

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

IN THE MATTER OF APPLICATIONS 55450)
AND 58269 FILED TO APPROPRIATE THE)
WATERS FROM AN UNDERGROUND SOURCE)
IN THE MUDDY RIVER SPRINGS AREA)
(219) CLARK COUNTY, NEVADA.)

RULING

4243

GENERAL

I.

Application 55450 was filed on November 9, 1990, by Moapa Valley Water District (MVWD) to appropriate 3.0 cfs of water from an underground source for municipal purposes. The proposed point of diversion is the existing Arrow Canyon well and is located within the SE $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 7, T.14S., R.65E., M.D.B.&M. The proposed place of use is the Moapa Valley Water District service area.¹

II.

Application 58269 was filed on October 27, 1992, by MVWD to appropriate 5.0 cfs of water from an underground source for municipal purposes. The proposed point of diversion is the Arrow Canyon well located as described above. The proposed place of use is the Moapa Valley Water District service area.²

III.

Application 55450 was timely protested by Nevada Power Company (NPC). NPC requested that the State Engineer deny the applications because "If approved, the appropriate(sic) and diversion proposed by this application will eventually reduce or eliminate the underground and surface water resources within the surrounding groundwater basin. Nevada Power Company's senior water rights would thus be impaired."¹

¹ File No. 55450, official records in the Office of the State Engineer.

² File No. 58269, official records in the Office of the State Engineer.

Application 55450 was timely protested by the United States Department of the Interior, National Park Service (NPS). NPS requested that the State Engineer deny Application 55450 because "...if granted, would divert water from the ground-water flow systems which feed the springs in Lake Mead National Recreation Area."¹

IV.

Application 58269 was timely protested by the NPS. NPS requested that the State Engineer deny Application 58269 because "...if granted, would divert water from the ground-water flow systems which feed the springs in Lake Mead National Recreation Area."²

Application 58269 was timely protested by the United States Fish and Wildlife Service (FWS). FWS requested that the State Engineer deny Application 58269 because "...the proposed increased withdrawal from this well, as described in Application No. 58269, may not be in the public interest because it may adversely affect the resident and migratory fish and wildlife species and their habitats within the Moapa Valley..." and could be detrimental to "...a pending Service water right."²

V.

As a result of the protests to both applications, Moapa Valley Water District (MVWD) submitted a phased aquifer test plan to the State Engineer for approval. The plan was approved and a phase one 72-hour test and a phase two, 120-day aquifer test were conducted.³

VI.

On July 14, 1971, Muddy River Springs Area Ground Water Basin (219) was designated by the State Engineer as a basin in need of additional administration.⁴

³ File Nos. 55450 and 58269, official records in the Office of the State Engineer.

⁴ State Engineer's Order No. 392, dated July 14, 1971, official records in the Office of the State Engineer.

The proposed point of diversion of Applications 55450 and 58269 is not located within the designated portion of Muddy Springs Area Ground Water Basin. The point of diversion is an existing well, known as the Arrow Canyon well and is located immediately up gradient from the designated area.^{3,4}

VII.

A public administrative hearing was held before the State Engineer on January 24 through 26, 1995 in Las Vegas, Nevada to receive testimony and evidence pertaining to Applications 55450 and 58269. A continuation of January's hearing was held in Las Vegas on February 7 through 10, 1995.⁵

MOTIONS

I.

At the hearing, MVWD made two motions to the Hearing Officer. The decisions on the motions are entered below.

Mr. Marshall, counsel for MVWD, made a motion to strike certain portions of the protests filed by the NPS. Mr. Marshall felt that those portions referring to the Las Vegas Valley Water District filings and their alleged impacts to Death Valley National Monument and Devil's Hole are irrelevant to the matter of Applications 55450 and 58269.⁶

Mr. Palmer, counsel for NPS, agreed in part, that portions of the protests may not directly relate to this matter.⁷

Mr. Marshall's motion was resolved at the conclusion of the hearing. The NPS submitted revised versions of its protests in which irrelevant portions were removed. These revised protests

⁵ Exhibit No. DWR-1, Public Administrative Hearing before the State Engineer, January, February, 1995.

⁶ Transcript, pp. 6-8, Public Administrative Hearing before the State Engineer, January, February, 1995.

⁷ Transcript, p. 8, Public Administrative Hearing before the State Engineer, January, February, 1995.

were admitted into the record as Exhibit Nos. 5 and 6.⁸ Therefore, the motion to strike was rendered moot and no decision is necessary.

