

IN THE OFFICE OF THE STATE ENGINEER

IN THE MATTER OF APPLICATIONS)
53692, 53693 AND 53784 FILED)
TO APPROPRIATE THE PUBLIC)
WATERS OF AN UNDERGROUND)
SOURCE IN LAS VEGAS VALLEY)
ARTESIAN BASIN, CLARK COUNTY,))
NEVADA.)

RULING

GENERAL

I.

Application 53692 was filed on July 18, 1989 by D.L. Denman Construction Company to appropriate 1.0 c.f.s. of water from an underground source for commercial purposes for a sand and gravel plant within the SW/14 SE1/4 Section 22, T.19S., R.62E., M.D.B.&M. The point of diversion is described as being within the SW1/4 SE1/4 Section 22, T.19S., R.62E., M.D.B.&M.¹

Application 53693 was filed on July 18, 1989, by Lane Holmes to appropriate 0.12 c.f.s. of water from an underground source for quasi-municipal purposes to serve 27 domestic units (trailer court) within the S1/2 S1/2 NW1/4 NE1/4 Section 19, T.23S., R.61E., M.D.B.&M. The point of diversion is described as being within the NW1/4 NE1/4 Section 19, T.23S., R.61E., M.D.B.&M.¹

Application 53784 was filed on August 23, 1989 by Minami Development, Inc. to appropriate 0.30 c.f.s. of water from an underground source for quasi-municipal purposes for a 200 room hotel within the S1/2 NE1/4, NW1/4 SE1/4, NE1/4 SW1/4 Section 28, T.19S., R.57E., M.D.B.&M. The point of diversion is described as being within the SE1/4 NE1/4 Section 28, T.19S., R.57E., M.D.B.&M.¹

¹ Public record in the office of the State Engineer.

II.

The State Engineer initially described and designated a portion of Las Vegas Valley on January 10, 1941, under the provisions of NRS Chapter 534, as a basin in need of additional administration.²

The State Engineer subsequently extended the designated area of the Las Vegas Valley Ground Water Basin on February 29, 1944,³ November 22, 1946,⁴ April 18, 1961,⁵ May 25, 1964,⁶ and December 27, 1983.⁷

The State Engineer issued an order on December 1, 1949, curtailing the appropriation of ground water for irrigation purposes within the following areas of the Las Vegas Valley Ground Water Basin.⁸

T.20S., R.60E. - Sections 13, 24, 25 and 36;

T.20S., R.61E. - Sections 13-36, inclusive;

T.20S., R.61E. - Section 1-10, inclusive, and Sections 15-18, inclusive.

² State Engineer's Order No. 175 dated January 10, 1941, public record in the office of the State Engineer.

³ State Engineer's Order No. 182 dated February 29, 1944, public record in the office of the State Engineer.

⁴ State Engineer's Order No. 189 dated November 22, 1946, public record in the office of the State Engineer.

⁵ State Engineer's Order No. 249 dated April 18, 1961, public record in the office of the State Engineer.

⁶ State Engineer's Order No. 275 dated May 25, 1964, public record in the office of the State Engineer.

⁷ State Engineer's Order No. 833 dated December 27, 1983, public record in the office of the State Engineer.

⁸ State Engineer's Order No. 196 dated December 1, 1949, public record in the office of the State Engineer.

The State Engineer issued an order relating to the issuance of permits for quasi-municipal use within the Las Vegas Valley Ground Water Basin on November 20, 1953.⁹

The State Engineer further extended the designated area of the Las Vegas Valley Ground Water Basin on December 27, 1983, and additionally declared irrigation was not a preferred use and that all further applications to appropriate water for irrigation purposes would be denied.⁷

III.

Water Resources - Information Series Report 27, titled "Water-Level Changes Associated with Ground-Water Development in Las Vegas Valley, Nevada, March 1976 to March 1977" by Terry Katzer, was prepared cooperatively by the Geological Survey, U.S. Department of the Interior, and the Division of Water Resources, State of Nevada.

