

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

IN THE MATTER OF APPLICATIONS 58592, 58593, )  
58594, 64041 AND 67893 FILED TO APPROPRIATE )  
THE UNDERGROUND WATERS OF THE BLACK )  
MOUNTAINS AREA HYDROGRAPHIC BASIN )  
(215), CLARK COUNTY, NEVADA. )

**RULING**  
**#6260**

**GENERAL**

**I.**

Application 58592 was filed on March 9, 1993, by Nevada Cogeneration Associates #1 and Nevada Cogeneration Associates #2 to appropriate 0.274 cubic feet per second (cfs) of groundwater from the Black Mountains Area Hydrographic Basin for industrial cogeneration power plant use. The proposed point of diversion is described as being located within the NE $\frac{1}{4}$  SE $\frac{1}{4}$  of Section 13, T.19S., R.63E., M.D.B.&M. The proposed place of use is described as being located within a portion of the SW $\frac{1}{4}$  NW $\frac{1}{4}$ , NW $\frac{1}{4}$  SW $\frac{1}{4}$  and NE $\frac{1}{4}$  SW $\frac{1}{4}$  of Section 7, T.20S., R.64E., M.D.B.&M., and a portion of the SE $\frac{1}{4}$  NE $\frac{1}{4}$ , SW $\frac{1}{4}$  NE $\frac{1}{4}$  of Section 34, T.18S., R.63E., M.D.B.&M. The remarks section of the application indicates that the annual consumptive use is anticipated to be 1.15 cfs continuous flow, or 1,665 acre-feet annually (afa) under Applications 58592, 58593 and 58594. However, other information in the application file indicates that the total quantity of water applied for under this and related Applications 58593 and 58594 is 200 afa for a total quantity of water under these applications and their existing water right (Permit 55271) for 1,865 afa. Information in the application file indicates that the proposed well under this and related Applications 58593 and 58594 will perforate the carbonate-rock aquifer.<sup>1</sup>

**II.**

Application 58592 was timely protested by the U.S. Department of Interior National Park Service on various grounds summarized as follows:<sup>1</sup>

1. It would not be in the public interest to impair the water and water-related resources of the Lake Mead National Recreation Area.

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<sup>1</sup> File No. 58592, official records in the Office of the State Engineer.

2. The proposed use of the water will eventually reduce or eliminate the flow of springs in the Lake Mead National Recreation Area and the U.S. National Park Service's senior water rights, water resources and water-related attributes would be impaired.
3. The proposed use of the water will impair the U.S. National Park Service's state permitted water right for Roger's Spring.
4. It is unclear how much water is being applied for or would be consumptively used.
5. There is no unappropriated water as committed resources exceed the system yield and not all water accounted for in the perennial yield may be available for appropriation.
6. The effects of this appropriation alone, or when combined with applications by the Las Vegas Valley Water District for groundwater, will impair the senior reserved rights, water resources and water-related attributes of the Lake Mead National Recreation Area.

### III.

Application 58593 was filed on March 9, 1993, by Nevada Cogeneration Associates #1 and Nevada Cogeneration Associates #2 to appropriate 0.274 cfs of groundwater from the Black Mountains Area Hydrographic Basin for industrial cogeneration power plant use. The proposed point of diversion is described as being located within the NE $\frac{1}{4}$  SE $\frac{1}{4}$  of Section 13, T.19S., R.63E., M.D.B.&M. The proposed place of use is the same as described on Application 58592. The remarks are the same as described under Application 58592, except the continuous flow is stated at 2.3 cfs instead of 1.15 cfs.<sup>2</sup>

### IV.

Application 58593 was timely protested by the U.S. Department of Interior National Park Service on the same grounds as Application 58592.<sup>2</sup>

### V.

Application 58594 was filed on March 9, 1993, by Nevada Cogeneration Associates #1 and Nevada Cogeneration Associates #2, to appropriate 0.274 cfs of groundwater from the Black Mountains Area Hydrographic Basin for industrial cogeneration power plant use. The proposed point of diversion is described as being located within the SE $\frac{1}{4}$  SE $\frac{1}{4}$  of Section 13, T.19S., R.63E., M.D.B.&M. The proposed place of use and remarks are the same as described under Application 58592.<sup>3</sup>

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<sup>2</sup> File No. 58593, official records in the Office of the State Engineer.

<sup>3</sup> File No. 58594, official records in the Office of the State Engineer.

## VI.

Application 58594 was timely protested by the U.S. Department of Interior National Park Service on the same grounds as Application 58592.<sup>3</sup>

## VII.

Application 64041 was filed on April 17, 1998, by Dry Lake Water, LLC to appropriate 10.0 cfs of groundwater from the Black Mountains Area Hydrographic Basin for quasi-municipal use. The proposed point of diversion is described as being located within the NE¼ NW¼ of Section 36, T.19S., R.63E., M.D.B.&M. The proposed place of use is described as being located within portions of Sections 32 and 33, T.17S., R.63E., M.D.B.&M., portions of Sections 3, 4, 5, 8, 9, 10, 11, 13, 14, 17, 19, 20, 22, 23, 24, 26, 27, 28, 29, 30, 31, 32, 34 and 35 and all of Sections 18 and 33, T.18S., R.63E., M.D.B.&M., and portions of Sections 2, 3, 4, 5, 6, 7, 8 and 9, T.19S., R.63E., M.D.B.&M. The remarks section of the application indicates that Dry Lake Water, LLC intends to be a distributor of water to commercial and industrial developments within the Apex Industrial Park. Additionally, the remarks section informs that the Applicant has applied for water rights in five basins for 40,000 afa under each application, but is actually requesting a total of 40,000 afa from all six applications and that the Applicant seeks to tap the deep carbonate aquifer.<sup>4</sup>

## VIII.

Application 64041 was timely protested by Nevada Power Company and U.S. Department of Interior National Park Service on various grounds summarized as follows:<sup>4</sup>

1. The total annual duty this application seeks is 7,239 afa. This basin may already be overappropriated and granting 10 cfs from the carbonate aquifer could result in groundwater mining. The public interest is not served by granting the application since it could result in overappropriation from the carbonate-rock aquifer.
2. There is no water available for appropriation because committed resources exceed groundwater recharge.
3. The National Park Service asserts that recharge from precipitation in the Black Mountains Area is estimated at less than 100 afa, inflow is estimated at 1,200 afa from the Las Vegas Valley and discharge from the valley is primarily by subsurface outflow to Lake Mead.

