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

IN THE MATTER OF APPLICATIONS)
72218, 72219, 72220 AND 72221 FILED TO)
APPROPRIATE THE UNDERGROUND)
WATERS OF THE KANE SPRINGS)
VALLEY HYDROGRAPHIC BASIN (206))
LINCOLN COUNTY, NEVADA.)

RULING

#5712

GENERAL

I.

Application 72218 was filed on February 14, 2005, by Lincoln County Water District and Vidler Water Company, Inc., to appropriate 6.0 cubic feet per second (cfs) of the underground water of the Kane Springs Valley Hydrographic Basin for municipal purposes within Coyote Spring Valley Hydrographic Basin more specifically described as portions of T.8S., R.62E., T.8S., R.63E., T.8S., R.64E., T.9S., R.61E., T.9S., R.62E., T.9S., R.63E., T.9S., R.64E., T.10S., R.61E., all of T.10S., R.62E., portions of T.10S., R.63E., T.10S., R.64E., T.11S., R.61E., all of T.11S., R.62E., portions of T.11S., R.63E., T.11S., R.64E., T.12S., R.61E., all of T.12S., R.62E., all of T.12S., R.63E., portions of T.12S., R.64E., T.12.5S., R.61E., T.12.5S., R.62E., T.13S., R.61E., all of T.13S., R.62E., portions of T.13S., R.63E., T.13S., R.64E., T.13.5S., R.63E., T.14S., R.61E., all of T.14S., R.62E., portions of T.14S., R.63E., T.15S., R.61E., T.15S., R.62E., T.15S., R.63E., T.16S., R.62E., M.D.B.& M. The proposed point of diversion is described as being located within the SW¼ SE¼ of Section 25, T.8S., R.65E., M.D.B.&M.[1]

II.

Application 72219 was filed on February 14, 2005, by Lincoln County Water District and Vidler Water Company, Inc., to appropriate 6.0 cfs of the underground water of the Kane Springs Valley Hydrographic Basin for municipal purposes within Coyote Spring Valley Hydrographic Basin more specifically as described above. The proposed point of diversion is described as being located within the SE¼ SW¼ of Section 31, T.9S., R.65E., M.D.B.&M.[2]

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[1] File No. 72218, official records of the Office of the State Engineer. Exhibit No. 2, public administrative hearing before the State Engineer, April 4-6, 2006. Hereinafter the exhibits and transcript will be referred to solely by exhibit number or transcript page.

[2] Exhibit No. 3.

III.

Application 72220 was filed on February 14, 2005, by Lincoln County Water District and Vidler Water Company, Inc., to appropriate 6.0 cfs of the underground water of the Kane Springs Valley Hydrographic Basin for municipal purposes within Coyote Spring Valley Hydrographic Basin more specifically as described above. The proposed point of diversion is described as being located within the SE¼ SW¼ of Section 6, T.11S., R.64E., M.D.B.&M.[3]

IV.

Application 72221 was filed on February 14, 2005, by Lincoln County Water District and Vidler Water Company, Inc., to appropriate 6.0 cfs of the underground water of the Kane Springs Valley Hydrographic Basin for municipal purposes within Coyote Spring Valley Hydrographic Basin more specifically as described above. The proposed point of diversion is described as being located in the SE¼ SW¼ of Section 11, T.9S., R.65E., M.D.B.&M.[4]

V.

Applications 72218 and 72219 were timely protested by White Pine County; however, said protests were withdrawn prior to the administrative hearing.[5]

VI.

Applications 72218 and 72219 were timely protested by Wayne Lister, Ruby Lister and Bevan Lister on the grounds that:

> 1. Lincoln County Water District has no written adopted plan for the use of the water applied for under this permit. There is no city or town within the area of this permit.
> 2. We have long argued that moving water from one basin to another is detrimental to the originating basin.
> 3. Lincoln County Water District is supposed to be a local government entity protecting and planning for the benefit of the citizens of Lincoln County but in teaming up with Vidler they become merely speculative with the sole objective to make a profit.[6]

VII.

Applications 72218, 72219, 72220 and 72221 were timely protested by the United States Department of Interior, National Park Service ("NPS") on the grounds that:

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[3] Exhibit No. 4.
[4] Exhibit No. 5.
[5] Exhibit No. 6.
[6] Exhibit No. 7.

1. There is no water available for appropriation because committed water resources exceed ground-water recharge.

2. The approval and development of the appropriation proposed by this application will impair the water rights of the United States, because:

A. The appropriation, in combination with other appropriations and withdrawals in Coyote Spring Valley will further reduce the discharge of the Muddy River. The United States' senior water right and other existing rights to the Muddy River would be impaired, if the appropriation is approved and developed.

B. The proposed appropriation, in combination with existing appropriations and pending applications in the White River ground-water flow system, if approved and developed, would reduce the discharge of Lake Mead NRA [National Recreation Area] springs, because of the large potential withdrawal rate. The drawdown caused by such large withdrawals would extend to capture ground water that naturally discharges through the springs.

C. The effects of the appropriation proposed by this application, when combined with other existing and proposed appropriations, could impair the senior water rights of the Lake Mead NRA more quickly and/or to a degree greater than the withdrawal proposed under this application alone.

3. The public interest would not be served, by granting a permit to this application, because:

A. The public interest would not be served by granting this application, because the water and water-related resources in the nationally important Lake Mead NRA would be diminished or impaired, as a result of the appropriation proposed by this application.

B. The land which the applicant proposes to withdraw the water is not owned by the applicant. [This protest claim only goes to Applications 72218 and 72219.][7]

VIII.