Geological Survey Water-Supply Paper 1780, titled "Available Water Supply of the Las Vegas Ground Water Basin, Nevada" by Glenn T. Malmberg, was prepared in cooperation with the Nevada Department of Conservation and Natural Resources, 1965.

U.S. Geological Survey Open-File Report 84-130, titled "Ground-Water Conditions in Las Vegas Valley, Clark County, Nevada, Part I, Hydrogeologic Framework, 1984" by Russell R. Plume, was prepared in cooperation with the Clark County Department of Comprehensive Planning.

Water Resources Bulletin No. 44, titled "Pumping and Ground Water Storage Depletion in Las Vegas Valley, Nevada, 1955-1974", was prepared cooperatively by the United States Department of the Interior, Geological Survey, and the State of Nevada, Division of Water Resources.

⁹ State Engineer's Order No. 212 dated November 20, 1953, public record in the office of the State Engineer.

Ground-Water Resources - Information Series Report 5, titled "Land Subsidence in Las Vegas Valley, Nevada, 1935-63" by G.T. Malmberg, was prepared cooperatively by Geological Survey, U.S. Department of the Interior, and the Department of Conservation and Natural Resources, State of Nevada, May 1964.

Water Resources - Information Series Report 22, titled "Water Level Changes Association with Ground-Water Development in Las Vegas Valley, Nevada, 1971-75" by James R. Harrill, was prepared cooperatively by the Geological Survey, U.S. Department of the Interior, and Department of Conservation and Natural Resources, State of Nevada, 1976.

Water Resources - Information Series Report 29, titled "Water-Level Changes Associated with Ground-Water Development in Las Vegas Valley, Nevada, March 1977 to March 1978" by David B. Wood, was prepared cooperatively by the Geological Survey, U.S. Department of the Interior, and the Division of Water Resources, State of Nevada, 1979.

Water Resources - Information Series Report 26, titled "Water-Level Changes Associated with Ground-Water Development in Las Vegas Valley, Nevada, March 1975 to March 1976" by James R. Harrill, was prepared cooperatively by the Geological Survey, U.S. Department of the Interior, and the Division of Water Resources, State of Nevada, 1976.

"Nitrates in Las Vegas Valley Water District Wells" was prepared by J.T. Monscvitz, Manager, Southern Nevada Water System, September 20, 1982.

"Nitrates in Las Vegas Valley Water District Wells" was prepared by J.T. Monscvitz, Manager, Southern Nevada Water System, March 8, 1982.

U.S.G.S. Water Supply Paper - 849-D, titled "Underground Leakage from Artesian Wells in the Las Vegas Area, Nevada" by Penn Livingston, 1941, was prepared in cooperation with the State Engineer of Nevada, Clark County, and the City of Las Vegas.

Water Resources Bulletin No. 5 titled "Geology and Water Resources of Las Vegas, Pahrump and Indian Spring Valleys, Clark and Nye Counties, Nevada", by G.B. Maxey and C.H. Jameson was prepared in cooperation with the United States Department of the Interior, Geological Survey, and the State Engineer's Office of Nevada, 1948.

Water Resources Bulletin No. 3, titled "Water Levels and Artesian Pressure in Wells in Las Vegas Valley and in Other Valleys in Nevada, 1913-1945" by T.W. Robinson, G.B. Maxey, J.C. Fredericks and C.H. Jameson, was prepared in cooperation with the United States Department of the Interior, Geological Survey, and the State of Nevada, Office of the State Engineer, 1947.

Water Resources Bulletin no. 18, titled "A Summary of the Hydrology of the Las Vegas Ground-Water Basin, Nevada, with Special Reference to the Available Supply" by Glenn T. Malmberg, was prepared in cooperation with the United States Department of the Interior, Geological Survey, and Department of Conservation and Natural Resources, 1961.