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<sup>4</sup> File No. 64041, official records in the Office of the State Engineer.

4. Committed groundwater resources in the Black Mountains Area are 6,200 afa, which greatly exceeds the recharge rate resulting in withdrawals from storage and groundwater mining.
5. The proposed use will impair the water rights of the United States by reducing the flow of the Muddy River and discharge of Lake Mead National Recreation Area springs.
6. It would not be in the public interest to impair the water and water-related resources of the Lake Mead National Recreation Area.
7. It would threaten to be detrimental to the public interest to approve the application when the Applicant does not control the point of diversion and place of use.

#### IX.

Application 67893 was filed on August 8, 2001, by Dry Lake Water, LLC to appropriate 10.0 cfs of groundwater from the Black Mountains Area Hydrographic Basin for quasi-municipal use. The proposed point of diversion is described as being located within the NE¼ NW¼ of Section 36, T.19S., R.63E., MDB&M. The proposed place of use and remarks are the same as described under Application 64041.<sup>5</sup>

#### X.

Application 67893 was timely protested by Coyote Springs Investment, LLC, Las Vegas Valley Water District, the Moapa Band of Paiute Indians and Nevada Power Company on various grounds summarized as follows:<sup>5</sup>

1. Existing groundwater permits in addition to pending applications would overappropriate the basin, which could potentially injure prior rights and is not in the best interest of the public.
2. The proposed use of the water will conflict with existing rights in Basin 218 and surrounding basins, including those rights held by Coyote Springs Investment, LLC, unquantified senior reserved rights of the Moapa Band of Paiutes to the waters of the Muddy River and groundwater under the Reservation and rights of the U.S. National Park Service and Nevada Power Company. Coyote Springs Investment, LLC has existing permits and pending senior priority applications in Coyote Spring Valley (Basin 210). The granting of this application from the same underground source (carbonate-rock aquifer) would interfere with and adversely affect existing rights.

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<sup>5</sup> File No. 67893, official records in the Office of the State Engineer.

3. The application is duplicative and unnecessary because the Applicant has already secured the water necessary to gain its subdivision approval and the power plants at Apex Industrial Park already have a water supply.
4. The Applicant has not demonstrated the financial capability to develop the water and place it to beneficial use.
5. Granting the application is contrary the approach adopted in State Engineer's Ruling No. 5008, which required gradual, staged development.
6. The application or series of applications contemplates an interbasin transfer which may be unjustified under NRS § 533.370(4) [now NRS § 533.370(3)]. The proposed export of water may be environmentally unsound and impair the Moapa Band of Paiute Indian's ability to put its own water rights to use.

### **FINDINGS OF FACT**

#### **I.**

Nevada Revised Statute (NRS) § 533.365(4) provides that it is within the State Engineer's discretion to determine whether a public administrative hearing is necessary to address the merits of a protest to an application to appropriate the public waters of the state of Nevada. The State Engineer finds that in the case of Applications 58592, 58593, 58594, 64041 and 67893 there is sufficient information contained within the records of the Office of the State Engineer to gain a full understanding of the issues and a hearing on these applications is not required.

#### **II.**

#### **Order 1169 and 1169A**

In 2001, a hearing was held on various applications in Coyote Spring Valley. Following the hearing, the State Engineer issued State Engineer's Order No. 1169 (Order 1169) on March 8, 2002. In that order, the State Engineer addressed what is known as the carbonate-rock aquifers, which are groundwater aquifers that exist underneath a significant portion of eastern and southern Nevada. The carbonate-rock aquifers have long been recognized as a potential water resource, but for which the water resources are not well defined, the hydrology and geology of the area are complex and data is sparse. The State Engineer noted that since 1984 it has been known that to arrive at some reasonable understanding of the carbonate-rock aquifer system, substantial amounts of money would be required to develop the science, that a significant period of study would be required, and "unless this understanding is reached, the

development of carbonate water is risky and the resultant effects may be disastrous for the developers and current users.”<sup>6</sup>

The State Engineer noted that previous studies suggested that confidence in predictions regarding the effect of development was low and would remain low until observations of the initial hydrologic results of development were analyzed. The State Engineer was concerned that the adverse effects of development would overshadow the benefits, and found that the development of the carbonate-rock aquifer system must be undertaken in gradual stages together with adequate monitoring. The State Engineer noted that it is unknown what additional quantity, if any, of groundwater could be appropriated in the Coyote Spring Valley Hydrographic Basin without unreasonable and irreversible impacts. The State Engineer pointed out that the Applicants’ own experts were unable to make a suggestion as to what part of the water budget could be captured without a great deal of uncertainty and that the question could not be resolved without stressing the system.

Order 1169 noted that testimony and evidence indicated approximately 50,000 afa of underflow comes into the Coyote Spring Valley from northern groundwater basins and approximately 53,000 afa of subsurface water flows out of the Coyote Spring Valley. Of that 53,000 afa that flows out of Coyote Spring Valley, approximately 37,000 afa of water discharges at the Muddy River Springs, which is appropriated under the Muddy River Decree.<sup>7</sup> Testimony and evidence indicated another approximately 16,000-17,000 afa is believed to flow to the groundwater basins farther south, including Black Mountains Area. Additionally, the State Engineer found that 50,465 afa of groundwater was already appropriated in Coyote Spring Valley and the surrounding basins identified as Black Mountains Area, Garnet Valley, Hidden Valley, Muddy River Springs Area (a.k.a. Upper Moapa Basin) and Lower Moapa Valley Hydrographic Basins. Because very few of these groundwater rights had actually been pumped, and water rights already issued in Coyote Spring Valley alone equaled the estimate of the amount of flow that by-passes the region, the State Engineer ordered additional study before consideration of granting any additional water rights in Coyote Spring Valley.

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<sup>6</sup> State Engineer’s Order No. 1169, dated March 8, 2002, p. 2, official records in the Office of the State Engineer.

<sup>7</sup> Judgment and Decree, *In the Matter of the Determination of the Relative Rights In and To the Waters of the Muddy River and Its Tributaries in Clark County, State of Nevada*, March 12, 1920, Tenth Judicial District Court of the State of Nevada, In and For the County of Clark.

