the surface. We have also heard testimony that wells logs can not indicate the presence or absence of faulting. Considering the seismic survey attempted by BSU on the M3 property was unsuccessful, it appears no data has been collected to support the lack of any faults that may be present in the upper 1,000 feet of the sedimentary section.

To further emphasize point that shallow faults may exist on the property, I would like to point to Dr. Wood's testimony that "{QUOTE} there was faulting going on, but it was not as intense"{END QUOTE} when we was discussing the depositional environment of the upper sedimentary sequence. Later, he testified he has observed faults in the Pierce Gulch Sand.

In conclusion, there is currently no research that has been conducted to confidently rule out the presence of faults in the upper sedimentary sequence. If faults do exist, they may play an important role in ground water flow in the area. They could serve as either conduits or flow barriers depending on the absence or presence of fault gauge. Or, more importantly in my opinion, could offset sedimentary units, increasing the hydraulic connections between different strata and reducing the hydraulic connection within the same strata.

Exhibit 2

Page 1

M3 Eagle Regional
Hydrogeologic Characterization
May 4, 2007
1
Hydro Logic, Inc
Boise, Idaho

M3 EAGLE REGIONAL HYDROGEOLOGIC CHARACTERIZATION
NORTH ADA, CANYON AND GEM COUNTIES, IDAHO
YEAR ONE PROGRESS REPORT –MAY 4, 2007

Overview

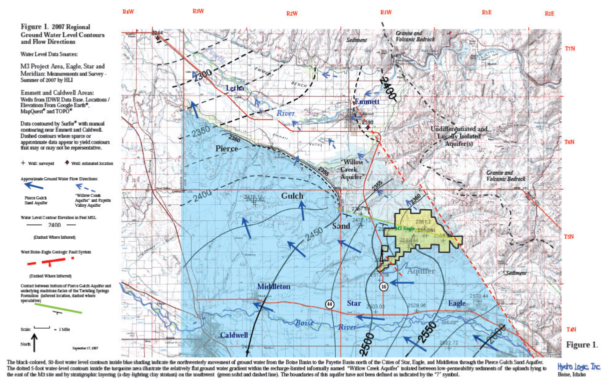
Hydrogeologic studies commissioned by M3 Eagle in the North Ada County area have delineated a highly productive regional sand aquifer with good water quality that underlies the area near Eagle and Star and the proposed M3 Eagle planned community. This aquifer, herein named the Pierce Gulch Sand Aquifer, underlies the north Ada County Foothills where it extends continuously from the Eagle-Star area to the Payette River Valley. Because the Payette Valley near Letha is almost 300 feet lower than the Boise Valley near Eagle, ground water flows out of the Boise River Basin and into the Payette River Basin through the sands of this aquifer. This conclusion is supported in this report by corresponding water level measurements in wells, by several exploratory test well drilling projects, by borehole geophysical surveys, and by other hydrogeologic analyses. Because the Pierce Gulch Sand Aquifer underlies this area, it appears highly likely that the M3 Eagle planned community will be able to develop its entire water needs from beneath its site without transporting water from the Valley areas of either basin. Extensive water-level monitoring in the area shows water levels in wells to be stable under current levels of use. The ground water proposed to be withdrawn by M3 Eagle for its development will be from subsurface flow that has already departed the Boise Basin, on its way to the Payette Basin, so that impacts to existing area water users in the lowlands near Eagle are predicted to be small. M3 Eagle has already implemented a significant ground water monitoring program to document aquifer conditions prior to development and to be able to assess any future impact to the aquifer from its proposed withdrawals over time. M3 Eagle is committed to continue its monitoring of aquifer pressures throughout the proposed development and beyond build out. Hydro Logic, Inc. has been commissioned by M3 Eagle to provide additional water studies to include future aquifer tests, numerical modeling, and ground water geochemistry modeling.

This next topic I would like to discuss in the aquifer continuity between the Boise and Payette basins. As we have heard through this testimony, the regional flow direction is not a significant aspect of this water right application. HLI spent a considerable amount of time and effort trying to illustrate the PGSA extending to the Payette basin. This slide shows part of page 1 of Exhibit 2, the one-year progress report developed by HLI. In this introduction paragraph, the connection to the Payette basin is referred to three times, as highlighted in red. I my opinion, establishing a connection to the assumed recharge mechanisms is more important than determining where the water flows once it leaves the site.

Exhibit 18

Figure 1

3) Aquifer Continuity Between the Boise and the Payette



This is figure 1 of exhibit 18, showing HLI's representation of the regional ground water flow in the Pierce Gulch Aquifer. There are several observations I would like to note regarding this figure.

HLI states on Page 10 of Exhibit 45 that "***The piezometer level map for the PGSA wells, based on reliable data from available wells completed into the PGSA***,". Additionally, on page 33 of Exhibit 45, HLI states "**{QUOTE}*We selected 59 wells for our second measurements because these were the only ones we were CONFIDENT were completed within the PGSA and they were the only ones that remained as candidates after a rigorous analysis weeded out wells of poor and/or unknown construction***." It should be noted that there are only approximately 20 of the 59 wells that were CONFIDENTLY identified as PGSA wells are plotted on this ground water map.

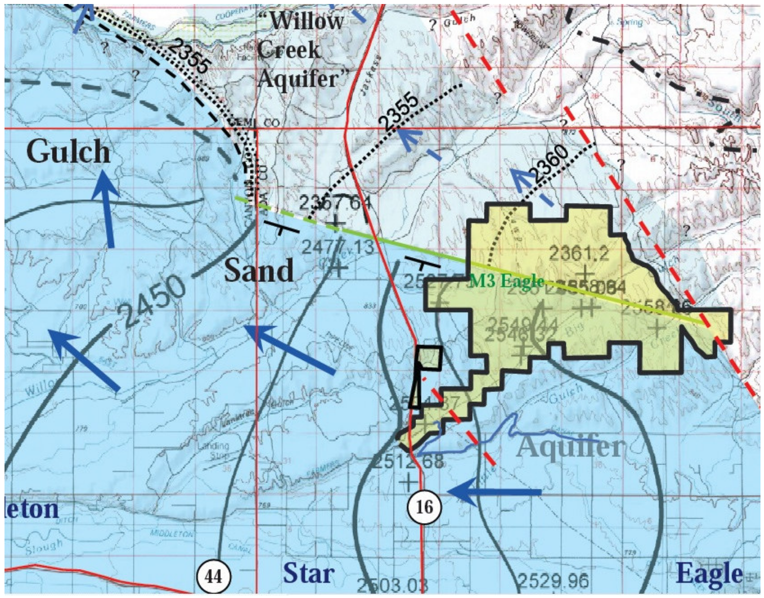
However, one of the wells, Caldwell Test Well #19, is one of the 16 wells used to develop the ground water contours. This well is also one of only four wells that lies west of the Ada/Canyon county line that were used to develop this map. It is noted in the data accompanying the flow map that the Caldwell well may be completed above the PGSA. HLI agrees that it is currently unknown whether or not this well is completed into or above the PGSA.

Data for the Zigler well, the well in the northwest corner of this map and located in the Payette valley, was not provided by HLI in the accompanying data with report, Exhibit 18. This well appears to be an important well to the inferred northwest ground water flow as this well is the furthest most northwestern well. I researched the well log for this well. This well is 176 feet deep that is composed primarily of silt and contains only six feet of saturated sand. It is not apparent to me that this well is completed in the PGSA.

