IN THE OFFICE OF THE STATE ENGINEER
OF THE STATE OF NEVADA

IN THE MATTER OF APPLICATIONS 53987 THROUGH 53992, INCLUSIVE, AND 54003 THROUGH 54021, INCLUSIVE FILED TO APPROPRIATE THE UNDERGROUND WATERS OF CAVE VALLEY, DELAMAR VALLEY, DRY LAKE VALLEY AND SPRING VALLEY HYDROGRAPHIC BASINS 180, 181, 182 AND 184), LINCOLN COUNTY AND WHITE PINE COUNTY, NEVADA	)))))))))

ERRATA TO SOUTHERN NEVADA WATER AUTHORITY'S PROPOSED RULINGS

After Southern Nevada Water Authority ("SNWA") submitted its proposed rulings for Spring, Delamar, Dry Lake, and Cave Valleys, certain errors contained within the footnote citations came to its attention. These errors are largely due to the conversion of citations from the unofficial to the official version of the transcripts, but other types of errors are also included. SNWA now submits the attached table of citation errors and corrected proposed ruling pages. The tables show the current text and the corrected text with changes in bold, while the corrected proposed ruling pages only show the corrected text. SNWA requests that the corrected proposed ruling pages be replaced in the official record copies of SNWA's proposed rulings.

Attached are the following:

1. Table of citation errors and corrections for SNWA's Proposed Spring Valley Ruling;
2. Corrected pages 143, 148, 149, 150, 151, 152, 153, 154, 158, 159, 160, 161, 162, 163, 168, 175, 176, 182, 187, 188, 189, 190, 191, 195, 196, 197, 198, 199, 203, 204, 207, 208, and 210 of SNWA's Proposed Spring Valley Ruling, containing the correct citations;
3. Table of citation errors and corrections for SNWA's Proposed Delamar Valley Ruling;
4. Corrected pages 98, 99, 107, 113, 117, 125, 130, 131, 132, 142, 157, 159, and 167 of SNWA's Proposed Delamar Valley Ruling, containing the correct citations;
5. Table of citation errors and corrections for SNWA's Proposed Dry Lake Valley Ruling;

6. Corrected pages 99, 110, 111, 114, 124, 129, 130, 131, 141, 144, and 165 of SNWA's Proposed Dry Lake Valley Ruling, containing the correct citations;

7. Table of citation errors and corrections for SNWA's Proposed Cave Valley Ruling; and

8. Corrected pages 104, 106, 108, 115, 119, 126, 128, 133, 134, 136, 146, 161, and 171 of SNWA's Proposed Cave Valley Ruling, containing the correct citations.

Respectfully submitted this 28th day of February, 2012.

By: Paul G. Taggart

PAUL G. TAGGART, ESQ.
Nevada State Bar No. 6136
TAGGART & TAGGART, LTD.
108 North Minnesota Street
Carson City, Nevada 89703
(775) 882-9900 – Telephone
(775) 883-9900 – Facsimile

DANA R. WALSH, ESQ.
Nevada State Bar No. 10228
SOUTHERN NEVADA WATER AUTHORITY
1001 South Valley View Boulevard, MS #485
Las Vegas, Nevada 89153
(702) 875-7080 – Telephone
(702) 862-7444 – Facsimile

ROBERT A. DOTSON, ESQ.
Nevada State Bar No. 5285
LAXALT & NOMURA, LTD.
9600 Gateway Drive
Reno, Nevada 89521
(775) 322-1170 – Telephone
(775) 322-1865 – Facsimile

STEVEN O. SIMS, ESQ.
Colorado State Bar No. 9961, *admitted pro hac vice*
BROWNSTEIN HYATT FARBER
SCHRECK, LLP
410 Seventeenth Street, Suite 2200
Denver, Colorado 80202
(303) 223-1100 – Telephone
(303) 223-1111 – Facsimile
Attorneys for SNWA

CERTIFICATE OF SERVICE

I hereby certify that on this 28th day of February, 2012, a true and correct copy of ERRATA TO SOUTHERN NEVADA WATER AUTHORITY'S PROPOSED RULINGS was served on the following by U.S. Postal Service, first class mail, postage prepaid delivery as follows:

Simeon Herskovits
Advocates for Community and Environment
94 Hwy 150, Suite 8
El Prado, New Mexico 87529

J. Mark Ward
Utah Association of Counties
5397 Vine Street
Murray, Utah 84107

Paul EchoHawk
V. Aaron Contreras
EchoHawk Law Office
505 Pershing Avenue, Suite 100
Pocatello, Idaho 83201-4527

Severin A. Carlson
Kaempfer Crowell Renshaw Gronauer & Fiorentino
50 West Liberty Street, Suite 900
Reno, Nevada 89501

George Benesch
190 West Huffaker Lane, Suite 408
Reno, Nevada 89511-2092

Laura Welcher, Director of Operations
Long Now Foundation
Fort Mason Center
Building A
San Francisco, California 94123

Jerald Anderson
EskDale Center
1100 Circle Drive
EskDale, Utah 84728

Henry C. Vogler, IV
HC 33 Box 33920
Ely, Nevada 89301

Aaron Waite
The Cooper Castle Law Firm, LLC
5275 South Durango Drive
Las Vegas, Nevada 89113

DATED this 28th day of February, 2012.

Employee of TAGGART & TAGGART, LTD.

No. 1

Table of citation errors and corrections for SNWA's Proposed Spring Valley Ruling

No. 2

Corrected pages 143, 148, 149, 150, 151, 152, 153, 154, 158, 159, 160, 161, 162, 163, 168, 175, 176, 182, 187, 188, 189, 190, 191, 195, 196, 197, 198, 199, 203, 204, 207, 208, and 210 of SNWA's Proposed Spring Valley Ruling, containing the correct citations

Table of citation errors and corrections for SNWA's Proposed Spring Valley Ruling			
Page	Footnote No.	Current Text	Corrected Text (Changes in Bold)
143	584	Transcript, Vol. 11, p. 2540:16-18 (Watrus).	Transcript, Vol. 11, pp. **2540:21-2541:8** (Watrus).
143	585	Transcript, Vol. 11, p. 2540:18-19 (Watrus).	Transcript, Vol. 11, pp. **2540:21-2541:8** (Watrus).
143	586	Transcript, Vol. 11, p. 2540:19-21 (Watrus).	Transcript, Vol. 11, pp. **2540:21-2541:8** (Watrus).
148	613	Exhibit No. SE_041; Transcript, Vol.11 p. 2499:21-24 (State Engineer).	Exhibit No. SE_041; Transcript, Vol.11 p. **2500:3-9** (State Engineer).
149	615	Exhibit No. SNWA_153; Transcript, Vol.8 p. 1840:14-17 (Prieur).	Exhibit No. SNWA_153; Transcript, Vol.8 p. **1839:8-22** (Prieur).
150	617	Transcript, Vol.8 pp. 1838:14–1839:9 (Prieur).	Transcript, Vol.8 p. **1838:4-1840:14** (Prieur).
151	624	Transcript, Vol.9 p. 2029:19-22 (Prieur).	Transcript, Vol.9 pp. **2029:23-2030:5** (Prieur).
152	636	Transcript, Vol.8 p. 1867:7-12 (Prieur).	Transcript, Vol.8 p. **1866:24-1868:22** (Prieur).
152	638	Transcript, Vol.8 p. 1839:10-12 (Prieur).	Transcript, Vol.8 p. **1838:6-1839:7** (Prieur).
153	640	Transcript, Vol.8 p. 1839:4-9 (Prieur).	Transcript, Vol.8 p. **1838:21-1839:1** (Prieur).
154	647	Transcript, Vol.9 p. 2068:20-22 (Prieur).	Transcript, Vol.9 pp. **2068:25-2069:2** (Prieur).
158	664	Transcript, Vol.8 p. 1849:2-4 (Prieur).	Transcript, Vol.8 pp. **1848:17-1849:4** (Prieur).
158	665	Exhibit No. SNWA_149, p. 32; Transcript, Vol.8 p. 1851:10-12 (Prieur).	Exhibit No. SNWA_149, p. 32; Transcript, Vol.8 p. **1850:23-1851:4** (Prieur).
158	668	Exhibit No. SNWA_179; Transcript, Vol.8 p. 1852:4-7 (Prieur).	Exhibit No. SNWA_179; Transcript, Vol.8 p. **1851:21-24** (Prieur).
159	673	Transcript, Vol.8 p. 1856:4-6 (Prieur).	Transcript, Vol.8 p. **1855:21-23** (Prieur).
159	677	Transcript, Vol.8 p. 1858:8-10 (Prieur).	Transcript, Vol.8 pp. **1857:25-1858:2** (Prieur).
160	680	Transcript, Vol.8 p. 1859:6-8 (Prieur).	Transcript, Vol.8 p. **1858:21-1859:21** (Prieur).
160	681	Transcript, Vol.8 p. 1859:6-9 (Prieur).	Transcript, Vol.8 pp. **1858:25-1859:3** (Prieur).
160	682	Transcript, Vol.8 p. 1859:19-21 (Prieur).	Transcript, Vol.8 pp. **1858:25-1859:3** (Prieur).
161	690	Transcript, Vol.8 p. 1864:1-3 (Prieur).	Transcript, Vol.8 p. **1863:11-20** (Prieur).
161	692	Transcript, Vol.8 p. 1868:2-5 (Prieur).	Transcript, Vol.8 p. **1867:17-23** (Prieur).
162	699	Exhibit No. SNWA_147, pp. 2-4, 2-5; Transcript, Vol.9 p. 2036:23-25 (Prieur).	Exhibit No. SNWA_147, pp. 2-4, 2-5; Transcript, Vol.9 p. **2037:2-4** (Prieur).
163	700	Transcript, Vol.9 p. 2034:10-13 (Prieur).	Transcript, Vol.9 p. **2035:1-4** (Prieur).
163	708	Transcript, Vol.9 p. 2035:5-10 (Prieur).	Transcript, Vol.9 pp. **2035:6-2036:18** (Prieur).

Table of citation errors and corrections for SNWA's Proposed Spring Valley Ruling			
Page	Footnote No.	Current Text	Corrected Text (Changes in Bold)
163	709	Transcript, Vol.9 p. 2039:1-25 (Prieur).	Transcript, Vol.9 pp. **2039:3-2040:4** (Prieur).
168	732	Transcript, Vol.9 p. 2063:23-25 (Prieur).	Transcript, Vol.9 p. **2064:2-8** (Prieur).
175	771	Transcript, Vol.11 p. 2540:14-16 (Watrus).	Transcript, Vol.11 p. 2540:**24-2541:2** (Watrus).
176	774	Exhibit No. SNWA_337, pp. 3-6, 7; Transcript. Vol.11 p. 2550:19-23 (Watrus)	Exhibit No. SNWA_337, pp. 3-6, **3-7**; Transcript. Vol.11 p. **2551:1-7** (Watrus)
176	775	Transcript, Vol.11 pp. 2552:12-2554:14 (Watrus).	Transcript, Vol.11 pp. **2552:11-2555:3** (Watrus).
176	776	Transcript, Vol.11 p. 2540:16-18 (Watrus).	Transcript, Vol.11 pp. 2540:**23-2541:3** (Watrus).
176	777	Transcript, Vol.11 p. 2540:18-19 (Watrus).	Transcript, Vol.11 p. **2541:2-5** (Watrus).
176	778	Transcript, Vol.11 p. 2540:19-21 (Watrus).	Transcript, Vol.11 p. **2541:5-8** (Watrus).
176	779	Transcript, Vol.11 p. 2573:20-23 (Watrus).	Transcript, Vol.11 pp. **2574:2-8** (Watrus).
182	813	Exhibit No. SNWA_087, p. 2; Transcript, Vol.9 p. 1909:7-10 (D'Agnese).	Exhibit No. SNWA_087, p. 2; Transcript, Vol.9 pp. **1908:12-1909:17** (D'Agnese).
187	847	Transcript, Vol.11 p. 2574:16-18 (Watrus).	Transcript, Vol.11 p. **2574:23-2575:4** (Watrus).
187	848	Transcript, Vol.11 p. 2574:18-19 (Watrus).	Transcript, Vol.11 p. **2575:3-4** (Watrus).
187	851	Transcript, Vol.11 p. 2556:22-24 (Watrus).	Transcript, Vol.11 p. **2557:1-9** (Watrus).
188	856	Exhibit No. GBWN_110, p. 15.	**Transcript, Vol.19 pp. 4219:15-4222:10 (Myers).**
189	864	Exhibit No. SNWA_337, p. 4-5; Transcript, Vol.11 p. 2561:7-23 (Watrus).	Exhibit No. SNWA_337, p. 4-5; Transcript, Vol.11 pp. **2560:18-2561:16** (Watrus).
189	866	Exhibit No. SNWA_337, p. 4-5; Transcript, Vol.11 p. 2561:7-23 (Watrus).	Exhibit No. SNWA_337, p. 4-5; Transcript, Vol.11 pp. 2561:**17-2562:8** (Watrus).
190	868	Transcript, Vol.11 pp. 2557:24-2558:8; 2558:13-16 (Watrus).	Transcript, Vol.11 pp. **2558:6-2559:6** (Watrus).
190	871	Transcript, Vol.11 p. 2566:20-21 (Watrus).	Transcript, Vol.11 p. **2566:10-24** (Watrus).
191	872	Transcript, Vol.11 p. 2584:19-24 (Watrus).	Transcript, Vol.11 p. **2585:2-12** (Watrus).
191	873	Transcript, Vol.11 p. 2584:19-24 (Watrus).	Transcript, Vol.11 p. **2585:2-19** (Watrus).
191	874	Transcript, Vol.11 pp. 2565:20-24, 2568:9-14 (Watrus).	Transcript, Vol.11 pp. 2565:**17-2566:9, 2567:25-2569:7** (Watrus).
195	888	Exhibit No. SNWA_341; Transcript, Vol.11 p. 2581:12-19 (Watrus).	Exhibit No. SNWA_341; Transcript, Vol.11 pp. 2581:**17-2582:6** (Watrus).

Table of citation errors and corrections for SNWA's Proposed Spring Valley Ruling			
Page	Footnote No.	Current Text	Corrected Text (Changes in Bold)
195	890	Exhibit No. SNWA_341; Transcript, Vol.11 p. 2583:10-13 (Watrus).	Exhibit No. SNWA_341; Transcript, Vol.11 pp. 2583:**18-2584:1** (Watrus).
196	892	Transcript, Vol.11 p. 2585:15-16 (Watrus).	Transcript, Vol.11 p. **2586:1-6** (Watrus).
196	894	Transcript, Vol.11 p. 2585:13-17 (Watrus).	Transcript, Vol.11 p. **2586:1-6** (Watrus).
196	896	Exhibit No. SNWA_337, p. 6-6; Transcript, Vol.11 p. 2585:24-25 (Watrus).	Exhibit No. SNWA_337, p. 6-6; Transcript, Vol.11 p. **2586:11-13** (Watrus).
197	899	The Federal Reserve Water Rights are R05274, R05237, R05269, R05272, R05278, R05279, R05280, R05292, R05292, R05292. Exhibit No. SNWA_337, p. 6-8. The State Engineer notes that none of these rights have been adjudicated. Transcript, Vol.11 p. 2589:17-22 (Watrus).	The Federal Reserve Water Rights are R05274, R05237, R05269, R05272, R05278, R05279, R05280, R05292, R05292, R05292. Exhibit No. SNWA_337, p. 6-8. The State Engineer notes that none of these rights have been adjudicated. Transcript, Vol.11 p. **2590:4-7** (Watrus).
198	901	Exhibit No. SNWA, p. 337.	Exhibit No. **SNWA_337, p. 6-8**.
198	902	Transcript, Vol.11 p. 2590:24-2591:16 (Watrus).	Transcript, Vol.11 p. **2591:23-2592:3** (Watrus).
199	907	Transcript, Vol.11 p. 2594:6-23 (Watrus).	Transcript, Vol.11 p. **2594:19-2595:11** (Watrus).
203	938	Transcript, Vol.11 p. 2589:17-22 (Watrus).	Transcript, Vol.11 p. **2590:6-25** (Watrus).
204	940	Transcript, Vol.11 p. 2589:10-13 (Watrus).	Transcript, Vol.11 p. **2589:19-2590:25** (Watrus).
207	958	Transcript, Vol.8 pp. 1855:22–1856:14 (Prieur).	Transcript, Vol.8 pp. **1854:10–1856:6** (Prieur).
208	966	Transcript, Vol.8 p. 1863:7-12 (Prieur).	Transcript, Vol.8 pp. **1862:12-1863:4** (Prieur).
210	973	Transcript, Vol.8 pp. 1848:25-1849:15; 1864:6-7 (Prieur).	Transcript, Vol.8 pp. **1848:17-1849:7; 1863:21-24** (Prieur).

However, those rights will remain junior in priority to the water rights granted to the Applicant and the Applicant will be afforded all privileges and protections of a senior appropriator under the Nevada law should a conflict arise between junior and senior pumping.

Based on the evidence in the record, including but not limited to that cited above, and on the State Engineer's water right files, the State Engineer finds that there are a total of 12,768.61 afa of committed groundwater rights in Spring Valley, including water rights that are both junior and senior to the Applications.

V. IMPACTS TO EXISTING RIGHTS

When considering new applications to appropriate water, the Nevada State Engineer must deny the applications if development of the new applications will conflict with existing water rights or with protectable interests in existing domestic wells.[582] To address this requirement, the Applicant prepared an expert report describing a three part analysis.[583] First, a qualitative analysis was performed, which assessed potential conflicts based on water right ownership, geographical location, and priority date.[584] Second, a quantitative analysis was performed with the Applicant's groundwater model, using the model to identify potential conflicts with existing water rights and sensitive environmental areas.[585] Third, a qualitative site specific analysis of each of the areas of concern identified in the model was performed to assess the potential for conflicts.[586] Additionally, the Applicant prepared a management plan for Spring Valley that included hydrologic monitoring components, management tools, and mitigation options. The Applicant requested that the State Engineer make the Hydrologic Monitoring and Mitigation

---

582 NRS 533.370(5) (2010).
583 Exhibit No. SNWA_337, p. 1-1, 3.
584 Transcript, Vol. 11, pp. 2540:21-2541:8 (Watrus).
585 Transcript, Vol. 11, pp. 2540:21-2541:8 (Watrus).
586 Transcript, Vol. 11, pp. 2540:21-2541:8 (Watrus).

testified that during development of the monitoring plan, the teams conducted joint field trips to identify springs that were of biologic interest and should be included in the hydrologic monitoring plan network.[608] The Applicant's representatives regularly meet with the TRP and the BWG to discuss ways to best utilize each group's data and to discuss any additional hydrologic data that may be needed under the plan.[609]

The Executive Committee reviews TRP recommendations pertaining to technical and mitigation actions. The Executive Committee also resolves disputes in the event the TRP cannot reach a consensus on monitoring requirements, research needs, technical aspects of study design, interpretation of results or appropriate actions to minimize or mitigate unreasonable adverse effects on federal resources or injury to federal water rights.[610] If the Executive Committee cannot reach a consensus, a dispute resolution procedure directs such a matter to be forwarded for resolution to the State Engineer or another qualified third party.[611]

This process was questioned by the Corporation of the Presiding Bishop ("CPB") as not requiring any type of resolution and not protecting existing rights.[612] First, CPB is not a party to the Stipulation, and the Stipulation was not intended to address non-federal water rights. The Stipulation was executed to protect federal resources, not CPB water rights.[613] Second, the State Engineer will oversee groundwater development in Spring Valley and is required by law to take action if groundwater withdrawal conflicts with CPB's existing rights.[614] The Stipulation in no way limits the State Engineer's obligations or authority to protect CPB water rights. For

---

[608] Transcript, Vol.8 p. 1837:13-19 (Prieur).
[609] Transcript, Vol.8 p. 1837:20-25 (Prieur).
[610] Transcript, Vol.8 pp. 1802:19-1803:10 (Prieur).
[611] Exhibit No. SE_041, Exhibit A, p. 14, II(2).
[612] Transcript, Vol.29 pp. 6438:11-6439:14 (Hejmanowski).
[613] Exhibit No. SE_041; Transcript, Vol.11 p. 2500:3-9 (State Engineer).
[614] Transcript, Vol.11 p. 2498:22-2499:15 (State Engineer).

instance, in addition to making the Spring Valley Management Plan part of the permit terms for these Applications, the State Engineer can require additional monitoring as needed to protect CPB water rights.

