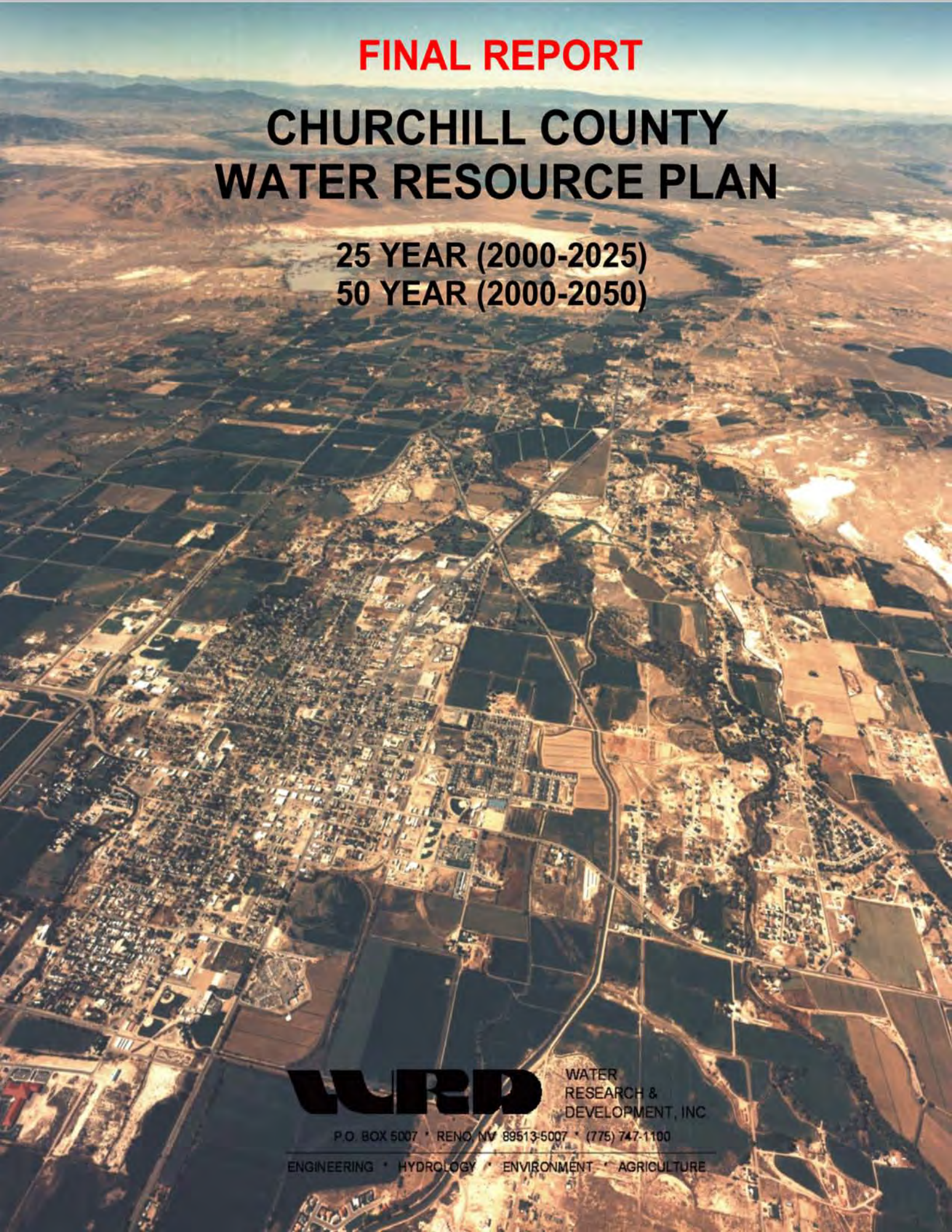

FINAL REPORT

CHURCHILL COUNTY WATER RESOURCE PLAN

25 YEAR (2000-2025)
50 YEAR (2000-2050)

WRD

WATER
RESEARCH &
DEVELOPMENT, INC

P.O. BOX 5007 • RENO, NV 89513-5007 • (775) 747-1100

ENGINEERING • HYDROLOGY • ENVIRONMENT • AGRICULTURE

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October 8, 2003

Prepared By:

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LIST OF ABBREVIATIONS

AC	Acre = 43,560 ft2
Act	Public Law 101-618
AF	Acre Feet = 325,872 gallons
AF/Ac	Acre Feet per Acre
AFA	Acre Feet per Annum
BHP	Brake Horse Power
BLM	Bureau of Land Management
BOR	U. S. Bureau of Reclamation
CCI	Construction Cost Index
CFS	Cubic Feet per Second = 448.83 gpm
COGO	Coordinate Geometry
CRBCOG	Carson River Basin Council of Governments
EHP	Electrical Horse Power
EPA	Environmental Protection Agency
ESWTR	Enhanced Surface Water Treatment Rule
FPST	Fallon Paiute Shoshone Tribe
GAL	Gallons
GIS	Geographic Information System
GPCD	Gallons per Capita per Day
GPD	Gallons per Day
GPM	Gallons per Minute
GW	Ground Water
HP	Horse Power
IDF	Inch Diameter Foot
ISO	Insurance Service Office
KV	Kilovolts
KW	Killowatt
KWh	Kilowatt-hours
LS	Lump Sum
M & I	Municipal & Industrial
MCL's	Maximum Contaminant Level's
MGA	Million Gallons Annually
MGD	Million Gallons per Day
MG/L	Milligrams per liter = ppm
MOU	Manner of Use
NAS	Naval Air Station - Fallon
NDEP	Nevada Division of Environmental Protection
NDOT	Nevada Department of Transportation
NTU	Nepelometric Turbidity Unit
OAF	Oxidation-Adsorption-Filtration
OCAP	Operating Criteria and Procedures

PLPT	Pyramid Lake Paiute Tribe
POD	Point of Diversion
POU	Place of Use
PPH	Persons per Household
PPB	Parts per billion
PPM	Parts per million = mgl
Project	Newlands Project
PSI	Pounds per square inch, 1 psi = 2.31 feet of TDH
PVC	Poly Vinyl Chloride
RSR	Recharge, Storage & Recovery
SAR	Sodium Adsorption Ratio
SDWA	Safe Drinking Water Act
SW	Surface Water
SWTR	Surface Water Treatment Rule
TCID	Truckee Carson Irrigation District
TCLA	Truckee Carson Leasing Authority
TDH	Total Dynamic Head (feet)
TDS	Total Dissolved Solids
THM	Trihalomethanes
TMWA	Truckee Meadows Water Authority
TROA	Truckee River Operating Agreement
USDOI	United States Department of Interior
USDOJ	United States Department of Justice
USFWM	United States Federal Water Master
USFWS	United States Fish & Wildlife Service
USGS	United States Geological Survey
WRD	Water Research & Development, Inc.

1. EXECUTIVE SUMMARY

3.0 Existing Water Resources

Surface Water: The sole source of surface water for Lahontan Valley is provided by the Truckee and Carson rivers. Historically during a 43 year period (1925-1967), the Truckee River, with large yearly fluctuations, furnished on an average 51% of the water stored in Lahontan Reservoir. The remaining amount was supplied by the Carson River.

In more recent times (1983-1996), due to Court decisions and Federal mandates, the Truckee River contribution to Lahontan Reservoir has been reduced to about 38%. During drought years (1988, 1990, 1991, 1992 and 1994), however, the Truckee River contributed an average of 62% of the water received by Lahontan Reservoir. In 1988 the Truckee River provided 81% of the water received by Lahontan Reservoir. Upon recognizing current and future upstream demands (Cui-Ui spawning flows and Truckee Meadows M & I growth) on the Truckee River, the diversion into the Truckee Canal may be further reduced. The impact of these threatened reductions in diversions from the Truckee River will be especially severe during drought years due to Lahontan Valley's dependence upon the supplemental flows from Truckee River in drought years when Carson River flows are low.