II.

Mr. Marshall's second motion was to strike that portion of the NPS protests that asserts federal reserved rights for the Lake Mead National Recreation Area (LMNRA). Mr. Marshall felt that there is no valid claim for reserved rights because LMNRA was established in 1964, long after the Muddy River system was declared fully appropriated.⁹

Mr. Palmer objected to the motion because any reserved right pertaining to LMNRA would be senior to Applications 55450 and 58269 and additional pumping of water as requested in said applications would have an impact to the springs in the LMNRA.¹⁰

It is unknown at this time, the location, quantity of water, and extent of any reserved right at the LMNRA. However, if reserved rights exist and are determined to be prior to Applications 55450 and 58269, then the State Engineer would consider any impacts on the reserved rights that said Applications may cause. If one or both of these applications were approved, they would be issued subject to any existing rights. It is not the purpose of this ruling to determine the existence of any federal reserve rights but the State Engineer is taking notice of the possibility of their existence. Therefore, the motion to strike the reference in the NPS protest to federal reserved rights is denied.

⁸ Transcript, pp. 1263-1264, Public Administrative Hearing before the State Engineer, January, February, 1995.

⁹ Transcript, pp. 9-10, Public Administrative Hearing before the State Engineer, January, February, 1995.

¹⁰ Transcript, pp. 10-11, Public Administrative Hearing before the State Engineer, January, February, 1995.

FINDINGS OF FACTS

I.

The area served by the MVWD is experiencing a population growth rate of about 5% per year and the water demand is increasing by 7% to 9% per year.¹¹ Considering this rate of increase, the base annual water demand and base peak daily demand are projected for future years and shown in Table I.¹²

Table I. Projection of Future Water Demand
Muddy Valley Water District

Year	Annual Water Demand, AF	Peak Daily Demand, CFS
1994	2,500	8.0
1996	2,800	9.2
1998	3,200	10.5
2000	3,600	12.0
2002	4,000	13.7
2004	4,500	15.8

MVWD presently holds existing water rights for underground and spring water of acceptable quality which allow the diversion of 8.0 cfs and the use of a total annual duty of 3985.33 AF.¹³

After 1994, the peak daily demand exceeded the permitted diversion rate of 8.0 cfs. The total annual water demand will not exceed that allowed under existing rights until the year 2002. The State Engineer finds that MVWD has an immediate need for additional water rights, such as those requested in Applications 55450 and

¹¹ Transcript, p. 798, Public Administrative Hearing before the State Engineer, January, February, 1995.

¹² Exhibit Nos. MWD-8 and MWD-9, Public Administrative Hearing before the State Engineer, January, February, 1995. The data shown in Table I were taken from these two exhibits.

¹³ Exhibit No. MWD-7, Public Administrative Hearing before the State Engineer, January, February, 1995.

58269, to satisfy the peak daily demand. The State Engineer further finds that MVWD holds existing water rights in excess of the predicted total annual water demand until the year 2002. In 2004, MVWD will need an estimated 4,500 AFA or 515 AFA of additional annual duty to meet the demand.

II.

The Arrow Canyon well is completed to a depth of 565 feet and draws water from a large regional aquifer, in which ground water flows in a generally southerly direction, through fractured carbonate rocks.¹⁴ This aquifer is known as the carbonate aquifer. The carbonate aquifer, in a complex and poorly understood manner, is hydraulically connected to a shallow, alluvial aquifer.¹⁵ Ground water flows from the carbonate aquifer at a higher potentiometric surface to the alluvial aquifer and surfaces at the numerous springs in the Muddy River Springs Area.¹⁶ Additionally, the carbonate aquifer is the source of water for the Muddy River.¹⁶ The State Engineer finds that Applications 55450 and 58269 seek to appropriate additional water from the carbonate aquifer, which serves as the source of water for the underground water in the Muddy Springs Area Groundwater Basin, the springs in the basin, and the Muddy River.

III.

The United States of America, through the National Park Service (NPS) and the Fish and Wildlife Service (FWS) filed protests to Applications 55450 and 58269.¹⁷ The NPS is concerned

¹⁴ Exhibit Nos. MWD-16 and NPC-1, Public Administrative hearing before the State Engineer, January, February, 1995.

¹⁵ Transcript, p. 316, Public Administrative Hearing before the State Engineer, January, February, 1995.