The Tribes argue that the Stipulation was executed by the Federal Agencies without proper consultation with the Tribes. The Tribes also argue that the Stipulations should not have been admitted into evidence based on the Tribes' interpretation of language in the Stipulation. The State Engineer finds that the Stipulation is relevant to the consideration of the Applications for the reasons stated above. Whether proper consultation occurred with the Tribes before the Stipulation was executed is a matter between the Tribes and the Federal Agencies and does not require resolution in order to consider the Applications. Whether admission of the Stipulation at these hearings was contrary to terms of the Stipulation is an issue between the parties to that agreement, not the State Engineer, and does not require resolution in order to consider the Applications.

1. **Monitoring Plan Requirements**

As indicated previously a monitoring plan for the Applications was finalized to comply with permit terms for the Applications after the Applications were approved in Ruling 5726. That plan was approved by the State Engineer on February 9, 2009.[615] The Applicant submitted an updated monitoring and mitigation plan for this hearing and requested that the State Engineer include compliance with the plan as part of the permit terms.[616] The proposed monitoring and mitigation plan includes all of the elements from the previous plan, and was updated to include

---

[615] Exhibit No. SNWA_153; Transcript, Vol.8 p. 1839:8-22 (Prieur).
[616] Exhibit No. SNWA_149.

survey information and construction information obtained since the plan was approved. Additionally, the plan addresses non-federal water rights.[617]

Data collection is a key component of the monitoring plan. Mr. Prieur testified that the purpose of data collection at this time is to provide a baseline characterization of the hydrologic system, including seasonal as well as climatological events, which will be used as background information to assess changes to the system once groundwater production commences.[618] The Applicant is collecting different types of data which include water level measurements in wells completed in the basin fill and carbonate aquifers, surface water discharge measurements from springs and streams, regional precipitation measurements, and water chemistry samples.[619] The plan also includes a gain loss study in the area around Big Springs Creek, Lake Creek, and Pruess Lake in Snake Valley. The gain loss study will evaluate how groundwater contributes to this surface water system in order to judge, over time, whether changes occur to the interaction between groundwater and surface water in this area after groundwater production commences in Spring Valley.

The monitoring plan includes a well monitoring network to characterize and monitor groundwater conditions. Mr. Prieur testified that the well network is designed to provide spatial distribution of monitoring across the valley in different hydrologic and geologic settings.[620] Importantly, the majority of the wells are clustered in the area of the proposed points of diversion.[621] Fourteen of these wells are equipped for continuous monitoring, which allows the

---

[617] Transcript, Vol.8 pp. 1838:4–1840:14 (Prieur).
[618] Transcript, Vol.8 pp. 1840:25-1841:6 (Prieur).
[619] Transcript, Vol.8 p. 1841:9-14 (Prieur).
[620] Transcript, Vol.8 p. 1843:17-19 (Prieur).
[621] Exhibit No. SNWA_147, p. 2-5.

Applicant to assess hourly water level variations in these wells.[622] In addition, once production starts, water elevations in the proposed production wells will be continuously monitored.[623]

Information on water level variation assists in assessing the horizontal and vertical hydraulic gradients (i.e. direction of groundwater flow) in the basin.[624] The information may also assist in evaluating confining units in the aquifer which will have an influence on the propagation of effects from water withdrawals.[625] The goal of the monitoring network is to provide a three-dimensional understanding of the groundwater flow in the basin.[626] Mr. Prieur testified that the Applicant spent well over $10,000,000 to develop the monitoring and test well network and to characterize the area hydrogeology.[627]

In addition to the monitoring well network, the plan also calls for a test well network. Test wells will provide geologic data and hydrologic aquifer property data.[628] Similar to the monitoring wells, these wells collect water level elevation information that is plotted on a hydrograph.[629] Mr. Prieur testified that historical hydrographs can show seasonal recharge impulses at the well site, which can be used to develop different pumping regimes to meet peak water demand.[630] This information can also be used to help manage groundwater production, such as how much water is pumped, when it is pumped, and where it is pumped.[631]

The monitoring network also includes surface water monitoring sites. These monitoring efforts covers sites throughout the valley, but are mainly concentrated around the Applicant's

---

622 Exhibit No. SNWA_147, pp. 2-5, and 2-6; Transcript, Vol.8 pp. 1846:17-19 (Prieur).
623 Exhibit No. SNWA_147, p. 2-7.
624 Transcript, Vol.9 pp. 2029:23-2030:5 (Prieur).
625 Transcript, Vol.9 p. 2030:2-6 (Prieur).
626 Transcript, Vol.9 p. 2029:19-22 (Prieur).
627 Transcript, Vol.8 pp. 1845:24-1846:5 (Prieur).
628 Transcript, Vol.9 p. 2072:3-7 (Prieur).
629 Transcript, Vol.9 p. 2073:13-17 (Prieur).
630 Transcript, Vol.9 pp. 2073:15-2074:9 (Prieur).
631 Transcript, Vol.9 p. 2075:16-(20 (Prieur).

proposed points of diversion.[632] The spring monitoring sites were selected in consensus with the TRP, BWG, and the State Engineer's office.[633] The criteria used to select the springs included the spatial distribution, the biologic importance, the hydrogeologic setting, and the areas of concern.[634]

Thirteen of the sites, including one site on Cleveland Ranch, have piezometers, or small wells, installed near the spring for the purpose of comparing water level measurements with spring discharge and evaluating the spring response under varying climatic conditions.[635] This information is compared against other spring monitoring sites and data near pumping areas to determine if they are hydrologically connected and to what degree they are connected.[636] Ultimately, impacts to springs on the range front or valley floor are dependent on three criteria: 1) whether there is a saturated material in the aquifer between the area that is being pumped and the spring; 2) whether there is a high enough hydraulic conductivity to propagate effects through the geologic material, and 3) whether the spring is within the area of influence of pumping.[637] In other words, impacts to springs are not determined solely by whether there is a water table decline or drawdown.

As required by the State Engineer, the monitoring plan already includes additional monitoring to protect existing non-federal water rights.[638] As part of the development of the approved monitoring plan, the State Engineer required the Applicant to monitor in the area of Cleveland Ranch. The State Engineer required two monitoring wells, one shallow and one deep,

---

[632] Exhibit No. SNWA_147, p. 2-8.
[633] Transcript, Vol.8 p. 1864:13-15 (Prieur).
[634] Transcript, Vol.9 p. 2059:13-17 (Prieur).
[635] Transcript, Vol.8 pp. 1866:23-1867:6 (Prieur).
[636] Transcript, Vol.8 pp. 1866:24-1868:22 (Prieur).
[637] Transcript, Vol.9 p. 2060:1-16 (Prieur).
[638] Transcript, Vol.8 pp. 1838:6-1839:7 (Prieur).

at two different sites. The State Engineer also required two flumes to measure spring discharge and a shallow piezometer.[639] The State Engineer also required regular spring discharge monitoring at Turnley Springs, which is a privately owned water source.[640] In addition, once the final pumping configuration is determined for the Applications, the State Engineer required installation of one additional monitoring well on the east side of the valley one mile north of the northernmost production well.[641] Also, throughout the development of the water rights, the State Engineer has the option and authority to add additional permit terms including but not limited to additional monitoring.

The monitoring plan includes other hydrologic elements that provide a comprehensive view of the hydrologic system. For example, there is a requirement in the plan to establish a precipitation measurement network. There is also a requirement to collect three rounds of water chemistry data from 40 sites at six month intervals, prior to groundwater production and every five years thereafter.[642] These additional data collection efforts will provide a well-rounded view of the hydrologic system.

The data collection process is subject to quality assessment and quality control procedures. The Applicant implemented a quality control process for collection of field data. The Applicant has standard procedures for site monitoring; instrumentation preparation, calibration and maintenance; and data recording and collection.[643] The Applicant also has standard procedures for database entry and management. The collected data is brought to the

---

[639] Transcript, Vol.8 p. 1838:14-24 (Prieur).
[640] Transcript, Vol.8 pp. 1838:21-1839:1 (Prieur).
[641] Transcript, Vol.8 pp. 1838:25-1839:3 (Prieur).
[642] Transcript, Vol.9 p. 2062:7-23 (Prieur).
[643] Transcript, Vol.9 pp. 2066:6-2067:11 (Prieur).

office and entered into the database.[644] Once it is entered into the database it is checked at two levels by other professionals and reviewed to make sure the quality processes were completed properly.[645] The hourly continuous data is processed using Aquarius software and then it is placed into the database.[646] Any erroneous data must go through an audit process in order for it to be removed from the database.[647]

A report is submitted to the State Engineer on a yearly basis that updates the status of each element of the monitoring program and documents daily averages of continuous water level readings, current and historical hydrographs, spring and stream discharge records, any water chemistry analysis, and a summary of precipitation data provided by other agencies.[648] These reports have been submitted to the State Engineer for 2008, 2009, 2010, and 2011 and are available to the public.[649] Electronic data is also provided to the State Engineer on a quarterly basis.

Dr. Bredehoeft, a witness for Great Basin Water Network, provided general opinions that monitoring will not be effective. Dr. Bredehoeft implied in his written report that monitoring may not effectively detect pumping signals at long distances or if detected, it may be too late to effectively react to it. However, during his testimony he admitted that the system can indeed be monitored effectively in Spring Valley.[650]

---

[644] Transcript, Vol.9 p. 2067:11-15 (Prieur).
[645] Transcript, Vol.9 pp. 2067:19-2068:2 (Prieur).
[646] Transcript, Vol.9 p. 2068:8-11 (Prieur).
[647] Transcript, Vol.9 pp. 2068:25-2069:2 (Prieur).
[648] Transcript, Vol.9 pp. 2068:25-2069:17 (Prieur).
[649] Exhibit Nos. SNWA_154 through SNWA_157; Transcript, Vol.9 pp. 2068:25-2069:2 (Prieur).
[650] Transcript, Vol.24 pp. 5400:17-5401:7, 5409:8–5409:12, 5455:20-24, 5495:16-5496:6 (Bredehoeft).

CPB representatives.[664] As mentioned above, the State Engineer required two monitoring well site locations. Wells SPR7030M and M2 were located at the toe of the Cleve Creek alluvial fan approximately 100 feet from the nearest spring.[665] These wells were completed as one deep well and one shallow well for the purpose of evaluating the vertical hydraulic gradient at this location.[666] The water elevations in these wells will be compared with spring discharge records to define the relationship between water elevation variability and spring discharge variability for springs at the toe of the Cleve Creek alluvial fan.[667]

The Applicant completed a geologic data analysis report for these wells.[668] The geology of a well site is important in analyzing how impacts from pumping will propagate in that area. This report documented onsite lithologic observations, (i.e. visual observations of geologic features), and drilling parameters, which document how the drill bit moves through the soil to assess how hard or soft the rock is.[669] The Applicant prepares reports such as these for all of the monitoring wells drilled by the Applicant in Spring Valley.[670]

Mr. Prieur testified that the geologic stratigraphic column for the deeper of the two wells, SPR7030M2, shows interbedded sands and clays at this site.[671] In this well, there are clay layers, from 40 to 60 feet and 160 to 190 feet, which are considered potentially impermeable layers. The well has flowing artesian conditions, which indicates an upward vertical gradient that may

---

[664] Transcript, Vol.8 pp. 1848:17-1849:4 (Prieur).
[665] Exhibit No. SNWA_149, p. 32; Transcript, Vol.8 pp. 1850:23-1851:4 (Prieur).
[666] Transcript, Vol.8 p. 1851:15-22 (Prieur).
[667] Transcript, Vol.8 pp. 1851:23-1852:3 (Prieur).
[668] Exhibit No. SNWA_179; Transcript, Vol.8 p. 1851:21-24 (Prieur).
[669] Exhibit No. SNWA_179, pp. 1, 7, 16.
[670] Transcript, Vol.8 p. 1853:15-17 ((Prieur).
[671] Transcript, Vol.8 p. 1855:4-5 (Prieur).

be the result of the confining clay units.[672] These confining clay units are important because they may act to shield the springs from pumping impacts.

These monitoring wells are located approximately a mile to a mile and a half from the Applicant's nearest proposed point of diversion.[673] Based on the stratigraphy of the well, and specifically the location of the confining units, Mr. Prieur concluded that it may be possible for the Applicant to pump from one confined unit and not impact another confined unit depending on the lateral extent of the clay layers, the leakage between the clay layers, and the pumping rate and duration.[674] Mr. Prieur further concluded that pumping stresses must be placed on the system for an extended period of time to determine with any certainty the potential impacts on groundwater and surface water sources in that area.[675] The State Engineer finds that continued monitoring at this location in conjunction with limited initial development in a staged development program will provide the data required to assure the Applications can be developed without conflicting with CPB's existing rights.

The second set of wells, SPR7029M and M2, are located approximately a mile and half to two miles to the west of SPR7030M and M2.[676] The location of these monitoring wells is coincident with the point of diversion for Application 54017.[677] The Applicant completed a hydrologic aquifer test at this location.[678]

Mr. Prieur explained the tremendous amount of work that must be completed for just one of these tests. Prior to the aquifer test, the Applicant must assess background conditions and

---

[672] Transcript, Vol.8 p. 1855:5-15 (Prieur).
[673] Transcript, Vol.8 p. 1855:21-23 (Prieur).
[674] Transcript, Vol.8 pp. 1855:22-1856:3 (Prieur).
[675] Transcript, Vol.8 p. 1856:17-23 (Prieur).
[676] Exhibit No. SNWA_149, p. 32; Transcript, Vol.8 p. 1857:17-19 (Prieur).
[677] Transcript, Vol.8 pp. 1857:25-1858:2 (Prieur).
[678] Transcript, Vol.8 p. 1858:11-12 (Prieur).

make sure the well is completely developed, meaning that the conditions in the well are stable.[679] Once these preliminary tasks are completed, the Applicant performs a step drawdown test, which pumps the well at different pumping rates for one to two hour intervals.[680] This step drawdown test yields well loss coefficients and well efficiency coefficients.[681] These coefficients are used to determine the rate water may be pumped during the constant rate pumping test without receiving a prohibitive amount of well loss and well interference, which will distort the test results.[682] For this aquifer test, the Applicant selected a constant rate of 500 gallons per minute ("gpm").[683] Following the step drawdown test, the well was allowed to recover to its static state.[684] The Applicant then pumped at a constant rate of 500 gpm for 120 hours to document drawdown in the test well and the monitoring well for the purpose of assessing aquifer properties, such as transmissivity and storage coefficients.[685] Following the test, well recovery measurements were performed and regional monitoring continues.[686]

The results of the test are documented in a hydrologic analysis report. These reports are prepared for each aquifer test. Drawdown data is generally reported on a log or semi-log plot, which shows the change in water level over time.[687] For this test, the drawdown in the monitoring well showed minimal or non-existent drawdown after five days of pumping stress at 500 gpm.[688] Given the relative lack of drawdown, Mr. Prieur concluded that it would be useful to pump the location at a higher rate and duration to observe the response in the aquifer for the

---

[679] Transcript, Vol.8 pp. 1858:14-1859:2 (Prieur).
[680] Transcript, Vol.8 pp. 1858:21-1859:21 (Prieur).
[681] Transcript, Vol.8 pp. 1858:25-1859:3 (Prieur).
[682] Transcript, Vol.8 pp. 1858:25-1859:3 (Prieur).
[683] Transcript, Vol.8 p. 1859:19-21 (Prieur).
[684] Transcript, Vol.8 p. 1859:12-13 (Prieur).
[685] Transcript, Vol.8 p. 1859:13-15 (Prieur).
[686] Transcript, Vol.8 pp. 1859:22-1860:4 (Prieur).
[687] Transcript, Vol.8 p. 1860:12-15 (Prieur).
[688] Transcript, Vol.8 p. 1861:7-9 (Prieur).

purpose of assessing whether the alluvial aquifer may be pumped without significantly reducing the hydraulic head, which supports spring discharge at the toe of the fan.[689] He further concluded that the role of monitoring is critical in determining the influence pumping the aquifer has at different pumping rates and durations.[690] The State Engineer finds that this additional monitoring is appropriate and should be conducted concurrently with staged pumping development at the points of diversion located near Cleveland Ranch.