Water Resources Bulletin No. 29, titled "Ground Water in Las Vegas Valley" by P.A. Domenico, D.A. Stephenson and G.B. Maxey, was prepared by the Desert Research Institute in cooperation with the State of Nevada, Department of Conservation and Natural Resources, April 1964.

Nevada Bureau of Mines and Geology Bulletin 95, titled "Subsidence in Las Vegas Valley", was prepared by John W. Bell, 1981.

FINDINGS OF FACT

I.

Application 53692 states that, "The well will be used in commercial operations which may include sand and gravel washing and dust control. Use is estimated at 100,000,000 gallons annually." (or 306.9 acre-feet annually.)¹

Applications 53693 proposes to serve a 27 unit trailer court using an estimated 30,000 gallons per day with all of the lots occupied (10.95 million gallons annually or 33.6 AFA).¹

Application 53784 proposes to serve a 200 room hotel using an estimated 40,000 gallons per day (14.6 million gallons annually or 44.81 AFA).¹

The Las Vegas Valley fill reservoir is grouped into zones having similar hydraulic characteristics. Three rather indistinct zones of artesian aquifers - a shallow, middle and a deep zone known as the principal aquifers - are penetrated or significantly affected by large capacity wells. A shallower zone, known as the near-surface reservoir is not well defined in areal extent or depth because they do not compose a distinct lithologic or hydrologic unit.¹⁰

Well logs within Las Vegas Valley show a persistent layer of blue clay with an average thickness of 20 feet, which acts as a confining layer that holds water under pressure in the aquifers and only transmits small quantities of water. In the upper elevations of the valley, these layers occur from 380 to 450 feet below the land surface, and in the lower elevations, the depth ranges from 150 to 250 feet. Relatively thick sand and gravel lenses which act as the major water bearing strata within the valley are present below and above the blue clay layers. Faults occur in the valley fill which may cause displacements of the blue clay beds. When these blue clay beds are penetrated by wells or broken by faults, the water rises in the wells or along the faults as the result of the pressure that is present. The confining beds are not wholly impermeable and appreciable quantities of water leak through the beds,

¹⁰ Water Resources Bulletin No. 5, by A.B. Maxey and C.H. Jameson, 1948.

especially in the vicinity of the fault zones. The principal aquifers are divided from the shallow water zone and near surface reservoir by the layers of blue clay. The shallow water zone and near surface reservoir can be termed as being hydrologically interconnected.¹⁰

III.

The average annual natural recharge to the Las Vegas Ground Water Basin has been estimated as 25,000 to 30,000 acre-feet annually which is derived from the precipitation in the mountains within the drainage basin.¹¹

IV.

The estimated perennial yield of the principal aquifers is augmented by 16,000 acre-feet per year of secondary recharge from irrigation of lawns, golf courses, parks, farms, etc., and waste water from sewage treatment plants.¹² This secondary recharge is substantially influenced by imported water from Lake Mead through the Southern Nevada Water Project.

V.

Water imports to the basin from Lake Mead through the Southern Nevada Water Project, were estimated at 193,272 acre-feet for the 1988 calendar year.¹³

11 Geological Survey Water-Supply Paper 1780 titled "Available water supply of the Las Vegas Ground Water Basin, Nevada", by Glenn T. Malmberg, 1965.

12 Water Resources Bulletin No. 44 titled "Pumping and Ground Water Storage Depletion in Las Vegas Valley, Nevada, 1955-1974", by James R. Harrill, 1976; Michael Dettinger, U.S. Geological Survey, oral communication, 1985.

13 Data collected by the Division of Water Resources, State of Nevada, Las Vegas Branch. Pumpage inventories are maintained by meter readings and data provided by local water companies. Water levels of selected wells within the Las Vegas Valley Basin are measured periodically. The State Engineer's office and U.S. Geological survey have cooperatively maintained ground water level monitoring networks in the Las Vegas Valley since 1945. This record is substantial and conclusive evidence of deteriorating ground water conditions.

VI.