The inclusion of data from these wells is inconsistent to HLI's statements that only wells CONFIDENTLY determined to be PGSA wells with reliable data were used to construct this map.

Exhibit 18

Figure 1 (Zoomed in on M3 Property)



This is a zoomed in image of the previous slide focused in on the M3 area that contains the majority of the data points plotted on the regional map. The “green line” on the map represents a no-flow barrier and has significant importance on the ground water flow direction . Notice at the termination of the line the ground water flow abruptly changes to the north.

Exhibit 44

Page 5

"*Indeed, the identified characteristic "geophysical signature" of the base of the Pierce Gulch Sand Aquifer (HLI, 2007) appears to be present in deep petroleum exploration bores beneath the cities of Meridian, Caldwell, and Payette, Idaho (S.H. Wood, personal communication, 2009) suggesting that the Pierce Gulch Sand Aquifer is extensive to not only the Payette River Valley but also to the Snake River Valley."*

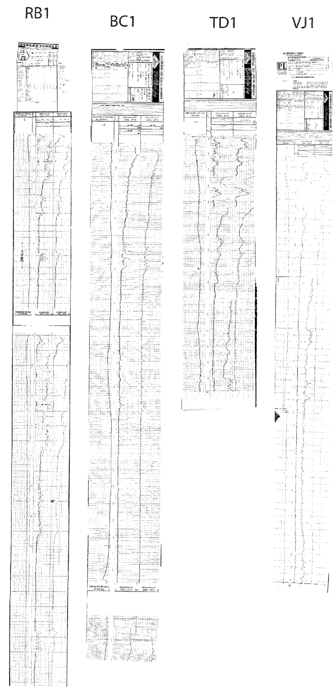
To support the continuity between the Boise and Payette basins, HLI states on Page 11 of Exhibit 45 "{QUOTE}The normal resistivity logs from the Ted Daws #1 well (submitted to IDWR in November 2008 and discussed in our January 2009 submittal) clearly show that the sand unit called the Pierce Gulch Sand Aquifer is a widespread deposit that extends to the Payette River Valley north of New Plymouth (Figures 3 and 4)."{End Quote}
And on Page 17, "{QUOTE} The identical log characteristics that HLI has shown in Boise area wells occur in the Ted Daws #1 well and the adjacent Virgil Johnson #1 well, and also in geophysical logs to the west near the town of Payette and south to Lake Lowell." {END QUOTE}
Continued on page 17, HLI states: "However, Dr. Ralston did not evaluate these geophysical logs from just wells that were described above, and did not evaluate the Zigler well. Id. at 103-104. It appears that the Staff also did not." {END QUOTE}

HLI is correct that the Staff did not review the geophysical logs for the mentioned wells in the Payette basin for two reasons. First, the April 1, 2009 memo prepared by HLI is the first and only HLI authored document in which these wells are specifically referenced. The quote that is currently on the screen is the extent of the discussion of these wells in the 2009 submittal. It reads "{QUOTE} "*Indeed, the identified characteristic "geophysical signature" of the base of the Pierce Gulch Sand Aquifer (HLI, 2007) appears to be present in deep petroleum exploration bores beneath the cities of Meridian, Caldwell, and Payette, Idaho (S.H. Wood, personal communication, 2009) suggesting that the Pierce Gulch Sand Aquifer is extensive to not only the Payette River Valley but also to the Snake River Valley."{END QUOTE}*

The subject wells are not directly referenced in the 2009 submittal.

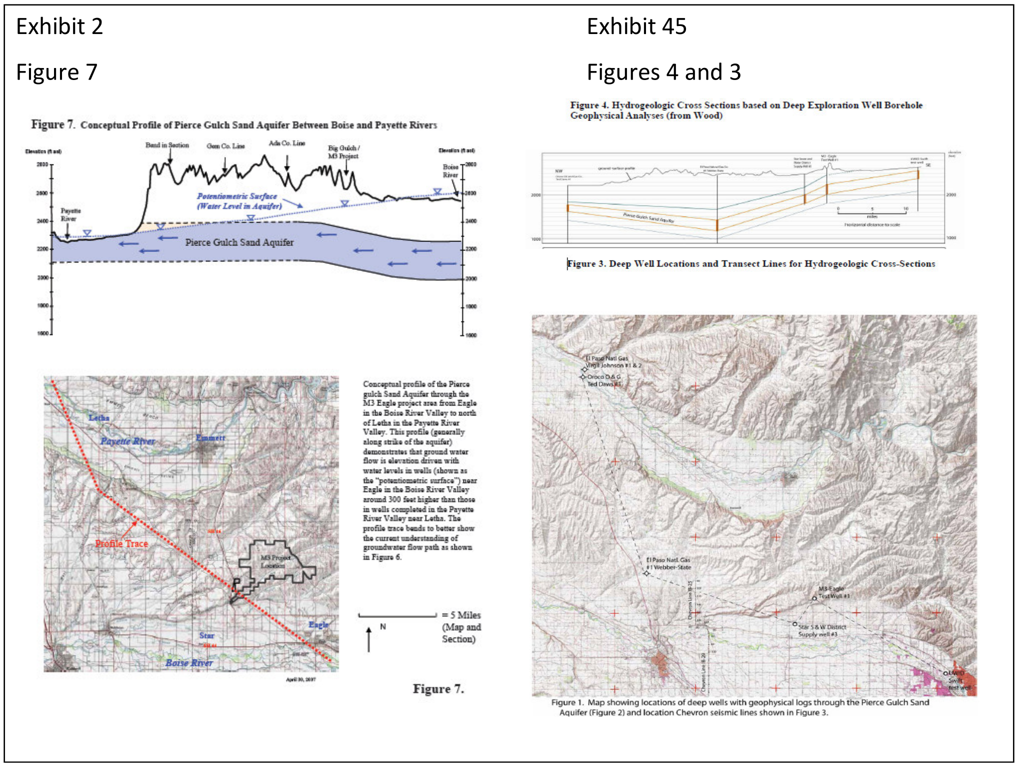
Exhibit 19

First Page



The second reason the Staff did not review the geophysical logs for the Daws and Johnson wells is because the logs were not properly identified and difficult to read. The slide shown here is are the geophysical logs as they were submitted to the department. Several issues made the review of these logs difficult. First it is unclear as to what the labels "RB1", "BC1" "TD1, and VJ1 represent. Second, there was not a map to accompany these plots to show their location. And third, the legibility of the actual data on the plots was difficult to read.

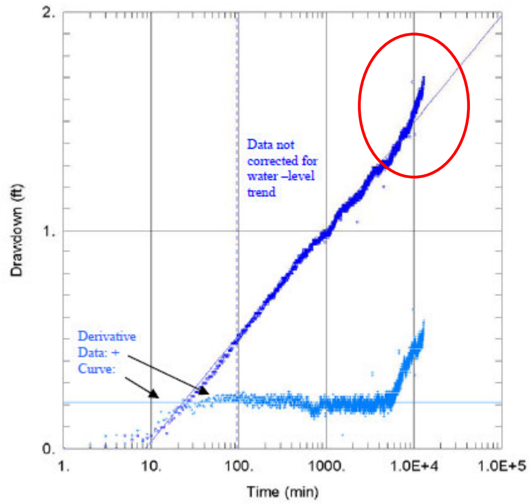
The department was unaware of the significance of these plots until we read the April 1, 2009 memo from HLI.