The monitoring plan also included spring and stream monitoring in and around Cleveland Ranch. Mr. Prieur testified that spring monitoring efforts in the vicinity of Cleveland Ranch include the west Spring Valley complex, south Millick Spring, Unnamed Spring, Unnamed # Five Spring, and Four-Wheel Drive Spring, which are part of the spring monitoring network described above.[691] In addition, the plan required maintenance of a continuous gauging station at Cleve Creek.[692] The purpose of continuous monitoring at Cleve Creek is to establish variations in stream discharge over time with varying precipitation.[693]

The spring and stream monitoring efforts associated with Cleveland Ranch cost the Applicant approximately $200,000. Mr. Prieur found that the monitoring around Cleveland Ranch will allow for a determination as to how development of the Applications near Cleveland Ranch will impact that area.[694] The State Engineer finds that the monitoring and aquifer testing performed by the Applicant provide assurances that pumping less than 500 gpm at the points of diversion near Cleveland Ranch will not conflict with existing rights. The State Engineer also

---

689 Transcript, Vol.8 p. 1863:9-12 (Prieur).
690 Transcript, Vol.8 p. 1863:11-20 (Prieur).
691 Transcript, Vol.8 p. 1867:20-24 (Prieur).
692 Transcript, Vol.8 p. 1867:17-23 (Prieur).
693 Transcript, Vol.8 p. 1868:15-25 (Prieur).
694 Transcript, Vol.8 pp. 1869:21-1870:1 (Prieur).

finds that the current monitoring program in the Cleveland Ranch area will allow the State Engineer to assess any impacts from water development at the proposed points of diversion around the Cleveland Ranch. Continuing monitoring and data gathering in this area will be required in order to determine if an additional quantity of water can be developed in this area without causing a conflict with existing rights.

b. Turnley Spring

In addition to the Cleveland Ranch area, the State Engineer previously required additional monitoring in the Turnley Spring area which is the primary source of water for property owned by Katherine and William Rountree.[695] Turnley Spring is located in the mountain block on Sacramento Pass.[696] The purpose of monitoring at this location is to protect the Rountree's domestic water right and to provide another spring discharge monitoring point in the mountain block to assess baseline conditions and long term variations in discharge.[697] The Applicant has collected spring discharge data at Turnley Spring since 2008.[698] The State Engineer finds that the Applicant is in compliance with this monitoring requirement and that continued monitoring will allow that State Engineer to continue to assure that development of the Applications will not conflict with these existing rights.

c. Shoshone Ponds

The Monitoring Plan requires monitoring wells in the area of Shoshone Ponds, which is an area of critical environmental concern.[699] Shoshone Ponds exists due to free flowing artesian wells that were drilled between 1935 and 1971. These wells form a free flowing well field that is

---

695 Transcript, Vol.9 p. 2032:5-17 (Prieur).
696 Exhibit No. SNWA_149, p. 31; Transcript, Vol.9 p. 2032:9-10 (2011Prieur).
697 Transcript, Vol.9 pp. 2032:18-2033:2 (Prieur).
698 Exhibit No. SNWA_147, p. 2-7.
699 Exhibit No. SNWA_147, pp. 2-4, 2-5; Transcript, Vol.9 p. 2037:2-4 (Prieur).

the source of water for the Ponds.[700] A monitoring location in the Ponds area was selected in consensus with the TRP and the State Engineer's Office.[701] It is located approximately one mile to the southeast of the Shoshone Ponds area.[702] The area near Shoshone Ponds is also a BLM Area of Critical Environmental Concern, which prevented the Applicant from selecting a site closer to the Ponds.[703] The monitoring point is positioned between Shoshone Ponds and the point of diversion for Application 54019. The monitoring location was selected to provide early warning of drawdown at the Ponds from pumping at Application 54019.[704]

Mr. Prieur testified that this monitoring location provides effective monitoring for Shoshone Ponds because the alluvial environment in the area indicates a more direct flow path between the point of diversion and Shoshone Ponds.[705] Dr. Myers, however, suggested that there may be an alternative flow path along the mountain front.[706] In response to this concern, Mr. Prieur testified that the monitoring wells were placed to the east of Shoshone Ponds to monitor any alternative flow along the mountain front and then to the west.[707] Two wells were completed at this site, a shallow well, SPR7024M, and a deep well, SPR7042M2, for the purpose of assessing the vertical hydraulic gradient.[708] Baseline conditions for Shoshone Ponds have not been obtained due to the unregulated flow of the artesian wells and the lack of quality data, among other reasons.[709] Mr. Prieur testified that the geologic conditions in this area are similar to Cleveland Ranch, where there is interbedded sands and clays near Shoshone Ponds and

---

[700] Transcript, Vol.9 p. 2035:1-4 (Prieur).
[701] Transcript, Vol.9 p. 2040:18-20 (Prieur).
[702] Transcript, Vol.9 p. 2035:2-3 (Prieur).
[703] Transcript, Vol.9 pp. 2036:23-2037:3 (Prieur).
[704] Transcript, Vol.9 p. 2035:13-19 (Prieur).
[705] Transcript, Vol.9 p. 2037:5-7 (Prieur).
[706] Transcript, Vol.9 p. 2040:7-9 (Prieur).
[707] Transcript, Vol.9 p. 2037:7-10 (Prieur).
[708] Transcript, Vol.9 pp. 2035:6-2036:18 (Prieur).
[709] Transcript, Vol.9 pp. 2039:3-2040:4 (Prieur).

The Management Plan also includes monitoring designed to protect the water resources of the Confederated Tribes of the Goshute Reservation ("CTGR"), which is located in basins north of Spring Valley. There is a significant distance between the Applications' points of diversion in Spring Valley and the CTGR resources located in Deep Creek Valley. There are also monitoring points in northern Spring Valley that were specifically requested by the Bureau of Indian Affairs between the Application points of diversion in that portion of Spring Valley and the CTGR's reservation in Deep Creek Valley.[731] The State Engineer finds that the monitoring points in northern Spring Valley will detect any spread of drawdown in the direction of the CTGR reservation. The State Engineer further finds that the significant distance between the Application points of diversion and the CTGR reservation will provide adequate lead time to prevent any potential conflicts with CTGR water rights on the reservation.

2. **Management Plan Requirements**

The Management Plan requires the data collection efforts from the monitoring plan to be coordinated with the development and refinement of a groundwater model for the purpose of managing the water resource in Spring Valley.[732] The State Engineer will use the groundwater model to assess where additional data is needed, to identify potential areas of impact, to review the appropriate location of new wells, and to optimize pumping at current well sites without causing impacts.[733] Mr. Prieur testified that stressing the aquifer with large scale pumping will increase the model's predictive capability because longer term pumping stresses provide aquifer response parameter data. With this information, the groundwater model will be used as a management tool.

---

[731] Transcript, Vol.11 p. 2479:11-14 (Prieur).
[732] Transcript, Vol.9 p. 2064:2-8 (Prieur).
[733] Transcript, Vol.9 p. 2064:1-9 (Prieur).

sustainable manner, and will take steps to manage the Project in a method to avoid conflicts with existing rights.[768] While the State Engineer is not a party to the Applicant's Stipulation with the Federal Agencies, the State Engineer finds that it provides a forum through which critical information can be collected from hydrologic experts, and used to assure development of the Applications will not conflict with existing water rights or with protectable interests in existing domestic wells. The State Engineer finds that mitigation measures listed in the Management Plan will be effective, and that the Applicant is required to perform any mitigation activities that may be necessary to avoid conflicts with existing rights.[769] Accordingly, in addition to other permits terms that will be required, the State Engineer will make the Spring Valley Management Plan a part of the permit terms for the Applications.

B. Analysis for Conflicts with Existing Rights

In addition to developing a Management Plan to assure the development of the Applications will not conflict with existing rights, the Applicant completed a specific analysis of every existing groundwater right and environmental area of interest located in Spring Valley. The Applicant's expert, Mr. James Watrus,[770] conducted a conflicts analysis by first identifying the Application points of diversion, existing rights and environmental areas of interest within Spring Valley.[771] The existing rights were queried from the Division of Water Resources database in September, 2010 and updated in April, 2011.[772] Federal water rights and resources

---

[768] Transcript, Vol.11 pp. 2398:10-2399:1 (Entsminger).
[769] *See* NRS 534.120(1) (State Engineer's authority to designate a basin for special administration); NRS 534.120(1) (State Engineer may regulate a basin where groundwater is being depleted); NRS 534.110(6) (2010) (where pumping exceeds recharge, State Engineer may restrict pumping based on priority rights); and NRS 534.110(5) (2010) (unreasonable adverse effects to domestic wells may be mitigated or pumping limited).
[770] Mr. Watrus is a senior hydrologist with the Southern Nevada Water Authority. The State Engineer qualified Mr. Watrus as an expert in groundwater hydrology. Transcript, Vol.11 pp. 2537: 3-2538:6 (State Engineer).
[771] Transcript, Vol.11 pp. 2540:24-2541:2 (Watrus).
[772] Exhibit No. SNWA_337, Appendix A; Transcript, Vol.11 p. 2551:7-9 (Watrus).

were included in this analysis.[773] The location of the environmental areas of interest were provided by Mr. Marshall and Ms. Luptowitz and further explained in the "Environmental Soundness" section of this ruling.[774] Mr. Watrus testified that he analyzed all of the identified water rights and environmental areas of interest in his conflicts analysis.[775] Protestants have not challenged this assertion. The State Engineer finds that Mr. Watrus performed a comprehensive review of the existing water rights and environmental areas of interest potentially impacted by groundwater development.

With this information, Mr. Watrus followed three steps in his analysis. First, he conducted a qualitative analysis, which assessed potential conflicts based on water right ownership, geographical location, and priority date.[776] Second, he conducted a quantitative analysis with the Applicant's groundwater model, using the model to identify potential conflicts with existing water rights and sensitive environmental areas.[777] Third, he completed a qualitative site specific analysis of each of the areas of concern identified in the model to assess the potential for conflicts.[778]

1. Initial Qualitative Analysis

The first step in the conflicts analysis was to identify the existing water rights that would not be in hydrologic or legal conflict with the Application points of diversion. Water rights that were owned by the Applicant were excluded from further analysis.[779] Water rights that were junior in priority to the Applications were excluded from further analysis since Nevada follows

---

[773] Transcript, Vol.11 p. 2551:1-4 (Watrus).
[774] Exhibit No. SNWA_337, pp. 3-6, 3-7; Transcript, Vol.11 p. 2551:1-7 (Watrus).
[775] Transcript, Vol.11 pp. 2552:11-2555:3 (Watrus).
[776] Transcript, Vol.11 pp. 2540:23-2541:3 (Watrus).
[777] Transcript, Vol.11 p. 2541:2-5 (Watrus).
[778] Transcript, Vol.11 p. 2541:5-8 (Watrus).
[779] Transcript, Vol.11 p. 2574:2-8 (Watrus).

local features that are not connected to the regional features.[812] Due to its regional nature, the Applicant's numerical model is not designed to simulate perched systems, predict drawdown at specific pumping wells or springs, derive steady-state budgets, or derive new basin or flowsystem boundaries. Dr. D'Agnese testified that predictions in cells where wells are located should not be relied on.[813]

The model covers 20,688 square miles, including Spring, Cave, Dry Lake, and Delamar valleys.[814] Though there are other regional models of similar size in the United States, they typically have much more available data.[815] The model grid-cells are each one kilometer by one kilometer.[816] The Applicant's model has 474 rows, 202 columns, and 11 layers with a total of 589,391 active cells.[817] Dr. D'Agnese testified that the data resolution for the area did not justify using smaller grid cell sizes.[818] He testified that given the size and amount of available data, the model should only be used to evaluate regional patterns and trends in drawdowns and changes in water budgets due to natural or human stresses.[819]

The complexity and large size of the region modeled and the sparseness of available data result in uncertainties in the Applicant's model simulations.[820] Furthermore, the lack of good historical data on anthropological uses of groundwater provides further uncertainty to the model simulations.[821] Because of the model's regional scale, local-scale features are not accurately simulated. For instance, Dr. D'Agnese testified that it would not be appropriate to use the model

---

[812] Exhibit No. SNWA_087, p. 1; Transcript, Vol.9 p. 1909:18–25 (D'Agnese).
[813] Exhibit No. SNWA_087, p. 2; Transcript, Vol.9 pp. 1908:12-1909:17 (D'Agnese).
[814] Exhibit No. SNWA_089, pp. 1-2, 4-2; Transcript, Vol.9 p. 1902:20–21 (D'Agnese).
[815] *See* Transcript, Vol.9 p. 1903:1–1906:6 (D'Agnese).
[816] Exhibit No. SNWA_087, p. 11; Exhibit No. 089, p. 4-1; Transcript, Vol.9 p. 1907:2–4 (D'Agnese);.
[817] Exhibit No. SNWA_089, pp. 3-4, 4-2.
[818] Exhibit No. SNWA_087, p. 11; Transcript, Vol.9 pp. 1907:5–1908:11 (D'Agnese).
[819] Transcript, Vol.9 pp. 1906:20–1907:1, 2026:9–2027:15 (D'Agnese).
[820] Exhibit No. SNWA_087, p. 9.
[821] Exhibit No. SNWA_087, p. 12.

Two model simulations were run, one using a baseline scenario and one that simulated pumping the full volume of the Applications.[846] Drawdown maps were prepared based on the difference in model results between the two scenarios.[847] In addition, changes in spring flow volumes were analyzed.[848] Mr. Watrus used the baseline pumping scenario to set the initial conditions of the water table.[849] He then used the full volume scenario to simulate the water elevations under pumping stresses.[850] The full volume pumping scenario simulated staged development of the resource based on the projected water demand in the Applicant's 2009 Water Resource Plan.[851] The baseline water level elevations and spring flows were subtracted from the pumping water elevations and spring flows to determine drawdown of the aquifer and changes in spring flow resulting from simulated pumping of the Applications.[852]

The Applicant selected the original version of the DEIS model for the analysis. During the NEPA process, the BLM requested that the Applicant modify the representation of Big Springs (in Snake Valley), which it did for the DEIS.[853] The original version, unlike the modified version of the model, simulated full discharge at Big Springs, which was an area of concern in the model analysis.[854] Dr. Myers testified that the original version used by the Applicant during this hearing is likely a more accurate representation of the hydrogeology of Big Springs.[855]

---

[846] Transcript, Vol.11 p. 2574:13-15 (Watrus).
[847] Transcript, Vol.11 pp. 2574:23-2575:4 (Watrus).
[848] Transcript, Vol.11 p. 2575:3-4 (Watrus).
[849] Transcript, Vol.11 p. 2555:5-10 (Watrus).
[850] Transcript, Vol.11 pp. 2555:17-2556:15 (Watrus); Exhibit No. SNWA_337, p. 4-3 and 4-4.
[851] Transcript, Vol.11 p. 2557:1-9 (Watrus).
[852] Transcript, Vol.11 p. 2555:11-15 (Watrus).
[853] Exhibit No. SNWA_090, pp. 3-1 to 3-3.
[854] Transcript, Vol.11 p. 2550:12-13 (Watrus).
[855] Transcript, Vol.18 p. 4087:8–12 (Myers).

Dr. Myers suggested that the conflicts analysis should have used the pumping scenarios identified in the DEIS.[856] The DEIS alternative pumping scenarios mainly simulate distributed pumping throughout Spring Valley.[857] The only pumping scenario that simulated pumping at the Application points of diversion also included pumping in Snake Valley. The Snake Valley Applications are not before the State Engineer for consideration at this time, and simulated pumping at those points of diversion may influence drawdown simulations from the Spring Valley Applications.[858] The State Engineer finds that this decision only involves the Application points of diversion in Spring Valley. None of the DEIS pumping scenarios analyze just pumping at the Spring Valley Application points of diversion. Accordingly, the State Engineer finds that the Applicant properly constructed a new model run in order to analyze the specific decision that is before the State Engineer at this time.

The Applicant selected a 75 year simulation period beyond full build-out of the project, which occurs in the year 2042. This simulation period was selected based upon the expected lifespan of the project and the reduced certainty in model results for longer simulation periods.[859] Mr. Holmes testified that the Applicant uses a 50 year water planning horizon because it provides a long enough look into the future to assess potential water demand and to provide enough lead time to meet that demand.[860] Mr. Holmes further testified that other entities such as the City of Phoenix and White Pine County, as well as federal agencies, such as the Army Corps of Engineers, use a 50 year planning horizon.[861] On the other hand, Dr. Myers and Dr. Jones ran

---

[856] Transcript, Vol.19 pp. 4219:15-4222:10 (Myers).
[857] Transcript, Vol.11 pp. 2562:19-2563:2 (Watrus).
[858] Transcript, Vol.11 pp. 2562:19-2563:2 (Watrus).
[859] Transcript, Vol.11 p. 2559:3-9 (Watrus).
[860] Transcript, Vol.2 pp. 307:24-308:7 (Holmes).
[861] Transcript, Vol.2 p. 308:10-15 (Holmes).

model simulations to 200 years beyond full build-out.[862] None of the Protestants provided a practical justification for running a 200 year simulation period and it is undisputed that the 200 year simulation periods were less certain than the 75 year simulation period.[863] The uncertainty with longer prediction periods relates in part to the fact that no actual data exists for large-scale pumping, so predicting conditions many hundreds of years into the future only compounds the uncertainty caused by lack of data. The State Engineer finds that the 75 year simulation period is appropriate for this conflicts analysis given the practical considerations provided by the Applicant and the substantial amount of uncertainty for longer prediction periods. Further, the State Engineer will require model updates every 5 years following the start of groundwater production and longer simulation periods may be required if it appears to the State Engineer that because the model was updated with actual pumping data, predictions for longer simulation periods become more certain.

Some adjustments had to be made to the model to represent full pumping of the Application points of diversion. Specifically, the model framework could not support pumping at Application 54021. The Applicant's model locates points of diversion in the center of the modeling cell, which in this case was an impermeable rock layer.[864] For the simulation, the Applicant moved the Application point of diversion into alluvial material.[865] The geology in the actual location of the point of diversion is alluvial material, which, according to Mr. Watrus, is suitable for production.[866] Dr. Myers confronted a similar problem at more than one point of

---

[862] Exhibit No. GBWN_003, p.5; Transcript, Vol.27 p. 6009:13-18 (Jones).
[863] Transcript, Vol.20 p. 4489:1-3 (Myers).
[864] Exhibit No. SNWA_337, p. 4-5; Transcript, Vol.11 pp. 2560:18-2561:16 (Watrus).
[865] Exhibit No. SNWA_337, p. 4-5; Transcript, Vol.11 p. 2561:7-23 (Watrus).
[866] Exhibit No. SNWA_337, p. 4-5; Transcript, Vol.11 pp. 2561:17-2562:8 (Watrus).

diversion in his simulations and used a similar technique to resolve the problem.[867] The State Engineer finds that for simulation purposes, it was appropriate for the Applicant to move the point of diversion for Application 54021 as described above.

There are limitations in the model predictions that must be accounted for in the conflicts analysis. First, at full-build out, the model simulated continuous pumping at maximum volume throughout the simulation period. As explained by Mr. Watrus, the model cannot account for human-driven management decisions to reduce, relocate, or stop pumping to prevent impacts to existing water rights or environmental areas of interest. In reality, the Project would be developed in a manner that responded to impacts before the drawdowns that are predicted in the model would occur.[868]

Second, Mr. Watrus testified that the volume of precipitation recharge that is simulated in the model is 82,600 afa as opposed to the current estimate of 99,200 afa.[869] In essence, this imbalance between recharge to the aquifer and pumping from the aquifer magnifies simulated impacts. If the model simulated the current estimate of recharge, the drawdown predictions would be less. Further, the full application volume pumping scenario simulated 91,224 acre-feet of pumping in Spring Valley.[870] Mr. Watrus testified that the imbalance between recharge (82,600 acre-feet) and pumping volume (91,224 acre-feet) would cause the model to over-simulate impacts as a whole simply because the simulation includes pumping greater than perennial yield.[871] A simulation that includes more recharge, and pumping at the rate that is

---

[867] Exhibit No. GBWN_003, p. 6.
[868] Transcript, Vol.11 pp. 2558:6-2559:6 (Watrus).
[869] Transcript, Vol.11 p. 2566:4-7 (Watrus).
[870] Transcript, Vol.11 p. 2566:10-12 (Watrus).
[871] Transcript, Vol.11 p. 2566:10-24 (Watrus).

ultimately approved by the State Engineer for these Applications, would predict less drawdowns or decreases in spring flows.