The State Engineer has maintained pumpage inventories and records of water levels in Las Vegas Valley since 1945. Ground water pumpage within the Las Vegas Artesian Basin for the year 1988 was inventoried as 67,854 acre-feet.¹³ This amount of pumping represents an overdraft of ground water on the order of approximately 27,000 acre-feet annually.

VII.

Land subsidence and water level declines within the Las Vegas Valley Ground Water Basin are active and of a major concern to the State Engineer.

(A)

During the 18 year period 1955-77, approximately 1,140,000 acre-feet of ground water was pumped from the valley fill reservoir in Las Vegas Valley. This resulted in substantial water level declines, the maximum net decline was 180 feet in the northwestern part of the valley where most of the pumping was concentrated. The pumping resulted in a loss of 68,000 acre-feet of water from compacted deposits induced by land subsidence and caused storage depletions of 470,000 acre-feet in the principal aquifers, 130,000 acre-feet from the near-surface reservoir and 35,000 acre-feet from consolidated rocks adjacent to the valley - a total ground water depletion of some 700,000 acre-feet.¹⁴

Ground water pumpage was reduced from 85,436 acre-feet in 1971 to 67,854 acre-feet in 1988 due mainly to the increased availability of Lake Mead water through the Southern Nevada Water Project. Ground water permits have been revoked upon availability of Lake Mead water, thus

¹⁴ Water Resources Bulletin No. 44 Titled "Pumping and Ground Water Storage Depletion in Las Vegas Valley, Nevada, 1955-1974", prepared by the U.S. Department of the Interior, Geological Survey, and the State of Nevada, Division of Water Resources.

lessening the depletion of the ground water source. Outside the areas of intense pumping, localized zones of net water level rises have occurred in the principal aquifer as a result of the cut-back of pumping in these areas coupled with an increase in infiltration of secondary recharge. Since 1973, areas of net rise within the basin have been 10-20 feet, with the Las Vegas Wash area consistently showing a net rise of about 5 feet per year.¹⁵

(B)

Land subsidence is the lowering of the earths surface due to either natural or man made processes.

Land subsidence within the Las Vegas Artesian Basin is active and subsidence in localized areas has been as much as 5.0 feet with the increase in pumping. This is due mainly to the decrease in artesian pressure below the surface as a result of excessive ground water withdrawals and storage depletion. With a reduction in the artesian head, sediment consolidation occurs and the reduced volume is reflected at the surface by land subsidence. Areas of most intense ground water pumping have historically been confined to the central portion of the basin where large decreases in artesian pressures are reflected by declining water levels in wells. These areas have also shown the greatest amount of historic land subsidence. Subsidence in the valley from 1935 to 1963, resulting principally from compaction of sediments, has been slightly more than 2 feet at some locations. Since 1963, subsidence has exceeded 2 feet along Las Vegas Boulevard near the casinos and along Highway 95 northwest of Las Vegas. Since 1935, it is estimated to be as much as 5 feet in the downtown area of Las Vegas.¹⁵

¹⁵ Nevada Bureau of Mines and Geology Bulletin 95 titled "Subsidence in Las Vegas Valley", prepared by John W. Bell, 1981.

Effects of land subsidence include (1) compaction of the ground water reservoir which reduces the interstitial pore space and diminishes storage capacity of the reservoir, and (2) potential damage to man-made structures.¹⁵

VIII.

Due to the decrease in the artesian pressure from the vast amount of ground water pumpage, leakage of water has reversed from an upward path (principal aquifer to near surface reservoir to ground level as springs seeps, etc.) to a downward path (irrigation waste water, sewage septic waste water, etc., to near surface reservoir to principal aquifer). This phenomina has raised a concern related to water quality because of the intrusion or migration of poor quality water of the near surface reservoir into the good quality principal aquifers.¹²

A study of the nitrate level in the Las Vegas Valley Water District wells is currently being conducted. Records have shown that the nitrate levels in 7 of the wells have increased from 0.0 mg/L of No_3 in 1975 to 1.0 mg/L or higher of No_3 in 1982. This rate cannot be sustained for any period of time without water quality deterioration to the ground water resource.¹⁶ Recommendations to prevent further contamination of the ground water supply referenced in the report include retarding the rate of pumpage from the Las Vegas Valley aquifer.

