IN THE OFFICE OF THE STATE ENGINEER

IN THE MATTER OF APPLICATION 36044) FILED TO APPROPRIATE THE PUBLIC) WATERS OF AN UNDERGROUND SOURCE IN) THE CARSON DESERT GROUND WATER) BASIN, CHURCHILL COUNTY, AND LYON) COUNTY, NEVADA.)

RULING

GENERAL

I.

Application 36044 was filed on October 16, 1978, by 2-H Ranch to appropriate 2.0 c.f.s. of water from an underground source for irrigation and domestic purposes on 40 acres of land within the NW1/4 SW1/4 Section 27, T.18N., R.28E., M.D.B.&M. The point of diversion is described as being within the NW1/4 SW1/4 Section 27, T.18N., R.28E., M.D.B.&M.[1]

II.

Water-Supply Paper 2263, entitled "Geohydrology of the Basalt and Unconsolidated Sedimentary Aquifers in the Fallon Area, Churchill County, Nevada", was prepared cooperatively by the United States Department of the Interior, Geological Survey, and the Nevada Department of Conservation and Natural Resources, Division of Water Resources.[1]

III.

Water Resources - Reconnaissance Series Report No. 59, entitled "Water-Resources Appraisal of the Carson River Basin, Western Nevada", published 1975-76, was prepared cooperatively by the United States Department of the Interior, Geological Survey, and the Nevada Department of Conservation and Natural Resources.[1]

FINDINGS OF FACT

I.

By Order No. 716, dated July 6, 1978, the State Engineer described and designated the Carson Desert Ground Water Basin (Basin 101) under the provisions of Nevada Revised Statutes (NRS), Chapter 534 (Conservation and Distribution of Underground Waters).[1]

By Order No. 722, dated October 4, 1978, the State Engineer declared that the irrigation of additional land within the Carson Desert Ground Water Basin using underground water would threaten to impair the value of existing underground and

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[1] Public record in the office of the State Engineer.

surface water rights and that such irrigation use is not considered a preferred use; The State Engineer ordered that all applications filed after October 4, 1978, to appropriate underground water for irrigation use will be denied.[1]

II.

The area of study of Water-Supply Paper 2263 is an irregularly shaped area of approximately 270 square miles surrounding Fallon, Nevada. The greatest dimension east-west is approximately 25 miles, and north-south approximately 31 miles. This study area is located entirely within the valley floor in the southwestern part of the Carson Desert Hydrographic Area[2], which is coincident with the Carson Desert Ground Water Basin.[1]

The area of study of Reconnaissance Series Report 59 includes the Carson Desert Ground Water Basin, which is part of the Carson River Basin. Reconnaissance Series Report 59 study area includes Water-Supply Paper 2263 study area.

III.

The proposed point of diversion under Application 36044 is located within the fill sediment of the valley floor approximately 6-1/2 miles southwesterly from Fallon, Nevada. This point of diversion is located within the study area of Reconnaissance Series Report 59, within the fringe area of the study area of Water-Supply Paper 2263 and within the fringe area of the Truckee-Carson Irrigation District.[1]

IV.

Topographic features in the Fallon area which may affect or may be affected by the water supply system are Rattlesnake Hill (i.e., basalt aquifer), Soda Lake and Little Soda Lake, Stillwater Wildlife Area, the irrigation canal system of the Truckee-Carson Irrigation District, and the Carson River.

Rattlesnake Hill is located approximately 1-3/4 miles northeast from Fallon. This hill is the top of an irregularly shaped basalt rock mass which extends vertically below the sedimentary plain down to a depth of approximately 2,000 feet and spreads out horizontally underground approximately five by seven miles. The underground part of this basalt mass forms an aquifer which is a source of water supply for Fallon and the U.S. Navy, Fallon Naval Auxillary Air Station. This basalt aquifer is primarily recharged by underground flow of waters from adjacent aquifers of varying water quality.[3]

A lowering of the water table in the Fallon area may induce increased intrusion of contaminated water into the basalt aquifer, which may result in degradation of the water quality of this aquifer.

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[2] U.S. Geological Survey Water-Supply Paper 2263, public record in the office of the State Engineer.