¹⁶ Transcript, pp. 94-95 and Exhibit Nos. NPC-5 and MWD-16, Public Administrative Hearing before the State Engineer, January, February, 1995.

¹⁷ Exhibit Nos. DWR-5, DWR-6 and DWR-7, Public Administrative Hearing before the State Engineer, January, February, 1995.

about springs in the Lake Mead National Recreation Area (LMNRA) referred to the Rogers-Bluepoint Spring Complex. The source of water to the Rogers-Bluepoint Spring Complex is probably not the carbonate aquifer and the additional pumping of water at the Arrow Canyon well probably would have no effect on these springs.¹⁸ The NPS is initiating a study to better understand the source of water of these springs. Because there was no evidence or testimony provided to show any connection between the carbonate aquifer and the springs, the State Engineer finds that the proposed additional pumping of the Arrow Canyon well will not affect the Rogers-Bluepoint Spring Complex.

The NPS is concerned that additional pumping of the Arrow Canyon well will reduce the flow of the Muddy River, to which NPS holds permitted water rights.¹⁹ The pumping of the Arrow Canyon well during the 121 day pump test appeared to have no effect on the flow of the Muddy River, as measured at the U.S.G.S. gauge near Moapa.²⁰ The State Engineer finds that when upstream diversions are accounted for, the flow in the Muddy River can be monitored because of the existence of the U.S.G.S. gauge.

The FWS has the jurisdiction over the protection of the endangered Moapa Dace, a fish species whose only habitat is the spring outflow area located within the Moapa Wildlife Refuge.²¹ The Moapa Dace has very specific hydraulic and temperature

¹⁸ Transcript, pp. 729-732, Public Administrative Hearing before the State Engineer, January, February, 1995.

¹⁹ Transcript, pp. 726-728 and Exhibit No. NPS-12, Public Administrative Hearing before the State Engineer, January, February, 1995.

²⁰ Water Resources Data, Nevada, Water Year 1994, USGS Water Data Report NV-94-1, 1995. See stream flow record for gauge at the Muddy River near Moapa, No. 09416000, for December 1994 through April 1994.

²¹ Exhibit Nos. FWS-8, FWS-9, and FWS-10, Public Administrative Hearing before the State Engineer, January, February, 1995.

requirements.²² FWS is concerned that the additional pumping at the Arrow Canyon well will cause a reduction in flow of the springs at the Moapa Wildlife Refuge and cause negative impacts to the Dace habitat.²³

No monitoring of the existing flows in the springs has occurred in the past.²⁴ The State Engineer finds that the flows from the springs in the Moapa Wildlife Refuge must be monitored as a first step in protecting the habitat of the Moapa Dace. The State Engineer further finds that if Applications 55450 and 58269 are approved, then the monitoring of the springs would be required to detect any impacts caused by the additional pumping of the Arrow Canyon well.

IV.

Applications 55450 and 58269 seek to appropriate water from the regional flow system referred to as the carbonate aquifer. The carbonate aquifer is the source of water for the Muddy River, the springs in the basin, and the underground water in the Muddy Springs Area Groundwater Basin, referred to as the alluvial aquifer.²⁵ The existing water rights from all these sources in the alluvial system total approximately 45,260 AFA.²⁶

²² Transcript, pp. 497 and 509 and Exhibit No. FWS-10, Public Administrative Hearing before the State Engineer, January, February, 1995.

²³ Exhibit No. DWR-7, Public Administrative Hearing before the State Engineer, January, February, 1995.

²⁴ Transcript, pp. 493-494, Public Administrative Hearing before the State Engineer, January, February, 1995.

²⁵ Transcript, pp. 94-95 and Exhibit Nos. NPC-5 and MWD-16, Public Administrative Hearing before the State Engineer, January, February, 1995.

²⁶ Transcript, pp. 899-900, Public Administrative Hearing before the State Engineer, January, February, 1995.