Applications 72220 and 72221 were protested by the United States Department of Interior, Fish and Wildlife Service ("FWS") on the grounds that:

> The proposed groundwater development threatens the biological and water resources under the jurisdiction of the US Fish and Wildlife Service in the White River Groundwater Flow System. Kane Springs Valley is located upgradient of Coyote Spring Valley and the Muddy River Area. Pumping of groundwater from the basin could reduce the groundwater influx to springs at Moapa Valley National Wildlife Refuge in the Muddy River Area. The combined perennial yield for Coyote Spring valley [sic] and Kane Springs Valley may be on the order of 2,600 acre-feet/yr as estimated in ground-water Resources Reconnaissance Series Report 25. Although there are no permits in Kane Springs Valley, there are at least 200,000

[7] Exhibit No. 8.

> acre-feet/yr of permitted and pending applications in Coyote Spring Valley, directly downgradient. An additional withdrawal would only add to the current exceedance of the perennial yield for the combined basins. Such a withdrawal of groundwater in excess of the perennial yield could result in reduced groundwater flow from Coyote Spring Valley to the Muddy River Area, or result in a reversed gradient causing groundwater outflow from Coyote Spring Valley to Kane Springs Valley. Senior water rights held by the Fish and Wildlife Service in the Moapa Valley National Wildlife refuge [sic] could be adversely impacted. Such an impact to the water rights and resources of the Moapa Valley National Wildlife refuge [sic] and environs could adversely impact threatened and endangered species including Moapa dace and Southwestern Willow Flycatcher; which depend on these water resources for survival. Water-dependent resources in Lower Meadow Valley Wash may be threatened by the proposed development too. The combined volume from all of these pending applications and permitted water rights exceeds all current estimates of the available water for appropriation in the White River Groundwater Flow System. Lacking more information to demonstrate that water is available for appropriation without adversely impacting existing water rights and water-related resources, these applications should be denied.[8]

IX.

By letter dated February 6, 2006, the NPS and FWS requested the State Engineer amend State Engineer's Order No. 1169 to include the Kane Springs Valley Hydrographic Basin within the provisions of the Order and included a request to hold these applications in abeyance until the pumping ordered in Coyote Spring Valley was completed and analyzed.[9] The reasoning behind the request is that these agencies believe Kane Springs Valley and Coyote Spring Valley, while administratively classified as separate hydrographic basins, are actually a single distinct hydrologic drainage basin and should be managed as such. At the public administrative hearing on these applications, the Applicant and Protestant FWS presented a stipulation to resolve the FWS's protests.[10] The resolution was also in lieu of statements made on behalf of the FWS in the February 6, 2006, letter that requested Kane Springs Valley be included in State Engineer's Order No. 1169.[11] Pursuant to the Stipulation, the FWS withdrew its protests and the parties requested that Exhibit A to the Stipulation be included as part of the terms and conditions of any applications that are granted. However, the NPS's request to include Kane Springs Valley Hydrographic Basin within the provisions of Order No. 1169 remains to be resolved.

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[8] Exhibit No. 9.
[9] Exhibit No. 10.
[10] Exhibit No. 116.
[11] Transcript, p. 12.

X.

After all parties of interest were duly noticed by certified mail, an administrative hearing was held with regard to the protested applications on April 4-6, 2006, at Carson City, Nevada, before representatives of the Office of the State Engineer.[12]

FINDINGS OF FACT

I.

The Listers protested the applications on the grounds that Lincoln County Water District has no written plan for the use of the water applied for and there is no city or town within the area of the applications. The State Engineer finds there is no requirement in Nevada water law for a written plan to be provided in furtherance of a water right application. The State Engineer finds water right applications are almost always filed for proposed projects that are planned, but not in existence, and the water cannot be used until the State Engineer grants a permit that authorizes the use of the water. As discussed in Section III below, the Nevada Legislature has provided the Lincoln County Water District with the authority to serve water to all real property located within the boundaries of Lincoln County. Nevada water law requires that an applicant provide evidence of an actual beneficial use for the water applied for[13] and proof satisfactory to the State Engineer of his intention in good faith to construct any work necessary to apply the water to the intended beneficial use with reasonable diligence and his financial ability and reasonable expectation to actually construct the work and apply the water to the intended beneficial use with reasonable diligence.[14] The State Engineer finds, as discussed below, that the Applicant provided substantial evidence of a project where the water applied for would be used and proof satisfactory of construction of the work to apply the water to the intended beneficial use with reasonable diligence and the financial ability and reasonable expectation to actually construct the work and apply the water to the intended beneficial use with reasonable diligence.

II.

The Listers' protests allege that they have long argued that moving water from one basin to another is detrimental to the originating basin. The State Engineer finds that Nevada water law specifically provides for the interbasin transfer of water provided the applicant meets all of the

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[12] Exhibit No. 1.
[13] NRS § 533.035.
[14] NRS § 533.370.

necessary criteria found in the Nevada Revised Statutes, including but not limited to NRS §§ 533.370(5) and (6). Nevada Revised Statute § 533.370(6)(c) and (d) require the State Engineer to take into consideration whether the proposed action is environmentally sound as it relates to the basin from which the water is exported and whether the proposed action is an appropriate long-term use which will not unduly limit the future growth and development in the basin from which the water is exported. The State Engineer finds Nevada water law requires the State Engineer to consider factors relevant to the originating basin, but specifically provides for the interbasin transfer of water.

III.

The Listers' protests allege that the Lincoln County Water District is supposed to be a local government entity protecting and planning for the benefit of the citizens of Lincoln County but, that in teaming up with Vidler Water Company, the Lincoln County Water District has become merely speculative with the sole objective to make a profit. In 2003, the Nevada Legislature enacted legislation that provided for the creation of the Lincoln County Water District.[15] The special legislative act that created the Lincoln County Water District provided that its jurisdiction and service area are all the real property located within the boundaries of Lincoln County and authorized the Lincoln County Water District to sell water and water rights and to enter into agreements with a private entity or corporation for the transfer or delivery of any water right or water appropriated.[16]

The State Engineer finds the Nevada Legislature gave the Lincoln County Water District its authority. The State Engineer finds the Lincoln County Water District like any other applicant has to demonstrate a beneficial use for the water applied for under these applications and has to satisfy the other statutory requirements. The State Engineer finds if the Protestant Listers have an issue with the operation of the Lincoln County Water District that is a matter outside of the State Engineer's jurisdiction.