This slide shows the two hydrogeologic profiles of the Pierce Gulch Sand Aquifer submitted in support of this application that extend into the Payette basin. Although similar, the two profile lines are not in the same location. They do however, follow the general strike of the aquifer as define to the northwest. Therefore the change in dip can not account for the different depths of the Pierce Gulch Sand Aquifer beneath the Payette River. The differences between the two profiles suggests additional information is necessary to better define this aquifer on a regional scale.

Exhibit 44

Figure 24 **Figure 24. Cooper-Jacob Analysis for the Big Gulch Stock Well**



Screen = 180 ft bgl (open hole)
T=500,000 gpd/ft
S = 1.2x 10^{-3}
Kv/Kh=0.1
b = 340 ft
t_c = 95 min
r = 845 ft
Q = 917gpm (at SVR #7)

Derivative analysis indicates method is valid for data between 100 and 6,000 min. Rise in apparent drawdown and derivatives after 6,000 minutes caused by declining regional aquifer water level trend. Data are uncorrected for this trend.

$T = 264Q/\Delta s$ Where:
T = Transmissivity in gallons per day per foot (gpd/ft)
Q = Pumping rate in gallons per minute (gpm) and
Δs = Change in drawdown of water level over one log cycle of time, in feet (ft)

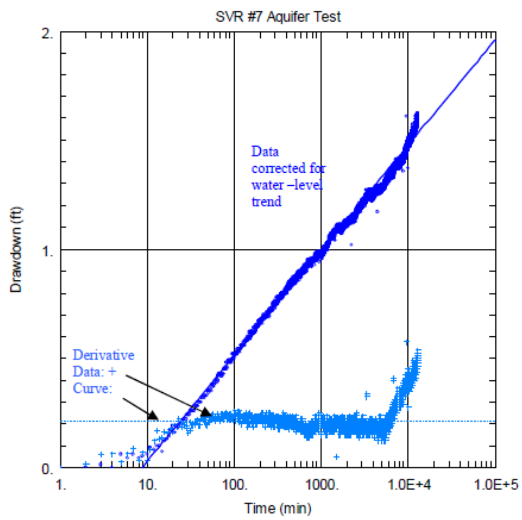
The next topic for discussion is aquifer testing. There are a few observations I would like to address on this topic.

This slide is Figure 24 from Exhibit 44 showing the drawdown plot for the Big Gulch Stock well in the January 2009 submittal. The sudden increase at the end of the test raised questions for the Department and we commented accordingly in the staff memo.

Exhibit 45

Figure 6

Figure 6. Cooper-Jacob Analysis for the Big Gulch Stock Well with Water-Level Trend Corrections



Screen = 180 ft bgl (open hole)
T=500,000 gpd/ft
S = 1.3x 10^{-3}
Kv/Kh=0.1
b = 340 ft
t_c = 95 min
r = 845 ft
Q = 917gpm (at SVR #7)

Derivative analysis indicates method is valid for data between 100 and 6,000 min. Rise in apparent drawdown and derivatives after 6,000 minutes may reflect boundary effect of nearest known "no-flow" boundary – the edge of the aquifer shown in the site plan as the "green line." Correction for water-level trend results in an indicated storativity (S) about 8 percent greater than value indicated without this correction. Transmissivity remains unchanged.

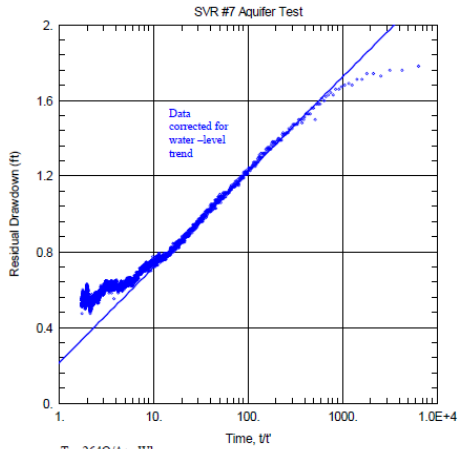
This is Figure 6 from Exhibit 45. HLI responded to our comments in the staff memo by correcting the drawdown data with the regional aquifer trend in attempt to account for the late rises in water levels. Note the increase is apparent in the corrected water levels as it was in the original submittal. In addition the text on the graph states "{QUOTE} Rise in apparent drawdown and derivatives after 6,000 minutes may reflect boundary effect of nearest know "no-flow" boundary – the edge of the aquifer shown in the site plan as the "green line.""{END QUOTE}

The presence of a hydraulic boundary is suspected by department and HLI. A test of longer duration would have provided additional information needed to determine the significance of such a boundary.

Exhibit 44

Figure 27

Figure 27. Theis Recovery Analysis for the Big Gulch Stock Well with Water-Level Trend Corrections



Screen = 180 ft bgl (open hole)
T=480,000 gpd/ft
S/S' =0.4
Kv/Kh=0.1
b = 340 ft
r = 845 ft
Q = 917gpm (at SVR #7)

S/S' less than 1 suggests "late" or "incomplete" recovery. However, incomplete correction for seasonal (declining), regional, water- level trend over 12 days of recovery is most probable cause of apparent incomplete recovery.

Partial penetration corrections neither needed nor applied.

$T = 264Q/\Delta s$ Where:

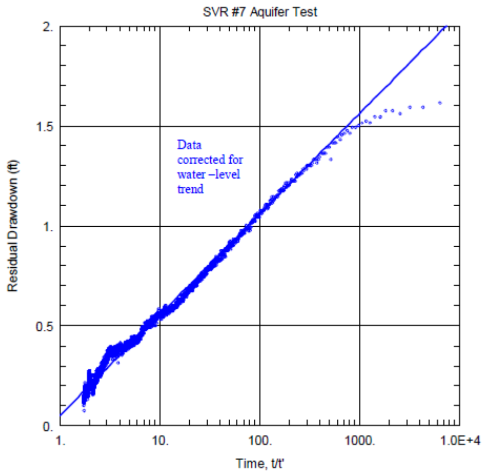
T = Transmissivity in gallons per day per foot (gpd/ft)
Q = Pumping rate in gallons per minute (gpm) and
Δs = Change in drawdown of water level over one log cycle of time, in feet (ft)

This slide is Figure 27 of Exhibit 44. This plot is a recovery plot of the Big Gulch Stock well. Note the deviation form the blue line on the left side of the plot. This deviation indicated an incomplete recovery in in the water levels, meaning the water level did not fully recover to the pre-test level. Again, we commented accordingly in our Staff Memo.