[3] U.S. Geological Survey Water-Supply Paper 2263 and Water Resources-Reconnaissance Series Report 59, public record in the office of the State Engineer.

Soda Lake and Little Soda Lake are located approximately seven miles west-northwest from Fallon. Salt deposits associated with Soda Lakes were mined extensively during the latter half of the 19th century and the early 20th century. Rising lake levels associated with infiltration of irrigation water, after the establishment of Newlands Reclamation Project, flooded the salt works and diluted the saline water. In 1906 when extensive irrigation began in the area, the levels of Big and Little Soda Lakes began to rise, continuing, until about 1930. The total rise in stage for the period was about 60 feet.[4]

A lowering of the water table in the Fallon area may induce seepage of saline water from Soda Lakes into nearby zones of the shallow aquifer, which would result in degradation of the water quality of these zones.

The Stillwater Wildlife Management Area and the Stillwater National Wildlife Refuge occupy an area of approximately 18 miles by 14 miles located approximately 10 miles northeast from Fallon. This area is used for recreation and as wildlife habitat. There are lakes, ponds and streams in this area which are replenished by flows of surface waters from the Carson River and the irrigation canal system in the Fallon area.[3]

A lowering of the water table in the Fallon area would induce additional seepage losses from the river and canal system, which would result in decreased in-flows of surface waters into the wildlife area. Decreased in-flows would result in degradation of water quality in this area and would promote a more hostile environment for wildlife.

The main sources of surface water for the Fallon area are runoff water from the Carson River system and imported water from the Truckee River system. Those surface waters are conveyed to the area by the Carson River and the Truckee Canal and are stored in Lahontan Reservoir. Irrigation water released from Lahontan Reservoir is conveyed by the Carson River into the Fallon area. A canal and ditch system distributes the irrigation water throughout this area for agricultural use.[3]

A lowering of the water table in the Fallon area would induce additional seepage losses from the river and canal system, which would result in decreased amounts of water available for agricultural use.

V.

The valley fill soil within the southwestern region of the Carson Desert was deposited by fluvial, deltaic, lacustrine and eolian mechanisms.[2] The geologic structure of the valley fill sediments in this region was influenced by ancient Lake Lahontan.[3] The geologic structure of the valley fill sediments in the study area of Water-Supply Paper 2263 is similar to that in the greater study area of Reconnaissance Series Report 59 in the southwestern region of Carson Desert.

The valley fill soil in the study area of Water-Supply Paper 2263 is characterized mainly by various sedimentary deposits of silt, sand, gravel and clay. These deposits are interbedded and interfingered so that water bearing zones of greater transmissivity are interlaced horizontally with zones of lesser transmissivity. Thus, the ground water moves both laterally and vertically through the valley fill soil space.[2]

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[4] Water Resources-Reconnaissance Series Report 59, public record in the office of the State Engineer.

VI.

The ground water system in Water-Supply Paper 2263 study area has been separated into four aquifer systems: 1) a shallow alluvial aquifer system extending from near ground surface to about 50 feet deep; 2) an intermediate depth alluvial aquifer system underlying the shallow system and extending from about 50 feet deep to as great as 500 feet to 1,000 feet deep; 3) a basalt aquifer system extending from about 200 feet to 1,000 feet deep; and 4) a deep aquifer system underlying the intermediate aquifer and basalt aquifer and extending down below the 500 feet to 1,000 feet depths.[2]

The shallow, intermediate and deep aquifers apparently are horizontally oriented, irregularly shaped layers, one over another, extending throughout the Fallon area. The basalt aquifer is an irregularly shaped bulbous mass of porous rock situated within these horizontal aquifer layers and extending from near ground surface (at Rattlesnake Hill) down to the depth of the deep aquifer.[3]

Generally, the water table of the shallow aquifer is less than 10 feet below land surface.[2]

VII.

Comparisons of water level measurements in selected wells tapping the shallow and intermediate aquifers to concurrent fluctuations of Carson River and local irrigation flows demonstrates an influence of surface water flows upon ground water levels. When the river flow increased, the water levels in these wells increased in response.[2] Therefore, a lowering of the level of the water table may induce an increase in seepage loss from the Carson River, unlined irrigation canals and stream channels.