Upon the enforcement of the elements of P.L. 101-618 (OCAP, Cui-Ui Recovery, Wetlands Acquisition of water rights, Naval Air Station Conservation, Project Delivery Efficiency increase, etc.) in addition to the effects of the Truckee River Water Quality Agreement, Bench & Bottom Decision and Transfer/Petition (A.B. 380) actions, Pyramid Lake Paiute Tribe's application for Truckee River Decree Claim Nos. 1 and 2 water rights, the potential cumulative reduction in irrigation diversions into the Project may vary from 381,000 to 437,000 AF. Based upon a diversion rate of 406,000 acre feet as set forth in the 1967 OCAP, these respective reductions represent a 94% to 108% reduction in Project diversion for irrigation. According to U.S. Fish & Wildlife Service

estimates for preserving the wetlands in Lahontan Valley, about 100,000 to 147,000 AF of irrigation rights may be acquired. These wetlands acquisitions alone represent a retirement of about 53% to 79% of the irrigated acreage within the Carson Division. Assuming all of these actions will act in a cumulative manner, the demand reduction threatens to exceed the total available water supply of the Project. The potential impacts of reducing Lahontan Reservoir storage capacity by 56% as supplied by the Truckee River, Recoupment of 1,500,000 AF from the Project, granting the Pyramid Lake Paiute Tribe (PLPT) Truckee River unappropriated water and the Truckee River Operating Agreement (TROA) will further reduce the water supply of the Project and Lahontan Valley.

No Programmatic Environmental Impact Statement has been prepared by the United States wherein the impacts of the interrelated proposed actions of P.L. 101-618 (the Act) and other prior or current actions have been taken into account. An environmental analysis must be made before these actions are enforced in reallocating the water supply for the Newlands Project, and thus, the Lahontan Valley.

Lahontan Valley Ground Water: Ground water recharge, resulting directly from precipitation (rain and snow) within the Carson Desert Basin (Lahontan Valley) is estimated at about 1,300 AFA (Glancy & Katzer, 1975). This recharge from the Stillwater Mountain range is estimated to occur only on the eastern side near the Stillwater Wildlife Area. This recharge, therefore, does not contribute to the recharge of the western and central portions of the Valley where the majority of potable wells are located. The estimated ground water recharge resulting from infiltration of Project irrigation water varies from 50,000 AFA to 100,000 AFA (Maurer, 1994).

If P.L. 101-618 is fully implemented thereby reducing the Project diversions for irrigation by conservatively 94%, the amount of recharge to ground water may be decreased by about 47,000 AFA to 94,000 AFA, leaving only about 3,000 AFA to 6,000 AFA for recharge. (Note: 50,000 AFA x 0.94 = 47,000 AFA, leaving 3,000 AFA for recharge to 100,000 AFA x 0.94 = 94,000 AFA, leaving 6,000 AFA for recharge.) The State

Engineer has permitted about 20,000 AFA of ground water in Lahontan Valley and another 11,000 AF is consumed by statutorily permitted domestic wells, therefore the total ground water resources currently committed approximates 31,000 AFA. The ground water resource may therefore be significantly over-drafted by approximately 25,000 AFA to 28,000 AFA (31,000 AFA – 6,000 AFA to 31,000 AFA – 3,000 AFA.) Due to the uncertainty surrounding future Project diversions and the proposed wetlands buy-out and their effects on ground water recharge, the State Engineer in August of 1995, curtailed (Order No. 1116) further development of ground water in the Lahontan Valley, excepting small, quasi-municipal wells pumping 4,000 gallons per day or less. This order has essentially curtailed any further large-scale, quasi-municipal or commercial development within the Valley. Small subdivisions relaying upon single dwelling domestic wells, however, are still permitted in the County at this time.

Ground Water Dixie Valley: Dixie Valley (Valley), located approximately thirty-five miles to the east of Fallon, has an estimated perennial ground water yield on the order of 40,000 to 50,000 AFA (Durbin, 1996). Currently, the Navy holds about 14,000 AF of permitted and certificated ground water rights in the southern portion of the Valley and Churchill County has pending Applications for 56,472 AF of ground water in the Valley. There is an ongoing effort between the Navy and county to combine these ground water resource rights for the development of a Community Water System whereby all entities, including Naval facilities in Lahontan Valley and Dixie Valley may be served.

4.0 Population & Water Demand Projection

Population Projections: Based upon a mean 3.0% per annum growth rate, the total population of the County, including the City of Fallon, the Naval Air Station and Indian Reservation, is projected to be 53,660 in year 2025 and 112,351 in year 2050.

Water Demand: Based upon an annual population growth rate of 3.0%, a 3.5% annual growth rate for dairy cattle and a 0% growth rate for beef cattle and a constant 270 gallons per capita per day (GPCD) consumption of water, the water demand for the

County is projected to be 21,531 AFA in year 2025 and 45,747 AFA in year 2050. Assuming a peak day demand rate at twice the annual average demand, the Phase I plant capacity to meet the year 2025 demand is 40 million gallon per day (MGD). The Phase II plant will require a capacity of 43 MGD, for a combined plant capacity of 83 MGD, which is projected to meet the year 2050 demand.

If Carson Division Project irrigation water rights were considered as the County wide quasi-municipal water supply, more surface water rights must be purchased than is demanded since decreed changes in use from irrigation to any other uses, including quasi-municipal is limited to 2.99 AF/Ac. Meeting a Phase I annual demand of 21,531 AFA, would therefore require the purchase of 25,204 AF of irrigation rights assuming an average head-gate duty of 3.5 AF/Ac. This acquisition would represent the retirement of about 7,200 acres of water-righted lands. Meeting a Phase II demand of 24,216 AFA, would require the acquisition and purchase of 28,346 AF feet of irrigation rights, representing about 8,099 acres of water right land. Total retired water right acreage for Phase I and II would approximate 15,300 acres.

5.0 Water Quality & Treatment

Surface Water: The water quality of Lahontan Reservoir is generally good, having turbidities ranging from 5.5 to 14.0 NTU and total dissolved solids (TDS) less than 300 milligrams per liter (MG/L) with moderate color and alkalinity. Limitations include seasonal algae accumulations, an arsenic concentration of about 17 part per billion (ppb), the presence of trihalomethanes that are precursors to carcinogenic trihalomethanes (THMs), and pathogenic organisms including Cryptosporidium, Giardia, and others which can be deactivated and/or removed by conventional treatment, including ozone. The Truckee Canal water supply is also of good quality, having average measured turbidities of 7.0 NTU, total dissolved solids of 200 ppm and arsenic concentrations 14 ppb (NDEP, 2000).

Lahontan Valley Ground Water: The basaltic aquifer meets current State of Nevada drinking water standards, excepting for arsenic, which typically occurs in concentrations of about 100 ppb. The maximum contaminate level (MCL) for arsenic is now set at 50 ppb. This MCL, however, has lowered to 10 ppb, effective in 2006. Arsenic can be removed by wellhead treatment using a relatively expensive process of a modified coagulation/filtration (MCF) process.

The shallow and intermediate aquifers in the Valley may have arsenic concentrations of 20 to 333 ppb and manganese concentrations of 0.24 to 1.22 ppm. The current MCLs for arsenic and manganese are 50 ppb and 0.10 ppm, respectively. Both constituents can be removed on a wellhead basis by the MCF system or for larger plant capacities by conventional treatment methods similar to those for surface treatment.

About 34% of the domestic wells sampled in the Valley exceed the current MCL (50 ppb) for arsenic, while about 29% of the wells exceed the MCL for manganese. Since the MCL for arsenic will be reduced to 10 ppb, however, about 68% of all wells will exceed this newly adopted MCL.

Dixie Valley Ground Water: The water quality of Dixie Valley ground water meets all current drinking water standards, excepting some wells that exhibit fluoride concentrations as high as 9.12 ppm. The MCL for fluoride is 2.0 ppm. Based upon a small sampling of 9 wells, 4 wells exceeded the MCL, however, the average fluoride concentration of all 9 wells is 4.42 ppm. The average arsenic concentration of the sampled wells is 15 ppb. Treatment for fluoride and/or arsenic can achieved either on a wellhead basis or by a larger central treatment plant utilizing an ion exchange method.

6.0 Distribution System

Distribution System: A distribution/transmission system was designed utilizing WaterCAD, a computer network hydraulic package for the 2025 and 2050 service areas outlined on Maps 6.1.1 and 6.1.2. An overall average quasi-municipal demand rate of

270 gpcd was utilized along with a 3% population growth which was distributed throughout the service area based upon existing zoning. Distribution pipelines were laid out along existing right-of-ways if possible and looped whenever possible to increase reliability over a branched system. The system was designed to allow integration and service to the City, FPST and NAS, as the affordability of many of these larger regional water supply options is dependent upon participation from the entire community. The bulk of the ground level storage required for operations, emergency reserve and fire flows was sited on top of Rattlesnake Hill adjacent to the storage facilities of the City, FPST and the NAS, which would allow for gravity pressurization for the bulk of the service areas. Additional elevated tank storage was sited throughout the service areas. The cost associated with the 2025 service area system is $28 million and $65 million for the 2050 system, which includes the 2025 system, therefore the incremental 2050 cost is $37 million. The location and size of the water mains for each of these systems is shown on Maps 6.1.1 and 6.1.2.