Third, as stated above, the model is a regional model that cannot make site-specific predictions. The model cannot currently represent the complex geologic stratification on the valley floor in Spring Valley.[872] Therefore, the model represents uniform drawdown in an area that has potentially numerous confined units which would influence and limit potential drawdown.[873] Other limitations include a lack of historical pumping drawdown data to determine how consumptive uses affect the aquifer over time, and a lack of variation in recharge over time to assess how increased or decreased recharge will influence drawdown under different pumping regimes.[874]

The State Engineer understands that the Applicant's model is not a perfect predictor of reality and that there are practical water management considerations that simply cannot be accounted for in the model simulations. The State Engineer finds that these model limitations cause the model to exaggerate pumping impacts and that the conflicts analysis must be viewed in this light.

Given the limitations associated with the model, Mr. Watrus testified that the model should be used to identify areas of concern that require more detailed qualitative analysis and consideration of whether adequate monitoring exists to protect such areas of concern.[875] Mr. Watrus did not consider the model results sufficiently accurate to predict specific drawdowns

---

[872] Transcript, Vol.11 p. 2585:2-12 (Watrus).
[873] Transcript, Vol.11 p. 2585:2-19 (Watrus).
[874] Transcript, Vol.11 pp. 2565:17-2566:9, 2567:25-2569:7 (Watrus).
[875] Transcript, Vol.11 p. 2575:3-7 (Watrus).

a. Groundwater Rights

The Applicant first qualitatively analyzed the underground water rights in areas with greater than 50 feet of simulated drawdown. The analysis of the CPB underground water rights in these areas will be discussed in the "Cleveland Ranch" section below. NRS 534.110 (2010) states that groundwater rights "must allow for a reasonable lowering of the static water level" and the section "does not prevent the granting of permits to applicants later in time on the ground that the diversions under the proposed later appropriations may cause the water level to be lowered at the point of diversion of a prior appropriator, so long as any protectable interests in existing domestic wells . . . and the rights of holders of existing appropriations can be satisfied under such express conditions." This statute indicates even if a new application for groundwater will cause a reasonable amount of drawdown at an existing water right, such a drawdown will not prevent the State Engineer from granting a permit for the new appropriation.

Permit 29371 (Cert. 10328) and 29567 (Cert. 10329) share a well, which corresponds to driller's log 10816 that is available in the State Engineer's records.[887] The driller's log indicates that the well is completed to a depth of 238 feet and has a static water level of 64 feet.[888] The saturated depth of this well is 174 feet. The State Engineer finds that this well can accommodate a reasonable lowering of the water table at this location without causing a conflict to these existing rights. Application 31239 corresponds with driller's log 17124.[889] For this well, the completion depth is 535 feet and the static water level is 231 feet.[890] Again, the State Engineer finds that the saturated depth of this well, 304 feet, can accommodate a reasonable lowering of

---

[887] Exhibit No. SNWA_337, p. 6-6.
[888] Exhibit No. SNWA_341; Transcript, Vol.11 pp. 2581:17-2582:6 (Watrus).
[889] Exhibit No. SNWA_341; Transcript, Vol.11 p. 2583:3-4 (Watrus).
[890] Exhibit No. SNWA_341; Transcript, Vol.11 pp. 2583:18-2584:1 (Watrus).

the water table. The State Engineer also finds that any effects to these water rights will be monitored and addressed pursuant to the required Management Plan.

The next group of water rights, Permit 7446 (Cert. 1515), 8075 (Cert. 1366), and 8077 (Cert. 1368), are located on the valley floor.[891] The water rights are small volume stock water rights.[892] There is no driller's log for these wells, and the Applicant determined that the wells were completed at shallow depths.[893] Given their location on the valley floor, it is likely that these wells are located in an area with multiple confining clay layers, which may influence impacts at this location. The State Engineer finds that if unreasonable impacts occur at this location, the small volume of water allocated to these water rights may be mitigated in any number of ways including deepening the current wells, drilling substitute wells, or simply replacing the water with water provided by the Applicant.[894] Further, by placing pumping stresses on the hydrologic system and studying the interaction of the clay layers in the vicinity of Cleveland Ranch, the State Engineer finds that the Applicant and the State Engineer will be in a better position to assess potential impacts at this site, and to manage pumping in a manner to avoid unreasonable lowering of the water table for these existing rights.

Other than CPB rights, which are discussed below, the final underground right, Permit 45496 (Cert. 11965), is located at the interface of the valley floor and the alluvial fan.[895] The water right is a stock water right with an annual duty of 86.24 acre-feet.[896] The well for this water right is completed to a depth of 495 feet and has a static water level of 407 feet below

---

[891] Transcript, Vol.11 pp. 2583:25-2584:2 (Watrus).
[892] Transcript, Vol.11 p. 2586:1-6 (Watrus).
[893] Transcript, Vol.11 p. 2584:7-11 (Watrus).
[894] Transcript, Vol.11 p. 2586:1-6 (Watrus).
[895] Exhibit No. SNWA_337, p. 6-6; Transcript, Vol.11 p. 2586:3-6 (Watrus).
[896] Exhibit No. SNWA_337, p. 6-6; Transcript, Vol.11 p. 2586:11-13 (Watrus).

ground surface ("bgs").[897] The saturated depth of the well, 88 feet, could accommodate some lowering of the water table. The first simulation period in which the right is impacted is in the year 2082.[898] This estimate is premature given the fact that the model oversimulates pumping and there are potentially multiple aquifers in this area. Based on this evidence, the State Engineer finds that there is lead time in the model simulation to determine whether this right will be impacted. The State Engineer further finds that the Applicant's monitoring pursuant to the Management Plan will identify any potential conflicts during this time.

With respect to domestic wells, the Applicant reviewed the presence of domestic wells and determined that no domestic wells would be impacted by the Project. Protestants submitted no evidence to indicate the Project will conflict with protectable interests in existing domestic wells.

b. <u>Spring Rights</u>

The next group of water rights are spring rights. The model simulated greater than 50 feet of drawdown at federal reserved rights associated with Unnamed Spring, Four Wheel Drive Spring, and Spring Creek Spring.[899] The Applicant entered into stipulations with the Federal Agencies and the USFS regarding these reserved rights.[900] The State Engineer finds that any conflicts with federal reserved rights will be managed by the parties pursuant to those stipulations, and that if these water rights are impacted by pumping pursuant to the Applications, the Applicant will be required to address the impacts to the satisfaction of the State Engineer.

---

[897] Exhibit No. SNWA_337, p. 6-6; Transcript, Vol.11 p. 2586:6-8 (Watrus).
[898] Exhibit No. SNWA_337, p. 6-8
[899] The Federal Reserve Water Rights are R05274, R05237, R05269, R05272, R05278, R05279, R05280, R05292, R05292, R05292. Exhibit No. SNWA_337, p. 6-8. The State Engineer notes that none of these rights have been adjudicated. Transcript, Vol.11 p. 2590:4-7 (Watrus).
[900] Exhibit No. SE_041; Exhibit No. SE_095.

The model also simulated a reduction in spring flow greater than 15 percent at north and south Millick Springs, which are located on the valley floor.[901] There are CPB water rights on these springs. Also, Applications 10921 and 10993, not owned by CPB, have their source from north and south Millick Springs. While the model runs simulated a reduction of 15 percent at these springs, these springs were not included as calibration targets in the model and there is no certainty that this simulation is accurate.[902] The accuracy of this simulation is further called into question by the fact that the model simulates very little drawdown in the water table in this area.[903] The State Engineer notes that this drawdown is exaggerated due to oversimulated pumping in the model and the lack of simulated geologic complexity on the valley floor. Given the relatively minimal simulated drawdown in this area after 75 years of continuous full volume pumping, the State Engineer finds with relative certainty that these water rights are unlikely to be impacted. The State Engineer further finds that there is a significant amount of monitoring occurring between these rights and the Application points of diversion, which will help detect the spread of drawdown toward these rights for the purpose of preventing impacts or implementing mitigation measures, if needed.

c. **Stream Rights**

The final group of water rights analyzed are stream rights. The model simulated greater than 50 feet of drawdown at Cleve Creek, Bastian Creek, and Willard Creek.[904] Cleve Creek and Bastian Creek will be discussed in the Cleveland Ranch section below. The model simulated

---

[901] Exhibit No. SNWA_337, p. 6-8.
[902] Transcript, Vol.11 p. 2591:23-2592:3 (Watrus).
[903] Exhibit No. CPB_011, p. 27.
[904] Exhibit No. SNWA_337, p. 6-10.

drawdown in excess of 50 feet at Willard Creek.[905] There are two senior water rights associated with Willard Creek, Permit 983 (Cert. 171) and Permit 1052 (Cert. 244).[906] The depth to groundwater in the vicinity of these rights is 14 feet and 80 feet, respectively.[907] CPB expert, Dr. Alan Mayo agreed that one of the requirements for impacts to stream rights from groundwater pumping is a saturated continuum between the stream and the groundwater table.[908] The parties did not dispute that there is no saturated continuum between the creek bed and the groundwater table. Therefore, the State Engineer finds that there will be no conflict with these existing water rights near Willard Creek.

The qualitative analysis results for the remaining steam rights owned by CPB are presented in later sections of this ruling.

d. <u>Environmental Areas of Interest</u>

There were a total of 36 environmental areas of interest within the model domain that were quantitatively analyzed. Only four of these environmental areas of interest were located in an area of Spring Valley where the model either simulated drawdown in excess of 50 feet or a spring discharge reduction in excess of 15 percent.[909] All of these springs will be monitored in accordance with the Monitoring Plan and the Stipulated Agreements between the Applicant and the Federal Agencies and the USFS. A more detailed analysis of these areas of interest is included in the "Environmental Soundness" section of this ruling.

e. <u>Cleveland Ranch and CPB water rights</u>

---

[905] Exhibit No. SNWA_337, p. 6-10.
[906] Exhibit No. SNWA_337, p. 6-10.
[907] Transcript, Vol.11 pp. 2594:19-2595:11 (Watrus).
[908] *See* Transcript, Vol.27 p. 6085:3-15 (Mayo).
[909] Exhibit No. SNWA_337, p. 6-12

of diversion, each of the wells have completion depth greater than 200 feet and can accommodate a reasonable lowering of the water table.[931] Mitigation measures will be required as needed to make any impacted water right whole.

CPB recently filed vested claims for water rights on Unnamed Spring #7 and #8, South Bastian Spring, South Bastian Spring 2, and Layton Spring. Federal reserved water rights R05278, R05272 and R05269 are associated with or in the vicinity of Unnamed Springs in this area.[932] The reserved rights are for 67.24, 67.24 and 3.59 acre-feet of spring discharge, respectively.[933] Pursuant to the Stipulation for Withdrawal of Protests between the Applicant and the Federal Agencies, a common goal of the Parties is "1) management the development of groundwater by [the Applicant] in the Spring Valley HB without causing injury to Federal Water Rights…"[934] In accordance with the Stipulation, a monitoring plan was developed by the Applicant and approved by the State Engineer.[935] The Applicant's Management Plan incorporates all of the elements from the approved plan.[936] Under that plan, a piezometer was installed at Four Wheel Drive Spring which is located a quarter mile from Unnamed Springs.[937] The vested rights to discharge from these springs have not been adjudicated; therefore, the State Engineer cannot determine whether the CPB has any right to the spring discharge from Unnamed Spring #7 and #8.[938] However, in order to take a conservative approach, the State Engineer will treat the vested claims as if they had been adjudicated. The State Engineer finds that the mandates of the Stipulation and the Management Plan will protect these rights. Finally, CPB has

---

[931] Exhibit No. SNWA_337, p. 6-5, 6-7.
[932] Exhibit No. SNWA_337, Plate 1.
[933] Exhibit No. SNWA_337, p. 6-8.
[934] Exhibit No. SE_041, p. 3, G.
[935] Exhibit No. SNWA_153.
[936] Transcript, Vol.8 p. 1840:12-17 (Prieur).
[937] Exhibit No. SNWA_337, p. 6-9.
[938] Transcript, Vol.11 p. 2590:6-25 (Watrus).

vested claims to water rights on South Bastian and Layton Springs. Both of these sites have been selected for monitoring.[939] Mr. Watrus testified that these monitoring efforts will help the Applicant determine the aquifer characteristics and the connection of these surface water features with groundwater development.[940] The State Engineer finds that the potentially impacted CPB water rights are or will be monitored and that this monitoring will allow for early warning of potential impacts to these water rights. By including the Management Plan as part of the permit terms, the State Engineer has the authority to require additional monitoring points to protect these existing rights and will exercise this authority as needed.

The next group of water rights is located north and east of the Cleve Creek alluvial fan.[941] The existing rights are located in an area where CPB experts predicted a drawdown of less than 20 feet after 75 years of continuous pumping from full build-out.[942] Given the limitations in the model, it is unlikely that impacts will actually be experienced at these water rights from pumping at the existing Application points of diversion. Nevertheless, the State Engineer finds that there is comprehensive monitoring occurring between the Application points of diversion and these water rights, which will provide the State Engineer with data to detect the spread of drawdown and take action to prevent unreasonable impacts. By including the Management Plan in the permit terms for the subject water rights, the State Engineer has the authority to require additional monitoring points to protect existing rights and will exercise this authority as needed.

---

939 Exhibit No. SE_095, Exhibit A, p. 5.
940 Transcript, Vol.11 pp. 2589:19-2590:25 (Watrus).
941 Recent vested claims in this area include V010086, V010087. Recent filed claims include the Fera Well. The remaining rights were analyzed as part of the Applicant's conflicts analysis. Exhibit No. CPB_011, p. 4; Exhibit No. SNWA_337, Appendix B.
942 Exhibit No. CPB_011, p. 27

avoid impacts to existing rights that derive their source above the clay layers[958] Dr. Harrington agreed that specific pumping management controls are best addressed in a Pumping Plan.[959] Dr. Myers agrees that the water which supplies the springs at the toe of the fan is perched, and not connected to the groundwater system.[960] On the other hand, CPB witness Dr. Mayo believed that pumping below the clay layers would cause the cone of depression to extend up the alluvial fan beyond the clay layers to the head of the system and intercept younger water destined to reach the springs at the base of the fan.[961] However, Dr. Mayo's opinion is more theoretical than practical, as he did not offer an opinion on the rate or duration of pumping it would take for the cone of depression to extend this far upgradient on the alluvial fan. Further, while Dr. Mayo suggested that pumping the older deeper water in the system is groundwater mining,[962] from both a hydrologic and policy standpoint, there is no precedent for distinguishing between older water and younger water for the purpose of determining perennial yield in a basin. If there is older water in the aquifer that exists below a clay layer or multiple clay layers and that water can be developed without causing injury to existing rights, then the State Engineer finds that the Applicant should be allowed to develop it.

Developing this water from the current points of diversion will not necessarily cause groundwater mining as suggested by Dr. Mayo. In response to questioning from staff, Dr. Mayo conceded that lowering the regional water table could lower the water table at the surface where

---

[958] Transcript, Vol.8 pp. 1854:10–1856:6 (Prieur).
[959] Transcript, Vol. 23 p.5308:7-17 (Harrington).
[960] Transcript, Vol.20 pp. 4491:24-4492:69 (Myers).
[961] Transcript, Vol.27 p. 6032:1-23 (Mayo).
[962] Transcript, Vol.27 p. 6031:5-25 (Mayo).

young water is discharged through evapotranspiration.[963] Therefore, the State Engineer finds development of this older water will not necessarily result in a groundwater mining situation.

The real issue is to what extent the Applicant can develop the water on the alluvial fan without causing harm to CPB water rights. As mentioned previously, the Applicant performed a 120-hour constant rate aquifer test of 500 gpm at test well SPR7029M2.[964] The response observed in the monitor well that is 110 feet from the test well was negligible.[965] This aquifer test indicates a possibility that water can be developed on the alluvial fan without causing enough drawdown to affect discharge at the springs at the toe of the fan. Mr. Prieur testified that it would be useful to perform an aquifer test from the nearest Application point of diversion at higher rates and durations than the previous test to observe the response in the aquifer at the monitoring wells.[966] The State Engineer finds that the negligible drawdown observed in the monitoring well during the constant rate aquifer test is evidence that pumping the deeper water in the aquifer may be possible without affecting the discharge of the springs at the base of the fan.

CPB witness Dr. Mayo admitted that there is some level of pumping that is acceptable from the Application points of diversion that CPB protested.[967] However, he concluded that specific conditions should be met in order to develop the groundwater.[968] The conditions are as follows: 1) calibrate the model using a much finer grid space; 2) design a pumping scheme with more wells at shallower depths with a wider distribution to capture ET; and 3) test this design against the local model.[969]

---

[963] Transcript, Vol.27 p. 6146:17-25 (Mayo).
[964] Exhibit No. SNWA_177.
[965] Exhibit No. SNWA_177, Appendix D, p. 3, Figure D-3.
[966] Transcript, Vol.8 pp. 1862:12-1863:4 (Prieur).
[967] Transcript, Vol.27 p. 6138:17-23 (Mayo).
[968] Transcript, Vol.27 p. 6046:8-23 (Mayo).
[969] Transcript, Vol.27 p. 6046:8-23 (Mayo).

CPB has argued that the monitoring and management program will not be effective at protecting existing rights.[972] However, CPB employees assisted in locating monitoring points around the Cleveland Ranch, which ultimately cost the Applicant approximately $200,000.[973] In addition, the State Engineer stated on the record, in relevant part, that:

> The regulation of these water rights are within our purview. If there's adverse impacts to existing rights...we're not going to be sitting on our hands. I mean, we're going to [be] out there being proactive. And we can assess penalties, we can require cease and desist, curtailment of pumping, et cetera.[974]

Accordingly, the State Engineer finds that there is no merit to CPB's position that the monitoring and management plan, from either a technical or administrative point of view, will be ineffective. Based on the evidence submitted by the Applicant, and the testimony of CPB's expert Dr. Mayo, the State Engineer finds that the Applications can be developed without conflicting with existing rights. Nevada law provides that, "the State Engineer may limit the initial use of water to a quantity that is less than the total amount approved for the application."[975] Additional use "may be authorized by the State Engineer at a later date if additional evidence demonstrates to the satisfaction of the State Engineer that the additional amount of water" can be developed in accordance with Nevada water law.[976] To make that determination, "the State Engineer may establish a period during which additional studies may be conducted or additional evidence provided to support the application."[977]

---

[972] Transcript, Vol.29 p. 6438:11-17 (Hejmanowski).
[973] Transcript, Vol.8 pp. 1848:17-1849:7; 1863:21-24 (Prieur).
[974] Transcript, Vol.11 p. 2499:2-8 (State Engineer).
[975] NRS 533.3705. (2010).
[976] NRS 533.3705. (2010).
[977] NRS 533.3705. (2010).