Exhibit 45

Figure 7

Figure 7. Theis Recovery Analysis for the Big Gulch Stock Well with Revised Water-Level Trend Correction



Screen = 180 ft bgl (open hole)
T=480,000 gpd/ft
S/S' =0.8
Kv/Kh=0.1
b = 340 ft
r = 845 ft
Q = 917gpm (at SVR #7)

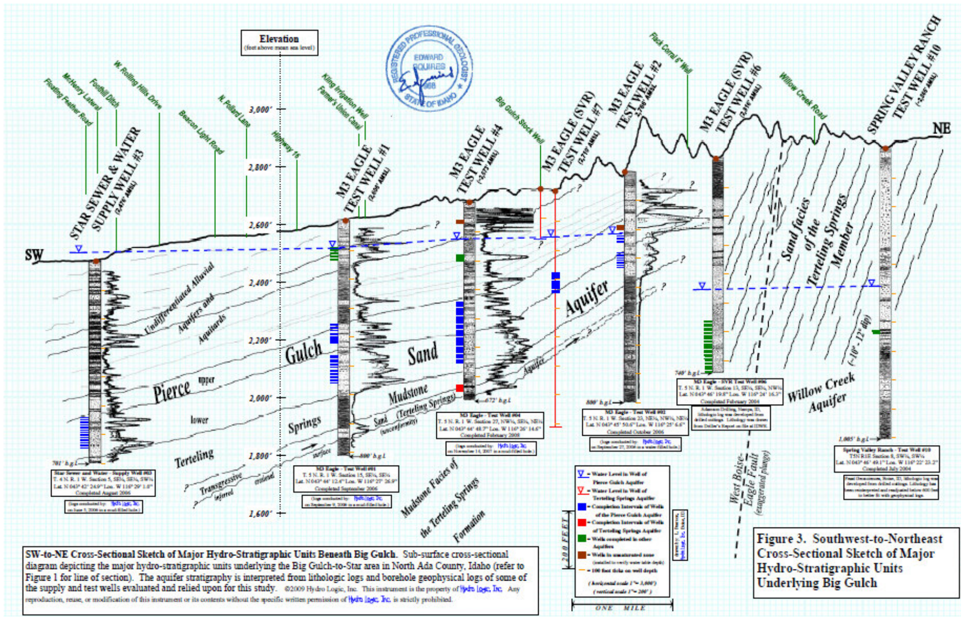
S/S' less than 1 suggests "late" or "incomplete" recovery. Apparent "late" recover caused by either, a) incomplete correction for seasonal (declining), regional, water- level trend or b) hydraulic effects of nearest known no-flow boundary – the edge of the aquifer ("green line" on the site plan.

Partial penetration corrections neither needed nor applied.

This slide is Figure 7 of Exhibit 45. HLI presented this plot in response to our comments regarding the lack of recovery. This is a plot of drawdown recovery data that was previously shown, but corrected for a trend that was misapplied to the data in the original submittal. Note this correction reduces the deviance from the straight blue line. The data also come closer to approaching full recovery. Possible reasons for the incomplete recovery are stated in the text of this plot that include: "{QUOTE} S/S' less than 1 suggests "late" or "incomplete" recovery. Apparent "late" recover caused by either a) incomplete correction for seasonal (declining) regional, water-level trend, or b)hydraulic effects of nearest known no-flow boundary – the edge of the aqufier (green line" on the site plan."{END QUOTE}

Exhibit 44

Figure 3



The next topic I would like to discuss is aquifer boundaries.

This is slide shows Figure 3, from Exhibit 44.

The “{QUOTE} green line” {END QUOTE} is one of the two boundaries that HLI states they have defined. As we heard in Mr. Vincent’s testimony, based on this figure it is unclear as to how the base of the aquifer can daylight on the west side of SVR #6. Additional questions are related to the water level fluctuations across the green line as it appears in this figure that permeable sediments could be in contact across the line.

EXHIBIT 2

FIGURE 3

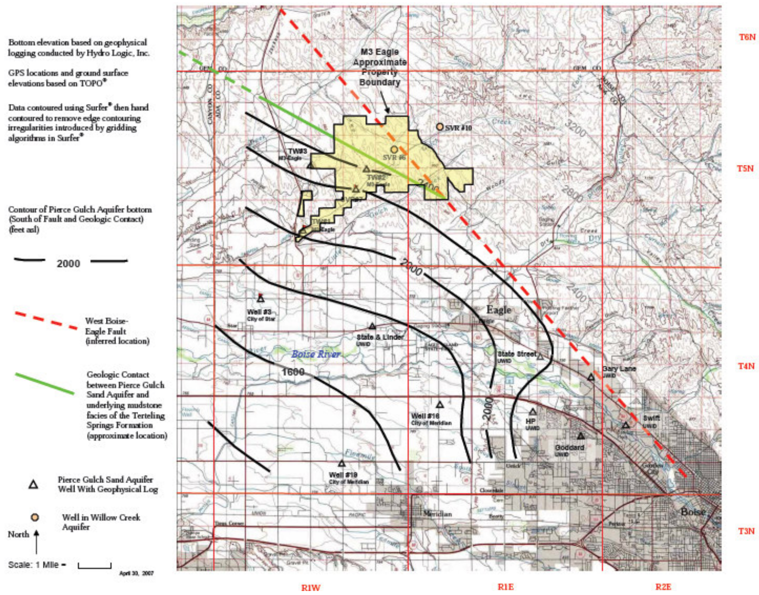


Figure 3. **Contours on the Bottom of the Pierce Gulch Sand Aquifer In the Greater M3 Eagle Project Area**

Structural contours of the base of the Pierce Gulch Sand Aquifer (regional aquifer) beneath the Eagle area north of the Boise River. The contours are based upon the analysis of drill-cuttings and borehole geophysical logs from thirteen test wells (see Figure 2). The contoured surface represents the base of the regional cold water aquifer. In other words, the occurrence of significant quantities of drinking- water-quality ground water is not likely beneath the contoured depths southwest of the red-dashed fault line.

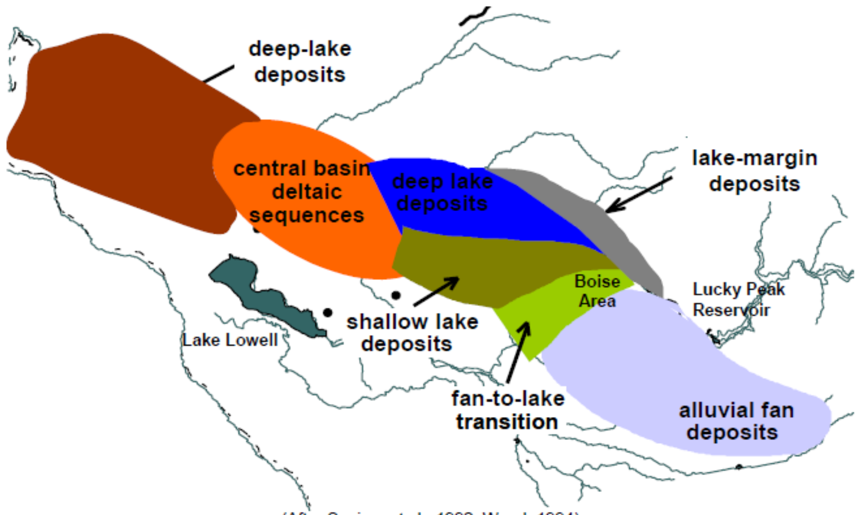
Figure 3.

Hydro Logic, Inc.
Boise, Idaho

This slide shows figure 3 of the Exhibit 2. The map depicts the elevation contours in which represent the bottom of the aquifer. The bottom of the Pierce Gulch Sand Aquifer is considered equivalent to the top of the underlying thick mudstone. Equating the extent of the Pierce Gulch Sand Aquifer to the extent of the mudstone involves making the assumption that the sediments that directly overlie the mudstone are composed of deltaic sands. As I previously testified, the distinction between the Pierce Gulch Sand Aquifer and the undifferentiated alluvial aquifers and aquitards that exist throughout the region becomes less distinct with distance from the M3 property.