7.0 Alternative Water Resources & Treatment

7.1 Historic Ground Water Development: Under this alternative, the assumption is made that there is no curtailment of ground water development in Lahontan Valley and that development will take place according to current zoning and that individual wells will continue to be constructed to serve the system as demand increases. (It is assumed under this alternative that State Engineer Order No. 1116, curtailing quasi municipal ground water wells to 4,000 gallons per day or less will be waived and/or conditional permits would be allowed.) Individual well head treatment for arsenic and/or manganese is considered as well as a central plant treatment for these constituents. For wells that meet the drinking standards, treatment would be limited to wellhead disinfection.

Projected primary areas of quasi-municipal development are assumed to progress to the west of the City Fallon and paralleling U.S. Hwy 50 toward the “Y” intersection of U.S. Hwy 50 and U.S. Hwy 50 Alternate and south to Sheckler Road, north in the

vicinity of Rice Road and east about a mile east of the city limits. The proposed well field for Phase I and II of this proposed alternative is aligned along the Carson River channel and the S Line Canal and bounded generally on the north by Rice Road, the east by Rattlesnake Mountain, the south by Sheckler Road and west by the Sheckler Cutoff Road.

The proposed well field for Phase I includes 27 wells located immediately to the north and west of the City, where conceptually four (4) wells would be located in each section with a half mile separation between wells. The pumping capacity of each well is assumed to be 1,000 gpm. Under Phase II, an additional 30 wells are proposed at 1,000 gpm per well to be sited generally to the west of Phase I wells and aligned near the Carson River channel and the S Line Canal.

Although this alternative is not viable due to pending Federal actions, it is presented to establish a baseline for the costs associated with developing a County Water Supply System, assuming these Federal actions do not take place. This alternative, may serve as a basis for mitigation to the community for development of an alternate water supply.

7.2 Project Conjunctive Surface & Ground Water Development: The water source for this alternative is dedicated or purchased Project irrigation water rights requiring a change in manner of use from irrigation to quasi-municipal before the State Engineer. Additionally, State Engineer Order No. 1116 must also be considered and perhaps modified. Conceptually, surface water rights at their full duty (3.5 af/ac) would be delivered by the TCID via canal for subsequent seepage into underlying ground water aquifers. The consumptive use component (2.99 af/ac) would then be pumped by recovery wells aligned adjacent to the canals. For Phase I, 113 manifolded wells on a 1/4 mile spacing aligned along 28 miles of canals (V-Line, S-Line, A-Line & L-Line), all located on the western side of the Irrigation Project represents this alternative's main features. The discharge capacity from the wells is assumed to vary between 200 and 250 gpm per well. Arsenic and/or manganese treatment has been considered either at

the well head or at a central plant. Wellhead disinfection is also considered for those wells that meet the drinking water standards.

Based upon BOR and TCID preliminary studies, this alternative appears to be feasible. This alternative would benefit the TCID by improving the conveyance efficiency of the Project. Pilot studies must be conducted to ascertain the final physical feasibility. The alternative is limited due to the susceptibility of the water supply to drought and the vagaries of Federal regulation. Possible interference between existing domestic wells and the recovery wells must also be addressed.

7.3 Project Induction Well Development: The water source for this alternative would also be dedicated or purchased Project irrigation water rights requiring a change in manner of use from irrigation to quasi-municipal use before the State Engineer. State Engineer Order No. 1116 must also be considered and perhaps modified. Surface water rights would be delivered by TCID to the Carson River (River) channel below the Carson Diversion Dam over a 14-mile reach extending down the channel to its terminus northeast of the City of Fallon. Conceptually, the full duty (3.5 af/ac) would be released into the River channel for infiltration into ground water storage. Subsequently, the consumptive use component (2.99 af/ac) would then be pumped from induction wells located near the River channel. For Phase I, 27 wells spaced about 1/2 mile apart over the 14 mile reach and manifolded together, represent this alternative's main features. Arsenic and/or manganese treatment has been considered at the wellhead or at a central plant. Wellhead disinfection treatment is also considered for those wells meeting drinking water standards.

From a regulatory standpoint, this alternative is attractive. However, the water supply is subject to droughts and the vagaries of Federal regulation. Pilot studies must be undertaken to ascertain the physical feasibility of this option. Interference between existing wells and the induction wells must also be addressed.

7.4 Project Lahontan Reservoir Development: The water source identified for this alternative is dedicated or purchased Project irrigation water rights requiring a change in manner of use from irrigation to quasi-municipal use before the State Engineer. Conceptually, the consumptive use component (2.99 af/ac) would be diverted from Lahontan Reservoir, conveyed and treated at a conventional surface treatment plant located near the Reservoir. From the treatment plant, the water would be pumped by mainline to the distribution system within the service area. For purposes of comparing alternative water resources and treatment, the main transmission pipeline is designed to deliver water to a central load center located near the City of Fallon.

From a regulatory standpoint, this alternative is attractive. However, the water supply is subject to droughts and the vagaries of Federal regulation. Deteriorating water quality during low Reservoir levels would limit the treatment efficiency of this water supply.

7.5 Project Recharge, Storage & Recovery Development: The water source identified in this alternative would also be dedicated or purchased Project irrigation water rights requiring a change in the manner of use from irrigation to quasi-municipal use before the State Engineer. Surface water is proposed to be diverted from Lahontan Reservoir and applied to a recharge area located on an alluvial fan adjacent and northeast of the Reservoir. This recharge area is located on the northern alluvial fan of the Dead Camel Mountains, east of Lahontan Reservoir, south of the V-Line Canal and west of the Bad Lands located to the west of Sheckler Reservoir. Since ground water levels are relatively deep, (50 to 117 feet on the north side and in the order of 300 feet deep on the south side), ground water quality is good, surface infiltration rates are high and topography varies between 1-5% slopes, this area appears to be the only site within Lahontan Valley that is suited for the recharge, storage and recovery of water. Pumped water from Lahontan Reservoir would be delivered by pipeline to the recharge area and thence applied by contour basins for infiltration into the ground water aquifers for storage. Production wells located within the recharge area would then recover the infiltrated surface water from ground water storage with treatment for arsenic, manganese and other constituents not meeting drinking water standards. If treatment is

required, a central treatment plant has been proposed to be located at the northern side of the recharge area, near the V-Line Canal. Treated water would then be pumped to the distribution system and a mainline designed to deliver water to a central load center located near the City of Fallon. Conceptually, the full duty (3.5 af/ac) would be diverted from the Reservoir and applied to the recharge area, while the consumptive use component (2.99 af/ac) would be recovered from ground water storage for quasi-municipal use. A recharge, storage and recovery permit would be required as granted be the State Engineer. Additionally State Engineer Order No. 1116 must be considered and perhaps modified to allow for this alternative.

For Phase I, a recharge area of about 2500 acres with 26 recovery/production wells would be required for this alternative. Phase II would require an additional 2800 acres of recharge area and 30 ground water recovery/production wells and associated pipelines and controls.

From a regulatory perspective, this alternative should not pose a problem, however the supply is also subject to droughts and the vagaries of Federal regulation. This alternative however has an added benefit in that it serves as “banking” or an underground storage reservoir for surface waters during high water years to augment water supplies during drought periods.

7.6 Dixie Valley Ground Water Importation Development: The Valley has an estimated ground water annual yield of 40,000 to 50,000 AFA, of which the County holds applications approximating this same amount. The Navy also holds ownership of about 14,000 AFA of ground water permits and certificates in the Valley. Currently, there is a joint effort ongoing whereby the Navy water rights may be dedicated to the County to augment the Community Water System in exchange for quasi-municipal water service for the Naval Air Station in Fallon and Navy facilities in Dixie Valley. The water source identified under this alternative consists of a combination of permits, certificates and applications for ground water in Dixie Valley (Valley).

Conceptually in Phase I, 10 ground water wells spaced over a 25-mile distance, comprises the well field. The well field would be located centrally around the Settlement Area of the Valley. From the well field, production would be conveyed westerly about 44 miles through a 42" pipeline along SR-121 and U.S. Hwy 50 over Sand Springs Summit (Summit) to Lahontan Valley. Ten (10) booster pump stations are required to convey the ground water from the floor of Dixie Valley (elevation 3445') about 1165 feet to the Summit (elevation 4610'). Once the discharge is pumped to the Summit, the water can then be delivered by gravity to the distribution system in Lahontan Valley. About one half of the storage requirement for the service area will be sited at the Summit.