No. 3
Table of citation errors and corrections for SNWA's Proposed Delamar Valley Ruling

Table of citation errors and corrections for SNWA's Proposed Delamar Valley Ruling			
Page	Footnote no.	Current Text	Corrected Text (changes in bold)
98	454	Exhibit No. SNWA_258, p. 6-14.	Exhibit No. SNWA_258, p. **6-17.**
99	461	Exhibit No. SNWA_258, p. 6-15.	Exhibit No. SNWA_258, p. **6-18.**
107	512	Exhibit No. SNWA_258, p. 7-21. See well Map ID's 182-9, 182-10, 209-16, and 209-20.	Exhibit No. SNWA_258, pp. **7-20 to 7-21**. See well Map ID's 182-9, 182-10, 209-16, and 209-20.
113	534	Exhibit No. SNWA_258, pp. 5-14; Exhibit No. GBWN_004, pp. 20, 35.	Exhibit No. SNWA_258, pp. 5-14; Exhibit No. GBWN_004, pp. **25**, 35.
113	536	NRS 533.024(c) (2010).	NRS 533.024**(1)**(c) (2010).
117	556	Exhibit No. GBWN_004, p. 38.	Exhibit No. GBWN_004, **p. 56.**
125	587	Transcript, Vol.11 p. 2540:16-18 (Watrus).	Transcript, Vol.11 p. **2541:1-3** (Watrus).
125	588	Transcript, Vol.11 p. 2540:18-19 (Watrus).	Transcript, Vol.11 p. **2541:3-4** (Watrus).
125	589	Transcript, Vol.11 p. 2540:19-21 (Watrus).	Transcript, Vol.11 p. **2541:3-6** (Watrus).
130	613	Exhibit No. State Engineer_041, Exhibit A, p. 14, § II(2).	Exhibit No. **SE_080, Appendix A, p. 19.**
130	615	Exhibit No. SNWA_149.	Exhibit No. SNWA_**148.**
131	619	Transcript, Vol.8 p. 1841:1-6 (Prieur).	Transcript, Vol.8 p. **1845:18-22** (Prieur).
132	625	Transcript, Vol.9 p. 2075:12-21 (Prieur).	Transcript, Vol.9 pp. 2075:**19-2076:4** (Prieur).
142	683	Exhibit No. SNWA_428, p. 9; Transcript, Vol.10 pp. 2397:17-2398:8 (Prieur).	Exhibit No. SNWA_428, p. 9; Transcript, Vol.**11** pp. **2379:16-23** (Prieur).
157	780	Exhibit No. GBWN_110, p. 15.	**Transcript, Vol.19 pp. 4219:15-4222:10 (Myers)**; ***see*** Exhibit No. GBWN_110, **p. ES-15.**
159	789	Transcript, Vol.11 p. 2584:13-23 (Watrus).	Transcript, Vol.11 p. **2585:3-12** (Watrus).
167	824	Exhibit No. GBWN_173, p. 3.	Exhibit No. GBWN_**137**, p. 3.

No. 4

Corrected pages 98, 99, 107, 113, 117, 125, 130, 131, 132, 142, 157, 159, and 167 of SNWA's Proposed Delamar Valley Ruling, containing the correct citations the other groundwater budget components of the WRFS.[448] The recharge efficiency is expressed as a mathematical equation representing the ratio of recharge to precipitation, in which recharge is a function of precipitation as a power function.[449] In the initial development of this relationship, in order to keep the calculated recharge efficiency values reasonable, the Applicant placed constraints (limits or ranges) on those values. For example, constraints were placed on the power function coefficients to ensure recharge efficiencies increase with increased precipitation.[450] To ensure the Excel Solver calculated representative recharge efficiencies for the WRFS, the Applicant set a maximum recharge efficiency value of 49 percent for the WRFS based on prior studies.[451] Areas where recharge was not expected to occur were also excluded from the Excel Solver analysis. Recharge efficiencies with values of zero were applied to 1) areas on the valley floor; 2) areas of groundwater ET discharge; and 3) areas that received less than 8 inches of precipitation annually.[452] Notably, none of the Protestants disputed these constraints. With these constraints in place, the Excel Solver yielded optimal solutions for recharge efficiencies for each 1-inch precipitation interval.[453] Having reviewed the method by which the Applicant utilized the Excel Solver, the State Engineer finds that the Applicant's use of the Excel Solver in this case is fundamentally sound.

The Applicant's recharge efficiencies were then applied to the spatial distribution of precipitation for Delamar Valley.[454] Recharge volumes were calculated for each 1-inch precipitation interval by multiplying the precipitation rate for the interval, by the surface area

---

[448] Exhibit No. SNWA_258, p. F-15.
[449] Exhibit No. SNWA_258, p. F-6.
[450] Exhibit No. SNWA_258, p. F-18.
[451] Exhibit No. SNWA_258, p. F-19.
[452] Exhibit No. SNWA_258, p. F-8.
[453] Exhibit No. SNWA_258, pp. F-22, F-24 to F-25.
[454] Exhibit No. SNWA_258, p. 6-17.

within the valley for the corresponding interval (not including areas of no recharge), and by the recharge efficiency.[455] The Applicant calculated total recharge by summing the recharge volumes for each precipitation interval in Delamar Valley, which equaled 6,600 afa.[456] The Applicant reported the following recharge estimates from prior investigations: 6,627 afa (SNWA, 2009a); 1,000 afa (Reconnaissance Series and Scott, et al. 1971); 2,000 afa (Kirk and Campana, 1988); 5,000 afa (LVVWD, 2001); 3,119 afa, 12,930 afa, 10,248 afa, 3,567 afa, and 21,442 afa (Epstein, 2004); 7,764 afa and 6,404 afa (Flint, et al. 2004); 1,000 afa (Brothers, et al, 1996).[457] The State Engineer finds that the Applicant's recharge estimate is well within the range of prior estimates, and is appropriate for use in the determination of perennial yield for Delamar Valley.

Dr. Myers appears[458] to urge the State Engineer to adopt the recharge estimate in the Reconnaissance Series report as the perennial yield for Delamar Valley.[459] This approach is inconsistent with his recharge analysis for Spring Valley. The State Engineer notes that for Spring Valley, Dr. Myers adopted a recharge estimate that was based on an average of estimates from prior investigations.[460] Interestingly, if this approach was applied to Delamar Valley, Dr. Myers' recharge estimate would have been much higher than the Reconnaissance Series estimate.[461] Dr. Myers did not document the reason for deviating from this approach or his criteria for selecting the Reconnaissance Series estimate over other estimates. As mentioned above, there are improvements in the modern precipitation data over the data that were available

---

455 Transcript, Vol.6 p. 1365:3-7 (Drici).
456 Exhibit No. SNWA_258, p. 6-17.
457 Exhibit No. SNWA_258, p. 6-18.
458 The State Engineer notes that Dr. Myers' reports and testimony do not explicitly state his groundwater budget components for Cave, Dry Lake, or Delamar Valleys.
459 Transcript, Vol.20 p. 4577:2-10 (Myers).
460 Transcript, Vol.20 p. 4432:8-10 (Myers).
461 Exhibit No. SNWA_258, p. 6-18.

carbonate rock and basin fill material in Dry Lake and Delamar Valleys is to the south toward the PSZ and Coyote Spring Valley.[508] While there is hydrologic potential (i.e. the water level in Pahranagat Valley is lower than the water level in Dry Lake Valley) between these valleys[509], the geologic and geochemical evidence does not support this suggested flow path. According to Millard County's witness, Dr. Hugh Hurlow[510], if these three lines of evidence are available, they should be considered in making this determination.[511] And a determination of interbasin flow cannot be made based on water levels alone when geologic and geochemical evidence contradicts the existence of interbasin flow. Dr. Myers did not submit any evidence which refuted the geologic and geochemical findings of the Applicant's experts.

The Applicant was unable to perform a Darcy analysis for the PSZ given the limited availability of hydrologic data. However, the hydraulic potential between Delamar Valley and Pahranagat Valley is 350 ft,[512] and 1,550 to 1,280 ft between Delamar Valley and Coyote Spring Valley.[513] In addition, the hydraulic potential between Pahranagat Valley and Coyote Spring Valley is approximately 1,400 feet.[514] The State Engineer concludes that the Applicant's hydrologic, geologic, and geochemical analyses all support the finding that groundwater outflow from Delamar Valley is to south toward Coyote Spring Valley and southern Pahranagat Valley.

When the evidence supports such a determination, the State Engineer will reserve from the perennial yield the quantity of interbasin flow that supports existing rights or sensitive

---

[508] Exhibit No. SNWA_258, Plate 2, Carbonate Wells Map ID's 181-6 and 181-25; and Basin Fill Wells 181-7, 181-3, 181-1, 181-19, 181-20, 181-21, 182-4, and 182-3.
[509] Exhibit No. SNWA_258, Plate 2.
[510] Dr. Hurlow is a senior scientist with the Utah Geologic survey. The State Engineer qualified Dr. Hurlow as an expert in hydrogeology. Transcript, Vol.16 pp. 3582:9-10; 3593:5-6 (Hurlow).
[511] Transcript, Vol.16 p. 3627:10-22 (Hurlow).
[512] Exhibit No. SNWA_258, pp. 7-20 to 7-21. See well Map ID's 182-9, 182-10, 209-16, and 209-20.
[513] SNWA Exhibit 258, p. 7-21 § 7.3.4.
[514] SNWA Exhibit 258, p. 7-21 § 7.3.4.

another basin, the State Engineer has discounted the amount of water appropriated in the upgradient basin from inflow into the downgradient basin to avoid double accounting and regional over appropriation.[532] However, full appropriation of the perennial yield is permitted if there is evidence showing that existing rights in down gradient basins will not be impacted by groundwater production in the subject basin.[533]

In this case, the parties do not dispute that there is minimal groundwater ET in Delamar Valley.[534] The Applicant argues that the State Engineer should depart from the one-half outflow method for Delamar Valley. In 1971, Scott et al. estimated that the amount that could be taken from storage with a dewatering of 50 feet was roughly 50% of a basin's outflow and provided estimates of the transitional storage reserve for Nevada basins based on an average dewatering of 30 to 40 feet.[535] This method was a reconnaissance-level tool to estimate perennial yield when little information was available. The method should not be adhered to when more information is available, as is the case presently. Thus, the assumptions underlying Scott et al.'s conclusion that the perennial yield in dry basins may be set to 50% of the outflow are not applicable in this case. The Legislature has encouraged the State Engineer to "consider the best available science in rendering decisions concerning the available surface and underground sources of water in Nevada."[536] Thus, historical estimates of and methods for determining perennial yield should be rejected when the best available science dictates. Therefore, the State Engineer finds that the majority of groundwater discharge in Delamar Valley occurs through subsurface outflow and that the recharge estimate for Delamar Valley should be used as the basis for perennial yield,

---

[532] State Engineer Ruling 5712, p. 14 (Feb. 2, 2007).
[533] *See* NRS 533.370(5) (2010).
[534] Exhibit No. SNWA_258, pp. 5-14; Exhibit No. GBWN_004, pp. 25, 35.
[535] Exhibit No. SNWA_300, p. 13.
[536] NRS 533.024(1)(c) (2010).

outflow for some basins, such as Pahranagat Valley, by reporting the interbasin flow as a negative value.[552] This effect is exaggerated due to the fact that Dr. Myers selected the Reconnaissance recharge estimates, which are some of the lowest reported estimates for Dry Lake and Delamar Valleys,[553] and then assumed that the Applicant would develop the full Application volumes as opposed to the unappropriated perennial yield.[554] With respect to this analysis, Dr. Myers indicated that the apparent reversal of flow was just "an accounting;"[555] however, in his expert report he concluded that "developing either SNWA's application amount or the published perennial yield will cause discharge from Pahranagat Valley to become negative once steady state becomes established."[556]

It is undisputed that the WRFS is a highly complex groundwater system. Given these complexities and the fundamental flaws in Dr. Myers' analysis, the State Engineer cannot find, with any amount of certainty, that removing water in upgradient basins will ultimately reduce the availability of water for users in downgradient basins based on a simple groundwater budget accounting analysis. Therefore, the State Engineer rejects Dr. Myers' WRFS groundwater budget conclusions. Instead, the State Engineer finds that the determination of the amount of water available for appropriation is made on a case by case or, more precisely, a basin by basin basis.[557]

---

[552] Exhibit No. GBWN_004, p. 39.
[553] Exhibit No. SNWA_258, p. 6-18.
[554] Exhibit No. GBWN_004, pp. 38-39.
[555] Transcript, Vol.17 p. 3859:19-24 (Myers).
[556] Exhibit No. GBWN_004, p. 56.
[557] Transcript, Vol.21 p. 4611:14-21 (Myers).

geographical location, and priority date.[587] Second, a quantitative analysis was performed with the Applicant's groundwater model, using the model to identify potential conflicts with existing water rights and sensitive environmental areas.[588] Third, a qualitative site specific analysis of each of the areas of concern identified in the model to assess the potential for conflicts was performed.[589]. Additionally, the Applicant prepared a management plan for Delmar, Dry Lake and Cave Valleys ("DDC Valleys") that included hydrologic monitoring components, management tools, and mitigation options. The Applicant requested that the State Engineer make the Hydrologic Monitoring and Mitigation Plan for Delamar, Dry Lake, and Cave Valleys (the "Management Plan") part of the permit terms for the Applications.[590]

A. **DDC Management Program**

The Project proposed by the Applicant is of a size and scope that requires a comprehensive management plan that will control development of the Applications long after the Applications are permitted. The State Engineer has required such plans to effectively manage other large scale water development projects in Nevada, particularly for the mining industry. The management program in this case is designed to promote sustainable development of the resource while protecting existing rights. The data collected from the plan will allow the State Engineer to make real time assessments of the spread of drawdown within the basin as well as make predictions, using data collected under the monitoring plan, as to the location and magnitude of drawdown in the future under different pumping regimes. The State Engineer finds that in order to determine that the Applications will not conflict with existing rights, a

---

587 Transcript, Vol.11 p. 2541:1-3 (Watrus).
588 Transcript, Vol.11 p. 2541:3-4 (Watrus).
589 Transcript, Vol.11 p. 2541:3-6 (Watrus).
590 Exhibit No. SNWA_148, p.1; Transcript, Vol.8 p. 1795:16-22 (Prieur).

effects on federal resources or injury to federal water rights.[612] If the Executive Committee cannot reach a consensus, a dispute resolution procedure directs such a matter to be forwarded for resolution to the State Engineer or another qualified third party.[613]

The Tribes argue that the Stipulation was executed by the Federal Agencies without proper consultation with the Tribes. The Tribes also argue that the Stipulations should not have been admitted into evidence based on the Tribe's interpretation of language in the Stipulation. The State Engineer finds that the Stipulation is relevant to the consideration of the Applications for the reasons stated above. Whether proper consultation occurred with the Tribes before the Stipulation was executed is a matter between the Tribes and the Federal Agencies and does not require resolution in order to consider the Applications. Whether admission of the Stipulation at these hearings was contrary to terms of the Stipulation is an issue between the parties to that agreement, not the State Engineer, and does not require resolution in order to consider the Applications.

1. Monitoring Plan Requirements

As indicated previously, a monitoring plan for the Applications was finalized to comply with permit terms for the Applications after the Applications were approved in Ruling 5875. That plan was approved by the State Engineer on December 22, 2009.[614] The Applicant submitted an updated monitoring and mitigation plan for this hearing and requested that the State Engineer include compliance with the plan as part of the permit terms.[615] The proposed monitoring and mitigation plan includes all of the elements from the previous plan, and was

---

[612] Transcript, Vol.8 pp. 1802:17-1803:8 (Prieur).
[613] Exhibit No. SE_080, Appendix A, p. 19.
[614] Transcript, Vol.11 p. 2332:6-20 (Prieur); Exhibit No. SNWA_152.
[615] Exhibit No. SNWA_148.

updated to include survey information and construction information obtained since the plan was approved. Additionally, the plan addresses non-federal water rights.[616]

Data collection is a key component of the monitoring plan. Mr. Prieur testified that the purpose of data collection at this time is to provide a baseline characterization of the hydrologic system, including seasonal as well as climatological events, which will be used as background information to assess changes to the system once groundwater production commences.[617] The Applicant is collecting different types of data which include water level measurements in wells completed in the basin fill and carbonate aquifers, surface water discharge measurements from springs and streams, regional precipitation measurements, and water chemistry samples.[618]

The Applicant has established a monitoring network of wells and springs as part of the monitoring plan. Mr. Prieur testified that the Applicant spent well over $10,000,000 to develop the monitoring, test, and exploratory well network.[619] Mr. Prieur testified that the well network provides spatial distribution across the valleys in different hydrologic and geologic settings.[620] The object of the hydrologic monitoring plan was to assess the hydrologic interrelationship between the DDC Valleys and adjacent basins, primarily White River Valley, Pahranagat Valley, and Northern Coyote Spring Valley.[621]

In addition to the monitoring well network, the plan also calls for a test well network. Test wells will provide geologic data and hydrologic aquifer property data.[622] Similar to the monitoring wells, these wells collect water level elevation information that is plotted on a

---

[616] Transcript, Vol.11 pp. 2332:23-2333:8 (Prieur).
[617] Transcript, Vol.8 p. 1840:17-23 (Prieur).
[618] Transcript, Vol.8 p. 1841:1-6 (Prieur).
[619] Transcript, Vol.8 p. 1845:18-22 (Prieur).
[620] Transcript, Vol.11 p. 2334:1-5 (Prieur).
[621] Transcript, Vol.11 p. 2336:3-7 (Prieur).
[622] Transcript, Vol.9 p. 2072:4-12 (Prieur).

hydrograph.[623] Mr. Prieur testified that historical hydrographs can show seasonal recharge impulses at the well site, which can be used to develop different pumping regimes to meet peak water demand.[624] This information can also be used to help manage groundwater production, such as how much water is pumped, when it is pumped, and where it is pumped.[625] Installing the test wells in the Project basins has cost the Applicant over $10,000,000.[626]

The major area of concern is the relationship between Dry Lake and Delamar Valleys and Pahranagat and Coyote Spring Valley. Here, the Applicant has installed one carbonate well at Pahroc summit, 209M-1, located between Dry Lake Valley and Pahranagat Valleys. The Applicant is also monitoring two existing basin fill wells to the east of Hiko Springs in Six Mile Flat and has committed to constructing a carbonate well between the basin fill wells and Hiko Springs.[627] In southern Delamar Valley, the Applicant has constructed two monitoring wells in volcanic material, and has committed to construct an additional monitoring wells further south between Delamar Valley and Pahranagat Valley.[628] Mr. Prieur specifically identified monitoring well 209M-1 as a potential indicator of any flow from Dry Lake and Delamar Valleys to Pahranagat Valley.[629] The Applicant will compare the water elevation in this well, located at Pahroc Summit, with the water elevation in the new carbonate well on the eastside of the Hiko Range and the other basin fill wells in the area to assess the prevailing hydraulic gradient.[630] In addition, water chemistry samples from this well will also be compared against samples from the

---

623 Transcript, Vol.9 p. 2073:18-22 (Prieur).
624 Transcript, Vol.9 pp. 2073:22-2074:8 (Prieur).
625 Transcript, Vol.9 pp. 2075:19-2076:4 (Prieur).
626 Exhibit No. SNWA_147, p. 3-4, Figure 3-1.
627 Transcript, Vol.11 p. 2337:7-12 (Prieur).
628 Transcript, Vol.11 p. 2343:13-20 (Prieur).
629 Transcript, Vol.11 pp. 2342:20-2343:20 (Prieur).
630 Transcript, Vol.11 p. 2343:13-20 (Prieur).

exploratory and test well network. The Applicant spent approximately $78,000 to acquire property, surface and groundwater rights and grazing allotments in the Project area that can be used to supplement or mitigate unreasonable Project impacts.[681] In addition, the Applicant has demonstrated that it has substantial experience with monitoring, management and mitigation, and is aware of the potential costs associated with these projects.[682] The State Engineer finds that the Applicant's financial commitment to monitoring in the DDC Valleys is overwhelming evidence of its financial commitment to the Project as a whole.