IV.

Through testimony and evidence, the Applicants' expert witnesses presented their interpretation of the geology and hydrogeology of the Kane Springs Valley and vicinity. They conclude that the northern portion of the valley is underlain by a volcanic caldera complex and,

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[15] Chapter 474, Statutes of Nevada 2003.
[16] *Id.* at Sections 11(7), 11(11), and 11(12).

therefore, has low potential for regional ground-water flow. However, they interpreted the evidence as indicating that the southwestern portion of the basin is underlain by a significant thickness of carbonate rocks.[17] The Applicants conducted a pumping test at their well KPW-1 and, based on the results of the test and their interpretation of the geology, concluded that there is the potential for considerable ground-water movement through the Paleozoic carbonate rocks in Kane Springs Valley.[18] The Kane Springs Wash fault zone is oriented in a northeasterly direction, and is thought to both channel ground-water flow along its length from northeast to southwest, and to act as a barrier to ground-water flow across it from north to south. The witnesses also presented testimony supporting ground-water inflow into the Kane Springs Valley from the north.[19]

The State Engineer finds that the Applicants' interpretation of ground-water movement in the Kane Springs Valley from northeast to southwest and into Coyote Spring Valley, preferentially along the Kane Springs Wash fault zone, is generally consistent with the available data. The State Engineer further finds that the Applicants' pumping test supports the conclusion that there is considerable potential for ground-water flow in the carbonate rocks in the vicinity of well KPW-1. The State Engineer also finds that there was not sufficient evidence presented to support a determination of the potential for ground-water inflow into the Kane Springs Valley.

V.

The Applicants presented evidence to quantify subsurface inflow and outflow across the Kane Springs Valley Hydrographic Basin boundaries. The Applicants propose that ground water enters Kane Springs Valley from northern Coyote Spring Valley, passing through its western tip, and exits southwesterly back into Coyote Spring Valley. Local recharge is thought to combine with the inflow and exit the basin to the southwest. Since the water table is relatively deep in Kane Springs Valley and ET of ground water is negligible, virtually all ground-water discharge from the basin must occur via subsurface outflow.

Mr. Lewis applied Darcy's law to estimate the magnitude of the ground-water inflow into Kane Springs Valley Hydrographic Basin via a three-mile corridor on the western edge of Kane Springs Valley.[20] Darcy's law states the volume of flow is equal to aquifer transmissivity multiplied by aquifer width multiplied by the hydraulic gradient. He estimated transmissivity for

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[17] Transcript, pp. 43-47, 57; Exhibit No. 15, pp. 13-14; Exhibit No. 20, pp. 3-4.
[18] Transcript, pp. 58-59, 62-63.
[19] Exhibit No. 20, pp. 6-13.
[20] Exhibit No. 20, pp. 6-13.

the "bulk aquifer" from the pumping test performed at the well identified as KPW-1. He then multiplied that value by three on the assumption that the aquifer is three times thicker than penetrated by the test well. For a value of hydraulic gradient, Mr. Lewis used water levels in wells CSVM-3 and CE-VF-2, which are located near the center of Coyote Spring Valley.

The State Engineer finds the Applicants' inflow analysis is overly interpretive and without sufficient supporting evidence. Inflow into the basin is proposed to occur through a three-mile wide zone on the western basin boundary. Flow direction is assumed to be from the north to south even though there are no local hydraulic head data to support the hypothesis of hydraulic gradient or flow direction. The Applicants' witness used hydraulic data from the KPW-1 pumping test, which is located approximately six miles from the proposed inflow area. The hydraulic gradient is assumed to be equal to that between wells CSVM-3 and CE-VF-2 even though these wells are located six and 15 miles away, respectively, from the proposed inflow zone. Inflow through the three-mile wide corridor is proposed by the Applicants to be 13,000 acre-feet per year. This amount is approximately one-third of the total amount of regional flow from Pahranagat and Delamar Valleys to Coyote Spring Valley of approximately 37,000 acre-feet per year.[21] However, the proposed flow corridor into Kane Springs Valley is a relatively narrow zone at the corner of the basin. Geologic structures in the area of the proposed inflow corridor strike north northeasterly, and may have the effect of channeling flow along them parallel to the basin boundary, similar to the conceptual model of the Applicants along the Kane Spring and Willow Spring fault zones. Geologic cross-section B-B' shows a thrusted block of low-permeability basement rocks that would act to block potential inflow.[22] The State Engineer finds that sufficient data does not exist to substantiate or reliably estimate subsurface flows into the Kane Springs Valley Hydrographic Basin and the Applicants' inflow estimates are hereby discounted and not accepted.

The Applicants' outflow analysis utilized two estimates of transmissivity from the KPW-1 pumping test. This analysis used a measured transmissivity of 50,000 gallons per day/foot (gpd/ft), which is thought to be representative of the regional carbonate aquifer and a transmissivity of 300,000 gpd/ft, which is thought to be representative of the local Willow Spring fault zone. The Applicants "scaled-up" the pumping test transmissivities to a basin scale by

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[21] State Engineer's Office, *Water for Nevada, State of Nevada Water Planning Report No. 3*, Oct. 1971.
[22] Exhibit No. 15.

multiplying the values by three. Outflow is thought to occur in a southwesterly direction parallel to the axis of the Kane Springs Valley. The outflow corridor is estimated to be four-miles wide by 3,000 feet thick. They attribute one-half mile of the four-mile width to the fault zone and the remaining three and one-half miles to regional conditions, each having separate hydraulic gradients for their flow calculations. For the regional flow they used a gradient of 0.005, and for the structural zone they used a gradient of 0.0005. Total basin outflow was calculated to be 16,000 acre-feet per year.[23]