Phase II conceptually consists of eleven (11) ground water wells (well field) spaced over a 35.6 mile distance and ten (10) booster pumps and a 42" mainline constructed as a parallel and stand alone system that can either be operated independently or in conjunction with the Phase I system. This phase, however, represents a worst case scenario, whereby the well field extends about 11 miles further to the north than the Phase I well field in an effort to avoid ground water interference between Phases. Additionally, the elevation gain for this Phase is somewhat greater since some of the wells are located in a lower (3378') portion of the Valley. The final location of the well field for Phase II would be based primarily upon the performance of the well field developed for Phase I. The proposed mainline routing for Phase II differs from Phase I in that the routing in Lahontan Valley is oriented in a westerly direction south of the NAS and thence follows U.S. Hwy. 95 north to the load center near the City, thereby allowing a looped mainline system with Phase I, which essentially follows U.S. Hwy 50 all the way from Dixie Valley to the load center. A central treatment plant, located in Dixie Valley, is included for both phases for the removal of fluoride, arsenic and other constituents not meeting the Safe Drinking Water Act. Based upon preliminary water quality sampling, treatment for fluoride removal may not be required depending upon blending of well water sources.

Although this alternative is the most costly, this source is the only alternative that represents development of a new, untapped water supply for the Lahontan Valley and is not subject to droughts and Federal regulations currently associated with the Truckee and Carson Rivers. A new, additional water supply added to existing water supplies from the Truckee & Carson Rivers would add significant development potential to the County as well as dependability to its municipal water supply.

8.0 Financial Considerations

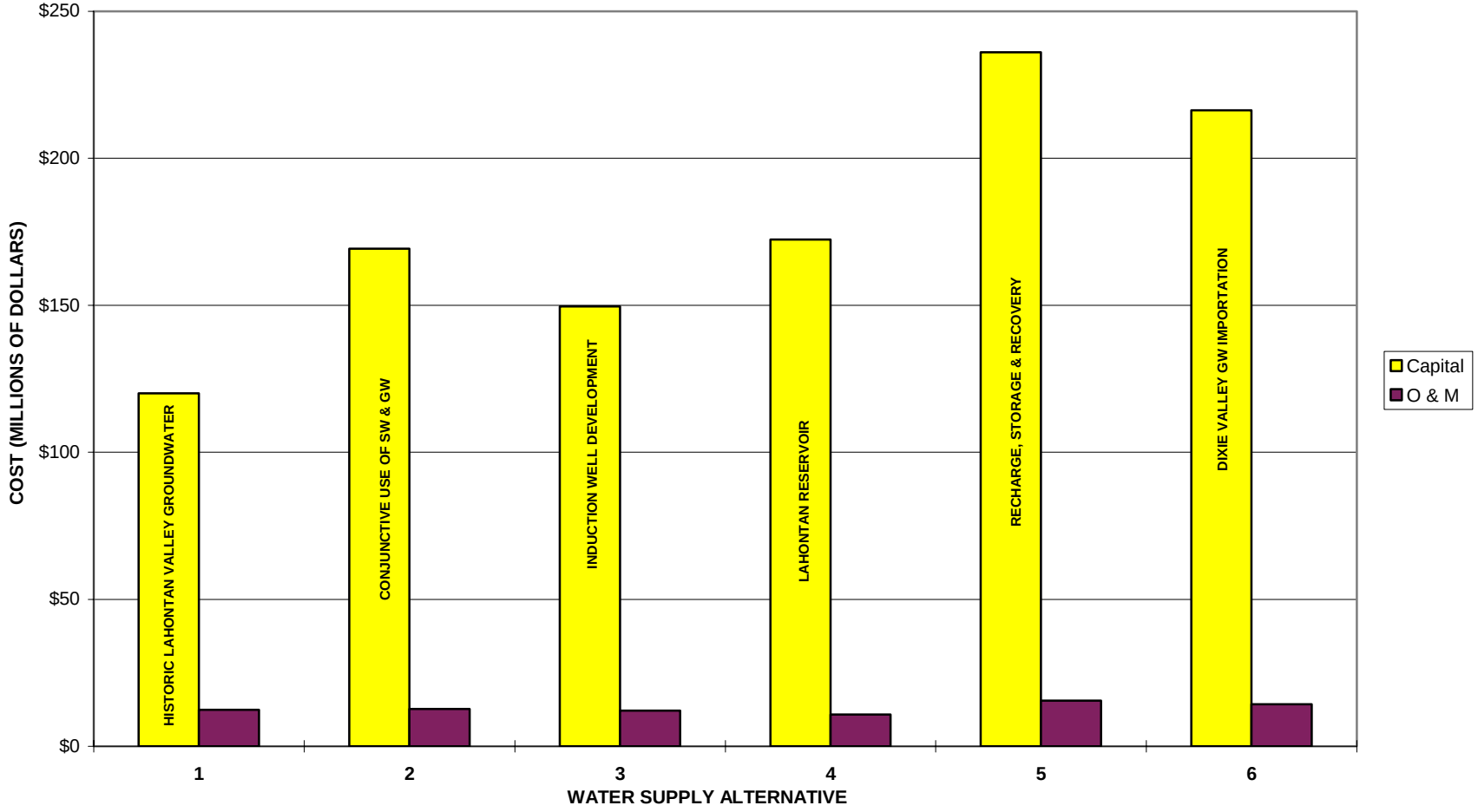
Method of Comparison of Alternative Water Supply Developments: For purposes of comparing the capital and annual operations and maintenance (O&M) costs on an equivalent basis, all alternatives include a mainline to deliver water to a common load center located in Section 25, T.19N., R.28E. M.D.B.&M. along the S-Line canal about a mile northwest of the intersection of U.S. Hwy 50 and U.S. Hwy 95. For those alternatives requiring treatment for arsenic and/or manganese at a central plant in the Lahontan Valley, the plant is also assumed to be located at this load center.

See Table 1.1.1 and Figure 1.1.1 showing the capital and annual O & M for each of the alternatives where treatment is required at a central plant. In this comparison it is assumed MCL's for arsenic, manganese and fluoride of the raw water are exceeded, therefore treatment for these constituents is included.

TABLE 1.1.1 SUMMARY OF COSTS OF THE VARIOUS WATER SUPPLY ALTERNATIVES FOR PHASE I, YEAR 2025 (21,531 AFA)

ITEM	TABLE	DESCRIPTION	CAPITAL COSTS $x1,000,000	O&M COSTS $x1,000,000
		Historic Lahontan Valley Ground Water:		
1	7.1.2	Historic Lahontan Valley Ground Water Development w/ Centralized 40 MGD Treatment Plant for Arsenic & Manganese Removal	$120.09	$12.39
		Project Conjunctive Use of Surface & Ground Water:		
2	7.2.1	Conjunctive Use of Surface & Ground Water w/ Centralized 40 MGD Treatment Plant for Arsenic & Manganese Removal	$169.27	$12.71
		Project Induction Well Development:		
3	7.3.1	Induction Well Development w/ Centralized 40 MGD Treatment Plant for Arsenic & Manganese Removal	$149.65	$12.14
		Project Lahontan Reservoir:		
4	7.4.1	Lahontan Reservoir w/ Centralized 40 MGD Surface Water Treatment Plant	$172.38	$10.84
		Project Recharge, Storage & Recovery:		
5	7.5.1	Recharge, Storage & Recovery w/ Centralized 40 MGD Treatment Plant for Arsenic Removal	$236.07	$15.57
		Dixie Valley Ground Water Importation:		
6	7.6.3	Dixie Valley Ground Water Importation w/ Centralized 40 MGD Arsenic & Fluoride Treatment Plant	$216.27	$14.32

FIGURE 1.1.1 SUMMARY OF CAPITAL & O&M COSTS FOR VARIOUS WATER SUPPLY ALTERNATIVES UNDER PHASE I, YEAR 2025 (21,531 AFA) WITH WATER TREATMENT