Exhibit 33D

Figure 3-4



(After Squires et al., 1992; Wood, 1994)

Figure 3-4: Subdivisions of Idaho Group sediments.

This slides shows Figure 3-4 of the Exhibit 33D. This figure depicts the Subdivisions of the Idaho Group Sediments in the Treasure Valley after Squires, et al 1992 and Wood 1994.

These subdivisions of the sedimentary units is supported through the data and testimony submitted in support of this water right application. Note the gray lobe on the northeast side of the group of classifications. This gray shaded area represents the lake-margin deposits, which would include the deltaic sands of the Pierce gulch Aquifer. The limited extent of the these lake-margin deposits supports the earlier testimony I provided that the lake-margin sediments merge into the finer grained deposits within the basin. This depiction of the sedimentary units within the Treasure Valley indicates the lake-margin deposits are not as extensive as conceptualized by HLI.

Exhibit 45

Page 25

"There likely is recharge at least at these locations: 1) the Boise River in the upper basin (above Capitol Bridge); 2) where PGSA rises up dip to the present-day Boise River gravels east of the United Water Idaho ("UWID") Swift well (in the vicinity of Garmers Union Ditch Co.'s river diversion); 3) added pressure head from the flood irrigation and irrigation laterals off the NYC and other main canals; 4) recharge along the eastern edge of the basin NE of Eagle; and 5) from ground water moving into the aquifer under an upward gradient from below."

I would like to now focus on recharge mechanisms to the target aquifer. HLI specifies five sources of recharge that they feel is likely in their opinion. Some of these recharge sources have been previously considered, others had not. As shown on this HLI states on page 25 of Exhibit 45 that *"{QUOTE}There likely is recharge at least at these locations: 1) the Boise River in the upper basin (above Capitol Bridge); 2) where PGSA rises up dip to the present-day Boise River gravels east of the United Water Idaho ("UWID") Swift well (in the vicinity of Garmers Union Ditch Co.'s river diversion); 3) added pressure head from the flood irrigation and irrigation laterals off the NYC and other main canals; 4) recharge along the eastern edge of the basin NE of Eagle; and 5) from ground water moving into the aquifer under an upward gradient from below."{END QUOTE}*
I would like to address each of the potential sources in the following slides.

Exhibit 45

Page 28

"*Staff for some reason combines reaches long known to be gaining with reaches long known to be losing apparently to suggest "considerable uncertainty" in seepage analysis.*"

The quote on this slide is from Page 28 of Exhibit 45. It states, "{QUOTE} "*Staff for some reason combines reaches long known to be gaining with reaches long known to be losing apparently to suggest "considerable uncertainty" in seepage analysis.*"{END QUOTE}

Staff referenced the various estimates of the gains or losses associated with the Boise River in the Staff memorandum to show there is considerable uncertainty in the estimates and sources of such estimates. I will now explain the referenced estimates to highlight the uncertainty in the estimates.

Exhibit 50

Table 1

Table 1. Estimates of the Boise River gains and losses for the Lucky Peak to Glenwood Bridge Reach.

	IDWR, 2009	USGS, 1997	Urban and Petrich, 1998	Urban, 2005
Estimated Gain or Loss (cfs)[1]	14	52	-21	-110

[1] Gains are indicated by positive values and losses are indicated by negative values.

This slide shows Table 1 from Exhibit 50, the IDWR staff memorandum. The table shows four different measurements of gains or losses associated with the Boise River in the reach between Lucky Peak and Glenwood Bridge. The first estimate, labeled IDWR, 2009, represents the difference in the gage readings from Lucky Peak to Glenwood Bridge for the non-irrigation season (November through March). Only the winter flow measurements were used in the estimate to eliminate any losses or returns from irrigation diversions. The results from these calculations resulted in a net gain of 14 cfs.

The second estimate, labeled USGS, 1997, represents the results from the 1999 USGS Report that was submitted as an exhibit by the protestants last week, titled Streamflow Gains and Losses in the Lower Boise River Basin, Idaho, 1996-1997. The results from this study indicated a net gain of 52 cfs, based on a seepage analysis along the lower reach of the river above Glenwood Bridge.

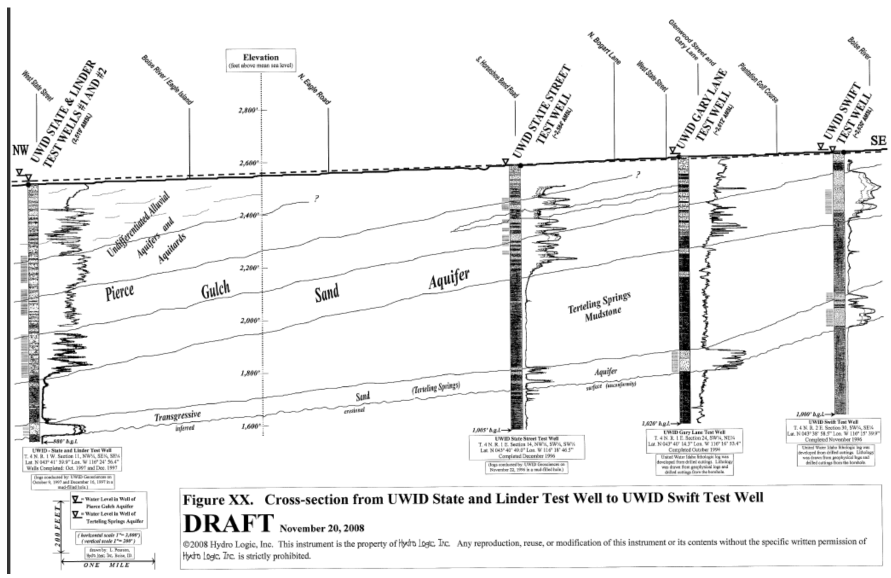
The third estimate, labeled Urban and Petrich, 1998, was the estimate used in the Treasure Valley Hydrologic Report. The data used for this estimate are unknown, other than it represents the reach of the river between Lucky Peak Dam and Capital Bridge. The result of this estimate was a loss of 21 cfs.

The fourth and final estimate, labeled Urban, 2005, is an updated estimate for the Treasure Valley Hydrologic Project. Again, the data used for this estimate is unknown, other than it represents the reach from Lucky Peak to Capital Bridge in the year 2000. The calculations used to produce this estimate are unclear, as a gage did not exist at the Capital Bridge in the year 2000. The results of from this estimate indicate a net loss of 110 cfs.

In summary, I included this table in the staff memorandum to highlight to the hearing officer the current level of uncertainty in the gains and losses associated with the Boise River.

Exhibit 26

Cross Section 4



This slide shows one of the submitted cross sections developed by HLI in exhibit 26. With respect to PGSA exposure under the Boise River, HLI states on page 28 of Exhibit 45 that the geophysical signature of the Swift well represents the PGSA 400 feet beneath the river. According to this figure, the PGSA is depicted from approximately 75 feet to 225 feet below the Boise River. This inconsistency questions the certainty of identifying this interval of this well as PGSA. In addition, the region identified as the PGSA in the two central wells of this diagram is not distinguishable from the undifferentiated alluvial aquifers and aquitards in the upper left section of this diagram.