The quantity of water flowing from the carbonate aquifer to the alluvial basin has historically been accepted as 51 cfs or 37,000 AFA.²⁷ However, experts testifying for the applicant estimate that there is probably at least 46,000 AFA and as much as 58,900 AFA flowing into the Muddy Springs Area Groundwater Basin, when the flows from California Wash, Lower Meadow Valley Wash and surface water inflows are considered.²⁸ It was estimated that an additional 5,000 AFA of secondary recharge from irrigation returns to the groundwater.²⁹ When this quantity is added to the previous estimates, the range of water available from all sources is estimated by the applicant to be between 51,000 AFA and 63,900 AFA. If the quantity of water under existing rights (45,260 AFA) is subtracted from the lower figure in the range of estimates (51,000 AFA), then 5,740 AFA of water would be available for appropriation. The State Engineer finds that while there is a degree of uncertainty inherent in the estimates, there is evidence that unappropriated water is available.

The above discussion of estimated recharge and quantity of existing water rights applies to the Muddy River Springs Area Groundwater Basin and surface water sources within the basin. Applications 55450 and 58269 seek to appropriate water from the carbonate aquifer which is the source of water for the alluvial basin. Therefore, the quantity of water available in the carbonate aquifer may be more important in deciding this matter than the availability of unappropriated water within the alluvial basin. Since the quantity of water existing in the carbonate aquifer is

²⁷ Transcript, pp. 1282-1286 and Exhibit Nos. MWD-15 and NPC-20, Public Administrative Hearing before the State Engineer, January, February, 1995.

²⁸ Exhibit No. MWD-16, Transcript, pp. 1191-1194, Public Administrative Hearing before the State Engineer, January, February, 1995. See also the Closing Brief filed on behalf of MVWD, March 27, 1995.

²⁹ Transcript, pp. 925-926, Public Administrative Hearing before the State Engineer, January, February, 1995.

unknown, we must address the issue of whether additional diversions from the carbonate aquifer at the Arrow Canyon well would reduce the inflow to the alluvial aquifer to a point where the water available in the basin would not satisfy the existing rights within the basin. This question may have to be answered in the analysis of data from a monitoring plan, which could be established to determine any conflict with existing rights. If at some time in the future, it is determined that pumping the Arrow Canyon well causes a conflict with existing rights, then that conflict would be caused by the reduction in water inflow from the carbonate aquifer to the alluvial system. If on the other hand, no conflict is shown to exist, then there must be unappropriated water available. The question of conflict with existing rights is explored in the following sections.

V.

From December 1993 to April 1994, MVWD conducted a long term pump test on the Arrow Canyon well, in which 1,550 acre feet of water were pumped at a rate of 2,900 gpm (6.39 cfs) for 121 days.³⁰ This quantity of water is equivalent to an average annual pumping rate of 2.12 cfs. The discharge rates from certain springs located within the Muddy River Springs Area and the water levels in several carbonate and alluvial wells were monitored throughout the test. The drawdowns in the monitored wells are presented in Table II.²¹ The discharge rates for the springs were unchanged.³¹

³⁰ Exhibit No. NPC-1, Public Administrative Hearing before the State Engineer, January, February, 1995.

³¹ Exhibit Nos. NPC-1 and MWD-23, Public Administrative Hearing before the State Engineer, January, February, 1995.

Table II. Maximum Drawdowns in Several Wells

Name	Aquifer	Distance from Arrow Canyon well, ft.	Maximum Drawdown, ft.
EH-4	Carbonate	14,000	0.50
EH-5B	Carbonate	1,800	0.50
MX-6	Carbonate	16,000	0.30
Dahlberg East	Alluvial	200	0.13
Lewis North	Alluvial	1,800	0
Lewis Farm	Alluvial	2,700	0

Several questions were raised about the pump test. First, NPC and FWS asserted that the length of time (121 days) was not adequate to stress the aquifer system to determine any negative impacts that would be observed in the carbonate and alluvial aquifers. The test should be a minimum of one year to cover all seasons, especially the summer when all the alluvial wells are pumping and the stress on the system is at its maximum.³²

Second, the test was accomplished during the winter, coinciding with the seasonal recovery of the carbonate and alluvial systems. Normally, the water level in the wells would rise during this time and NPC stated that the hydrographs for the monitoring wells should be adjusted to account for this phenomenon. NPC concludes that the real drawdown in the monitoring wells should be two to three times what was actually observed during the pump test.³³

³² Exhibit No. NPC-10 and Transcript, pp. 351-352 and pp. 592-595, Public Administrative Hearing before the State Engineer, January, February, 1995.

³³ Exhibit Nos. NPC-5 through NPC-8 and Transcript, pp. 340-347, Public Administrative Hearing before the State Engineer, January, February, 1995.