9.0 CHURCHILL COUNTY WATER RESOURCE PLAN EVALUATION & RECOMMENDATIONS

Over 50 copies of the Final Draft of the Churchill County Resource Plan were sent to various entities, including the Churchill County Commissioners, the Churchill County Planning Commissioners and Staff, the City of Fallon, the Truckee Carson Irrigation District, the Fallon Naval Air Station, the Fallon Paiute-Shoshone Tribe, the Pyramid Lake Paiute Tribe, the State of Nevada Governor/Assemblymen & Senators, the United States Nevada Representatives & Senators, the Carson Water Sub conservancy District, the Washoe County Division of Water Planning, the United States Bureau of Land Management, the United States Bureau of Reclamation, the United States Fish & Wildlife Service, the United States Geological Survey, the Nevada State Engineer, the Nevada Division of Water Planning, the Nevada Division of Environmental Protection, the Nevada Bureau of Health and Protection Services, Sierra Pacific Power Company, and other individuals interested in the water resources of Lahontan Valley. In addition to the Water Resource Plan and Appendices, a "Subjective Matrix Evaluation of Water Supply Alternatives" was also forwarded to these agencies and individuals to obtain their evaluation of the seven water resource alternatives that were presented in the Plan. Formal reviews were received from members of the Churchill County Planning Commission, the Nevada Division of Water Resources, the Nevada Division of Water Planning, the Nevada Division of Environmental Protection, the United States Bureau of Reclamation, the United States Geological Survey, the Carson Water Sub conservancy District, and the Washoe County Division of Water Planning. These formal reviews and the authors response are presented in Appendix 9.0. Informal reviews were received from many individuals and agencies, including the Truckee Carson Irrigation District, Churchill County Planning and Administration Staff, Sierra Pacific Power Company (Fallon Office) and others representing Lahontan Valley quasi municipal and agricultural interests. Extensive review and constructive input into this document was also provided by the Churchill County Manager, and legal representatives of the County.

Table 1.1.2 Subjective Matrix Evaluation of Water Supply Alternatives prepared by the authors of this Plan was provided in the Final Draft of Churchill County Resource Plan is presented to show the reasoning used in arriving at the subjective evaluation made at that time in 2000. The alternatives arranged from the most favorable to least favorable were: Dixie Valley, Lahontan Reservoir, Recharge Storage & Recovery, Conjunctive Use, Induction Wells, and Historic Valley Ground water.

TABLE 1.1. 2 WRD SUBJECTIVE MATRIX EVALUATION SUMMARY OF WATER SUPPLY ALTERNATIVES

WATER SUPPLY ALTERNATIVE	WATER QUANTITY	WATER QUALITY	ENVIRO. IMPACT CONSID.	PERMITTING	LEGAL POLITICAL LEGISLATIVE ISSUES	CAPITAL & O&M COSTS	PHYSICAL SYSTEM FEASIBILITY	DROUGHT RESISTANCE / SUPPLY DIVERSITY	AVG.	REMARKS
	RATING SCORE									
Dixie Valley Ground Water Importation	5	4	5	5	5	2	5	4	4.4	Although this is the most costly alternative, it is the only one which represents a new water supply for the valley and does not depend upon flows from either the Truckee or Carson Rivers. Additional pilot studies required to determine Fluoride conc.
Lahontan Reservoir	1	3	4	4	3	3	5	2	3.1	Relies upon Project surface water which is more susceptible to drought & Federal regulation.
Recharge, Storage & Recovery	1	3	4	4	3	2	3	3	2.9	Ultimately relies upon Project surface water, which is more susceptible to drought & Federal regulation. Additional pilot studies required to determine feasibility of recharge basins & recovery wells.
Conjunctive Use of Surface & Ground Water	1	3	2	3	3	3	2	3	2.5	Ultimately relies upon Project surface water, which is more susceptible to drought & Federal regulation. Positive benefit to TCID as it captures waters lost through distribution system. Additional pilot studies required.

WATER SUPPLY ALTERNATIVE	WATER QUANTITY	WATER QUALITY	ENVIRO. IMPACT CONSID.	PERMITTING	LEGAL POLITICAL LEGISLATIVE ISSUES	CAPITAL & O&M COSTS	PHYSICAL SYSTEM FEASIBILITY	DROUGHT RESISTANCE / SUPPLY DIVERSITY	AVG.	REMARKS
Induction Well Development	1	3	2	3	3	3	2	3	2.5	Ultimately relies upon Project surface water, which is more susceptible to drought & Federal regulation. Additional pilot studies required to determine feasibility of inducing groundwater flow from the Carson River channel.
Historic Lahontan Valley Ground Water	1	3	3	1	1	4	4	2	2.4	Although this alternative is the most attractive from an economic standpoint, it is not a viable considering the numerous federal actions which impact recharge. The State Engineer has also placed a moratorium on any further GW development in excess of 4000 GPD.

RATING SCORES:

5 = Criterion will impose little or no constraint on achievability of the option (Most Attractive)

4 = Criterion will impose some constraint on achievability of the option; however there is a better than 50% probability that the constraint can be mitigated

3 = Criterion will impose some constraint on achievability of the option; and there is a 50-50 chance that the constraint can be mitigated

2 = Criterion will impose substantial constraint on achievability of the option; and there is a less than 50% probability that the constraint can be mitigated

1 = Criterion will impose an outright prohibition on achievability of the option or the constraint is so severe it probably cannot be mitigated (Least Attractive)

Table 1.1.3 Subjective Matrix Evaluation Summary of Water Supply Alternatives, shows the individual and mean evaluations of these alternatives as presented by the five Churchill County Planning Commissioners, the Nevada Division of Water Resources, the Nevada Division of Water Planning, and the Washoe County Department of Water Resources. In terms of averages of these eight evaluations, Dixie Valley was rated as most favorable, followed by Lahontan Reservoir, Conjunctive Use, Induction Wells & the Recharge & Recovery were tied, followed as least favorable is the Historic Ground water alternative.

TABLE 1.1.3 REVIEWER'S SUBJECTIVE MATRIX EVALUATION SUMMARY OF WATER SUPPLY ALTERNATIVES

REVIEWER/ WATER SUPPLY ALTERNATIVE	CHURCHILL COUNTY PLANNING CHAIRMAN	CHURCHILL COUNTY PLANNING VICE CHAIRMAN	CHURCHILL COUNTY PLANNING MEMBER	CHURCHILL COUNTY PLANNING MEMBER	CHURCHILL COUNTY PLANNING MEMBER	NEVADA DIVISION OF WATER PLANNING	NEVADA DIVISION OF WATER RESOURCES	WASHOE COUNTY DEPARTMENT OF WATER RESOURCES	AVERAGE
	OVERALL AVERAGE RATING SCORE								
Historic Lahontan Valley Ground Water	2.4	2.5	3.4	2.5	3.4	2.1	3.0	2.4	**2.7**
Conjunctive Use of Surface & Ground Water	2.5	2.6	3.3	3.4		2.4	2.8	4.0	**3.0**
Induction Well Development	2.5	2.8	3.3	3.4		2.4	2.3	2.6	**2.8**
Lahontan Reservoir	3.1	2.5	3.3	3.3	3.4	3.0	3.3	3.6	**3.2**
Recharge, Storage & Recovery	2.9	3.3	3.0	3.5	1.3	2.8	3.0	2.9	**2.8**
Dixie Valley Ground Water Importation	4.4	4.1	4.1	4.5	4.0	4.0	3.4	3.5	**4.0**

RATING SCORES:

5 = Criterion will impose little or no constraint on achievability of the option (Most Attractive)

4 = Criterion will impose some constraint on achievability of the option; however there is a better than 50% probability that the constraint can be mitigated

3 = Criterion will impose some constraint on achievability of the option; and there is a 50-50 chance that the constraint can be mitigated

2 = Criterion will impose substantial constraint on achievability of the option; and there is a less than 50% probability that the constraint can be mitigated

1 = Criterion will impose an outright prohibition on achievability of the option or the constraint is so severe it probably cannot be mitigated (Least Attractive)

Major recommendations presented by these reviewers included:

1. The County should develop an ordinance requiring the dedication of water rights by developers of subdivisions for eventual support of a County wide water system. (Note: The County has subsequently adopted this ordinance in November, 2000)

2. A County-wide waste water system should also be considered along with the Water Resource Plan to prevent degrading of the ground water.

3. A new source of water is needed for the Valley. Dixie Valley Alternative was preferred since the source is relatively drought resistant as compared to alternative surface supplies, water quality appears to be superior to other sources, the alternative would not reduce the agricultural water supply, and the source would be less subject to restrictive Federal actions. The downside of course is the cost.