The State Engineer finds several irregularities and inconsistencies with the Applicants' analysis. The Applicants' hydrologist used a hydraulic gradient of 0.005 for the regional component of flow based on the water levels in wells CSVM-3 and CE-VF-2, which are located near the center of Coyote Spring Valley, rather than using a hydraulic gradient of 0.0004 for the regional component of flow based on water levels in wells KPW-1 and CSVM-4, which are located at the outflow of Kane Springs Valley Hydrographic Basin and better situated to measure the applicable gradient.[24] The Applicant calculated the regional component of outflow to be 15,000 acre-feet per year using the hydraulic gradient of 0.005 as opposed to an outflow calculation of 1,250 acre-feet per year using the lower hydraulic gradient of 0.0004. The State Engineer finds that using the higher hydraulic gradient of 0.005 to compute outflow from Kane Springs Valley Hydrographic Basin rather than using the lower gradient of 0.0004 between KPW-1 and CSVM-4 is in error and inconsistent with the Applicants' documented conceptual view of the flow system.[25]

The Applicants' estimate of outflow along the structural zone was computed separately using a transmissivity of 900,000 gpd/ft and a hydraulic gradient of 0.0005. The State Engineer finds the Applicant incorrectly approximated the hydraulic gradient to be 0.0005, and should have used a hydraulic gradient of 0.0004.[26] Based on the actual hydraulic gradient of 0.0004 the resulting basin outflow along the structural zone would then be 1,000 acre-feet per year. Adding the estimated outflow along the structural zone of 1,000 acre-feet per year to the regional flow of 1,250 acre-feet per year results in an estimated basin outflow of 2,250 acre-feet annually rather than the Applicants' calculation of 16,000 acre-feet annually.

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[23] Exhibit No. 16.
[24] *Ibid.*, pp. 20 and 31.
[25] Exhibit No. 17, p 21.
[26] Exhibit No. 20, p. 11.

The State Engineer finds the Applicants' inflow and outflow analyses lack sufficient data to provide a reliable estimate of basin boundary flows. Furthermore, he finds the Applicants' conceptual analyses were overly interpretive and, in part, were inconsistent with their conceptual model of regional flow. The State Engineer finds that sufficient data were not collected or presented to substantiate the Applicants' estimate of subsurface flow into or out of the Kane Springs Valley Hydrographic Basin.

VI.

The Applicant presented a witness to address the geochemical framework of the Kane Springs Valley Hydrographic Basin and the White River flow system south of the Pahranagat shear zone. The witness presented evidence on stable isotopes, major ion chemistry, and carbon-14 analyses.[27] In summary, the geochemical evidence supports the ground-water gradient data that indicates Kane Springs Valley ground water flows into Coyote Spring Valley and that, in general, water in the White River flow system flows from north to south and mixes with local recharge en route to discharge areas. The witness presented deuterium data collected from springs in Kane Springs Valley believed to represent local recharge water, springs in Pahranagat Valley believed to represent regional carbonate water, and ground water from KPW-1 believed to represent a mix of local recharge water and regional carbonate water. Using a mixing equation the witness computed the percent of regional carbonate ground water from the KPW-1 deuterium sample to equal 77 percent.[28] If the same analysis is repeated using oxygen-18 instead of deuterium, the percent of regional carbonate ground water from the KPW-1 oxygen-18 sample equals 87 percent.[29] As previously discussed, the reinterpretation of the Applicants' subsurface outflow analysis resulted in approximately 2,250 acre-feet per year of basin outflow from the Kane Springs Valley Hydrographic Basin. The State Engineer finds applying the percentages of regional carbonate ground water from KPW-1 for both the deuterium and oxygen-18 samples, the local ground-water recharge component of the outflow would therefore be approximately 518 acre-feet per year and 293 acre-feet per year, respectively. These values appear to support the reconnaissance estimate of 500 acre-feet per year of recharge, however, it is recognized that the re-interpreted outflow is only an estimate, and its value is limited due to uncertain hydraulic parameters.[30]

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[27] Testimony of R. Glanzman; Exhibit No. 32.
[28] Exhibit No. 117, p. 10.
[29] Exhibit No. 34, Table 1, p. 2.
[30] State Engineer's Office, *Water for Nevada, State of Nevada Water Planning Report No. 3*, Oct. 1971.

VII.

Testimony and evidence was presented in an attempt to support a determination that significantly more water is locally recharged in the Kane Springs Valley Hydrographic Basin than previously reported. The Applicants presented Mr. Walker, who possesses a background in range management, as a witness who used plant communities as a method to estimate precipitation. However, Mr. Walker also testified that the use of plant communities as a method to calculate recharge does not exist, and his methodology for calculating recharge is not used anywhere else in the United States.[31] The Applicants then presented Mr. Lewis for the purpose of using Mr. Walker's estimation of precipitation for the establishment of new recharge estimates in the Kane Springs Valley Hydrographic Basin.[32]

Reconnaissance investigations by the U.S.G.S. estimate the combined recharge for Kane Springs Valley, Coyote Spring Valley and the Muddy River Springs Area to be 2,600 acre-feet annually.[33] Recharge for Kane Springs Valley was further delineated in 1971 and was estimated to be 500 acre-feet per year.[34] The methods and estimates presented by the Applicants in Exhibit Nos. 29 and 30 used four estimates of precipitation. With each of the four estimates of precipitation, ground-water recharge was then estimated using two methods: a version of the well-known Maxey-Eakin technique and a water budget method. In total, the Applicants computed eight recharge estimates ranging from 5,300 to 14,155 acre-feet per year[35]

One method for estimating precipitation tied plant communities to precipitation and elevation, and then used elevation zones to distribute precipitation throughout the basin. The second method used a spatial distribution of vegetative zones and their respective precipitation based on a United States Department of Agriculture, Natural Resource Conservation Service technical guide for ecological site descriptions.[36] A third precipitation method used PRISM[37]

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[31] Transcript, pp. 244, 264.
[32] Transcript, pp. 245-246.
[33] T.E. Eakin, *Ground- water Resources – Reconnaissance Series Report 25, Ground-water Appraisal of Coyote Spring and Kane Spring Valleys and Muddy River Springs Area, Lincoln and Clark Counties, Nevada*, State of Nevada, Department of Conservation and Natural Resources, United States Department of Interior, Geologic Survey, February 1964.
[34] Transcript, p. 253.
[35] Exhibit No. 16, p. 5.
[36] Exhibit No. 29, pp. 6, 15-17.
[37] PRISM – Parameter-elevation Regressions on Independent Slopes Model and is a method of spatially distributing precipitation.

modeled precipitation.[38] The last precipitation estimate was based on a local altitude-precipitation method developed by the Las Vegas Valley Water District.[39] For each of these precipitation estimates, Mr. Lewis applied both a numerical form of the Maxey-Eakin technique and water budget approach for estimating recharge.