Next, NPC observed that the Arrow Canyon well was pumped at a rate of 6.39 cfs for 121 days. When the diversion rate of water requested under Application 55450 and 58269 (3 cfs and 5 cfs, respectively) is added to the quantity of water already appropriated in the Arrow Canyon well (2 cfs, Permit 52520), the result is 10 cfs. NPC feels that conclusions based on a pump test at 6.39 cfs may understate the impacts when 10 cfs is being diverted from the Arrow Canyon well. The MVWD analysis does not consider the complex boundary conditions, but instead assumes that the system has simple boundary conditions. NPC asserts that to correctly predict the drawdowns for higher pumped rates and longer times, one must consider the complex boundary conditions. NPC feels that MVWD's use of the Theis non-equilibrium method inaccurately estimates the long-term drawdowns.³⁴

Finally, NPC feels that the MVWD ignored the data gathered over years of monitoring the Muddy River Springs Area Groundwater Basin.³⁴

Considering the data produced from the 121 day pump test, there appears to be little or no impact to either the carbonate aquifer or the alluvial aquifer based on the observations from the monitoring wells. Even if we double or triple the observed drawdowns, they are still very small, on the order of one or two feet. The question is whether the 121 day pump test and MVWD's analysis of the data accurately predicts the long term effects on the aquifer system that will occur if Applications 55450 and 58269 are approved. Experts testified on both sides of the issue. After considering the evidence and testimony from the seven day hearing, the State Engineer makes the following findings:

1. The drawdowns observed during the 121 day pump test were reasonable;

³⁴ Exhibit No. NPC-11, Public Administrative Hearing before the State Engineer, January, February, 1995.

2. The results from the 121 day pump test are not sufficient to accurately predict the long term impacts to the carbonate and alluvial aquifers when 10 cfs are pumped continuously from the Arrow Canyon well. There may be no economical way to predict the long term effects;
3. A realistic way to assess the long term impacts is to allow additional pumping of the Arrow Canyon well while implementing a comprehensive monitoring program on the wells in the carbonate and alluvial aquifers, the springs in the Muddy River Springs Area, and the Muddy River.

VI.

MVWD has a need for additional pumping rate to meet the present and future peak demand for water within the service area.³⁵ Applications 55450 and 58269 were filed to appropriate additional water from the carbonate aquifer at the existing Arrow Canyon well, to meet the demand through the year 2004.³⁶ However, additional pumping of the Arrow Canyon well, up to a rate of 10 cfs, may lower the potentiometric elevation of the ground water surface in the carbonate aquifer, which would reduce the flow of water from the carbonate aquifer to the alluvial aquifer. The result may be a lower groundwater table in the alluvial aquifer and possibly reduced flows in the springs located within the basin and a reduced flow of the Muddy River.³⁷ It is not possible to predict the Arrow Canyon well pumping rate that causes unacceptable conditions, with the present information on the record.

³⁵ Exhibit Nos. MWD-8 and MWD-9, Public Administrative Hearing before the State Engineer, January, February, 1995.

³⁶ File Nos. 55450 and 58269, official records in the Office of the State Engineer.

³⁷ Transcript, pp. 348-349, Public Administrative Hearing before the State Engineer, January, February, 1995.

The answer can be found by instituting a comprehensive monitoring plan and allowing additional pumping of the Arrow Canyon well, above the permitted 2.0 cfs, at an increasing rate each year, as shown in Table III.³⁸

Table III. Required Pumping Rate from the Arrow Canyon Well to meet the Increasing Demand.

Year	Total Pumping Rate Required, cfs	Additional Pumping Rate Required, cfs
1996	3.2	1.2
1997	3.9	1.9
1998	4.5	2.5
1999	5.2	3.2
2000	6.0	4.0
2001	7.0	5.0
2002	7.7	5.7
2003	8.9	6.9
2004	9.8	7.8

The objectives of the comprehensive monitoring program are:

1. Provide an "early warning" so that any negative impact can be mitigated or reversed by ceasing pumping;
2. Protect the groundwater table in the alluvial aquifer;
3. Protect the groundwater table in the carbonate aquifer;
4. Protect the flow from the springs in the Muddy Springs Area, and in the LMNRA;
5. Protect the flow in the springs which supply water to the Moapa Dace habitat;
6. Protect the flow in the Muddy River.