4. Review ordinances to establish the benefits of subdivision regulations as versed to parceling process.

5. The recharge, storage and recovery (RSR) alternative should be studied further since the effects of droughts could be lessened. Additionally, the alternative may be developed in a such a manner as to capture and store surface flood waters in the underground during high flow years. (Note: A RSR first phase study has been recently completed.)

6. The County should adopt a proactive stance in developing a quasi municipal water supply as versed to a reactive position.

RECOMMENDATIONS:

1. Continue use of historic ground water resources for quasi-municipal development. Petition the Nevada State Engineer to modify Order No. 1116 and/or grant waivers or revocable well permits for quasi-municipal use only.

2. Acquire Water Treatment Load Center property. Suggest approximately 20 acres located within the NW ¼ of Section 15, T.19N, R.28E, M.D.B.&M. along the south side of the S-Line Canal.

3. Continue to require new quasi-municipal development to provide water rights as per the County water right dedication ordinance.

4. Require new quasi-municipal development to provide appropriate water and waste water systems, which upon completion would be dedicated to the County.

5. Establish a utility division within Churchill County to operate the newly created water and wastewater systems. Note: An ordinance establishing a utility was adopted in 1994.

6. Establish processes and procedures to acquire and operate private water and wastewater system upon the request of individual system owners.

7. Continue hydrologic and engineering studies to further establish the feasibility of the seven water source alternatives. See Chapter 9.0 RECOMMENDATIONS.

2. INTRODUCTION

In 1977, Wateresource Consulting Engineers developed an Interim Draft Report (Wateresource, 1977) for the development of a rural domestic water system for Churchill County. Topics covered in this report included: water sources, water demand, water treatment, transmission and distribution relative to the formation of a rural, domestic water system. Environmental assessment, financial planning, summary and conclusion as well as recommendations were not included in this interim report.

In 1993, as a result of Public Law 101-618 (The Truckee Carson Pyramid Lake Water Rights Settlement Act of 1990) and the subsequent Truckee River Operating Agreement (TROA) negotiations, Churchill County requested Wateresource to update the 1977 Interim Draft and present some pertinent conclusions and recommendations for the development of a County domestic water supply. In this second Interim Draft Report, (Wateresource, 1995) several water supply and treatment alternatives were considered. The most favored alternatives appeared to be alternative # 3: Surface water (Lahontan Reservoir) with treatment at a central plant at Lahontan and # 99: Surface water (Lahontan Reservoir) with treatment at a smaller central plant at Lahontan and peaking demand wells developed in the basalt aquifer currently serving the City of Fallon. The estimated capital costs of these two alternatives were $221,535,900 and $190,069,500, respectively. At that time it appeared reasonable to use basalt wells having an arsenic concentration of 100 ppb for peaking purposes if commingled with treated Lahontan surface water having a concentration of 17 ppb arsenic. The finished arsenic concentration of the water would be less than the maximum contaminant level (MCL) of 50 ppb. However, since the EPA has lowered the arsenic MCL to 10 ppb effective in 2006, the use of the basalt wells for peaking appears less practical.

In 1995, by Order No. 1116, the State Engineer curtailed further ground water appropriations in Lahontan Valley (Hydrologic Basin 101 Carson Desert), except for quasi-municipal uses limited to less than 4,000 gallons per day. Currently, about 20,000 AF of water right permits and certificates have been granted in Basin 101. Since

the annual natural recharge to the western and central portions of the Basin is insignificant, primary recharge to the Basin is provided by Project irrigation water that infiltrates to the ground water aquifers. The State Engineer's Order was based upon a recognition that the annual recharge to ground water aquifers in Lahontan Valley from irrigation will be significantly reduced by changes in the operation of the Irrigation Project, reduction in diversions to the Project, and retirement of significant irrigated acreage through the Lahontan Wetlands buy-out of irrigation rights. This Order has essentially brought large scale subdivision development in the Lahontan Valley to a standstill, since these developments relied upon new appropriations of ground water for quasi-municipal uses that exceed 4,000 gallons per day. Subdivisions that depend upon individual domestic wells, however, are still allowed at this time.

In order for the State Engineer to rescind Order No. 1116 and/or to allow "conditional ground water rights" to be granted in the Lahontan Valley, the community must prepare an approved Water Plan identifying alternative water resources for development to replace the "conditional ground water rights" once the Water Plan Project is in place.

In 1996, Churchill County requested Water Research & Development, Inc. to develop a Water Plan for the County. The Draft Water Plan is presented in the following sections: 1.0 Executive Summary, 2.0 Introduction, 3.0 Existing Water Resources, 4.0 Water Demand, 5.0 Water Treatment, 6.0 Distribution System, 7.0 Alternative Water Resources & Treatment Projects, and 9.0 Recommendations.

A final draft of the Churchill County Water Resource Plan was developed and presented to the County in 2000. This draft was subsequently circulated to reviewers and the review input and author responses were incorporated in this Final Plan. Additionally a comprehensive distribution system was developed for the anticipated County service area in 2002, the water treatment chapter was modified and updated to reflect the most recent water treatment technology, and a Financial Planning chapter was added to this final Plan in 2003.

3. EXISTING WATER RESOURCES

3.1 3.1 SURFACE WATER

The Carson and Truckee Rivers both rise in the Sierra Nevada mountain range along the west central Nevada border within the State of California. The Truckee River is the sole surface water supply for the Truckee Division of the Newlands Irrigation Project (Fernley, Hazen & Swingle Bench). The commingled Rivers serve as the sole source for the Carson Division (Lahontan Valley below Lahontan Reservoir) of the Newlands Project.

3.1.1 Truckee River:

The Truckee River (River) originates at Lake Tahoe and flows generally north from the dam at Tahoe City through the town of Truckee California. Lake Tahoe provides the largest storage on the Truckee River at about 732,000 AF, impounded by a 16 foot dam at Tahoe City, the uppermost works of the Newlands Irrigation Project. Smaller storage volumes are also provided by Martis Lake and Prosser Creek Reservoir, having respective storage capacities of 11,780 AF and 28,640 AF on Martis and Prosser Creeks. On the Little Truckee River, Boca Reservoir stores 40,868 AF and Stampede Reservoir has a storage capacity of 226,500 AF. Sierra Pacific Power Company (SPPCo.), privately owns 17,500 AF of storage in Independence Lake, which is tributary to the Little Truckee River. Donner Lake, having a storage capacity of 9,500 AF, is jointly owned by SPPCo. and the Truckee-Carson Irrigation District (TCID) the federal contractor for Project operations. From this alpine area in eastern California, the Truckee continues in an easterly direction, crossing the California/Nevada State line and into the Truckee Meadows. See Figure 3.1 showing the Truckee River system features in California and Nevada.