Order 1169 ordered that all applications for new appropriations from the carbonate-rock aquifer system in Coyote Spring Valley (Basin 210), Black Mountains Area (Basin 215), Garnet Valley (Basin 216), Hidden Valley (Basin 217), Muddy River Springs Area a.k.a. Upper Moapa Valley (Basin 219) and Lower Moapa Valley (Basin 220) would be held in abeyance until further information could be gathered by stressing the aquifer system by way of a pumping test. *See*, Attachment 1, Location Map of the Order 1169 Hydrographic Basins, Clark County and Lincoln County, Nevada. Unlike other basins in Nevada, the above listed basins were tied together in Order 1169 because it was well established that the spring discharge in the Muddy River Springs Area was produced from a distinct regional carbonate-rock aquifer that underlies and uniquely connects the basins. There is a very high hydraulic transmissivity found in most of this area of the carbonate-rock aquifer which results in a flat potentiometric surface in these basins. Changes in the potentiometric surface in any one of these basins occur in lockstep directly affecting the other basins, further demonstrating the regional nature of the aquifer across these basins.

In Order 1169, the State Engineer ordered a study under the provisions of NRS § 533.368 that required at least 50% (8,050 afa) of the water rights then currently permitted in Coyote Spring Valley be pumped for at least two consecutive years, and that data be gathered from others who currently held water rights in the Order 1169 area. At the end of the study, the study participants, which included the Las Vegas Valley Water District, Southern Nevada Water Authority, Coyote Springs Investment, LLC, Nevada Power Company, Moapa Valley Water District, Dry Lake Water Company, LLC, Republic Technologies, Inc., Chemical Lime Company, Nevada Cogeneration Associates or their successors, were required to submit reports identifying the information obtained and any impacts seen to the groundwater or surface water resources of the carbonate-rock aquifer system or alluvial system from the pumping. The State Engineer also ordered the LVVWD to update a model it had presented during the course of its case-in-chief at the LVVWD hearing with the new data. The State Engineer indicated that he would then decide whether sufficient information had been gathered to act on the pending applications. By State Engineer's Ruling No. 5115, dated April 18, 2002, the California Wash Hydrographic Basin (Basin 218) was included in Order 1169 because of its hydrologic connection.

By letter dated May 26, 2010, the Moapa Band of Paiute Indians indicated their concern that the pumping test itself was likely to impact water resources at the Muddy River Springs, which are the source of water for the Muddy River.

At a meeting of the Order 1169 study participants on June 22, 2010, each of the participants agreed that the pumping test would provide sufficient information even if the minimum 8,050 afa was not pumped. In response to that meeting, in a letter dated July 1, 2010, the State Engineer expressed his concern that it had been eight years since the pumping test was ordered, that the pumping requirements of the study had not even begun, and found that decisions regarding future appropriations in the basins subject to the order could not be deferred indefinitely. The State Engineer ordered that the test was to go forward even if the 8,050 afa minimum amount of pumping designated in Order 1169 was not pumped.

On December 21, 2012, the State Engineer issued Order 1169A, wherein he revised the requirements of Order 1169, indicating his belief that sufficient information had been obtained and declaring the pumping test completed as of December 31, 2012. Order 1169A provided the study participants the opportunity to address the information obtained from the study/pumping test, the impacts of pumping, and to opine as to the availability of additional water resources to support the pending applications. These reports were due in the Office of the State Engineer by June 28, 2013. The State Engineer finds that reports were submitted in a timely manner and that all the requirements of Order 1169 and 1169A have been satisfied.

### III.

#### **Order 1169 and 1169A Pumping Test**

The Order 1169 pumping test originally required the participants to pump 8,050 afa from wells in Coyote Spring Valley for two years. As stated above, the State Engineer ordered on July 1, 2010, that the test go forward with reduced pumping. The test officially began on November 15, 2010. Water pumped from the MX-5 well was piped to the Moapa Valley Water District municipal infrastructure, and ultimately piped to Bowman Reservoir in Lower Moapa Valley. This water was released from Bowman Reservoir in an open channel to Lake Mead. Water pumped from wells operated by CSI was put to beneficial use in Coyote Spring Valley.

The pumping test officially ended on December 31, 2012, after a period of 25½ months. The total amount pumped between the CSI wells and the MX-5 well during the test period was 11,249 acre-feet, which translates to about 5,290 acre-feet per year, well short of the initially intended amount to be pumped in the study. There were a number of mechanical problems

encountered during the test that required the MX-5 well to shut down. Even without the mechanical issues, the maximum pumping rate would not have resulted in a total pumpage from Coyote Spring Valley of 8,050 afa.

In addition to measuring pumping from wells in Coyote Spring Valley, pumpage was also measured and reported from 30 other wells in the Muddy River Springs Area, Garnet Valley, California Wash, Black Mountains Area, and Lower Meadow Valley Wash. Stream diversions from the Muddy River to the Reid Gardner power plant were reported by NV Energy. Measurements of the natural discharge of the Muddy River and of several of the Muddy River's headwater springs were collected daily. Water-level data were collected for 79 monitoring and pumping wells. Barometric data were collected at three sites: two sites in Coyote Spring Valley and one site in California Wash. The State Engineer finds the pumping test proceeded as required and all of the required data was collected and made available to each of the parties and the public.

#### **IV.**

#### **Pumping Test Reports**

Order 1169A provided the study participants the opportunity to file reports and requested they address three questions: (1) what information was obtained from the study/pumping test; (2) what were the impacts of pumping under the pumping test; and (3) what is the availability of additional water resources to support the pending applications. Reports or letters were submitted by the Southern Nevada Water Authority (SNWA), the U.S. Department of Interior Bureau of Fish and Wildlife Service, National Park Service and Land Management (DOI Bureaus), Moapa Band of Paiute Indians (MBOP), Moapa Valley Water District (MVWD), Coyote Springs Investment, LLC (CSI), Great Basin Water Network (GBWN) and Center for Biological Diversity (CBD).

##### **1. Southern Nevada Water Authority**

SNWA prepared a comprehensive report that discusses water levels in monitoring wells throughout the Order 1169 basins and stream flows in the Muddy River Springs Area. As to Question 2, SNWA did not differentiate water-level decline due to pumping at the MX-5 well from other pumping in the area.

SNWA recognized that declines in spring flow occurred at Pedersen and Pederson East springs, and that the spring flows declined as a result of new pumping at the MX-5 well. Decline in flow at Warm Springs West was characterized as minimal, and it did not recognize any other

surface flow reductions caused by groundwater pumping at the MX-5 well. SNWA provided figures that illustrate how groundwater levels and some spring flows are highly correlated with climate. Figure 12 of SNWA's report clearly shows how the long-term declining trend in groundwater levels recovered after the wet winter of 2005.<sup>8</sup> A similar correlation is noted for flows at the Warm Springs West gage, where a declining trend in spring discharge reversed after the winter of 2005.<sup>9</sup> SNWA points out that the flows of the Muddy River at Moapa did not decline during the period of the pumping test and asserts that the river flows are primarily impacted by valley fill pumping, primarily by NV Energy, and not carbonate pumping.