VIII.

The recharge to the ground water system in the Fallon area is due primarily to seepage losses from stream channels, irrigation canals and ditches and the irrigation of land, with insignificant contributions from local precipitation and underground flow from adjacent basins.[2]

Such seepage losses directly recharge the shallow aquifer. The shallow aquifer recharges the intermediate aquifer. The intermediate aquifer recharges the basalt aquifer. The deep aquifer may also recharge the basalt aquifer. The basalt aquifer is subject to strong recharge from overlying sediments and minor recharge from deeper sediments. Pollutants occurring in the shallow, intermediate and deep aquifers may be transported into the basalt aquifer by the recharge mechanism.[2]

Groundwater flow directions and gradients have a strong eastward component. Most of the shallow aquifer through-flow ultimately moves northeastward toward the Carson Sink and eastward toward Stillwater Lakes.[2]

IX.

The basalt aquifer water is generally about 2-1/2 times more saline than the overlying intermediate aquifer water. Results of an electrical resistivity study suggest that deep aquifer water, underlying the basalt aquifer, is more saline than basalt aquifer water. This suggests that basalt aquifer water is a blend of overlying fresh water and

underlying saline water. The intermediate aquifer water has dissolved solids concentration of approximately 230 mg/l; the basalt aquifer water of approximatley 575 mg/l; and the deep aquifer water of approximately 5,000 mg/l.[2]

X.

Calculations suggest, and historical water level data verify, that historical pumping from the basalt aquifer has lowered the artesian head 4 to 5-1/2 feet.[2]

The deep aquifer may experience a higher artesian head than the basalt aquifer and, thus, may be contributing recharge water to the basalt aquifer.[2]

A lowering of the water table in the Fallon area may induce a decrease in the artesian head of the basalt aquifer, which may result in increased intrusion into the basalt aquifer of saline water from the underlying deep aquifer and degradation of the water quality of the basalt aquifer.

XI.

The shallow aquifer serves as the water supply source for most of the rural population in the Fallon area. Water-Supply Paper 2263 estimates 3,000 to 4,000 wells tapping the shallow aquifer and about 100 wells tapping the intermediate aquifer in 1981.[1]

The State Engineer anticipates that domestic use of the shallow aquifer and intermediate aquifer waters will increase in the future in the rural areas as this population increases.

Most of the people extracting water from shallow domestic wells also use septic tanks that discharge at shallow depth within, or very close to, the water supply zone.[4]

An increase in the rural population should result in increased use of septic systems for disposal of domestic sewage. Increased use of this disposal method will increase the potential for contamination of the shallow aquifer system.

A lowering of the water table will reduce the total volume of underground water available to dilute septic system effluents discharged into the soil space, which will tend to promote degradation of the water quality.

XII.

A lowering of the water table will tend to promote or to aggravate the following conditions:

- Result in increased pumping lifts and corresponding increased pumping costs;
- Result in a lesser pressure head differential to induce ground water flow from surrounding soil space into an existing well, and thereby reduce the maximum well yield;
- Result in reduced pump intake pressure head, tending to cause cavitation and corresponding pump damage; and
- Require deepening of an existing well to achieve satisfactory well yield and operating conditions.

The occurrence and severity of these possible effects depend upon the amount of water withdrawn and the hydraulic characteristics of the water bearing zones involved.

XIII.

NRS Chapter 534, allows the development and use of water from a well for domestic purposes for a single family dwelling without obtaining a permit from the State Engineer when the draught does not exceed 1,800 gallons per day.

NRS Chapter 534, authorizes the State Engineer under certain conditions to limit the depth of domestic wells and to prohibit the drilling of wells for domestic use in areas where water can be furnished by an approved water district or a municipality. In other areas, since a permit to use water from a well for domestic purposes normally is not required, it is impracticable for the State Engineer to exercise similar control of domestic use of underground water as is done for other uses which require permits.

XIV.