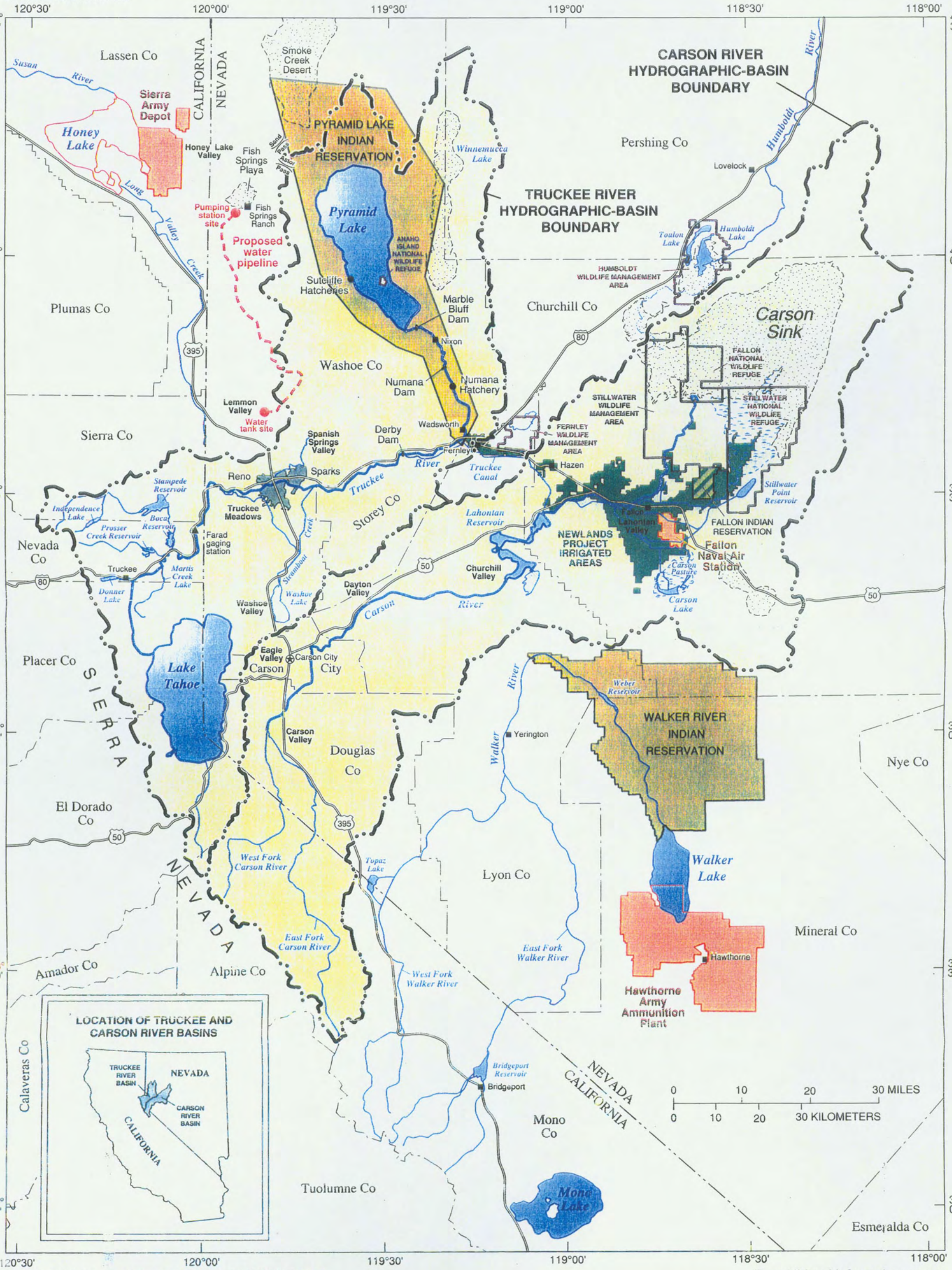
HYDROLOGIC FEATURES OF THE TRUCKEE AND CARSON RIVER BASINS AND ADJACENT AREAS, WESTERN NEVADA AND EASTERN CALIFORNIA

By
Jeffrey V. Trionfante and Lorri A. Peltz

1994

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

OPEN-FILE REPORT 93-368



Base from U.S. Geological Survey digital data 1:100,000, 1977-85
Albers Equal-Area Conic projection
Standard parallels 29°30' and 45°30', central meridian -119°00'

For additional information, contact
District Chief / U.S. Geological Survey
333 W. Nye Lane / Carson City, NV 89706

A product of the Truckee-Carson Program

MAP 3.1

Truckee Meadows Water Authority (TMWA): The Truckee River (River) provides between 75% and 85% of the municipal water supply to the TMWA service area, which includes the communities of Reno and Sparks, located in the Truckee Meadows (SPPCo., 1994). Current Truckee River water rights held by TMWA include their 40 cfs right at 28,959 AF and irrigation rights acquired or dedicated as of 1995 of 42,771 AF, all totaling about 72,000 AF. In order to meet the year 2015 demand of about 115,000 AF, TMWA intends to acquire an additional 43,029 AF of irrigation rights from the River. See following summary of Truckee River water rights that TMWA. has acquired and intends to acquire to meet the year 2015 demand. (Note: Sierra Pacific Power Company (SPPCo), a private company has sold the water portion of the enterprise to a publicly owned organization called the Truckee Meadows Water Authority (TMWA).

TABLE 3.1.1 TRUCKEE MEADOWS WATER AUTHORITY TRUCKEE RIVER DIVERSION RIGHTS

TMWA's Truckee River Water Rights:	Amount
TMWA's 40 cfs Right:	28,959 AFA
TMWA's Acquired Irrigation Rights (1995):	42,771 AFA
TMWA's Future (2015) Acquired Irrigation Rights:	43,029 AFA
Total[1] (TMWA's Rights to 2015):	115,000 AFA

[1] Does not include Hunter Creek Rights.

TMWA's current upstream (California) storage rights include Boca at 800 AF, Donner Lake at about 4,750 AF and Independence Lake at 17,500 AF, totaling about 23,000 AF. (SPPCo., 1994) Additional TMWA "drought" storage of about 39,000 AF is anticipated upon implementation of P.L. 101-618 and the Truckee River Operating Agreement (TROA). Although the 39,000 AF of additional storage is referred to as "drought" storage, some portion of this storage will apparently be used to support new population water demand within TMWA's service area. This trend of using so called "drought storage" to support continued growth is supported by the fact that the TMWA

planners have sought to reduce the drought standard of 10 years to 8 years as recently presented in TMWA' Water Resource Plan (TMWA, 2002).

Pyramid Lake: The River continues east from the Truckee Meadows toward the community of Wadsworth and turns north, terminating in Pyramid Lake. Under the 1944 Orr Ditch Decree (United States of America v. Orr Water Ditch Company, et al.) (Claims No. 1 & 2), the Pyramid Lake Indian Reservation was awarded a right to irrigate 5,875 acres of land within the Reservation using about 30,000 AF. Pyramid Lake, itself was not allocated a water right under this decree. Recently, however the Tribe has made a temporary application to change the manner of use of Claims Nos. 1 and 2 to wildlife and fishery uses on the Lower Truckee River. The State Engineer has granted a temporary permit for this change of use for about 19,000 AFA. Serious efforts to obtain a water supply for Pyramid Lake in order to stabilize the Lake at the 1971 level has been made by the Pyramid Lake Paiute Tribe (PLPT) over the past 35 years. Based upon a lake evaporation rate of 4.0 AF per acre, the Lake with an area of 110,000 acres, annually loses or evaporates about 440,000 AF (110,000 ac. x 4.0 ac.ft/ac). Since the Lake receives about 55,000 AF annually as direct precipitation, the net demand to maintain the Lake at the 1971 level approximates 385,000 AF (440,000 - 55,000). (Mahannah, 1975)

In various ways, the PLPT has endeavored to gain a water supply to stabilize Pyramid Lake's level, including claims that other Truckee water users (Newlands Irrigation Project, Truckee Meadows users, etc.) have used water inefficiently and/or illegally. Methods used by the PLPT include: instituting Federal operating criteria (OCAP) under authority granted to the Secretary of the Interior to protect endangered species and more recently Federal legislation (P.L. 101-618) and the Truckee River Operating Agreement (TROA) which further reduce diversions to the Newlands Project and the continued invocation of the Endangered Species Act mandating high water demands on the lower Truckee River (Derby Dam to the Lake). These flows are to support the spawning runs for the federally listed endangered Cui-Ui Lake sucker and the threatened Lahontan Cutthroat Trout. Under Applications 48061 and 48494 filed with

the State Engineer, the PLPT made a claim for all the unappropriated water on the Truckee River. These applications specify a diversion rate of 3,000 cfs and a total annual demand of 477,851 AF. The State Engineer (State Engineer, 11/27/98) in Ruling No 4683 granted the PLPT these permits for all of the unappropriated water on the River. The TCID has appealed this ruling. The PLPT Chairman (PLPT, 1994) has indicated that the Lake's ultimate demand mandates the shutting down of any further diversions of Truckee River water into the Truckee Canal at Derby.

Newlands Irrigation Project: Within the reach of the River between the Truckee Meadows and Wadsworth, the Derby Dam diverts a portion of the river's flow into the Truckee Canal, conveying water for delivery to the Truckee Division (Fernley, Hazen & Swingle Bench) of the Newlands Project to meet irrigation, municipal, industrial and domestic water demands for about 5,900 acres of land. The communities of Hazen and Swingle Bench are located within Churchill County and have an irrigation demand of about 1651 acres. From Derby Dam the Truckee Canal continues generally to the southeast to serve the Truckee Division and augment the water supply to Lahontan Reservoir. Within this reservoir, the Truckee River and Carson River waters are commingled and stored for the irrigation of 56,000 acres within the Project below the dam and for municipal, industrial and domestic water purposes supported by the Project in Churchill County.

The demands on the Truckee River significantly exceed the supply. In summary, see the demands placed upon the River by SPPCo. for the year 2015, other decreed rights, the Pyramid Lake Paiute Tribe and the Newlands Irrigation Project compared to the mean annual discharge of the River at Farad as shown in Table 3.1.2.