As to the availability of additional water for appropriation, SNWA states that:

It remains unclear if additional resource development beyond existing permitted rights could take place in Coyote Spring Valley at locations north of the Kane Spring fault in the area near CSMV-3. However, the presence of boundaries and variations in hydraulic conductivity suggest that, at a minimum, these areas may have the potential to be used for redistributing development of existing rights. Whether pending applications in Coyote Spring Valley are approved or denied, in whole or in part, they should be considered in order of priority with all other groundwater applications held in abeyance by Order 1169.<sup>10</sup>

## 2. Coyote Springs Investment, LLC

CSI submitted a letter in which they stated that they agree with the SNWA report. CSI believes water can be developed in Coyote Spring Valley north of the Kane Springs fault without impacting the Muddy River Springs and that pending applications of both CSI and SNWA should be granted in whole or part.

## 3. U.S. Department of Interior Bureaus

DOI Bureaus provided documentation and interpretations of the effects of the pumping test as well as predictions of the effects of various pumping scenarios. They analyzed water levels, spring and stream flows, and climate in the Order 1169 basins and some adjacent areas.

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<sup>8</sup> Southern Nevada Water Authority, *Nevada State Engineer Order 1169 and 1169A Study Report*, pp. 23 – 25, June 2013, official records in the Office of the State Engineer.

<sup>9</sup> *Id.* at 26.

<sup>10</sup> *Id.* at 57 - 58.

The DOI Bureaus found the pumping test was sufficient to document the effects of the pumping, identify regional drawdown, predict future effects of pumping on water levels and spring flow, and to determine the availability of water pursuant to the applications. Their analyses of impacts under the test were extensive. They used SeriesSEE<sup>11</sup> to discern and partition the effects of pumping at the MX-5 well from pumping at other locations. Their reported findings are that water-level decline due to MX-5 pumping (drawdown) encompasses 1,100 square miles and extends from northern Coyote Spring Valley through the Muddy River Springs Area, Hidden Valley, Garnet Valley, California Wash, and the northwestern part of the Black Mountains Area. Drawdown due to MX-5 pumping is estimated to be 1 to 1.6 feet in this area. They also found minor drawdown of 0.5 feet or less in the northern part of Coyote Spring Valley north of the Kane Springs Wash fault zone, in disagreement with SNWA. They found that water-level decline did not extend into Lower Moapa Valley. They estimate 80-90% of the pumped groundwater was derived from storage (hence the drawdown) and the remainder from capture of spring flow or from reductions in the flow of the Muddy River.<sup>12</sup>

They completed an in-depth analysis of spring flows in relation to nearby carbonate water levels and found a direct correlation. Measurable flow decline at Pedersen, Plummer and Apar units and Baldwin Spring are highly correlated with water levels in adjacent carbonate wells. If linear trends continue, spring flow can be estimated as a function of water levels in the adjacent carbonate aquifer. They argue that all pumping from carbonate aquifers will ultimately capture spring flow.

They also compared observed water level changes to water levels simulated in a groundwater flow model of the region.<sup>13,14</sup> The model was updated to include pumping through

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<sup>11</sup> Halford, K., Garcia, C.A., Fenelon, J., and Mirus, B., 2012, *Advanced methods for modeling water-levels and estimating drawdowns with SeriesSEE, an Excel add-In*, U.S. Geological Survey Techniques and Methods 4-F4, 29 pp.

<sup>12</sup> U.S. Fish and Wildlife Service, U.S. Bureau of Land Management and U.S. National Park Service Order 1169A Report, *Test Impacts and Availability of Water Pursuant to Applications Pending Under Order 1169*, June 28, 2013, official records in the Office of the State Engineer.

<sup>13</sup> Tetra Tech, *Development of a Numerical Groundwater Flow Model of Selected Basins within the Colorado Regional Groundwater Flow System, Southeastern Nevada*, September 28, 2012. References provided along with the DOI Report, official records in the Office of the State Engineer.

<sup>14</sup> Tetra Tech, *Predictions of the Effects of Groundwater Pumping in the Colorado Regional Groundwater Flow System Southeastern Nevada*, September 28, 2012. References provided along with the DOI Report, official records in the Office of the State Engineer.

2012.<sup>15</sup> If the applications, which are the subject of Ruling No. 6254, were pumped along with current water rights, they predict springs in the headwaters of the Muddy River, and the Muddy River itself above Moapa, would cease to flow in less than 200 years. The effects would occur much sooner if all of the pending applications held in abeyance pursuant to Order 1169 were granted and pumped. They report that the model under-predicts drawdown and also would therefore under-predict flow losses in the springs. After analyzing model results and observations made from monitor wells and springs, they believe that pumping at current (Order 1169) rates of less than one-half of existing permits, will result in both of the Pedersen springs going dry in 3 years or less.<sup>16</sup>

The overall conclusions of the DOI Bureaus' report are that the effects of pumping from the MX-5 well are spread out over a 1,100 square-mile area. They suggest that five basins within that area, Coyote Spring Valley, Muddy River Springs Area, Hidden Valley, Garnet Valley, and California Wash should be managed as one hydrographic area because of their uniquely immediate hydrologic connection. Pumping within any of these five basins, with the possible exception of the northernmost part of Coyote Spring Valley, will have substantially similar effects on groundwater levels throughout the area because of the hydrologic connection, and will eventually capture water that discharges in the Muddy River Springs Area.<sup>17</sup>

As to the availability of water pursuant to the pending applications, the DOI Bureaus indicated that their review of the water budget and perennial yield information leads to the conclusion that there is no water available for new appropriation within the five-basin area delineated through their groundwater analyses. The five-basin area that the DOI Bureaus referenced includes Coyote Spring Valley, Muddy River Springs Area, Hidden Valley, Garnet Valley and California Wash. Additionally, the groundwater modeling simulation results, which examined progressively greater pumping of pending water right applications in these five basins, provide supporting evidence of the wide-ranging effects that can be expected in these five basins with increased pumping in a very short period of time.