Dissolved arsenic concentrations exceeding recommended health limits commonly occur in the shallow aquifer and intermediate aquifer. Harmful concentrations of dissolved arsenic do not occur in inflowing surface waters that recharge the shallow aquifer. This suggests that arsenic occurs in the upper layer of valley fill sediment and that dissolved arsenic is transported into the intermediate aquifer by recharge water from the shallow aquifer. Arsenic may also occur in the intermediate aquifer. The concentration of arsenic in basalt water is believed to be mainly indigenous to the recharge water from surrounding sediments.[2]

A lowering of the water table in the Fallon area would decrease the total volume of water available to dilute arsenic contaminated water occuring in the soil space, which will tend to promote degradation of the water quality.

XV.

Water from the intermediate aquifer is commonly bad smelling and swampy tasting. The odor may be due to hydrogen sulfide gas generated by decaying organic materials in this aquifer. Increased pumping may increase the release of this gas.[2]

A lowering of the water table in the Fallon area may induce a decrease in the static pressure head in the intermediate aquifer, which may result in the release of increased amounts of malodorous gases within the soil space and degradation of the water quality.

CONCLUSIONS

I.

The State Engineer has jurisdiction of the parties and the subject matter of this action and determination.[5]

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[5] NRS Chapters 533 and 534.

II.

The State Engineer is prohibited by law[6] from granting a permit under an application to appropriate the public waters where:

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

III.

The basalt aquifer and the shallow aquifer are the main water supply sources for industrial, municipal and domestic uses in the Fallon area. The amount of water withdrawn from these aquifers for these uses will increase in the future as population increases. Protection of the water quality of these aquifers is essential to the public health and welfare and to the economic vitality of the community. Water of suitable quality is a basic necessity of a community.

The basalt aquifer is recharged either directly or indirectly from the shallow, intermediate and deep aquifers. Contaminated water may be transported into the basalt from the other aquifers by the recharge mechanism; and thereby degrade the quality of water in the basalt aquifer.

IV.

Surface waters released from Lahontan Reservoir and conveyed by Carson River into the Fallon area are used for irrigation of land, recharge the underground water supply sources, and pass through the area and replenish lakes, ponds and streams in the Stillwater Wildlife area.

V.

Additional withdrawal and consumption of increasing amounts of water from the underground reservoir will result in a lowering of the water table in the Fallon area and may promote or aggravate the following conditions:

1. Induce increased seepage losses from streams, canals, ditches and the irrigation of land, and thereby reduce water available for agricultural, recreation and wildlife use;
2. Induce seepage of saline water from Soda Lakes into nearby zones of the shallow aquifer, and thereby degrade the water quality of such zones;
3. Induce increased intrusion of saline water from the deep aquifer into the basalt aquifer, and thereby degrade the water quality of the basalt aquifer;
4. Reduce the total volume of underground water available to dilute sewage and arsenic contaminated water, and thereby degrade the water quality of the shallow, intermediate and basalt aquifers;
5. Result in increased pumping and maintenance costs to continue operating existing domestic and commercial wells, and thereby impose an additional economic burden upon persons and businesses relying upon such wells for water supply;

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[6] NRS 533.370(3).

6. Induce release of increased amounts of malodorous gases in the intermediate aquifer, and thereby degrade the water quality of this aquifer; and
7. Result in additional public and private expenditures to construct, improve, maintain and operate water supply and treatment facilities to produce water of acceptable quality for domestic, municipal and industrial use.

VI.

Approval of Application 36044 would result in the irrigation of additional land using underground water, which is not a preferred use. The additional withdrawal and consumption would remove water from the ground water reservoir, which would result in a lowering of the water table, in additional seepage losses from surface sources, and in possible degradation of the quality of underground water. Therefore, the additional withdrawal and consumption of underground water for irrigation use would conflict with existing rights and threaten to prove detrimental to the public interest.

Ruling

Application 36044 is hereby denied on the grounds that the appropriation of additional ground water for irrigation use from the area described in the application would conflict with existing rights and prove detrimental to the public interest.

Respectfully submitted,

PETER G. MORROS
State Engineer

PGM/RLT/bk

Dated this 16th day of

March, 1987.