However, Mr. Halford, as expert witness for the Protestant National Park Service, testified that the use of the Maxey-Eakin technique in each of these cases was in error,[40] because using the Maxey-Eakin recharge coefficients with any precipitation estimates other than the Hardman precipitation map is inappropriate. The Maxey-Eakin recharge coefficients are married to the Hardman map and cannot be used otherwise.[41] Mr. Halford testified that if one is going to develop a new method of estimating recharge they must have the precipitation maps for the area of interest and controls on ground-water discharge, and then they can develop new recharge coefficients based on that information.[42]

The Applicants also used a water-budget approach with each of the precipitation estimates to arrive at an estimate of recharge. In the approach for Kane Springs Valley Hydrographic Basin, it was estimated that recharge is equal to precipitation less the sum of evapotranspiration (ET), surface runoff and spring discharge. Surface runoff and spring discharge were each estimated to average a few hundred acre-feet annually; therefore, recharge was estimated to be approximately equal to precipitation minus ET. Due to the lack of ET measurements or estimates of ET in Kane Springs Valley, the Applicants used data from a United States Geologic Survey report on evapotranspiration in Ruby Valley, over 200 miles to the north.[43] Their evidence provides that a report prepared by Berger in 2001 reports an estimate of ET using the Bowen-ratio method for an upland-shrub non-phreatophytic plant community of 12 inches per year where annual precipitation was estimated to be 13 to 15 inches.[44] On that basis, the Applicants assume 12 inches per year of ET for areas receiving 13 to 15 inches of precipitation in Kane Springs Valley and 13 inches per year of ET for areas receiving greater than 15 inches per year of precipitation.

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[38] Exhibit No. 29, p. 9.
[39] Exhibit No. 54, public administrative hearing before the State Engineer, July 16-20, 23-27, 2001, official records in the Office of the State Engineer.
[40] Transcript, pp. 489-520.
[41] Transcript, p. 493.
[42] Transcript, p. 495.
[43] Exhibit No. 29, p. 13.
[44] *Ibid.*

However, the State Engineer believes the Applicants misinterpreted and/or misapplied the data from the Berger 2001 report, which states that precipitation at the Ruby Lake National Wildlife Refuge site for the 2000 water year was only 7.74 inches, or 58 percent of the 1961 to 1990 30-year average of 13.3 inches.[45] During this same time period, ET at the upland-shrub site was 11.96 inches.[46] The report does not indicate what ET rates might be in the upland-shrub community during average precipitation years, although the data does support higher daily ET rates in the summer months when there was an increase in available soil moisture from precipitation.[47] In addition, the Applicants did not provide evidence suggesting that the ET rates in areas that receive greater than 15 inches per year would remain constant at 13 inches. The Applicants also did not address other factors that differ between Kane Springs Valley and Ruby Valley that could have an effect on ET rates such as differences in temperature, solar radiation, time and type of precipitation, and variable plant species distinct from those in Kane Springs Valley.

The State Engineer recognizes the difficulty in accurately estimating recharge and even the Applicants admit that estimates of recharge are extremely problematic as it is a parameter that cannot be measured directly.[48] The State Engineer agrees that recharge is a very difficult parameter to measure, and if it is used to determine perennial yield, the uncertainty in the estimates must be recognized and a conservative approach taken. Given the uncertainties inherent in estimating recharge and the validity in the testimony of the Protestant's expert stating that the recharge technique applied was in error and inappropriate, the State Engineer finds that the Applicants' evidence and testimony lack the scientific and practical basis to substantiate the proffered recharge of 5,000 to 14,000 acre-feet annually and are hereby discounted and not accepted. However, the State Engineer also recognizes that the current reconnaissance estimate of average annual recharge is probably low.

The Death Valley flow system area lies west and southwest of Kane Springs Valley. Because the Kane Springs Valley climate, latitude, geology and soil types are similar to the Death Valley flow system basins, it is reasonable to expect that similar precipitation amounts will result in

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[45] D.L. Berger, M.J. Johnson, M.L. Tumbusch, *Estimates of Evapotranspiration from the Ruby Lake National Wildlife Refuge Area, Ruby Valley, Northeastern Nevada, May 1999-October 2000,* Water-Resources Investigations Report 01-4234, United States Department of Interior, Geological Survey, Nevada Division of Water Resources and the United States Department of Interior, Fish and Wildlife Service, 2001.
[46] *Id.* at 25.
[47] *Id.* at 20.
[48] Transcript, p. 267.

similar amounts of ground-water recharge. Recharge within the Death Valley regional flow system has been calibrated to measured discharge, and therefore provides a greater level of certainty than recharge estimates made without a comparative discharge.[49] Several basins within the Death Valley regional flow system have similar amounts of precipitation as Kane Springs Valley with the ground-water recharge in those basins ranging from 1% to 2% of total precipitation.[50] Recent estimates of precipitation in the Kane Springs Valley range from 120,000 to 140,000 acre-feet per year as opposed to the Hardman estimate of 80,000 acre-feet per year.[51] Using a recharge to precipitation ratio of 1% to 2% as found in the Death Valley regional flow model for basins with similar amounts of precipitation, the recharge in Kane Springs Valley would be 1,200 to 2,800 acre-feet per year, which is substantially less than the Applicants' estimate of recharge of 5,000 to 14,000 acre-feet annually. This is a qualitative comparison, and is not proposed by the State Engineer to definitively estimate recharge in Kane Springs Valley, but serves as a barometer, for comparative purposes only, of recharge estimates in this area. The State Engineer finds recharge in Kane Springs Valley is uncertain, but is likely greater than the reconnaissance estimate of 500 acre-feet per year and less than the Applicant's estimates of 5,000 to 14,000 acre-feet per year.