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<sup>15</sup> Tetra Tech, *Comparison of Simulated and Observed Effects of Pumping from MX-5 Using Data Collected to the End of the Order 1169 Test, and Prediction of the Rates of Recovery from the Test*, June 10, 2013. References provided along with the DOI Report, official records in the Office of the State Engineer.

<sup>16</sup> U.S. Fish and Wildlife Service, U.S. Bureau of Land Management and U.S. National Park Service Order 1169A Report, *Test Impacts and Availability of Water Pursuant to Applications Pending Under Order 1169*, p. 85, June 28, 2013, official records in the Office of the State Engineer.

<sup>17</sup> *Id.* at 84.

The DOI Bureaus point out that groundwater that was withdrawn in the Coyote Spring Valley over the period of the pumping test is only one-third of the groundwater rights that already exist in the basin. The DOI Bureaus assert that the pumping test provides evidence that even this reduced volume of groundwater pumping cannot be developed long-term without adverse impacts to springs, endangered fish, Federal trust resources, and downstream senior water rights. They argue that the five-basin area uniquely behaves as one connected aquifer, and pumping in any of the basins will have similar effects on the whole. Consequently, they conclude that no additional groundwater is available for appropriation to satisfy the pending water right applications that are currently being held in abeyance for this portion of the carbonate-rock aquifer.<sup>18</sup>

#### 4. Moapa Band of Paiute Indians

MBOP provided a report that analyzed varying lines of evidence in addition to data collected during the pumping test. They analyzed water budgets, climatic effects, stream base flow identification, water demand for power generation, and water temperature-electrical conductivity and mixing models. MBOP argues that the drawdown due to MX-5 pumping was significantly less than that cited by the DOI Bureaus, and that the limit of detection of drawdown due to MX-5 pumping extended only five miles from the MX-5 well.<sup>19</sup> Nevertheless, they contend that carbonate pumping in Coyote Spring Valley and Muddy River Springs Area will have a 1:1 impact on Muddy River flows. They interpret total flux of the system in the Muddy River Springs Area as variable, ranging from about 35,000 afa to 42,000 afa, with the average being about 38,000 afa. Their average annual estimate is similar to Eakin's estimate of 36,000 afa.<sup>20</sup> MBOP asserts that some of the regional water-level decline during the period of the pumping test, and much of the annual fluctuation, is attributed to changes in the water level in Lake Mead. MBOP argues that crustal loading and deformation is associated with the rising and falling Lake Mead surface, which in turn causes pore-pressure changes and pore-volume reductions in the carbonate aquifer. They argue that these crustal effects cause carbonate water levels to rise and fall in near tandem with lake levels. They assert that these conditions have

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<sup>18</sup> *Id.* at 5.

<sup>19</sup> Johnson and Mifflin, *Summary of Order 1169 Testing Impacts, per Order 1169A*, p. 25, June 28, 2013, official records in the Office of the State Engineer.

<sup>20</sup> T.E. Eakin, *A Regional Interbasin Ground-water System in The White River Area, Southeastern Nevada*, Water Resources Bulletin No. 33, p. 264 (Department of Conservation and Natural Resources, Division of Water Resources and U.S. Department of Interior, Geological Survey), 1966.

resulted in the water-level decline on the MBOP reservation that others have attributed to pumping from well MX-5. They also argue for the existence of a southern carbonate aquifer flow field separated from Coyote Spring Valley and the Muddy River Springs Area by a northeasterly-trending barrier. This barrier extends from just north of Garnet Valley through the Muddy River Springs to the northern edge of the Lower Moapa Valley Hydrographic Area. MBOP argues this southern flow field, which includes California Wash, Hidden and Garnet valleys, and portions of the Black Mountains Area, is hydrologically isolated and could be developed without impacting spring flows. They estimate that groundwater supply to the southern flow field is 15,000 to 20,000 afa.<sup>21</sup>

As to the availability of additional water resources, the MBOP asserts that the Order 1169 test results indicate that the 1989 LVVWD applications for approximately 27,000 afa should be denied. Their rationale is that these applications equal about 72% of the flux in the carbonate-rock aquifer that discharged as pre-development base flows of the Muddy River and that all the hydrogeological evidence indicates such production would reduce the flux to the discharge area by a similar amount over a relatively short time. They assert that almost one-third of pre-development Muddy River flows are currently consumed before reaching the Moapa gage, and these applications should be denied on the grounds that they would impact senior rights by the full amount.<sup>22</sup>

The MBOP argues for the creation of a new water management unit that would include upgradient basins including at least the Muddy River Springs Area, Coyote Spring Valley and Kane Springs Valley. They assert to prevent future desiccation of the headwater springs, the currently undeveloped permits within the proposed management unit must be largely revoked, restricted, or otherwise creatively managed because they total up to a similar order of magnitude as the current flow of the Muddy River.<sup>23</sup> They indicate that the water-resource potential of the southern flow field should be evaluated with a large interim pumping experiment in the northern portion of the southern flow field near the MBOP reservation.<sup>24</sup>

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<sup>21</sup> Johnson and Mifflin, *Summary of Order 1169 Testing Impacts, per Order 1169A*, p. 26, June 28, 2013, official records in the Office of the State Engineer.

<sup>22</sup> *Id.* at 30.

<sup>23</sup> *Ibid.*

<sup>24</sup> *Id.* at 31.

#### 5. Moapa Valley Water District

MVWD evaluated only data for water levels and flows in the Muddy River Springs Area. MVWD's report recognizes that water-level declines are attributable to MX-5 pumping, as are spring flow decreases at the two Pedersen springs, Warm Springs West gage, and Baldwin Spring, but it does not recognize effects at Jones Spring or Muddy Spring at LDS.

As to the availability of additional water resources, MVWD did not provide a direct response. However, MVWD submitted a supplemental report analyzing its applications in the Lower Moapa Valley, coming to the conclusion that those applications could be developed without impacting the springs.

#### 6. Great Basin Water Network

GBWN provided both a technical report by Dr. Tom Myers and a letter summarizing their position and interpretation of the test. Their report recognized a water-level decline in Coyote Spring Valley and the Muddy River Springs Area and decreases in spring flow that they assert are directly attributable to the MX-5 well pumping. The report states that the test did not provide adequate data to analyze water availability in the other Order 1169 basins. As to the availability of additional water resources for the pending applications, GBWN argues against granting any of the pending applications and states that pumpage of even the existing water rights in Coyote Spring Valley and the Muddy River Springs Area will result in spring flow reductions to rates that are insufficient to maintain a known endangered species.