Dr. Bredehoeft testified for GBWN and said that mitigation measures will be ineffective. Dr. Bredehoeft asserted that recovery may take a long time at locations a great distance from pumping wells. However, these impacts will be the least in magnitude. Recovery will be quicker and more effective near the wells,[683] where drawdowns are expected to be greatest.

Dr. Bredehoeft believes that reduction of pumping is unrealistic due to a lack of political will to stop or lessen water imports once they are started.[684] These opinions are not based on hydrology. Dr. Bredehoeft testified that reducing or ceasing pumping is a technically feasible way to mitigate impacts of pumping and that stopping pumping would allow the basin to recover.[685] He notes, however, that it may not achieve full recovery and that recovery may take a long time.[686] Dr. Bredehoeft also testified that the Endangered Species Act may effectively force the reduction or cessation of pumping.[687] In addition, the federal stipulations may require the

---

681 Transcript, Vol.10 p. 2397:3-10 (Entsminger).
682 Transcript, Vol.10 pp. 2397:17-2398:8 (Entsminger).
683 Exhibit No. SNWA_428, p. 9; Transcript, Vol.11 pp. 2379:16-23 (Prieur).
684 Exhibit No. GBWN_009, p. 9.
685 Transcript, Vol.24 pp. 5464:22–5465:4 (Bredehoeft).
686 Transcript, Vol.24 pp. 5378:1–17, 5402:9–13 (Bredehoeft).
687 Transcript, Vol.24 p. 5465:13–23 (Bredehoeft).

version used by the Applicant during this hearing is likely a more accurate representation of the hydrogeology of Big Springs.[779]

Dr. Myers suggested that the conflicts analysis should have used the pumping scenarios identified in the DEIS.[780] The DEIS alternative pumping scenarios mainly simulate distributed pumping.[781] The only pumping scenario that simulated pumping at the application points of diversion also included pumping in Snake Valley. The Snake Valley Applications are not before the State Engineer for consideration at this time, and simulated pumping at those points of diversion may influence drawdown simulations from the Spring Valley Applications.[782] The State Engineer finds that at the hearing on the DDC Applications, the only other Application points of diversion that were at issue were in the DDC Valleys. None of the DEIS pumping scenarios analyze just pumping at the DDC Valley Application points of diversion. Accordingly, the State Engineer finds that the Applicant properly constructed a new model run in order to analyze the specific decision that is before the State Engineer at this time.

The Applicant selected a 75 year simulation period beyond full build-out of the project, which occurs in the year 2042. This simulation period was selected based upon the expected lifespan of the project and the reduced certainty in model results for longer simulation periods.[783] Mr. Holmes testified that the Applicant uses a 50 year water planning horizon because it provides a long enough look into the future to assess potential water demand and provides enough lead time to meet that demand.[784] Mr. Holmes further testified that other entities such as

---

779 Transcript, Vol.18 p. 4087:8-12 (Myers).
780 Transcript, Vol.19 pp. 4219:15-4222:10 (Myers); *see* Exhibit No. GBWN_110, p. ES-15.
781 Transcript, Vol.11 pp. 2562:17-2563:12 (Watrus).
782 Transcript, Vol.11 pp. 2562:17-2563:12 (Watrus).
783 Transcript, Vol.11 p. 2559:13-18 (Watrus).
784 Transcript, Vol.2 pp. 307:22-308:5 (Holmes).

Second, as stated above, the model is a regional model that cannot make site-specific predictions. The model cannot currently represent the complex geologic stratification in the DDC Valleys and the WRFS.[788] Therefore, the model represents uniform drawdown in an area that has potentially numerous confined units which would influence and limit potential drawdown.[789] Other limitations include a lack of historical pumping drawdown data to determine how consumptive uses affect the aquifer over time, and a lack of variation in recharge over time to assess how increased or decreased recharge will influence drawdown under different pumping regimes.[790]

The State Engineer understands that the Applicant's model is not a perfect predictor of reality and that there are practical water management considerations that simply cannot be accounted for in the model simulations. The State Engineer finds that these model limitations cause the model to exaggerate pumping impacts and that the conflicts analysis must be viewed in this light.

Given the limitations associated with the model, Mr. Watrus testified that the model should be used to identify areas of concern that require more detailed qualitative analysis and consideration of whether adequate monitoring exists to protect such areas of concern.[791] Mr. Watrus did not consider the model results sufficiently accurate to predict specific drawdowns and specific spring discharges.[792] This opinion is consistent with that of the model's author, Dr. D'Agnese, who testified that analyzing drawdown at specific sites was not an appropriate use of the model. Given all of these limitations of the model, and the model's predictive accuracy, Mr.

---

[788] Transcript, Vol.11 p. 2585:3-12 (Watrus).
[789] Transcript, Vol.11 p. 2585:3-12 (Watrus).
[790] Transcript, Vol.11 pp. 2566:5-9; 2567:24-2568:13 (Watrus).
[791] Transcript, Vol.11 p. 2575:5-17 (Watrus).
[792] Transcript, Vol.11 pp. 2575:5-17 (Watrus).

that would change the limitations of the model that were documented by the authors of the RASA model.

The State Engineer finds that there is no reason to use the RASA model instead of the Applicant's model to make predictions of impacts due to pumping in Cave, Dry Lake, and Delamar Valleys. The RASA model was never intended to be used to make such predictions. It is very coarse and has many limitations, which its original authors and Dr. Myers acknowledge. Indeed, according to Dr. Bredehoeft, one of the Protestant's experts, most observers think that the RASA model was too simplistic and coarse to yield a good estimate of the local impacts.[824] Dr. Bredehoeft appears to place very little confidence in the RASA model due to its lack of a good underlying conceptual model.[825] However, Dr. Myers states that it is appropriate to consider estimates using the RASA model as long as the low precision of those estimates is understood.[826] On the other hand, Dr. D'Agnese opines that the RASA model was never intended to be and should never be used for predictions.[827]

Dr. Myers testified that the RASA model is better than nothing.[828] In this case, the alternative is not nothing, but the Applicant's competent model. Dr. Myers testified that he would not solely rely on the RASA model, but still suggested that it should be one of the tools considered.[829] In the end, however, Dr. Myers stated that he did not disagree with the

---

[824] Exhibit No. GBWN_137, p. 3.
[825] Transcript, Vol.24 pp. 5394:15–17, 5396:19–21, 5420:2–5 (Bredehoeft).
[826] Exhibit No. GBWN_004, p. 43.
[827] Exhibit No. SNWA_405, p. 7; Transcript, Vol.9 pp. 1960:24–1961:7 (D'Agnese).
[828] Transcript, Vol.20 p. 4497:18–20 (Myers).
[829] Transcript, Vol.20 p. 4499:10–12 (Myers).

No. 5
Table of citation errors and corrections for SNWA's
Proposed Dry Lake Valley Ruling

Table of citation errors and corrections for SNWA's Proposed Dry Lake Valley Ruling			
Page	Footnote no.	Current Text	Corrected Text (changes in bold)
99	460	Exhibit No. SNWA_258, p. 6-15	Exhibit No. SNWA_258, p. **6-18**
110	511	Exhibit No. SNWA_258, pp. 5-14; Exhibit No. GBWN_004, pp. 20, 35	Exhibit No. SNWA_258, pp. 5-14; Exhibit No. GBWN_004, pp. **25**, 35
111	513	NRS 533.024(c) (2010).	NRS 533.024**(1)**(c) (2010).
114	532	Exhibit No. GBWN_004, p. 38	Exhibit No. GBWN_004, p. **56**
124	572	Transcript, Vol.11 p. 2540:16-18 (Watrus).	Transcript, Vol.11 p. **2541:1-3**(Watrus).
124	573	Transcript, Vol.11 p. 2540:18-19 (Watrus).	Transcript, Vol.11 p. **2541:3-4** (Watrus).
124	574	Transcript, Vol.11 p. 2540:19-21 (Watrus).	Transcript, Vol.11 p. **2541:3-6** (Watrus).
129	600	Exhibit No. SNWA_149.	Exhibit No. SNWA_**148**.
130	604	Transcript, Vol.8 p. 1841:1-6 (Prieur).	Transcript, Vol.8 p. **1845:18-22** (Prieur).
131	610	Transcript, Vol.9 p. 2075:12-21 (Prieur).	Transcript, Vol.9 pp. **2075:19-2076:4** (Prieur).
141	667	Exhibit No. SNWA_428, p. 9; Transcript, Vol.10 pp. 2397:17-2398:8 (Prieur).	Exhibit No. SNWA_428, p. 9; Transcript, Vol.**11** p. **2379:16-23** (Prieur).
144	681	Transcript, Vol.11 p. 2551:1-7 (Watrus); Exhibit No. SNWA_337, pp. 3-7.	Transcript, Vol.11 p. 2551:1-7 (Watrus); Exhibit No. SNWA_337, **pp. 3-6 to 3-7.**
165	804	Exhibit No. GBWN_173, p. 3.	Exhibit No. GBWN_**137**, p. 3.

No. 6

Corrected pages 99, 110, 111, 114, 124, 129, 130, 131, 141, 144, and 165 of SNWA's Proposed Dry Lake Valley Ruling, containing the correct citations

Dr. Myers appears[457] to urge the State Engineer to adopt the recharge estimate in the Reconnaissance Series report for Dry Lake Valley.[458] This approach is inconsistent with his recharge analysis for Spring Valley. The State Engineer notes that for Spring Valley, Dr. Myers adopted a recharge estimate that was based on an average of estimates from prior investigations.[459] Interestingly, if this approach was applied to Dry Lake Valley, Dr. Myers' recharge estimate would have been much higher than the Reconnaissance Series estimate.[460] Dr. Myers did not document the reason for deviating from this approach or his criteria for selecting the Reconnaissance Series estimate over other estimates. As mentioned above, there are improvements in the modem precipitation data over the data that were available at the time of the Reconnaissance Series investigations. In addition, there have been dramatic advancements in the computing power and spatial-analysis techniques which now lead to more accurate estimates of recharge as opposed to the method applied in the Reconnaissance Series estimates.[461] Because of these scientific advancements, the State Engineer finds that the Reconnaissance Series report does not contain the most current and accurate estimate for recharge in Dry Lake Valley.

With respect to the Applicant's analysis, Dr. Myers questioned whether the Applicant could accurately calculate recharge for individual basins using the PRISM 800-meter precipitation distribution. The Applicant's analysis acknowledged that PRISM generally overestimates precipitation, but that nearly all the PRISM estimates fall within plus or minus ten percent of the station values.[462] However, using the Applicant's method, overestimating

---

[457] The State Engineer notes that Dr. Myers' reports and testimony do not explicitly state his groundwater budget components for Cave, Dry Lake, or Delamar Valleys.
[458] Transcript, Vol.20 p. 4577:2-10 (Myers).
[459] Transcript, Vol.20 p. 4432:8-10 (Myers).
[460] Exhibit No. SNWA_258, p. 6-18.
[461] Transcript, Vol.6 p. 1349:4-9 (Drici).
[462] Exhibit No. SNWA_258, p. B-15.

via interbasin outflow to adjacent basins.[505] In basins such as these, groundwater discharge is difficult to quantify; therefore, the State Engineer traditionally uses precipitation recharge and subsurface inflow as the basis for perennial yield.[506]

Historically, the State Engineer has sometimes set the perennial yield to half the estimated recharge and inflow from other basins. The State Engineer developed this policy to prevent over-appropriation of the flow system due to uncertainties associated with quantifying the amount of interbasin flow that can actually be captured.[507] When setting the perennial yield estimate in a dry basin based on outflow, the State Engineer has taken care to avoid double-appropriation of the water in downgradient basins.[508] In determining the amount of water available for appropriation in basins where outflow from one basin is part of the inflow to another basin, the State Engineer has discounted the amount of water appropriated in the upgradient basin from inflow into the downgradient basin to avoid double accounting and regional over appropriation.[509] However, full appropriation of the perennial yield is permitted if there is evidence showing that existing rights in down gradient basins will not be impacted by groundwater production in the subject basin.[510]

In this case, the parties do not dispute that there is minimal groundwater ET in Dry Lake Valley.[511] The Applicant argues that the State Engineer should depart from the one-half outflow method for Dry Lake Valley. In 1971, Scott et al. estimated that the amount that could be taken from storage with a dewatering of 50 feet was roughly 50% of a basin's outflow and provided

---

505 State Engineer's Ruling 5986, p. 5.
506 State Engineer's Ruling 5986, p. 5.
507 State Engineer Ruling 5986, p. 5.
508 State Engineer Ruling 5465, p. 39 (Jan. 4, 2005).
509 State Engineer Ruling 5712, p. 14 (Feb. 2, 2007).
510 *See* NRS 533.370(5) (2010).
511 Exhibit No. SNWA_258, pp. 5-14; Exhibit No. GBWN_004, pp. 25, 35.

estimates of the transitional storage reserve for Nevada basins based on an average dewatering of 30 to 40 feet.[512] This method was a reconnaissance-level tool to estimate perennial yield when little information was available. The method should not be adhered to when more information is available, as is the case presently. Thus, the assumptions underlying Scott et al.'s conclusion that the perennial yield in dry basins may be set to 50% of the outflow are not applicable in this case. The Legislature has encouraged the State Engineer to "consider the best available science in rendering decisions concerning the available surface and underground sources of water in Nevada."[513] Thus, historical estimates of and methods for determining perennial yield should be rejected when the best available science dictates.

K. <u>"One River" Argument</u>

The Protestants have often argued that groundwater flow in the WRFS should be considered "one river." The "one river" argument analogizes the WRFS to a surface water river where diversion of water upstream results in less total water in the river for downstream water users. Dr. Myers' groundwater water budget accounting for the basins within the WRFS treats the system in this manner.[514] The State Engineer finds numerous sources of error in this analysis.

First, from a conceptual standpoint, the WRFS cannot be characterized as a river for the purpose of determining the potential availability of water in downgradient or upgradient basins. On this point, the Applicant admitted a USGS report authored by Ralph Heath, which addressed misconceptions about groundwater movement.[515] Mr. Heath states, in relevant, part that

---

[512] Exhibit No. SNWA_300, p. 13.
[513] NRS 533.024(1)(c) (2010).
[514] Exhibit No. GBWN_004, pp. 35, 38.
[515] Exhibit No. SNWA_283.

simply reduced the outflow estimates for the basins in the WRFS without accounting for potential capture of groundwater discharge.[526]

With respect to interbasin flow, Dr. Myers treats each basin as a single cell, with a set amount of recharge, discharge, and boundary flow. Dr. Myers provides no analysis of any of these components within the individual basins, which is a clear source of error given the complexities of the system.[527] In addition, Dr. Myers' analysis appears to cause a reversal of outflow for some basins, such as Pahranagat Valley, by reporting the interbasin flow as a negative value.[528] This effect is exaggerated due to the fact that Dr. Myers selected the Reconnaissance recharge estimates, which are some of the lowest reported estimates for Dry Lake and Delamar Valleys,[529] and then assumed that the Applicant would develop the full Application volumes as opposed to the unappropriated perennial yield.[530] With respect to this analysis, Dr. Myers indicated that the apparent reversal of flow was just "an accounting;"[531] however, in his expert report he concluded that "developing either SNWA's application amount or the published perennial yield will cause discharge from Pahranagat Valley to become negative once steady state becomes established."[532]

It is undisputed that the WRFS is a highly complex groundwater system. Given these complexities and the fundamental flaws in Dr. Myers' analysis, the State Engineer cannot find, with any amount of certainty, that removing water in upgradient basins will ultimately reduce the availability of water for users in downgradient basins based on a simple groundwater budget

---

526 Exhibit No. GBWN_004, p. 39.
527 Exhibit No. GBWN_004, p. 39.
528 Exhibit No. GBWN_004, p. 39.
529 Exhibit No. SNWA_258, p. 6-18.
530 Exhibit No. GBWN_004, pp. 38-39.
531 Transcript, Vol.17 p. 3859:19-24 (Myers).
532 Exhibit No. GBWN_004, p. 56.

analysis was performed, which assessed potential conflicts based on water right ownership, geographical location, and priority date.[572] Second, a quantitative analysis was performed with the Applicant's groundwater model, using the model to identify potential conflicts with existing water rights and sensitive environmental areas.[573] Third, a qualitative site specific analysis of each of the areas of concern identified in the model to assess the potential for conflicts was performed.[574]. Additionally, the Applicant prepared a management plan for Delmar, Dry Lake and Cave Valleys ("DDC Valleys") that included hydrologic monitoring components, management tools, and mitigation options. The Applicant requested that the State Engineer make the Hydrologic Monitoring and Mitigation Plan for Delamar, Dry Lake, and Cave Valleys (the "Management Plan") part of the permit terms for the Applications.[575]

A. DDC Management Program

The Project proposed by the Applicant is of a size and scope that requires a comprehensive management plan that will control development of the Applications long after the Applications are permitted. The State Engineer has required such plans to effectively manage other large scale water development projects in Nevada, particularly for the mining industry. The management program in this case is designed to promote sustainable development of the resource while protecting existing rights. The data collected from the plan will allow the State Engineer to make real time assessments of the spread of drawdown within the basin as well as make predictions, using data collected under the monitoring plan, as to the location and magnitude of drawdown in the future under different pumping regimes. The State Engineer

---

[572] Transcript, Vol.11 p. 2541:1-3 (Watrus).
[573] Transcript, Vol.11 p. 2541:3-4 (Watrus).
[574] Transcript, Vol.11 p. 2541:3-6 (Watrus).
[575] Exhibit No. SNWA_148, p.1; Transcript, Vol.8 p. 1795:16-22 (Prieur).

cannot reach a consensus, a dispute resolution procedure directs such a matter to be forwarded for resolution to the State Engineer or another qualified third party.[598]

The Tribes argue that the Stipulation was executed by the Federal Agencies without proper consultation with the Tribes. The Tribes also argue that the Stipulations should not have been admitted into evidence based on the Tribe's interpretation of language in the Stipulation. The State Engineer finds that the Stipulation is relevant to the consideration of the Applications for the reasons stated above. Whether proper consultation occurred with the Tribes before the Stipulation was executed is a matter between the Tribes and the Federal Agencies and does not require resolution in order to consider these Applications. Whether admission of the Stipulation at these hearings was contrary to terms of the Stipulation is an issue between the parties to that agreement, not the State Engineer, and does not require resolution in order to consider these Applications.