VIII.

The perennial yield of a ground-water reservoir may be defined as the maximum amount of ground water that can be salvaged each year over the long term without depleting the ground-water reservoir. The perennial yield cannot be more than the natural recharge to a ground water basin and in some cases is less. 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 must take into consideration the amount of water appropriated in the upgradient basin and discount the amount from inflow into the downgradient basin. If the water appropriated in an upgradient basin is not deducted from the amount which discharges to the downgradient basin, it creates the potential for double accounting and regional over appropriation. Thus, the State Engineer is still able to manage the ground-water basins as they have been historically managed administratively, but also take into consideration the concerns that arise for ground-water basins that are hydrologically connected.

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[49] Belcher, W., ed., 2004 Death Valley Regional Ground-Water Flow System, Nevada and California – Hydrogeologic Framework and Transient Ground-Water Flow Model, USGS SIR 2004-4205.
[50] Belcher, W., ed., 2004, Death Valley Regional Flow Model, USGS SIR 2004-4205.
[51] Exhibit 16, p. 5.

The Applicants propose that ground water flows from upgradient basins through Kane Springs Valley into downgradient basins. In the case of the Kane Springs Valley Hydrographic Basin, the upgradient basin and the downgradient basin is the Coyote Spring Valley Hydrographic Basin. That is, ground water is proposed to flow from northern Coyote Spring Valley into Kane Springs Valley then back into Coyote Spring Valley. The Protestant NPS argues that the State Engineer should consider any inflow into Kane Springs Valley from the Coyote Spring Valley as previously allocated in Coyote Spring Valley and the subsequent outflow from Kane Springs Valley should be permitted to flow into Coyote Spring Valley in its entirety to meet the approximate 16,000 acre-feet per year of senior appropriated rights there. The majority of those senior water rights were issued with the intent to develop ground water from the White River regional carbonate-rock aquifer system. Given the unique hydrologic connection between the Kane Springs Valley Hydrographic Basin and the Coyote Spring Valley Hydrographic Basin, the development of ground water within Kane Springs Valley will ultimately affect water levels and flows in the White River regional carbonate-rock aquifer system. However, the State Engineer believes a small amount of water can be developed in the Kane Springs Valley and not unreasonably impact existing rights in the discharge areas of the White River carbonate-rock aquifer system, which are already fully appropriated. Well KPW-1 lies within 1,000 feet of Coyote Spring Valley and pumping simulations by the Applicant show a cone of depression extending well into Coyote Spring Valley. To further minimize potential effects on existing rights in the discharge areas of the White River carbonate-rock aquifer system, the State Engineer will limit the amount of ground water that can be pumped from wells in Kane springs Valley near the boundary with Coyote Spring Valley. After careful consideration of the uncertainties regarding the ranges of ground-water recharge, quantification of subsurface inflows and outflows, the demonstrated connection of Kane Springs Valley with the White River Regional flow system, and senior appropriated rights in the down-gradient basins, the State Engineer finds that 1,000 acre-feet is a reasonable amount to allow for appropriation from Kane Springs Valley.

IX.

Nevada Revised Statute § 533.370(5) provides that an applicant provide proof satisfactory to the State Engineer of his intention in good faith to construct any work necessary to apply the water to the intended beneficial use with reasonable diligence and his financial ability and

reasonable expectation to actually construct the work and apply the water to the intended beneficial use with reasonable diligence. Nevada Revised Statute § 533.375 provides that in the case of an application or multiple applications proposing to divert more than 10 cubic feet per second (such as the applications under consideration here) the State Engineer may require in the case of an incorporated company the submission of articles of incorporation, the names and places of residence of directors and officers and the amount of its authorized and paid-up capital. If the applicant is not an incorporated company, he may require a statement as to the name of the person proposing to construct the work, and a showing of facts necessary to enable him to determine whether the applicant has the financial ability to carry out the proposed work and whether the application has been made in good faith.

The Applicants presented the Chairwoman for the Lincoln County Water District, Rhonda Hornbeck, as a witness who testified that the Lincoln County Water District through its partner Vidler Water Company has an agreement with Coyote Springs Investment (CSI) to provide wholesale water to CSI's development. Additionally, the witness indicated they are working with the United States Department of Interior, Bureau of Land Management to gain a right of way to bring water from the wellhead down to the CSI property. The testimony indicated that a general improvement district is in place, as is a planned unit development.[52] The Applicants provided evidence on the plan of development, which is a report that was submitted to the United States Department of Interior, Bureau of Land Management, that identifies how the ground water will be withdrawn, how the pipes will be installed, what equipment is needed to complete the well and addresses the pipeline project to deliver the water to the place where it will be used, and pipeline permitting is underway.[53]

When questioned whether the Lincoln County Water District had the financial resources to place the water to beneficial use, the witness for the Lincoln County Water District provided several scenarios as to how those financial resources might be obtained, but did not provide any specific evidence of having the financial resources in place. The testimony indicated that the possibilities include: (1) floating a bond with its partner Vidler Water Company; (2) asking the State of Nevada

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[52] Transcript, pp. 388-389; Exhibit No. 41; Exhibit No. 122 (Agreement dated Oct. 17, 2005, between Coyote Springs Investment, LLC and Lincoln County Water District and Vidler Water Company - marked as an exhibit after the hearing when document was filed upon request of the State Engineer.)
[53] Transcript, p. 95; Exhibit No. 26.