Exhibit 45

Page 25

3) added pressure head from the flood irrigation and irrigation laterals off the NYC and other main canals;

With respect to the third source of proposed recharge, we have heard testimony regarding the age and travel time of the ground water in the PGSA. It is still unclear to the staff as to how the irrigation water seepage upstream from Cole Road is available as a recharge source to the PGSA.

Exhibit 45

Page 25

4) recharge along the eastern edge of the basin NE of Eagle;

This fourth source of recharge was not included in the numerical model developed to predict impacts from pumping in the PGSA. There was no attempt to identify or quantify the specific mechanisms that could be contributing recharge to the PGSA in the eastern edge of the basin northeast of Eagle.

Exhibit 45

Page 25

5) from ground water moving into the aquifer under an upward gradient from below.

HLI's fifth and final source of proposed recharge to the PGSA is from ground water moving into the aquifer through the thick mudstone.

HLI's recharge from ground water moving into the aquifer under an upward gradient from below is not viewed as a significant source of recharge to the PGSA based on HLI's finding in the modeling report that stated: "The differences between runs with and without this upward flow from beneath the Pierce Gulch Sand Aquifer were found to be so small (maximum increase in water levels in the Pierce Gulch Sand Aquifer of less than 0.1 foot) that an eight layer was deemed unnecessary." Pg. 17 of Exhibit 16. Therefore, it seems odd that HLI would suggest this recharge mechanism and not model it as one.

Exhibit 45

Page 28

"*In past studies and HLI's more recent, it is shown that the PGSA receives substantial recharge primarily from the Boise River and associated canal systems*."

"*The issue of water availability for the proposed project does not, in our view, require M3 Eagle to work out the exact PGSA recharge mechanisms in the Boise Basin*."

And

Page 41

"the aquifer is strongly recharged".

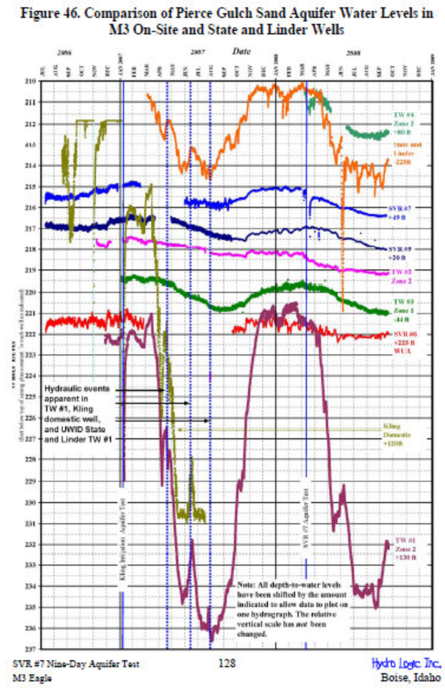
These quotes are from page 28, Exhibit 45, and the top one states "{QUOTE} *In past studies and HLI's more recent, it is shown that the PGSA receives substantial recharge primarily from the Boise River and associated canal systems*." No specific references are provided to support the statement.

The second quote states "{QUOTE}*The issue of water availability for the proposed project does not, in our view, require M3 Eagle to work out the exact PGSA recharge mechanisms in the Boise Basin*."
IDWR agrees that the exact recharge mechanisms in the Boise Basin do not need fully identified, but an attempt to characterize and quantify the recharge mechanisms to the aquifer in which the water right application should be done.

The third quote, also from Exhibit 45 states "{QUOTE}the aquifer is strongly recharged."{END QUOTE} The statement is not referenced with any documentation to support the statement.

Exhibit 44

Figure 46



Now I'd like to change the focus of this testimony to water level and trends. This slide is Figure 46 of Exhibit 44. It is a plot of the water level data collected by HLI in the M3 test wells. The dates on the plot range from July of 2006 through October 2008. There are several observations I would like to point out with this graph.

First, I would like to point out four wells that all show a similar downward trend over the past three years of monitoring. The wells are SVR #7, SVR #9, TW#2, and TW#3. They are the two blue plots and the pink and green plots on the graph. These wells are all located in the central A close visual inspection of the water levels from these four wells on the M3 property shows a declining trend over the past few years. This trend is interesting, considering the testimony that water levels are rising down in the valley in wells believed to be completed into the same aquifer.

Next, I'd like to point out two more wells on this graph. The wells are United Water State and Linder Test Well and the Tw#1. These wells are represented by the orange plot (the united water well) and the maroon plot (TW#1) on the graph. Notice the significantly different seasonal water level fluctuation exhibited in these wells when compared to the first four. TW#1 is located down in the southwest portion of the "panhandle" section of the property. United Water State and Linder well is located near the intersection of State Street and Linder Road. The department noted this change in water level fluctuations in the staff memorandum and HLI responded on Page 20 of Exhibit 45

"{QUOTE}*The PGSA as monitored by M3 Eagle's more westerly wells are more confined with lower storativity and thus show a greater water level drawdown and recovery from the collective pumping from the aquifer to the south. Such responses are consistent with basic principles of hydrogeology*." {END QUOTE}

And

"{QUOTE}*The fact that the water level fluctuations between the two wells is "nearly an order of magnitude greater" does not justify Staff's implication that the two well groups lie in separated geologic units*. *Such a difference would be expected given the locations of these wells relative to the pumping wells that are causing the seasonal drawdowns*".{END QUOTE}

The staff did not ever imply that the two groups of wells were in separate geologic units. This difference in fluctuations does not support HLI's claim that the fluctuations are due to the proximity of the pumping centers, or one would expect the State and Linder monitoring well would have a greater response to such pumping than TW#1. The response by HLI is not supported by the data presented Figure 46, as the seasonal fluctuations in the State and Linder (closer to the pumping wells) are approximately five feet, whereas the same seasonal fluctuations in TW#1 are on the order of 16 feet.

Exhibit 2

Page 14

"A "water level change map" of measured water levels in comparison to water levels reported on driller's reports is planned for HLI's comprehensive report."

And

Exhibit 45

Page 27

"many of the wells completed in the PGSA have water level elevations that are at or above the levels reported by the well driller when the well was initially completed."

On page 14 of Exhibit 2, HLI states "{QUOTE} *A "water level change map" of measured water levels in comparison to water levels reported on driller's reports is planned for HLI's comprehensive report.*" {END QUOTE} The department has not received a water level change map from HLI. However HLI does appear to have knowledge of water level changes when they quote on Page 27 of Exhibut 45 that"{QUOTE} *many of the wells completed in the PGSA have water level elevations that are at or above the levels reported by the well driller when the well was initially completed.*"{END QUOTE} It should be noted that many of the PGSA identified wells on M3 property have water levels that are below the level they were when drilled.

Exhibit 45
Pg. 29

"*the Boise River and New York Canal seepage values were not directly input to the model*."

And

Exhibit 16
Pg. 28

"We assume that a significant portion of this general head flow into the model's southeastern boundary originated as seepage from both the Boise River and the New York Canal."