1. **Monitoring Plan Requirements**

As indicated previously a monitoring plan for the Applications was finalized to comply with permit terms for the Applications after the Applications were approved in Ruling 5875. That plan was approved by the State Engineer on December 22, 2009.[599] The Applicant submitted an updated monitoring and mitigation plan for this hearing and requested that the State Engineer include compliance with the plan as part of the permit terms.[600] The proposed monitoring and mitigation plan includes all of the elements from the previous plan, and was

---

[598] Exhibit No. SE_080.
[599] Transcript, Vol.8 p. 2332:6-20 (Prieur); Exhibit No. SNWA_152.
[600] Exhibit No. SNWA_148.

updated to include survey information and construction information obtained since the plan was approved. Additionally, the plan addresses non-federal water rights.[601]

Data collection is a key component of the monitoring plan. Mr. Prieur testified that the purpose of data collection at this time is to provide a baseline characterization of the hydrologic system, including seasonal as well as climatological events, which will be used as background information to assess changes to the system once groundwater production commences.[602] The Applicant is collecting different types of data which include water level measurements in wells completed in the basin fill and carbonate aquifers, surface water discharge measurements from springs and streams, regional precipitation measurements, and water chemistry samples.[603]

The Applicant has established a monitoring network of wells and springs as part of the monitoring plan. Mr. Prieur testified that the Applicant spent well over $10,000,000 to develop the monitoring, test, and exploratory well network.[604] Mr. Prieur testified that the well network provides spatial distribution across the valleys in different hydrologic and geologic settings.[605] The object of the hydrologic monitoring plan was to assess the hydrologic interrelationship between the DDC Valleys and adjacent basins, primarily White River Valley, Pahranagat Valley, and Northern Coyote Spring Valley.[606]

In addition to the monitoring well network, the plan also calls for a test well network. Test wells will provide geologic data and hydrologic aquifer property data.[607] Similar to the monitoring wells, these wells collect water level elevation information that is plotted on a

---

[601] Transcript, Vol.11 pp. 2332:23-2333:8 (Prieur).
[602] Transcript, Vol.8 p. 1840:17-23 (Prieur).
[603] Transcript, Vol.8 p. 1841:1-6 (Prieur).
[604] Transcript, Vol.8 p. 1845:18-22 (Prieur).
[605] Transcript, Vol.11 p. 2334:1-5 (Prieur).
[606] Transcript, Vol.11 p. 2336:3-7 (Prieur).
[607] Transcript, Vol.9 p. 2072:4-12 (Prieur).

hydrograph.[608] Mr. Prieur testified that historical hydrographs can show seasonal recharge impulses at the well site, which can be used to develop different pumping regimes to meet peak water demand.[609] This information can also be used to help manage groundwater production, such as how much water is pumped, when it is pumped, and where it is pumped.[610] Installing the test wells in the Project basins has cost the Applicant over $10,000,000.[611]

The major area of concern is the relationship between Dry Lake and Delamar Valleys and Pahranagat and Coyote Spring Valley. Here, the Applicant has installed one carbonate well at Pahroc summit, 209M-1, located between Dry Lake Valley and Pahranagat Valleys. The Applicant is also monitoring two existing basin fill wells to the east of Hiko Springs in Six Mile Flat and has committed to constructing a carbonate well between the basin fill wells and Hiko Springs.[612] In southern Delamar Valley, the Applicant has constructed two monitoring wells in volcanic material, and has committed to construct additional monitoring wells further south between Delamar Valley and Pahranagat Valley.[613] Mr. Prieur specifically identified monitoring well 209M-1 as a potential indicator of any flow from Dry Lake and Delamar Valleys to Pahranagat Valley.[614] The Applicant will compare the water elevation in this well, located at Pahroc Summit, with the water elevation in the new carbonate well on the eastside of the Hiko Range and the other basin fill wells in the area to assess the prevailing hydraulic gradient.[615] In addition, water chemistry samples from this well will also be compared against samples from the

---

[608] Transcript, Vol.9 p. 2073:18-22 (Prieur).
[609] Transcript, Vol.9 pp. 2073:22-2074:8 (Prieur).
[610] Transcript, Vol.9 p. 2075:19-2076:4 (Prieur).
[611] Exhibit No. SNWA_147, p. 3-4, Figure 3-1.
[612] Transcript, Vol.11 p. 2337:7-12 (Prieur).
[613] Transcript, Vol.11 p. 2343:13-20 (Prieur).
[614] Transcript, Vol.11 pp. 2342:20-2343:20 (Prieur).
[615] Transcript, Vol.11 p. 2343:13-20 (Prieur).

The Applicant has demonstrated a financial commitment to monitoring, management and mitigation if necessary. To summarize, the Applicant spent over $10,000,000 for the monitoring, exploratory and test well network. The Applicant spent approximately $78,000,000 to acquire property, surface and groundwater rights and grazing allotments in the Project area that can be used to supplement or mitigate unreasonable project impacts.[665] In addition, the Applicant has demonstrated that it has substantial experience with monitoring, management and mitigation, and is aware of the potential costs associated with these projects.[666] The State Engineer finds that the Applicant's financial commitment to monitoring in the DDC Valleys is overwhelming evidence of its financial commitment to the Project as a whole.

Dr. Bredehoeft testified for GBWN and said that mitigation measures will be ineffective. Dr. Bredehoeft asserted that recovery may take a long time at locations a great distance from pumping wells. However, these impacts will be the least in magnitude. Recovery will be quicker and more effective near the wells,[667] where drawdowns are expected to be greatest.

Dr. Bredehoeft believes that reduction of pumping is unrealistic due to a lack of political will to stop or lessen water imports once they are started.[668] These opinions are not based on hydrology. Dr. Bredehoeft testified that reducing or ceasing pumping is a technically feasible way to mitigate impacts of pumping and that stopping pumping would allow the basin to recover.[669] He notes, however, that it may not achieve full recovery and that recovery may take a long time.[670] Dr. Bredehoeft also testified that the Endangered Species Act may effectively force

---

[665] Transcript, Vol.10 p. 2397:3-10 (Entsminger).
[666] Transcript, Vol.10 pp. 2397:17-2398:8 (Entsminger).
[667] Exhibit No. SNWA_428, p. 9; Transcript, Vol.11 pp. 2379:16-23 (Prieur).
[668] Exhibit No. GBWN_009, p. 9.
[669] Transcript, Vol.24 pp. 5464:22–5465:4 (Bredehoeft).
[670] Transcript, Vol.24 p. 5378:1–17, 5402:9–13 (Bredehoeft).

were included in this analysis.[680] The location of the environmental areas of interest were provided by Mr. Marshall and Ms. Luptowitz and further explained in the "Environmental Soundness" section of this ruling.[681] Mr. Watrus testified that he analyzed all of the identified water rights and environmental areas of interest in his conflicts analysis.[682] Protestants have not challenged this assertion. The State Engineer finds that Mr. Watrus performed a comprehensive review of the existing water rights and environmental areas of interest potentially impacted by groundwater development.

With this information, Mr. Watrus followed three steps in his analysis. First, he conducted a qualitative analysis, which assessed potential conflicts based on water right ownership, geographical location, and priority date.[683] Second, he conducted a quantitative analysis with the Applicant's groundwater model, using the model to identify potential conflicts with existing water rights and sensitive environmental areas.[684] Third, he completed a qualitative site specific analysis of each of the areas of concern identified in the model to assess the potential for conflicts.[685]

1. Initial Qualitative Analysis

The first step in the conflicts analysis was to identify the existing water rights that would not be in hydrologic or legal conflict with the Application points of diversion. Water rights that were owned by the Applicant were excluded from further analysis.[686] Water rights that were junior in priority to the Applications were excluded from further analysis since Nevada follows

---

680 Transcript, Vol.11 p. 2551:8-13 (Watrus).
681 Transcript, Vol.11 p. 2551:1-7 (Watrus); Exhibit No. SNWA_337, pp. 3-6 to 3-7.
682 Transcript, Vol.11 pp. 2552:11-2555:3 (Watrus).
683 Transcript, Vol.11 p. 2541:1-3 (Watrus).
684 Transcript, Vol.11 p. 2541:3-5 (Watrus).
685 Transcript, Vol.11 p. 2541:5-6 (Watrus).
686 Transcript, Vol.11 p. 2574:2-8 (Watrus).

techniques to update the model parameters.[803] Myers made no adjustments to the RASA model that would change the limitations of the model that were documented by the authors of the RASA model.

The State Engineer finds that there is no reason to use the RASA model instead of the Applicant's model to make predictions of impacts due to pumping in Cave, Dry Lake, and Delamar Valleys. The RASA model was never intended to be used to make such predictions. It is very coarse and has many limitations, which its original authors and Dr. Myers acknowledge. Indeed, according to Dr. Bredehoeft, one of the Protestant's experts, most observers think that the RASA model was too simplistic and coarse to yield a good estimate of the local impacts.[804] Dr. Bredehoeft appears to place very little confidence in the RASA model due to its lack of a good underlying conceptual model.[805] However, Dr. Myers states that it is appropriate to consider estimates using the RASA model as long as the low precision of those estimates is understood.[806] On the other hand, Dr. D'Agnese opines that the RASA model was never intended to be and should never be used for predictions.[807]

Dr. Myers testified that the RASA model is better than nothing.[808] In this case, the alternative is not nothing, but the Applicant's competent model. Dr. Myers testified that he would not solely rely on the RASA model, but still suggested that it should be one of the tools considered.[809] In the end, however, Dr. Myers stated that he did not disagree with the

---

803 Exhibit No. GBWN_002, p. 2; GBWN_004, p. 43; Transcript, Vol.20 pp. 4505:9–4507:15 (Myers).
804 Exhibit No. GBWN_137, p. 3.
805 Transcript, Vol.24 pp. 5394:15–17, 5396:19–21, 5420:2–5 (Bredehoeft).
806 Exhibit No. GBWN_004, p. 43.
807 Exhibit No. SNWA_405, p. 7; Transcript, Vol.9 pp. 1960:24–1961:7 (D'Agnese).
808 Transcript, Vol.20 p. 4497:18–20 (Myers).
809 Transcript, Vol.20 p. 4499:10–12 (Myers).

No. 7

Table of citation errors and corrections for SNWA's Proposed Cave Valley Ruling

Table of citation errors and corrections for SNWA's Proposed Cave Valley Ruling

Page	Footnote no.	Current Text	Corrected Text (changes in bold)
104	480	Exhibit SNWA_058, Section 4.4.1.10 and Figure 4-13	Exhibit SNWA_058, **pp. 4-47 to 4-50**, Section **4.4.10** and Figure 4-13
104	481	Exhibit No. SNWA_077, p. iii; Transcript, Vol.5 pp. 1017:3–25, 1045:1523 (Thomas).	Exhibit No. SNWA_077, p. iii; Transcript, Vol.5 pp. 1017:3–25, 1045:**15-23** (Thomas).
104	482	Transcript, Vol.5 pp. 1066:11–1067: 1 (Thomas).	Transcript, Vol.5 p. **1066:10-25** (Thomas).
104	483	Transcript, Vol.5 pp. 1017:12, 1044:12–25, 1082:6–16 (Thomas); Transcript, Vol.20 pp. 4539:21-1:1 (Myers).	Transcript, Vol.5 pp. 1017:12, 1044:12–25, 1082:6–16 (Thomas); Transcript, Vol.20 pp. 4539:21-**4541:1** (Myers).
106	492	Exhibit No. SNWA_258, Plate 2; Transcript, Vol.7 p. 619-1597:13 (Burns).	Exhibit No. SNWA_258, Plate 2; Transcript, Vol.7 p. **1596:19-1597:16** (Burns).
108	503	NRS 533.024(c)	NRS 533.024**(1)**(c)
115	527	NRS 533.024(c) (2010).	NRS 533.024**(1)**(c) (2010).
119	547	Exhibit No. GBWN_004, p. 38.	Exhibit No. GBWN_004, p. **56.**
126	577	Exhibit No. SNWA_097, p. 2-12, Table 2-4; Exhibit No. SNWA_460, Cave Valley, p. 1, Table 1	Exhibit No. SNWA_097, p. 2-12, Table 2-4; Exhibit No. SNWA_460, Cave Valley,**pp. 1 and 3**
128	584	Transcript, Vol.11 p. 2540:16-18 (Watrus)	Transcript, Vol.11 p. **2541:1-3** (Watrus)
128	585	Transcript, Vol.11 p. 2540:18-19 (Watrus)	Transcript, Vol.11 p. **2541:3-4** (Watrus)
128	586	Transcript, Vol.11 p. 2540:19-21 (Watrus)	Transcript, Vol.11 p. **2541:3-6** (Watrus)
133	611	Exhibit No. State Engineer_041, Exhibit A, p. 14, § II(2).	Exhibit No. **SE_080, Appendix A, p. 19.**
134	613	Exhibit No. SNWA_149.	Exhibit No. SNWA_**148.**
134	617	Transcript, Vol.8 p. 1841:1-6 (Prieur).	Transcript, Vol.8 p. **1845:18-22** (Prieur).
136	632	Transcript, Vol.11 p. 124-2352:5 (Oct. 10, 2011).	Transcript, Vol.11 p. **2351:20**-2352:5 (**Prieur**).
146	685	Exhibit No. SNWA_428, p. 9; Transcript, Vol.10 pp. 2397:17-2398:8 (Prieur)	Exhibit No. SNWA_428, p. 9; Transcript, Vol.**11 p. 2379:16-23** (Prieur)
161	786	Transcript, Vol.11 p. 2555:13-25 (Watrus).	Transcript, Vol.11 p. **2550:4-25** (Watrus).
161	788	Exhibit No. GBWN_110, **p. 15.**	**Transcript, Vol.19 pp. 4219:15-4222:10 (Myers); see** Exhibit No. GBWN_110, p. **ES-**15.
171	834	Exhibit No. GBWN_173, p. 3	Exhibit No. GBWN_**137**, p. 3

No. 8

Corrected pages 104, 106, 108, 115, 119, 126, 128, 133, 134, 136, 146, 161, and 171 of SNWA's Proposed Cave Valley Ruling, containing the correct citations

Valley and joining the western down-to-the-west, range-front normal fault of the Schell Creek Range[476]. This second fault serves to separate the northern Cave Valley sub-basin from the southern Cave Valley sub-basin because the footwall (southern) side of the fault reaches almost entirely across Cave Valley.[477] The Shingle Pass fault provides a permissible outlet for some groundwater to pass from northern Cave Valley southwestward into White River Valley. But all the groundwater in northern Cave Valley will not pass through Shingle Pass (with an elevation of somewhat less than 7,000 feet),[478] because an easier and lower-elevation conduit exists in the large north-trending, range-front fault[479] that bounds the base of the entire western side of the Schell Creek Range at an elevation of less than 6,500 feet elevation.[480]

Dr. Thomas testified that the isotopic data show that little if any groundwater from Cave Valley flows to the warm springs in White River Valley.[481] He testified, however, that some Cave Valley recharge flows to the cool, range-front springs in White River Valley that includes Butterfield and Flag Springs.[482] The Southern Egan Range separates White River Valley and Cave Valley. Thus, the two valleys share the Southern Egan Range as a recharge area. Isotopic data cannot determine how much of the Southern Egan Range recharge discharging at the cool springs comes from White River Valley and how much comes from Cave Valley.[483]

Dr. Myers estimated that all of the recharge in Cave Valley occurs in the northern portion of the valley, and discharges as either groundwater ET (1,200 afa) or as interbasin flow through

---

[476] Exhibit SNWA_058, p. Page 6-8
[477] Exhibit SNWA_058, p. Page 6-8
[478] Exhibit SNWA_058, p. Page 6-8
[479] Exhibit SNWA_058, Plates 4 and 8, Cross Section R—R'
[480] Exhibit SNWA_058, pp. 4-47 to 4-50, Section 4.4.10 and Figure 4-13
[481] Exhibit No. SNWA_077, p. iii; Transcript, Vol.5 pp. 1017:3–25, 1045:15-23 (Thomas).
[482] Transcript, Vol.5 pp. 1066:10–25 (Thomas).
[483] Transcript, Vol.5 pp. 1017:12, 1044:12–25, 1082:6–16 (Thomas); Transcript, Vol.20 pp. 4539:21-4541:1 (Myers).

Pass.[490] However, in Dry Lake Valley, there are carbonate wells, Map ID's 181-6 and 181-25, which show a gradient to the south when compared to the southernmost carbonate well in Cave Valley, Map ID 180-34.[491] Adding to this issue, the water levels in the basin-fill wells in the southern portion of Cave Valley are highly variable.[492] While the prevailing gradient in the carbonate and basin fill aquifers in Cave Valley is for the most part still uncertain, the distinct gradient from north to south in the basin-fill wells directly east of Shingle Pass strongly suggests that a portion of the recharge in northern Cave Valley flows to southern Cave Valley.

Based on the geologic, hydrologic, and geochemical evidence, it is clear that not all of the recharge in Cave Valley exits that valley into White River Valley. The Applicant approximated Shingle Pass outflow "(1) by equating it to the downgradient spring discharge minus the recharge from contributing watersheds in the White River Valley, and (2) by estimating the volume of recharge contributing to the flow based on the potential recharge distribution in Cave Valley and the hydrogeologic framework affecting its movement."[493] For the first method, the Applicant calculated the annual discharge at these spring complexes using gauging stations maintained by both the Applicant and the USGS.[494] The total discharge at the springs was estimated to be 7,300 afa.[495] This volume of water was reduced by the annual recharge calculated for the contributing watershed in White River Valley which was estimated to be 3,500 afa.[496] The

---

[490] Exhibit No. SNWA_258, Plate 2.
[491] Exhibit No. SNWA_258, Plate 2.
[492] Exhibit No. SNWA_258, Plate 2; Transcript, Vol.7 p. 1596:19-1597:16 (Burns).
[493] Exhibit No. SNWA_258, p. 7-10.
[494] Transcript, Vol.7 p. 1439:5-8 (Burns).
[495] Exhibit No. SNWA_258, p. 7-10.
[496] Exhibit No. SNWA_258, p. 7-10.