for a low-interest loan; or (3) a development agreement with CSI, where CSI would pay for the infrastructure to place the water to beneficial use; however the witness then testified there is already an agreement in place with CSI paying the cost of infrastructure.[54]

Dorothy-Timian Palmer, as a witness for the Applicants, testified that Vidler Water Company has already drilled a production well and a monitoring well and has spent a considerable amount of money on field work and analyses of that field work and has the financial ability to construct the work necessary to put the water to beneficial use.[55] The Agreement between CSI, the Lincoln County Water District and Vidler Water Company provides that CSI will purchase "all water available within the Kane Springs Basin." "Upon payment in full of the purchase price of Kane Water, the DISTRICT and VIDLER will convey the Kane Water by Water Rights Deed to CSI and will partially assign to CSI certain rights and delegate to CSI certain obligations related to the underlying water rights permit(s)."[56] The Applicants only intend to develop the water to the wellhead and CSI will develop the infrastructure to deliver the water from the wellhead to the development.[57]

Harvey Whittemore, as a witness for the Applicants, testified that within the CSI project there would be two separate general improvement districts. The one in Lincoln County has already been formed; however, the one in Clark County was to be formed in June 2006. The testimony indicated that the water rights already held by CSI will be assigned for the benefit of the general improvement districts and the Clark and Lincoln County Commissions will act as trustees for the general improvement districts. Mr. Whittemore indicated that the development is at a stage where all of the approvals necessary for the first phase of construction have been acquired with respect to Clark County. As to the Lincoln County portion of the project, it is still subject to the completion of a multi-species habitat conservation plan, as well as a number of additional approvals from federal agencies. The water rights at issue here would ultimately be owned by the developer CSI and then transferred to the Lincoln County General Improvement District.[58] CSI has already received approval in the form of parcel maps, zoning entitlement and development agreements for 49,000 units in Clark County and 110,000 units in Lincoln County.[59]

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[54] Transcript, pp. 392-393.
[55] Transcript, pp. 458-461.
[56] Exhibit No. 122.
[57] Transcript, pp. 412-415.
[58] Transcript, pp. 419-420.
[59] Transcript, pp. 427, 439; Exhibit Nos. 43, 44, 45.

The State Engineer finds the Applicants provided proof satisfactory to the State Engineer of an intention in good faith to construct any work necessary to apply the water to the intended beneficial use with reasonable diligence and a reasonable expectation to actually construct the work and apply the water to the intended beneficial use with reasonable diligence.

X.

Testimony and evidence indicate there are no permitted or certificated groundwater rights in Kane Springs Valley Hydrographic Basin.[60] However, the witness for the NPS testified that Kane Springs Valley Hydrographic Basin and Coyote Spring Valley are hydrographically and hydrologically one and the same basin. Approximately 16,100 acre-feet have been appropriated in Coyote Spring Valley and applications are pending for another 200,000 acre-feet annually. Therefore, there is no water available for appropriation.[61] The State Engineer finds no water has been appropriated in Kane Springs Valley Hydrographic Basin and by limiting the quantity of water authorized for appropriation, the potential impacts to existing rights in down-gradient hydrographic basins will be minimized.

XI.

Nevada Revised Statute § 533.370(6) provides that in determining whether an application for an interbasin transfer of ground water must be rejected the State Engineer shall consider: (a) whether the applicant has justified the need to import water from another basin; (b) if the State Engineer determines that a plan for conservation of water is advisable for the basin into which the water is to be imported, whether the applicant has demonstrated that such a plan has been adopted and is effectively being carried out; (c) whether the proposed action is environmentally sound as it relates to the basin from which the water is exported; (d) whether the proposed action is an appropriate long-term use which will not unduly limit the future growth and development in the basin from which the water is exported; and (e) any other factor the State Engineer determines is relevant.

Testimony was provided as to the extent of the project proposed in Coyote Spring Valley and estimates of the quantity of water necessary to carry out the project. That testimony satisfactorily addresses the provision of whether the applicant has justified the need to import water

[60] Transcript, pp. 208-209.
[61] Transcript, pp. 589-594.

from another basin.[62] Testimony was provided that indicated conservation measures are in place for the planned development similar to traditional development measures associated with development in southern Nevada that have been adopted and imposed,[63] and there is no evidence that the appropriation of water from Kane Springs Valley Hydrographic Basin will damage the environment of the valley.

Testimony was provided that indicated there is no private land within Kane Springs Valley Hydrographic Basin, rather all land within the valley is owned by the federal government; therefore, the use of the water will not unduly limit future growth and development in Kane Springs Valley Hydrographic Basin.[64]

The State Engineer finds the evidence does not support rejection of the application for an interbasin transfer of water.

XII.

Witnesses for both the Applicants (Glanzman)[65] and the Protestant NPS (Van Liew)[66] agree that the discharge at Rogers and Blue Point Springs in the Lake Mead National Recreation Area is not entirely carbonate-rock aquifer discharge, but is composed of some local precipitation that infiltrates and mixes with the carbonate-rock aquifer water that is flowing toward land surface along fault structures. Mr. Glanzman testified that in general when water in the White River flow system flows from north to south it mixes with local recharge en route to discharge areas at the Muddy River Springs Area and Rogers Springs and Blue Point Springs.[67] Using isotopic data, Mr. Glanzman estimated that approximately 25% of the discharge at Rogers Springs and Blue Point Springs could be characterized as regional carbonate water. For purposes of his analysis, Mr. Glanzman considered water in the carbonate aquifer of Pahranagat Valley to be 100% carbonate water.[68,69] Mr. Van Liew testified that discharge from the White River flow system appears to be predominantly at the Muddy River Springs, Rogers Springs and Blue Point Springs and raised the

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[62] Transcript, pp. 427-445.
[63] Transcript, pp. 428-429.
[64] Transcript, pp. 207-208.
[65] Transcript, pp. 115-203, 221-236.
[66] Transcript, pp. 523-621.
[67] Exhibit No. 34; Transcript, pp. 115 –203, 221-236.
[68] Transcript, pp. 137-138.
[69] Exhibit No. 117.

argument that there does not seem to be anywhere else for the ground water to flow. In addition, he doubted much water moved out to the Lake Mead area and testified that the ground-water gradient supports that conclusion.