GBWN somewhat contradicts their own report with a statement that the test did not provide adequate data to analyze water availability, and asserts that the information obtained was sufficient to make determinations on the effects of the pumping and of the availability of water not just in Coyote Spring Valley, but in all of the Order 1169 basins. The letter also argues that their report supports a conclusion that full pumping of existing rights in the Order 1169 basins will unacceptably decrease spring discharge.

#### 7. Center for Biological Diversity

CBD used the same report from Dr. Myers that was filed by the GBWN. CBD believes that pumping of existing water rights will have unacceptable effects on the springs, and, therefore, all pending applications in the Order 1169 basins should be denied. Furthermore, they assert that all applications in the entire White River Flow System up to Cave Valley should be denied. CBD also recommends that the State Engineer take administrative action to reduce permits in the Order 1169 basins to sustainable levels.

Based on the responses received and the State Engineer's own interpretations of the test, the State Engineer finds that sufficient information has been obtained from the Order 1169 pumping test to rule on the pending applications.

Based on reports filed pursuant to Orders 1169 and 1169A and the State Engineer's analysis of the pumping test, the State Engineer finds:

1. The information obtained from the pumping test satisfied the goal of the test and is sufficient to document the effects of pumping on water levels and spring flows in the Order 1169 basins. The information obtained from the test and reports is adequate to formulate an informed opinion as to the future impacts from groundwater pumping and the availability of groundwater in Black Mountains Area pursuant to the applications.
2. The impacts of pumping from the MX-5 well, and other existing wells, during the pumping test are widespread, and extend north in Coyote Spring Valley at least to Kane Springs Valley, south to Hidden Valley and Garnet Valley, and southeast to the Muddy River Springs Area and California Wash. Pumping effects were seen in the northwestern part of the Black Mountains Area, but were not observed in Lower Moapa Valley. Groundwater-level declines attributable to MX-5 pumping range from less than one foot in northern Coyote Springs Valley, two feet or more in central Coyote Spring Valley, and one foot or more in the carbonate aquifer in the Muddy River Springs Area, Hidden Valley and California Wash. The additional pumping at the MX-5 well contributed significantly to decreases in spring flow at high-elevation spring (Pedersen Springs) sources of the Muddy River, and contributed to measurable decreases in flow at Baldwin and Jones Springs and to the numerous springs whose combined flows are measured at the Warm Springs West and Iverson gages. The pumping test effects documented in Coyote Spring Valley, Muddy River Springs Area, Hidden Valley, Garnet Valley, California Wash, and part of Black Mountains Area provide clear proof of the close hydrologic connection of the basins that distinguishes these basins from other basins in Nevada.
3. As to the availability of water pursuant to pending applications, the request in Order 1169A referred to pending applications in Coyote Spring Valley that were addressed in Ruling No. 6254. Several of the respondents also replied with an opinion concerning available groundwater in the remainder of the Order 1169 basins. As discussed above, the parties were not unanimous in their interpretation of the test and whether additional

water is available to appropriate in the basins. The DOI Bureaus, Great Basin Water Network and Center for Biological Diversity agree that there is no unappropriated groundwater in any of the basins. The MBOP found there is no additional water available to appropriate in Coyote Spring Valley or Muddy River Springs Area, but that unappropriated water exists in California Wash, and perhaps in Hidden and Garnet Valleys. They are silent on the Black Mountains Area and Lower Moapa Valley. The SNWA did not directly answer the question; rather they suggest groundwater might be developed in western or northern Coyote Spring Valley. The results of the pumping test, together with the submitted technical reports and existing records of the State Engineer's office have provided sufficient information to make a determination on the availability of water pursuant to pending applications in all of the Order 1169 basins.

## V.

### **Perennial Yield**

Nevada Revised Statute § 533.370(2) requires that the State Engineer reject an application to appropriate water where there is no unappropriated water at the source of supply. For groundwater appropriations, the State Engineer uses the perennial yield of a basin as the measure of the amount of water available for appropriation. The perennial yield is based on water budgets for the basin in question. Water budgets and perennial yield were significant issues raised in the 2001 hearings on the pending applications that needed additional information.

The perennial yield of a groundwater basin has been defined in numerous State Engineer rulings. It can be defined as the maximum amount of groundwater that can be withdrawn each year over the long-term without depleting the groundwater reservoir. Perennial yield is ultimately limited to the maximum amount of natural discharge that can be utilized for beneficial use. The perennial yield cannot be more than the natural recharge to a groundwater basin and in some cases is less. If the perennial yield is exceeded, groundwater levels will decline and steady state conditions will not be achieved, a situation commonly referred to as groundwater mining. Additionally, withdrawals of groundwater in excess of the perennial yield may contribute to adverse conditions such as water quality degradation, storage depletion, diminishing yield of wells, increased pumping costs, and land subsidence.

The United States Geological Survey in conjunction with the Nevada Division of Water Resources estimates recharge from precipitation to the Black Mountains Area as being less than 100 afa.<sup>25</sup> Subsurface inflow to the Black Mountains Area has been estimated as ranging from less than 400 afa<sup>26</sup> to as much as 1,200 afa.<sup>27</sup> Estimated evapotranspiration in the Black Mountains Area (discharge) is estimated at 1,200 afa.<sup>28</sup> The State Engineer has accepted a perennial yield for the Black Mountain Area of 1,300 afa. There are currently 5,798 acre-feet of committed groundwater rights in the basin.<sup>29</sup>

The Black Mountains Area was included in Order 1169 because in the northwest portion of the basin where these pending applications are located, the area is underlain by the regional carbonate aquifer. The water table in the location of these applications was monitored during the Order 1169 test. Water levels in this basin are virtually the same as water levels in Garnet Valley, California Wash and the Muddy River Springs Area. The hydrograph of well BMDL-2 shows accelerated water-level decline during the pumping test and supports the argument that it is part of the regional flow system.<sup>30</sup> The DOI Bureaus' reports exclude the Black Mountains Area from the five-basin area that they believe should be managed jointly. However, the hydrogeology, water levels and water-level changes at the location of the pending applications are consistent with the carbonate aquifer in the five-basin area,<sup>31</sup> and it is clear to the State Engineer that this northwestern portion of the Black Mountains Area Hydrographic Basin lies within the regional carbonate aquifer. Except for the northwest portion of Black Mountains Area, the basin is not underlain by the regional carbonate aquifer, and water levels are significantly lower. Water supply in the basin is limited to local recharge of less than 100 afa from precipitation within the basin or to inflow along the Las Vegas Wash to the south.