IX.

The State Engineer has the authority to deny an application without publication where a previous application for a similar use of water within the same basin has been rejected on the same grounds.¹⁷

¹⁶ "Nitrates in Las Vegas Valley Water District Wells", prepared by J.T. Monscvitz, Manager, Southern Nevada Water System, March 8, 1982.

¹⁷ NRS 533.370(3).

X.

Applications for irrigation purposes and quasi-municipal purposes have been denied within the Las Vegas Valley Artesian Basin.¹

CONCLUSIONS

I.

The perennial yield of a hydrologic system is the maximum amount of water of usable chemical quality that can be consumed economically each year for an indefinite period of time. If the perennial yield is continually exceeded, ground water levels will decline until the ground water reservoir is depleted of water of usable quality or until the pumping lifts become uneconomical to maintain. Perennial yield cannot exceed the natural replenishment to an area indefinitely and ultimately is limited to the maximum amount of natural discharge that can be salvaged for beneficial use.¹⁸

II.

Withdrawals of ground water in excess of the perennial yield contribute to adverse conditions such as water quality degradation, storage depletion, diminishing yield of wells, increased economic pumping lifts, land subsidence and reversal of ground water gradients which could result in significant changes in the recharge/discharge relationship. These conditions have developed in several other ground water basins within the State of Nevada where storage depletion and declining water tables have been recorded and documented.¹⁸

III.

The amount of ground water withdrawal exceeds the perennial yield within the Las Vegas Artesian Basin. The records of the State Engineer's office are well documented

¹⁸ See attached Appendix of References.

with evidence of declining water tables, water quality deterioration and active land subsidence in the Las Vegas Valley Ground Water Basin.

IV.

The State Engineer has jurisdiction of the parties and the subject matter of this action and determination.¹⁹

V.

The State Engineer is prohibited by law from granting a permit under an application to appropriate the public waters where:²⁰

- A. There is no unappropriated water at the proposed source, or
- B. The proposed use conflicts with existing rights, or
- C. The proposed use threatens to prove detrimental to the public interest.

VI.

The State Engineer may deny applications to appropriate ground water for any purpose in areas where service can be provided by an entity such as a water district or a municipality presently engaged in furnishing water to the inhabitants thereof.²¹

VII.

There is a record of substantial and conclusive evidence confirming overdraft of the ground water resource, ground water level declines, ground water storage depletion, active land subsidence, ground water quality deterioration and significant change in the recharge-discharge relationship within the Las Vegas Ground Water Basin due to sustained overdraft of the ground water resource.

¹⁹ NRS 533.325.

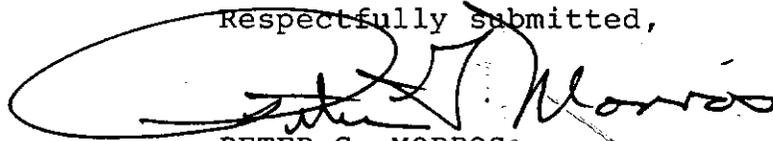
²⁰ NRS 533.370, subsection 3.

²¹ NRS 534.120, subsections 1, 2 and 3.

RULING

Applications 53692, 53693 and 53784 are hereby denied on the grounds that the granting thereof would adversely affect existing rights and would be detrimental to the public interest and welfare.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Peter G. Morros", is written over a circular stamp. The signature is fluid and cursive.

PETER G. MORROS
State Engineer

PGM/MA/pm

Dated this 23rd day of

January, 1990

APPENDIX OF REFERENCES

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State of Nevada, Department of Highways, Report on Land Subsidence in Las Vegas Valley.

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