³⁸ The total pumping rate required from the Arrow Canyon well (second column, Table III) was calculated by subtracting 6.0 cfs, the permitted diversion rate from all other sources, from the demand curve in Exhibit No. MWD-9. The additional pumping rate required (third column, Table III) was calculated by subtracting 2.0 cfs, the permitted diversion rate from the Arrow Canyon well, from the entries in the second column, Table III.

The successful implementation of the monitoring plan requires the cooperation of at least four parties, MVWD, FWS, NPS, and NPC. Each year, MVWD will be required to submit to the State Engineer the results of their monitoring, the results of the other parties' monitoring for the previous year, and a justification for increasing the Arrow Canyon well pumping for the next year.

The State Engineer finds that the approval of Applications 55450 and 58269, conditioned on the phased-in increases in pumping of the Arrow Canyon well, and the annual evaluation of the monitoring data will allow MVWD to meet its water demand, prevent any conflict with existing rights, and protect the public interest.

CONCLUSIONS

I.

The State Engineer has jurisdiction over the subject matter.³⁹

II.

The State Engineer is prohibited by law from granting an application to appropriate water where:

1. There is no unappropriated water in the proposed source of supply;
2. The proposed use conflicts with existing rights; or
3. The proposed use threatens to prove detrimental to the public interest.⁴⁰

III.

Under its present water rights, which allow the diversion of up to 8.0 cfs of water, MVWD cannot meet the peak daily demand.⁴¹ The State Engineer concludes that MVWD must obtain additional water rights to meet the peak daily demand. The State Engineer further

³⁹ NRS Chapters 533 and 534.

⁴⁰ NRS 533.370.

⁴¹ Exhibit Nos. MWD-7 and MWD-9, Public Administrative Hearing before the State Engineer, January, February, 1995.

concludes that the diversion rates requested under Applications 55450 and 58269, or 3.0 cfs and 5.0 cfs, respectively, will meet the projected demand through the year 2004.

Under its existing water rights, MVWD is allowed to divert 3985.33 AFA, which will meet the projected annual water demand through the year 2001.⁴² After that, MVWD will require an additional 515 AFA to meet the demand through the year 2004.

IV.

NPS protested Applications 55450 and 58269 because of potential impacts to the springs within the Rogers - Bluepoint Spring Complex on the LMNRA. However, the source of water for the springs is not known to be the carbonate aquifer and therefore, the additional pumping of the Arrow Canyon well would have no effect on the springs. NPS will attempt to determine the source of water for the Roger - Bluepoint Spring Complex. The NPS should begin a formal monitoring program of the springs of concern so that changes in spring flow can be detected and related to the causes.

NPS is concerned that additional pumping of the Arrow Canyon well will cause a reduction in the flow of the Muddy River. Because the source of water for the Muddy River is the carbonate aquifer, this is a valid concern. The United States Geological Survey maintains a monitoring station on the Muddy River near Moapa. The State Engineer concludes that the approval of Applications 55450 and 58269 must be conditioned upon the review and analysis of the stream gauge records, in order to detect any reduction in flow of the Muddy River.

V.

FWS manages the Moapa Wildlife Refuge, the location of the habitat for the endangered Moapa Dace. The source of water for the springs on the refuge is the carbonate aquifer. FWS is concerned that additional pumping of the Arrow Canyon well will reduce the flow of water from the springs and damage the Dace habitat. The

⁴² Exhibit No. MWD-8, Public Administrative Hearing before the State Engineer, January, February, 1995.

State Engineer concludes that a monitoring plan for the springs is an essential element in protecting the Dace habitat. The reporting of the monitoring of the springs is essential to the success of the comprehensive monitoring plan.

VI.

There is evidence on the record that the historically accepted quantity of water flowing from the carbonate aquifer to the alluvial system (51 cfs of 37,000 AFA) may underestimate the quantity of water available in the alluvial system. The applicant estimates the range of values to be 51,000 AFA to 63,900 AFA, which is more than the quantity of existing water rights from all sources within the alluvial basin (45,260 AFA).

The source of water for Applications 55450 and 58269 is the carbonate aquifer, not the alluvial system. There was no evidence or testimony received regarding the quantity of existing water available for appropriation from the carbonate aquifer. Instead, evidence and testimony were related to the issue of whether increased pumping of the Arrow Canyon well would reduce the inflow of water from the carbonate aquifer to the alluvial system. The State Engineer concludes that this issue is properly addressed later in this ruling when the subject of potential conflicts with existing rights is considered.