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<sup>25</sup> F. Eugene Rush, *Water-Resources Appraisal of the Lower Moapa – Lake Mead Area, Clark County, Nevada*, Water Resources-Reconnaissance Series Report 50, (Department of Conservation and Natural Resources, Division of Water Resources and U.S. Department of Interior, Geological Survey), p. 25, 1968.

<sup>26</sup> *Id.* at 26.

<sup>27</sup> Geraghty & Miller, Inc., *Hydrologic Evaluation on the Impact of Groundwater Withdrawals from the Nevada Cogeneration Associates Well Field Black Mountains Hydrographic Area, Nevada*, p. 6, August 1994. File No. 58592, official records in the Office of the State Engineer.

<sup>28</sup> F. Eugene Rush, *Water-Resources Appraisal of the Lower Moapa – Lake Mead Area, Clark County, Nevada*, Water Resources-Reconnaissance Series Report 50, (Department of Conservation and Natural Resources, Division of Water Resources and U.S. Department of Interior, Geological Survey), p. 35, 1968.

<sup>29</sup> Official records of the Office of the State Engineer.

<sup>30</sup> Official records of the Office of the State Engineer, <http://water.nv.gov/data/waterlevel/>.

<sup>31</sup> Geraghty & Miller, Inc., *Hydrogeologic Evaluation on the Impact of Groundwater Withdrawals from the Nevada Cogeneration Associates Well Field Black Mountains Hydrographic Area, Nevada*, August 1994. File No. 58592 official records in the Office of the State Engineer.

The northwestern portion of the Black Mountains Area is within the regional carbonate aquifer. The total water supply of the regional carbonate aquifer is estimated at approximately 50,000 afa. Groundwater rights total about 49,000 acre-feet and the Muddy River and springs, which utilize the same water, are fully appropriated with approximately 30,000 afa of water rights. Therefore, the State Engineer finds there is no unappropriated water available to grant the pending applications. Even if these applications were moved to a part of the Black Mountains Area that is outside of the regional carbonate aquifer, there would be no unappropriated water available, as the established perennial yield of 1,300 afa is fully allocated.

## VI.

### Existing Rights

Nevada Revised Statute § 533.370(2) requires that the State Engineer reject an application to appropriate water where the use of the water conflicts with existing rights or with protectable interests in existing domestic wells. There are 5,798 acre-feet of senior groundwater rights already appropriated in the Black Mountains Area and another 43,000 acre-feet of senior groundwater rights in the other Order 1169 basins. The Muddy River and springs, the discharge location of the bulk of the region's water, have approximately 30,000 afa of decreed and appropriative rights.

One of the main goals of Order 1169 and the associated pumping test was to observe the effects of increased pumping on groundwater levels and spring flows. The Pedersen and Pedersen East springs, the highest elevation springs in the area and which are considered to be the "canary in the coal mine" with respect to impacts from pumping, showed an unprecedented decrease in flow during the pumping test. Pedersen spring flow decreased to 0.08 cfs, down from its average of about 0.22 cfs prior to the test. Pedersen East decreased to 0.12 cfs, down from its average flow of 0.2 cfs prior to the test.<sup>32,33</sup> The Warm Springs West gage, the site at which trigger levels have been set among parties to a memorandum of agreement,<sup>34</sup> declined from 3.6 to 3.3 cfs during the test.<sup>35</sup> Baldwin and Jones Springs declined about 4% during the

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<sup>32</sup> U.S. Fish and Wildlife Service, U.S. Bureau of Land Management and U.S. National Park Service Order 1169A Report, *Test Impacts and Availability of Water Pursuant to Applications Pending Under Order 1169*, pp. 43 – 46, June 28, 2013, official records in the Office of the State Engineer.

<sup>33</sup> <http://waterdata.usgs.gov/nv/nwis/>.

<sup>34</sup> In 2006, a Memorandum of Agreement (MOA) was signed by the Southern Nevada Water Authority, U.S. Fish and Wildlife Service, Coyote Springs Investment, LLC, Moapa Band of Paiute Indians, and Moapa Valley Water District pursuant to which, the parties agreed to certain conservation measures for the protection and recovery of the Moapa dace, an endangered species found in the Moapa Valley National Wildlife Refuge.

<sup>35</sup> <http://waterdata.usgs.gov/nv/nwis/>.

test.<sup>36</sup> The Muddy River at the Moapa gage did not display any decrease in flow,<sup>37</sup> although the MBOP report points out that total flux of the system is variable, and argues that flows in the river would have been even higher if Order 1169 pumping had not occurred.<sup>38</sup>

The State Engineer finds that pumping under the Order 1169 test measurably reduced flows in headwater springs of the Muddy River, and that water level decline was measurable in the northwestern Black Mountains Area near the pending applications. It is clear that if pending water right applications were permitted and pumped in addition to existing groundwater rights in Coyote Spring Valley and the other Order 1169 basins, headwater spring flows would be reduced in tens of years or less to the point that there would be a conflict with existing rights. The State Engineer finds the Muddy River and the Muddy River springs, the discharge location of the bulk of the region's water, is fully appropriated. The State Engineer finds that evidence submitted by the DOI Bureaus is convincing that pumping of groundwater under the pending applications in addition to existing rights would reduce the flow of the Muddy River in tens of years or less to the point where there would be a conflict with existing rights.

## VII.

### Public Interest

Nevada Revised Statute § 533.370(2) requires the State Engineer reject an application if the use of the water threatens to prove detrimental to the public interest. The State Engineer views this requirement in terms of Nevada water law and management of the public's water, but not to areas that are outside of his purview. The State Engineer finds to approve applications that will within a short period of time conflict with existing water rights threatens to prove detrimental to the public interest.

The Moapa dace is an endangered species that lives only in the headwater springs of the Muddy River. The USFWS holds water rights on some of the springs in the Muddy River Springs Area that were appropriated specifically for the protection of the dace. The State Engineer finds to permit the appropriation of these applications in the Black Mountains Area, which is directly connected to the regional aquifer in the Order 1169 area, would impair

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<sup>36</sup> U.S. Fish and Wildlife Service, U.S. Bureau of Land Management and U.S. National Park Service Order 1169A Report, *Test Impacts and Availability of Water Pursuant to Applications Pending Under Order 1169*, pp. 50 – 51, June 28, 2013, official records in the Office of the State Engineer.