The State Engineer finds there is not substantial evidence that the appropriation of the limited quantity being granted under this ruling will likely impair the flow at Muddy River Springs, Rogers Springs or Blue Point Springs.

XIII.

By letter dated February 6, 2006, the NPS and FWS requested the State Engineer amend State Engineer's Order No. 1169 to include the Kane Springs Valley Hydrographic Area.[70] The reasoning behind the request is that these agencies believe Kane Springs Valley and Coyote Spring Valley, while administratively classified as separate hydrographic basins, are actually a single distinct hydrologic drainage basin and should be managed as such. However, during the public administrative hearing, the FWS indicated that the resolution of its protests pursuant to the Stipulation also goes to its statements in the February 6, 2006, letter. Thus, the Stipulation was presented in place of the FWS request to include Kane Springs Valley within the provisions of Order No. 1169.[71] However, the request by the NPS to include the Kane Springs Valley Hydrographic Basin within the provisions of Order No. 1169 still remains. Thus, two separate agencies within the United States Department of Interior take different positions with regard to the request to include Kane Springs within the provisions of Order No. 1169.

The witness for the Protestant NPS testified as to various reports and information that all conclude that the discharge from the Muddy River Springs is regional in nature, that a sufficient quantity does not come from local recharge to support the discharge and that a substantial portion of the discharge of the region is concentrated in the Muddy River Springs Area.[72] Citing to Exhibit No. 91, the witness noted that the writer of that report found that the "Coyote Springs Valley, Kane Springs Valley and the Muddy River Springs hydrographic areas (1,025 square miles) in southern Lincoln and Clark Counties have been combined for this report because the areas are hydrologically and topographically connected."[73] The faults in the area are believed to control the majority of

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[70] Exhibit No. 10.
[71] Transcript, pp. 12-13.
[72] Transcript, pp. 530-581; *See*, Exhibit Nos. 87, 88, 91.
[73] Transcript, p. 533.

ground-water movement through the carbonate aquifer, including Kane Springs Wash fault zone, which the witness believes to be a conduit for flow to Coyote Spring Valley.[74] Additionally, the NPS witness believes that the Kane Springs Valley Hydrographic Basin and the Coyote Spring Valley are one hydrographic area.[75]

A witness for the Applicants indicated that there is a presumption that the Kane Springs Wash fault zone is effectively a no-flow boundary such that water flowing into Kane Springs Valley Hydrographic Basin flows out of Kane Springs Wash into Coyote Spring Valley, and that the water that is recharged in Kane Springs Valley Hydrographic Basin flows into Coyote Spring Valley.[76] Additionally, evidence developed from the well pump test and analyzed in conjunction with other evidence, such as the implication of a flat gradient, indicates a relatively high transmissivity across the southern half of the study area, indicating a high potential for regional ground-water flow.[77]

The State Engineer finds the evidence indicates a strong hydrologic connection between Kane Springs Valley and Coyote Spring Valley, specifically, that ground water flows from Kane Springs Valley into Coyote Spring Valley. However, carbonate water levels near the boundary between Kane Springs Valley and Coyote Spring Valley are approximately 1,875 feet in elevation, and in southern Coyote Spring Valley and throughout most of the other basins covered under Order No. 1169, carbonate-rock aquifer water levels are mostly between 1,800 feet and 1,825 feet. This marked difference in head supports the probability of a low-permeability structure or change in lithology between Kane Springs Valley and the southern part of Coyote Spring Valley. The State Engineer finds Order No. 1169 was issued to address the requests for the additional appropriation of water filed in Coyote Spring Valley, but the focus of the additional study ordered is the Muddy River Springs Area. The State Engineer finds there is not substantial evidence that the appropriation of a limited quantity of water in Kane Springs Valley Hydrographic Basin will have any measurable impact on the Muddy River Springs that warrants the inclusion of Kane Springs Valley in Order No. 1169. Therefore, the State Engineer denies the request to hold these applications in abeyance and include Kane Spring Valley within the provisions of Order No. 1169.

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[74] Transcript, pp. 545-550.
[75] Transcript, pp. 589-591.
[76] Transcript, pp. 291, 303.
[77] Transcript, pp. 329-330.

XIV.

The Applicants requested that the State Engineer act on Applications 72220 and 72221 and grant them for a total combined duty of 5,000 acre-feet annually and hold Applications 72218 and 72219 in abeyance. The State Engineer finds that the total amount of 1,000 acre-feet annually of groundwater available to be appropriated in Kane Springs Valley Hydrographic Basin is less than the requested 5,000 acre-feet annually; therefore the State Engineer finds he will not hold any of the applications in abeyance.

CONCLUSIONS

I.

The State Engineer has jurisdiction over the parties and the subject matter of this action and determination.[78]

II.

The State Engineer is prohibited by law from granting a permit to appropriate the public waters where:[79]

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 protectible 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 to permit the appropriation of water in an amount greater than permitted under this ruling will conflict with existing rights and threaten to prove detrimental to the public interest.

RULING

The protests to the applications are hereby upheld in part and overruled in part. Application 72220 is hereby granted for a duty of 500 acre-feet annually. Applications 72218, 72219, and 72221 are hereby granted for a total combined duty of 500 acre-feet annually.

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[78] NRS chapters 533 and 534.
[79] NRS 533.370(5).

Applications 72218, 72219, 72220, and 72221 are granted subject to:

1. The payment of statutory permit fees;
2. A monitoring plan to be approved by this office.

Respectfully submitted,

Tracy Taylor, P.E.

TRACY TAYLOR, P.E.
State Engineer

TT /jm

Dated this 2nd day of February, 2007.