Now I'd like to change the focus of this testimony to the ground water modeling category. This slide shows two quotes from HLI documents that discuss the southeastern boundary of the model, that state on page 29 of Exhibit 45 "{QUOTE} *the Boise River and New York Canal seepage values were not directly input to the model*." {END QUOTE} I agree that the seepage values were not directly input into the ground water model, but I do think the seepage is represented in the model. This idea is supported by the statement made by HLI on page 28 of Exhibit 16 that states"{QUOTE} *We assume that a significant portion of this general head flow into the model's southeastern boundary originated as seepage from both the Boise River and the New York Canal."* {END QUOTE}

Exhibit 16

Appendix B

Tables 3 and 4

Table 3: Water Budget for Steady-State and 50-Year Transient Hmatch Simulation

Water Budget Component	Boundary Type	Model Layer	Hmatch (SS No Pumping) Net Inflow (cfs)	Hmatch (50 Year Pumping) Net Inflow (cfs)	Hmatch (Difference) Difference[1] 50yr-SS (cfs)	Hmatch (Difference) Percent Contribution to NPW Pumping
Recharge	Recharge	Uppermost Active	542.44	542.44	0.00	0.00%
Boise River Seepage	River	Layer 1	-530.53	-521.58	8.95	89.27%
Payette River Seepage	River	Layers 1,2,3	-386.91	-386.72	0.19	1.92%
Lake Lowell Seepage	River	Layer 1	17.49	17.51	0.01	0.14%
Dry Creek Seepage Inflow	Wells	Layer 1	3.95	3.95	0.00	0.00%
Middle Aquifer Pumping (Domestic, Industrial)	Wells	Layer 3	-59.68	-59.51	0.17	1.72%
PGSA Pumping (Municipal, Industrial & Irrigation Pumping)	Wells	Layers 5-7	-84.09	-94.12	-10.03	NA
Boise River Alluvial Aquifer Inflow	CHB	Layer 1	80.95	81.57	0.62	6.21%
Boise River Alluvial Aquifer Outflow	CHB	Layer 1	11.76	11.78	0.02	0.20%
Payette River Alluvial Aquifer Inflow	CHB	Layer 1	282.48	282.49	0.01	0.07%
Payette River Alluvial Aquifer Outflow	CHB	Layer 1	-1.92	-1.91	0.00	0.01%
PGSA Inflow from SE Model Boundary	GHB[2]	Layers 5-7	114.77	114.77	0.00	0.00%
PGSA Outflow at SW Model Boundary	CHB	Layers 5-7	7.61	7.62	0.01	0.14%
Payette River Valley Fill Outflow	CHB	Layers 5-7	1.98	1.98	0.00	0.02%
Willow Creek Aquifer Along NE Model Boundary	CHB	Layers 5-7	-0.30	-0.27	0.03	0.31%
Model Mass Balance Error			<1%	<1%		

1. Negative number indicates more outflow simulated in the transient model. Positive number indicates more inflow
2. For the 50 year pumping simulation the boundary type was constant flux

Table 4: Water Budget for Steady-State and 50-Year Transient Tmatch Simulation

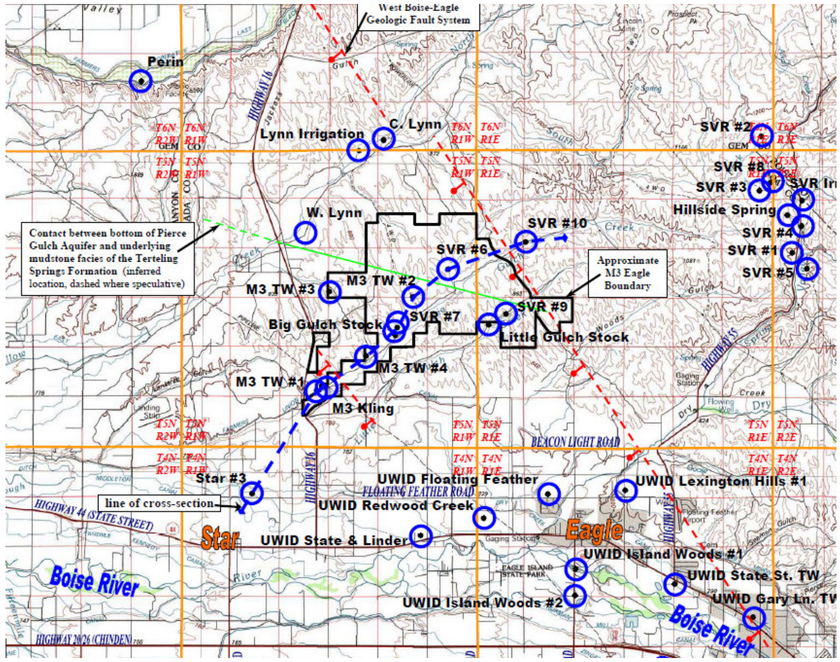
Water Budget Component	Boundary Type	Model Layer	Tmatch (SS No Pumping) Net Inflow (cfs)	Tmatch (50 Year Pumping) Net Inflow (cfs)	Hmatch (Difference) Difference[1] 50yr-SS (cfs)	Hmatch (Difference) Percent Contribution to NPW Pumping
Recharge	Recharge	Uppermost Active	542.44	542.44	0.00	0.00%
Boise River Seepage	River	Layer 1	-529.18	-520.05	9.13	88.60%
Payette River Seepage	River	Layers 1,2,3	-387.02	-387.00	0.01	0.14%
Lake Lowell Seepage	River	Layer 1	17.36	17.38	0.02	0.23%
Dry Creek Seepage Inflow	Wells	Layer 1	3.95	3.95	0.00	0.00%
Middle Aquifer Pumping (Domestic, Industrial)	Wells	Layer 3	-59.52	-59.39	0.14	1.33%
PGSA Pumping (Municipal, Industrial & Irrigation Pumping)	Wells	Layers 5-7	-84.09	-94.40	-10.30	NA
Boise River Alluvial Aquifer Inflow	CHB	Layer 1	88.50	88.84	0.34	3.35%
Boise River Alluvial Aquifer Outflow	CHB	Layer 1	11.61	11.64	0.04	0.37%
Payette River Alluvial Aquifer Inflow	CHB	Layer 1	282.49	282.47	-0.01	-0.14%
Payette River Alluvial Aquifer Outflow	CHB	Layer 1	-2.18	-1.92	0.26	2.48%
PGSA Inflow from SE Model Boundary	GHB[2]	Layers 5-7	106.82	106.82	0.00	0.00%
PGSA Outflow at SW Model Boundary	CHB	Layers 5-7	7.42	7.45	0.03	0.28%
Payette River Valley Fill Outflow	CHB	Layers 5-7	1.75	1.97	0.22	2.14%
Willow Creek Aquifer Along NE Model Boundary	CHB	Layers 5-7	-0.39	-0.34	0.05	0.48%
Model Mass Balance Error			<1%	<1%		

1. Negative number indicates more outflow simulated in the transient model. Positive number indicates more inflow
2. For the 50 year pumping simulation the boundary type was constant flux

This slide shows Tables 3 and 4 from Appendix B of Exhibit 16. These tables show the water budgets for the most current model runs performed by PGG. The inflow rates assigned to the PGSA in the southeastern corner of the model are based on losses from the Boise River and New York Canal and are higher than all of the combined pumping in these layers (Layers 5, 6, and 7) that represent the PGSA. In the upper table, Table 3, the total inflow in the southeast corner is 114.77 cfs. The total pumping from this table is 94.12 cfs from these layers for the entire model domain. In the lower table, Table 4,the total inflow in the southeastern corner of the model is 106.82 cfs. The total withdraw from these layers for the entire model domain due to pumping is 94.4 cfs. The amount of water entering the model is an approximate amount, that is similar to a better known rate of current discharge. A slight error in the inflow component to the model would result in the predicted impacts to be underestimated.