River Valley and an underestimate of the potential recharge in the Cave Valley contributing watershed. However, these issues were addressed by the additional analysis by the Applicant at this hearing, and the Applicant's analysis was not contested by any of the Protestants in this hearing. The State Engineer is directed by Nevada law to consider the best available science in determining the available water in Cave Valley.[503] The scientific approach that the Applicant used to measure interbasin flow at this area represents the best available science and addresses concerns of the State Engineer at the prior hearing. The State Engineer has found that the Applicant's method for estimating recharge is fundamentally sound. Since the analysis conducted by the Applicant is based primarily on the Applicant's recharge analysis, the State Engineer finds that the Applicant's estimate of interbasin flow is fundamentally sound.

Accordingly, the State Engineer finds the Applicant's allocation of interbasin flow from Cave Valley persuasive. The Applicant's analysis of interbasin flow to White River Valley through Shingle Pass is based on the geologic fault structure in northern Cave Valley and the distribution of recharge in White River Valley and Cave Valley derived from the groundwater balance approach using the Excel Solver. The State Engineer finds the Excel Solver method is scientifically sound for the purpose of assessing recharge. Therefore, the State Engineer finds that persuasive evidence supports the conclusion that 3,800 afa of interbasin outflow occurs at the Shingle Pass area. The remaining interbasin outflow, 8,600 afa, discharges from Cave Valley in the southern portion of the basin. This interbasin outflow was derived by subtracting 3,800 afa that discharges as interbasin flow through Shingle Pass and 1,300 afa that discharges as groundwater ET in northern Cave Valley from the estimated total recharge of 13,700 afa.

---

[503] NRS 533.024(1)(c).

estimates of the transitional storage reserve for Nevada basins based on an average dewatering of 30 to 40 feet.[526] This method was a reconnaissance-level tool to estimate perennial yield when little information was available. The method should not be adhered to when more information is available, as is the case presently. Thus, the assumptions underlying Scott et al.'s conclusion that the perennial yield in dry basins may be set to 50% of the outflow are not applicable in this case. The Legislature has encouraged the State Engineer to "consider the best available science in rendering decisions concerning the available surface and underground sources of water in Nevada."[527] Thus, historical estimates of and methods for determining perennial yield should be rejected when the best available science dictates. Therefore, the State Engineer finds that the majority of groundwater discharge in Cave Valley occurs through subsurface outflow and that the recharge estimate for Cave Valley should be used as the basis for perennial yield, subject to the amount of outflow, as determined above, that is needed to satisfy existing rights in down gradient basins.[528] This avoids double-counting because the amount available for appropriation within a basin is based on the amount of recharge occurring within that basin without including inflow from upgradient basins.

I. <u>"One River" Argument</u>

The Protestants have often argued that groundwater flow in the WRFS should be considered "one river." The "one river" argument analogizes the WRFS to a river where diversion of water upstream results in less total water in the river for downstream water users.

---

[526] Exhibit No. SNWA_300, p. 13.
[527] NRS 533.024(1)(c) (2010).
[528] NRS 533.370(5) (2010).

or the published perennial yield will cause discharge from Pahranagat Valley to become negative once steady state becomes established."[547]

It is undisputed that the WRFS is a highly complex groundwater system. Given these complexities and the fundamental flaws in Dr. Myers' analysis, the State Engineer cannot find, with any amount of certainty, that removing water in upgradient basins will ultimately reduce the availability of water for users in downgradient basins based on a simple groundwater budget accounting analysis. Therefore, the State Engineer rejects Dr. Myers' WRFS groundwater budget conclusions. Instead, the State Engineer finds that the determination of the amount of water available for appropriation is made on a case by case or, more precisely, a basin by basin basis.[548]

IV. EXISTING RIGHTS

To determine the amount of water available for appropriation in a groundwater basin, the State Engineer must determine the amount of committed groundwater rights in the basin.[549] Committed groundwater rights are the portion of groundwater rights that actually deplete water from the groundwater reservoir. The Applicant undertook a complete and comprehensive evaluation of committed groundwater rights in Cave Valley. The Applicant's evaluation was presented through exhibits and the testimony of expert water rights surveyor, Michael Stanka of Stanka Consulting, LTD.[550] Mr. Stanka presented an expert report which quantified the total amount of committed groundwater rights in Cave Valley.[551] Mr. Stanka's report identified every

---

[547] Exhibit No. GBWN_004, p. 56.
[548] Transcript, Vol.21 p. 4611:14-21 (Myers).
[549] NRS 533.370(5) (2010); NRS 534.110(3).
[550] Mr. Stanka holds professional engineering licenses in Nevada and Florida and is a water rights surveyor in the State of Nevada. He was qualified by the State Engineer as an expert in water rights research and quantification. Exhibit No. SNWA_096; Transcript, Vol.2 p. 420:19-21 (Qualification of Mr. Stanka).
[551] Exhibit No. SNWA_097.

50 afa of committed groundwater rights.[577] Therefore, the difference is only 1.37 afa which was primarily due to differences in the analyses of domestic well use. The fact that two analyses were prepared independently but arrived at nearly the same results provides strong evidence of the reliability of those results. The Protestants did not present an alternative methodology for estimating domestic well consumptive uses. As a result of the evidence and detailed explanations submitted at this hearing, the State Engineer has elected to apply the methodology utilized by Mr. Stanka for domestic wells.

The State Engineer's basin inventory was a reasonable estimate of the water rights in Cave Valley. However, the State Engineer finds that Mr. Stanka's analysis provides additional evidence and supporting analysis regarding the committed groundwater rights in Cave Valley. The Protestants did not present any evidence quantifying the committed groundwater rights in Cave Valley. The State Engineer finds that the methodology used by Mr. Stanka is reasoned, thorough, documented, and transparent and the State Engineer will use the results of Mr. Stanka's analysis to determine the amount of groundwater available for appropriation in Cave Valley.

G. Application to Junior Rights

The Nevada water rights appropriation system is based on the principle of first in time, first in right. Applications to appropriate water are given priority based on the date they are filed with the State Engineer.[578] When an application is approved and permit issued, the priority date of the permit is the date the application was filed. If water is appropriated pursuant to the permit terms, the State Engineer will issue a certificate with the same priority date as the underlying

---

[577] Exhibit No. SNWA_097, p. 2-12, Table 2-4; Exhibit No. SNWA_460, Cave Valley, pp. 1 and 3.
[578] NRS 534.080(3) ("[T]he date of priority of all appropriations of water from an underground source . . . is the date when application is made in proper form and filed in the Office of the State Engineer").

V. IMPACTS TO EXISTING RIGHTS

When considering new applications to appropriate water, the Nevada State Engineer must deny the applications if development of the new applications will conflict with existing water rights or with protectable interests in existing domestic wells.[582] To address this requirement, the Applicant prepared an expert report describing a three part analysis. [583] First, a qualitative analysis was performed, which assessed potential conflicts based on water right ownership, geographical location, and priority date.[584] Second, a quantitative analysis was performed with the Applicant's groundwater model, using the model to identify potential conflicts with existing water rights and sensitive environmental areas.[585] Third, a qualitative site specific analysis of each of the areas of concern identified in the model to assess the potential for conflicts was performed.[586] Additionally, the Applicant prepared a management plan for Delmar, Dry Lake and Cave Valleys ("DDC Valleys") that included hydrologic monitoring components, management tools, and mitigation options. The Applicant requested that the State Engineer make the Hydrologic Monitoring and Mitigation Plan for Delamar, Dry Lake, and Cave Valleys (the "Management Plan") part of the permit terms for the Applications.[587]

A. <u>DDC Management Program</u>

The Project proposed by the Applicant is of a size and scope that requires a comprehensive management plan that will control development of the Applications long after the Applications are permitted. The State Engineer has required such plans to effectively manage

---

[582] NRS 533.370(5) (2010).
[583] Exhibit No. SNWA_337, p. 1-1, 3.
[584] Transcript, Vol.11 p. 2541:1-3 (Watrus).
[585] Transcript, Vol.11 p. 2541:3-4 (Watrus).
[586] Transcript, Vol.11 p. 2541:3-6 (Watrus).
[587] Exhibit No. SNWA_148, p.1; Transcript, Vol.8 p. 1795:16-22 (Prieur).

monitoring plan network.[608] The Applicant's representatives regularly meet with the TRP and the BRT to discuss ways to best utilize each group's data and to discuss any additional hydrologic data that may be needed under the plan.[609]

The Executive Committee reviews TRP recommendations pertaining to technical and mitigation actions. The Executive Committee also resolves disputes in the event the TRP cannot reach a consensus on monitoring requirements, research needs, technical aspects of study design, interpretation of results or appropriate actions to minimize or mitigate unreasonable adverse effects on federal resources or injury to federal water rights.[610] If the Executive Committee cannot reach a consensus, a dispute resolution procedure directs such a matter to be forwarded for resolution to the State Engineer or another qualified third party.[611]

The Tribes argue that the Stipulation was executed by the Federal Agencies without proper consultation with the Tribes. The Tribes also argue that the Stipulations should not have been admitted into evidence based on the Tribe's interpretation of language in the Stipulation. The State Engineer finds that the Stipulation is relevant to the consideration of the Applications for the reasons stated above. Whether proper consultation occurred with the Tribes before the Stipulation was executed is a matter between the Tribes and the Federal Agencies and does not require resolution in order to consider the Applications. Whether admission of the Stipulation at these hearings was contrary to terms of the Stipulation is an issue between the parties to that agreement, not the State Engineer, and does not require resolution in order to consider the Applications.

---

[608] Transcript, Vol.8 p. 1837:12-17 (Prieur).
[609] Transcript, Vol.8 p. 1837:18-21 (Prieur).
[610] Transcript, Vol.8 pp. 1802:17-1803:8 (Prieur).
[611] Exhibit No. SE_080, Appendix A, p. 19.

1. Monitoring Plan Requirements

As indicated previously a monitoring plan for the Applications was finalized to comply with permit terms for the Applications after the Applications were approved in Ruling 5875. That plan was approved by the State Engineer on December 22, 2009.[612] The Applicant submitted an updated monitoring and mitigation plan for this hearing and requested that the State Engineer include compliance with the plan as part of the permit terms.[613] The proposed monitoring and mitigation plan includes all of the elements from the previous plan, and was updated to include survey information and construction information obtained since the plan was approved. Additionally, the plan addresses non-federal water rights.[614]

Data collection is a key component of the monitoring plan. Mr. Prieur testified that the purpose of data collection at this time is to provide a baseline characterization of the hydrologic system, including seasonal as well as climatological events, which will be used as background information to assess changes to the system once groundwater production commences.[615] The Applicant is collecting different types of data which include water level measurements in wells completed in the basin fill and carbonate aquifers, surface water discharge measurements from springs and streams, regional precipitation measurements, and water chemistry samples.[616]

The Applicant has established a monitoring network of wells and springs as part of the monitoring plan. Mr. Prieur testified that the Applicant spent well over $10,000,000 to develop the monitoring, test, and exploratory well network.[617] Mr. Prieur testified that the well network

---

[612] Transcript, Vol.11 p. 2332:6-20 (Prieur); Exhibit No. SNWA_152.
[613] Exhibit No. SNWA_148.
[614] Transcript, Vol.11 pp. 2332:23-2333:8 (Prieur).
[615] Transcript, Vol.8 pp. 1840:17-23 (Prieur).
[616] Transcript, Vol.8 p. 1841:1-6 (Prieur).
[617] Transcript, Vol.8 p. 1845:18-22 (Prieur).

that provides background monitoring information.[627] The monitoring plan also calls for monitoring of local springs in southern Cave Valley and regional springs in White River Valley.[628]

Well 180W501M is located in the area of Shingle Pass. Mr. Prieur testified that water level information from this well is useful in assessing the hydraulic gradient in the carbonate aquifer. He found that the water elevation of this well can be compared against the water level in the new well on the west side of the Egan Range and the water level elevation of surrounding springs to assess the hydraulic gradient for the purpose of further assessing the potential interbasin flow to White River Valley.[629]

In the southeast section of Cave Valley there is a monitoring and test well configuration for Test Well 180W902M.[630] The monitoring and test well configuration is designed in a triangle with two wells lined up along the fault structure and one well located across the fault zone.[631] The wells were designed to evaluate the variation in hydraulic conductivity along the fault as compared to across the fault.[632] Two constant rate aquifer tests were run at this site, one on the test well and one on the monitoring well located on the fault structure.[633] The test results yield a transmissivity along the fault of 23,600 ft^2 per day as opposed to 9,200 ft^2 per day across the flow structure. Mr. Prieur testified that transmissivity in the fault structure could support

---

[627] Transcript, Vol.11 p. 2336:22-23 (Prieur).
[628] Exhibit No. SNWA_147, p. 3-4, Figure 3-1.
[629] Transcript, Vol.11 p. 2342:6-19 (Prieur).
[630] Transcript, Vol.11 pp. 2350:13-2351:2 (Prieur).
[631] Transcript, Vol.11 p. 2351:23 (Prieur).
[632] Transcript, Vol.11 p. 2351:20-2352:5 (Prieur).
[633] Exhibit No. SNWA_164, p. 2-1; Transcript, Vol.11 p. 2352:62 (Prieur).

Dr. Bredehoeft testified for GBWN and said that mitigation measures will be ineffective. Dr. Bredehoeft asserted that recovery may take a long time at locations a great distance from pumping wells. However, these impacts will be the least in magnitude. Recovery will be quicker and more effective near the wells,[685] where drawdowns are expected to be greatest.

Dr. Bredehoeft believes that reduction of pumping is unrealistic due to a lack of political will to stop or lessen water imports once they are started.[686] These opinions are not based on hydrology. Dr. Bredehoeft testified that reducing or ceasing pumping is a technically feasible way to mitigate impacts of pumping and that stopping pumping would allow the basin to recover.[687] He notes, however, that it may not achieve full recovery and that recovery may take a long time.[688] Dr. Bredehoeft also testified that the Endangered Species Act may effectively force the reduction or cessation of pumping.[689] In addition, the federal stipulations may require the Applicant to reduce pumping.[690] Also, it may be in the Applicant's own interests to reduce or cease pumping in order to prevent extreme drawdown and the associated increased costs of pumping. Mr. Prieur testified that there have been examples where ceasing pumping has been an effective mitigation measure. In particular, pumping impacts were successfully mitigated in northeastern Illinois by ceasing pumping and substituting surface water. Mr. Prieur testified that the hydraulic properties of this aquifer are similar to those found in Nevada.[691]

---

[685] Exhibit No. SNWA_428, p. 9; Transcript, Vol.11 pp. 2379:16-23 (Prieur).
[686] Exhibit No. GBWN_009, p. 9.
[687] Transcript, Vol.24 pp. 5464:22–5465:4 (Bredehoeft).
[688] Transcript, Vol.24 pp. 5378:1–17, 5402:9–13 (Bredehoeft).
[689] Transcript, Vol.24 p. 5465:13–23 (Bredehoeft).
[690] Transcript, Vol.11 pp. 2384:11–2385:3 (Prieur).
[691] Transcript, Vol.11 pp. 2385:4–2389:15 (Prieur).

elevations under pumping stresses.[782] The full volume pumping scenario simulated staged development of the resource based on the projected water demand in the Applicant's 2009 Water Resource Plan.[783] The baseline water level elevations and spring flows were subtracted from the pumping water elevations and spring flows to determine drawdown of the aquifer and changes in spring flow resulting from simulated pumping of the Applications.[784]

The Applicant selected the original version of the DEIS model for the analysis. During the NEPA process, the BLM requested that the Applicant modify the representation of Big Springs (in Snake Valley), which it did for the DEIS.[785] The original version, unlike the modified version of the model, simulated full discharge at Big Springs, which was an area of concern in the model analysis.[786] Dr. Myers testified that the original version used by the Applicant during this hearing is likely a more accurate representation of the hydrogeology of Big Springs.[787]

Dr. Myers suggested that the conflicts analysis should have used the pumping scenarios identified in the DEIS.[788] The DEIS alternative pumping scenarios mainly simulate distributed pumping.[789] The only pumping scenario that simulated pumping at the application points of diversion also included pumping in Snake Valley. The Snake Valley Applications are not before the State Engineer for consideration at this time, and simulated pumping at those points of diversion may influence drawdown simulations from the Spring Valley Applications.[790] The

---

[782] Transcript, Vol.11 p. 2555:4-25 (Watrus).
[783] Exhibit No. SNWA_337, p. 4-3; Transcript, Vol.11 p. 2557:1-9 (Watrus).
[784] Transcript, Vol.11 p. 2555:4-25(Watrus).
[785] Exhibit No. SNWA_090, pp. 3-1 to 3-3.
[786] Transcript, Vol.11 p. 2550:4-25 (Watrus).
[787] Transcript, Vol.18 p. 4087:8–14 (Myers).
[788] Transcript, Vol.19 pp. 4219:15-4222:10 (Myers); *see* Exhibit No. GBWN_110, p. ES-15.
[789] Exhibit No. SNWA_091, pp. 3-1 to 3-22.
[790] Transcript, Vol.11 pp. 2562:17-2563:12 (Watrus).

techniques to update the model parameters.[833] Myers made no adjustments to the RASA model that would change the limitations of the model that were documented by the authors of the RASA model.

The State Engineer finds that there is no reason to use the RASA model instead of the Applicant's model to make predictions of impacts due to pumping in Cave, Dry Lake, and Delamar Valleys. The RASA model was never intended to be used to make such predictions. It is very coarse and has many limitations, which its original authors and Dr. Myers acknowledge. Indeed, according to Dr. Bredehoeft, one of the Protestant's experts, most observers think that the RASA model was too simplistic and coarse to yield a good estimate of the local impacts.[834] Dr. Bredehoeft appears to place very little confidence in the RASA model due to its lack of a good underlying conceptual model.[835] However, Dr. Myers states that it is appropriate to consider estimates using the RASA model as long as the low precision of those estimates is understood.[836] On the other hand, Dr. D'Agnese opines that the RASA model was never intended to be and should never be used for predictions.[837]

Dr. Myers testified that the RASA model is better than nothing.[838] In this case, the alternative is not nothing, but the Applicant's competent model. Dr. Myers testified that he would not solely rely on the RASA model, but still suggested that it should be one of the tools considered.[839] In the end, however, Dr. Myers stated that he did not disagree with the

---

[833] Exhibit No. GBWN_002, p. 2; GBWN_004, p. 43; Transcript, Vol.20 pp. 4505:9–4507:15 (Myers).
[834] Exhibit No. GBWN_137, p. 3.
[835] Transcript, Vol.24 pp. 5394:15–17, 5396:19–21, 5420:2–5 (Bredehoeft).
[836] Exhibit No. GBWN_004, p. 43.
[837] Exhibit No. SNWA_405, p. 7; Transcript, Vol.9 pp. 1960:24–1961:7 (D'Agnese).
[838] Transcript, Vol.20 p. 4497:18–20 (Myers).
[839] Transcript, Vol.20 p. 4499:10–12 (Myers).