<sup>37</sup> Southern Nevada Water Authority, *Nevada State Engineer Order 1169 and 1169A Study Report*, p. 41, June 2013, official records in the Office of the State Engineer.

<sup>38</sup> Johnson and Mifflin, *Summary of Order 1169 Testing Impacts, per Order 1169A*, pp. 5 - 8, June 28, 2013, official records in the Office of the State Engineer.

protection of these springs and the habitat of the Moapa dace and therefore threatens to prove detrimental to the public interest.

### CONCLUSIONS

#### I.

The State Engineer has jurisdiction over the parties and of the subject matter of this action and determination.<sup>39</sup>

#### II.

The State Engineer is prohibited by law from granting an application to appropriate the public waters where:<sup>40</sup>

- A. there is no unappropriated water at the proposed source;
- B. the proposed use or change conflicts with existing rights;
- C. the proposed use or change conflicts with protectable interests in existing domestic wells as set forth in NRS § 533.024; or
- D. the proposed use or change threatens to prove detrimental to the public interest.

#### III.

The State Engineer concludes that the committed groundwater resources of the Black Mountains Hydrographic Area exceeds the groundwater basin's estimated perennial yield. The State Engineer concludes that the approval of Applications 58592, 58593, 58594, 64041 and 67893 would add to the imbalance of the quantity of existing rights to perennial yield and would conflict with existing rights and thereby threaten to prove detrimental to the public interest.

#### IV.

The State Engineer concludes that approval of the applications would threaten to prove detrimental to the public interest by removing water that in the past has been available for the endangered species in the Muddy River Springs Area. The State Engineer concludes that while the use of the water under these applications may have a public benefit, removing the water from the springs would threaten the water resources upon which the endangered Moapa dace are dependent.

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<sup>39</sup> NRS Chapters 533 and 534.

<sup>40</sup> NRS § 533.370(2).

**RULING**

The protests to Applications 58592, 58593, 58594, 64041 and 67893 are hereby upheld in part and the applications are hereby denied on the grounds that there is no unappropriated groundwater at the source of the supply, the proposed use would conflict with existing rights in the Order 1169 basins and the proposed use of the water would threaten to prove detrimental to the public interest in that it would threaten the water resources upon which the endangered Moapa dace are dependent. No ruling is made on the merits of the remaining protest grounds.

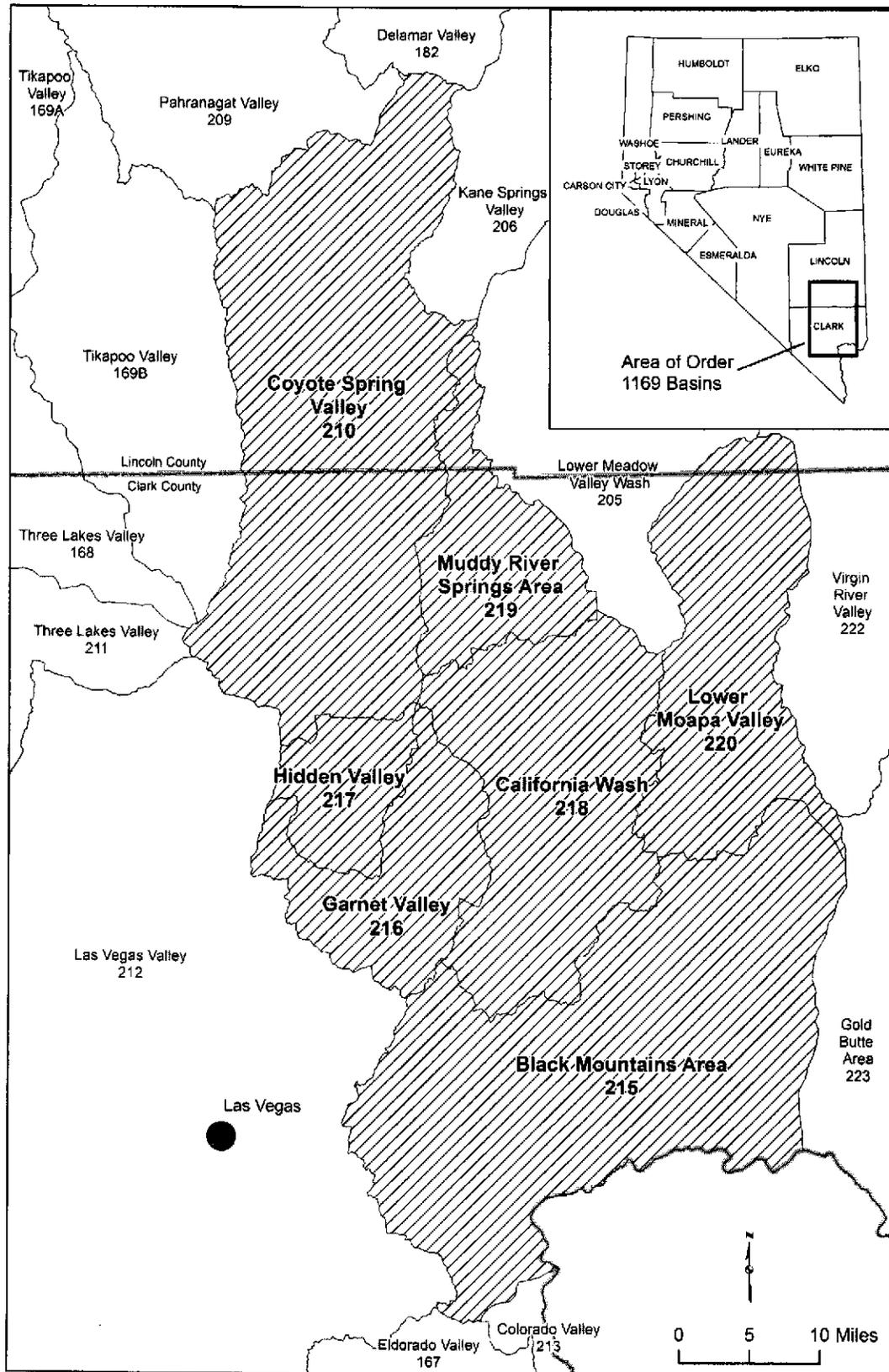
Respectfully submitted,



JASON KING, P.E.  
State Engineer

Dated this 29<sup>th</sup> day of  
January, 2014.

ATTACHMENT 1



Location Map of the Order 1169 Hydrographic Basins, Clark County and Lincoln County, Nevada.