Exhibit 43

Figure 1



I would like to change the focus of this testimony to the geochemistry work completed in support of this application. I have only few observations related to this topic.

First, we heard testimony from Mr. Glanzman that the TDS values in the Pierce Gulch ranged from approximately 80 mg/L to over 400 mg/L. He later testified that the low TDS value indicate you are near a recharge zone. The lowest TDS value from PGSA wells came from the State and Linder Well, which is tens of miles from the speculated recharge area. The location in which the State and Linder well is located is defined as a discharge area for the PGSA by HLI, an inconsistency in the conceptual model and the geochemical results.

It does not appear that many (or any) shallow, non PGSA identified wells were sampled and analyzed. The analysis of the overlying aquifers when compared to the PGSA analysis would provide information related to the interconnectivity between the aquifers.

Exhibit 45

Page 40

"Although the staff refers to "lines of evidence" suggesting the aquifer "may be limited," not even a listing of such evidence appears in the Staff Memo."

I would now like to change the focus of this to aquifer sustainability. The quote on the slide is presented on Page 40 of Exhibit 45. On this page, HLI states, "{QUOTE} Although the staff refers to "lines of evidence" suggesting the aquifer "may be limited," not even a listing of such evidence appears in the Staff Memo."{END QUOTE} The lines of evidence the staff was referring to was the lack of recovery of the Big Gulch Stock well and the current downward decline in monitored water levels in the test wells completed on the M3 property. A response to the lack of recovery was presented in Exhibit 45 and presented in this testimony. However, the fact that the water level declines on the M3 property exist without being nearby a significant source of pumping question the recharge rates and long term sustainability of the aquifer.

An additional concern regarding the long term sustainability was presented through the testimony that the southeast Boise ground water management area exists although very productive aquifer materials exist in the area. The southeast Boise ground water management area exists on the edge of the Treasure Valley aquifer system, much like the M3 area. The southeast Boise area is underlain with highly transmissive aquifer materials, much like the M3 Eagle area. And finally, the recharge mechanisms to southeast Boise area are limited, although it exists within this basin that receives a significant amount of recharge on an annual basis.

Exhibit 45

Pages 38 and 40

"*the largest uncertainties in understanding the hydrogeology of the North Ada County area, in our opinion, derive from the data available from poor-quality driller's reports and poorly constructed or dilapidated domestic and irrigation wells that are so prevalent here."*
-- Page 38 Exhibit 45

"The Staff does not address in its report the uncertainty inherent in its use of data from wells that are not sealed, whose construction is both unknown and questionable, and that may be receiving ground water from (or leaking it to) aquifers other than the PGSA, this omission is significant."
-- Page 40, Exhibit 45

There are a few final miscellaneous comments I would like to make. This slide shows two quotes presented by HLI regarding the department's uncertainties regarding the hydrogeology of the area. The first quote from page 38 of Exhibit 45 states :"{QUOTE} t*he largest uncertainties in understanding the hydrogeology of the North Ada County area, in our opinion, derive from the data available from poor-quality driller's reports and poorly constructed or dilapidated domestic and irrigation wells that are so prevalent here."* {END QUOTE}
And later on page 40 of Exhibit 45, HLI states :"{QUOTE} *The Staff does not address in its report the uncertainty inherent in its use of data from wells that are not sealed, whose construction is both unknown and questionable, and that may be receiving ground water from (or leaking it to) aquifers other than the PGSA, this omission is significant.*" {END QUOTE}

HLI is actually contributing to these uncertainties in understanding the hydrogeology by using poorly constructed wells to collect data and reference such wells in support of their conclusions. Examples of such uses are 1) The SVR #7 well was used as the pumping well in the 9-day aquifer test. This well, admitted by HLI, has construction issues; 2) the Big Gulch Stock well, which was the closest observation well to the pumping well in the SVR #7 9-day aquifer test has unknown construction; 3) the Kling Irrigation well was used as the pumping well in HLI's first aquifer test. This well again has construction issues; and 4) the Eagle Pines well which is documented by HLI to be unsealed, is referenced twice in the response to the staff memorandum as "*Another example of remarkably stable water levels in the PGSA*", page 38 in Exhibit 45.

Exhibit 45

Figure 27

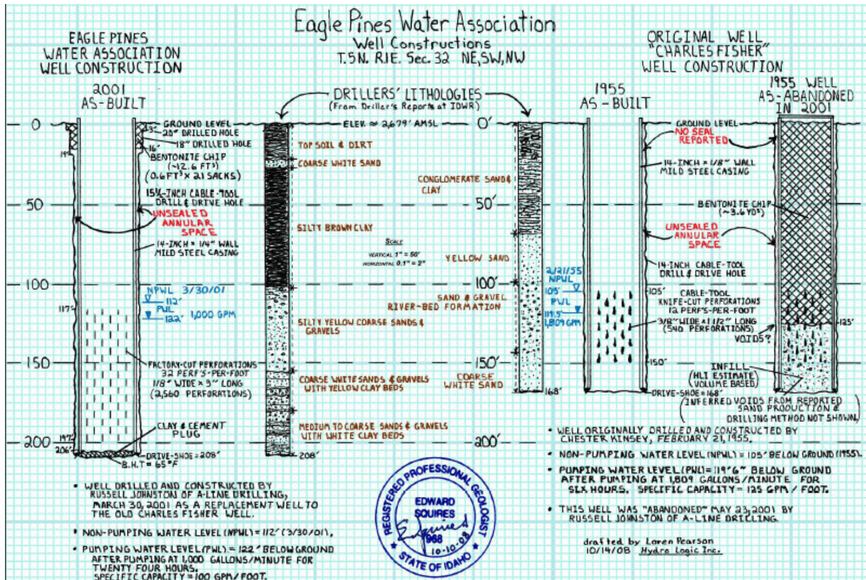


Figure 27. Cross-sectional sketch of the Eagle Pines Water Association's irrigation wells (1955 and 2001) showing 1) the details of as-built construction, 2) conflicting lithologic logs of the drilled geologic section by the two drillers, and 3) the unsealed annular spaces outside of the casing in the cable-tool, drill-and-drive wells. Also evident is the, essentially unchanged, non-pumping water level in the well(s) reported by the drillers, after 46 years of pumping from the well and the collective pumping of other surrounding Eagle-area wells during significant population growth and increased withdrawals from the aquifer. The Eagle Pines Water Association's irrigation well is completed into the Pierce Gulch Sand Aquifer.

This slide shows figure 27 of Exhibit 45. This figure depicts the Eagle Pines Water Association old and new irrigation well diagrams. Note the annular seal on the both wells is identified as "Unsealed Annular Seal".

On page 40 of Exhibit 45, HLI states :"{QUOTE} *The Staff does not address in its report the uncertainty inherent in its use of data from wells that are not sealed, whose construction is both unknown and questionable, and that may be receiving ground water from (or leaking it to) aquifers other than the PGSA, this omission is significant.*" {END QUOTE}

On page 38 of the same document, Exhibit 45, HLI states "{QUOTE} *Another example of remarkably stable water levels in the PGSA*"{END QUOTE}.

By referring to the water levels in this well that is identified by Mr. Squires as unsealed, HLI is not consistent with their previous statements regarding the use of data from unsealed wells.