VII.

The results of the 121 day pump test of the Arrow Canyon well showed a very small drawdown (0.3 to 0.5 ft.) in the carbonate aquifer, spread over a large area and a negligible drawdown in the alluvial aquifer (up to 0.13 ft.). The flow in the Muddy River and the flow from the springs did not decrease during the pump test. It must be noted that with regard to the spring flows, there may have been some diversions upstream from the measuring points that were not taken into account. The protestants pointed out other problems with the pump test and the applicant's interpretation of the results. The State Engineer concludes that the way to accurately determine the impact of additional pumping of the Arrow

Canyon well on the carbonate aquifer and the alluvial aquifer is to allow the additional pumping and require the monitoring of the entire system.

VIII.

MVWD filed Applications 55450 and 58269 to obtain additional water rights to satisfy the increasing peak daily demand and the total annual demand for water within its service area. The protestants fear that additional pumping from the Arrow Canyon well will reduce the flow of water from the carbonate aquifer to the alluvial system, which is the source of water for the underground water within the Muddy River Springs Area Groundwater Basin, the springs within the basin, and the Muddy River. After reviewing the record which includes expert testimony from both sides, the State Engineer concludes the following:

1. The hydraulic connection between the carbonate aquifer and the alluvial system is poorly understood;
2. It is unknown whether the additional pumping of the Arrow Canyon well will reduce the quantity of water entering the alluvial system and reduce the groundwater table within the alluvial aquifer, the flow in the springs, and the flow in the Muddy River to a point when a conflict with existing rights is created;
3. It is unknown whether the quantity of water entering the alluvial system is limited to 37,000 AFA or if higher quantities in the range between 51,000 AFA to 64,000 AFA, are available for use in the basin;
4. The way to determine the impacts is to allow the additional pumping of the Arrow Canyon well and measure the effects.

Therefore, as a condition of approval, a comprehensive monitoring plan must be submitted by MVWD to the State Engineer and the Protestants. The Protestants will be allowed to comment on the plan. The plan must then be approved by the State Engineer.

MVWD will be required to submit an annual report of the monitoring results, which will include the monitoring data from the FWS, NPS, and NPC. The report will also include a justification for increasing the pumping rate for the next year. The FWS, NPS, and NPC will have the opportunity to review and comment on the annual report. The State Engineer will then approve the pumping rate that will be allowed for the next year, or any other action that may be necessary to protect the public interest or to prevent any conflict with existing rights.

If any of the parties choose not to cooperate with MVWD and submit the monitoring data in a timely manner, then the State Engineer will approve the pumping rate allowed for the next year, based on the information provided.

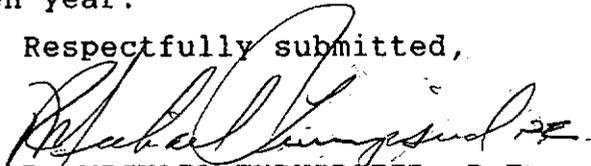
Applications 55450 and 58269 should be approved subject to limitations on the pumping rate and total quantity of water allowed for each year. Beginning in 1996, MVWD will be allowed to pump 1.2 cfs under Applications 55450 and 58269. Considering the 2.0 cfs already permitted in the Arrow Canyon well, MVWD will be allowed to pump a total of 3.2 cfs from this well. The total annual quantity diverted from all sources will be limited to 3985.33 AFA, the quantity of water already appropriated. At the end of 1996, MVWD will submit its report. After receiving comments from the other parties, the State Engineer will approve the allowable pumping rate for 1997 and any other appropriate action that may be required to protect the public interest and to ensure no conflict with existing rights.

RULING

The protests to Applications 55450 and 58269 are hereby overruled and said Applications are hereby approved subject to:

1. Existing rights;
2. The payment of statutory fees;
3. The approval of a comprehensive monitoring plan to be submitted by Moapa Valley Water District, on or before December 29, 1995.
4. Annual review of the previous year's monitoring data and approval of the allowed pumping rate for the next year. The annual review will continue past the year 2004.
5. Applications 55450 and 58269 are approved supplemental to Permits 22739, 28791, 46932, and 52520 and the total annual quantity of water will be limited to the actual demand for any given year.

Respectfully submitted,


R. MICHAEL TURNIPSEED, P.E.
State Engineer

RMT/JCP/ab

Dated this 27th day of
October, 1995.