TABLE 3.1.2 TRUCKEE RIVER DECREED DIVERSION RIGHTS & PYRAMID LAKE PAIUTE TRIBE DEMANDS

Truckee River Decreed Rights & Demand	AFA x 1000
TMWA's decreed rights for quasi-municipal use (year 2015)[1]	58 (115)
Other decreed rights for irrigation (Steamboat - Pyramid)[2]	56
Subtotal (Truckee Meadows & Canyon rights):	114
Newlands Irrigation Project decreed irrigation & M&I decreed rights as per the 1988 OCAP or the 1967 OCAP[3]	108 - 180
Pyramid Lake net evaporation rate demand and PLPT unappropriated water "claims"	385 - 478
Total Demand Range:	**607 - 772**
Truckee River Supply at Farad	
Mean annual flow for the period 1909 - 1994:	542
1994 drought year	240

[1] By year 2015 TMWA will have acquired approximately 115,000 afa of river water rights. Assuming an average return flow of 50% from the Reno-Sparks treatment plant, about 58,000 af will be returned to the river at Vista.

[2] Includes PLPT's Claims 1 & 2 for irrigation. Also includes lands irrigated in the Truckee Meadows and the Canyon. In 1997, 8,052 acres of land was irrigated in the Truckee Meadows (USFWM, 1998) Total decreed acreage irrigated in the Truckee Meadows from Steamboat Canal to Derby Dam, exclusive of tributary & drain rights, approximates 26,176 acres and the average duty is assumed to be 4.0 af/ac (Mahannah, 1998). Assumed mean canal & ditch delivery efficiency at 85%.

[3] The 1997 adjusted OCAP limits the target storage capacity of Lahontan Reservoir to such an extent that the diversions for the Truckee River may approach zero during years when the Carson River is flowing above normal amounts.

The average deficit for the period 1909 - 1994 between demand and supply approximates 65,000 to 230,000 AF. Upon reviewing the magnitude of this deficit on a mean flow year, it is apparent the termination of diversion into the Truckee Canal (108,000 AF to 180,000 AF) balances out the supply and demand for TMWA, the PLPT and other users on the upper and lower reaches of the Truckee River.

Truckee Canal Diversions: Historically during a 43 year period (1925-1967), the Truckee River, with large yearly fluctuations, furnished on average 51% or about 200,000 AFA of the water stored in Lahontan Reservoir. In recent years, due to the discontinuation of off-season generation of power at the Lahontan Power Plant and other institutional changes, the average diversion from the Truckee River has been further reduced. During the 1983-1996 period, the Truckee provided 38% of the Lahontan water, while during drought years, the Truckee provided on average 62% of the Lahontan storage for the drought years 1988, 1989, 1991, 1992, 1993, and 1994. During these six drought years, the amount of Lahontan Reservoir storage provided by the Truckee Canal varied from 45% to 81%. See Table 3.1.3, Truckee River Contribution to the Carson Division.

TABLE 3.1.3 TRUCKEE RIVER CONTRIBUTION TO THE CARSON DIVISION[1]

WATER YEAR	TRUCKEE CANAL BELOW HAZEN	CARSON RIVER NEAR FT. CHURCHILL	TOTAL FLOW INTO LAHONTAN RESERVOIR	TRUCKEE RIVER CONTRIBUTION TO CARSON DIVISION	WATER YEAR STATUS[2]
	AF	AF	AF	%	
1983	29,950	804,600	834,550	4%	WET
1984	35,940	482,900	518,840	7%	WET
1985	148,500	197,500	346,000	43%	AVG
1986	88,070	537,500	625,570	14%	WET
1987	167,100	110,900	278,000	60%	DRY
1988	189,080	43,230	232,310	81%	DRY
1989	224,400	166,400	390,800	57%	AVG
1990	173,734	71,518	245,252	71%	DRY
1991	111,400	72,980	184,380	60%	DRY
1992	70,260	52,130	122,390	57%	DRY
1993	109,400	340,000	449,400	24%	WET
1994	62,248	75,827	138,075	45%	DRY
1995	86,944	632,284	719,228	12%	WET
1996	9,370	495,512	504,882	2%	WET
			OVERALL AVERAGE:	38%	
			WET AVERAGE:	10%	
			DRY AVERAGE:	62%	

[1] Attachment A, Mahannah, 1998 Direct Testimony before the State Engineer in the matter of application numbers 62405 through 63283.

[2] Water Year Status: Carson River Near Ft. Churchill:

WET	>250,000 AFA
AVG	150,000 - 250,000 AFA
DRY	<150,000 AFA

Orr Ditch Decree, Claim No. 3: Under Claim No. 3. of the Orr Ditch Decree (U.S. Nevada District Court, 1944), the Newlands Project, with a priority of 1902, has a right to divert: “through the Truckee canal 1,500 cubic feet of water per second flowing in the

Truckee River for the irrigation of 232,800 acres of lands on the Newlands Project, for storage in the Lahontan Reservoir, for generating power, **for supplying the inhabitants of cities and towns on the project and for domestic and other purposes,** and under -----" (emphasis added).

The decree defined an irrigation duty, under Claim No. 3 as: "---, provided that the amount of this water allowed or used for irrigation shall not exceed, after transportation loss and when applied to the land, 3.5 AF/Ac for the bottom lands, nor 4.5 AF/Ac for the bench land under the Newlands Project."

Churchill County Claim: Historically, the water diverted from the Truckee River into the Newlands Project has supplied municipal, industrial and domestic users in the rural and municipal communities by direct river or open channel diversion and indirectly by infiltration or percolation from the Project's conveyance system to the ground water aquifers that supply ground water wells. Recognizing the County inhabitants dependency upon surface water diverted from the Truckee River, the County in an effort to further clarify the municipal, industrial and domestic rights associated with the Newlands Project, petitioned the United States Bureau of Reclamation for 20,000 AFA of supplemental water under Claim No. 3 in 1995. (Churchill County, 1995) In January of 2001 the BOR Commissioner denied the County Application made under Claim 3 alleging that any excess water was obligated to the Pyramid Tribe under the language of Tribe v. Morton and PL 101-618. After denial of an appeal to the Department of Interior the County filed a petition for judicial review in the Federal District Court which is now being briefed by the parties.

3.1.2 Carson River:

The Carson River originates in the Sierra Nevada mountains south of Lake Tahoe in California. After entering Nevada, the river's two main forks (West Fork and East Fork) converge in the Carson Valley near the communities of Minden and Gardnerville in Douglas County. According to the 1980 Alpine Decree (*United States v. Alpine Land & Cattle Company, et al.*), about 39,000 acres of decreed, irrigated

acreage is located in the Carson Valley in Douglas County within Segments 2, 4, 5 and 6 of the river. Upstream storage on the East and West Forks of the Carson River system consist of a series of small alpine reservoirs with storage approximating 7,146 AF, while lower-lying valley reservoirs within the Carson Valley store approximately 4,453 AF. At this time, very little of the Carson River decreed water has been converted to quasi-municipal uses, except for a small portion to Carson City.

Within Segment 7, the River flows generally eastward near the communities of Carson City and Dayton and terminates at Lahontan Reservoir, serving about 6,450 acres of irrigated land. Currently, none of these decreed rights have been converted to quasi-municipal use and no storage has been developed within this Segment. According to the Alpine Decree, upon a change of manner of use from irrigation to any other use, the change for the new use shall be limited to the net consumptive use of 2.5 AF/Ac. This condition applies to all Carson River upstream segments above and including Segment 7.

Additionally, according to the Alpine Decree, any change in the point of diversion from one segment to another constitutes a loss of priority to a later or junior priority that is set as that date when the change in point of diversion application is made. This condition applies to all segments, including Segment 8. The Lahontan Reservoir and all lands lying downstream of the Reservoir (Newlands Project), is within the lowermost segment of the River, Segment 8.

Lahontan Reservoir, completed by the BOR in 1915, is the only large reservoir on the Carson River, having a storage capacity of 295,542 AF without flash-boards or 317,742 AF with 20 inch flash-boards. Water released from Lahontan Reservoir is diverted into the Newlands Project conveyance system for meeting the irrigation demand of the agricultural community. Significant portions of these agricultural irrigation releases recharge the ground water aquifers that lie beneath the Project. Surface runoff and flood releases flow to one of two wetland areas: the Carson Lake Pasture to the south, or the Stillwater Wildlife Management Area to the northeast. Any flows that pass

beyond the Stillwater Wildlife Management Area terminate in the Carson Sink, the lowest area of the closed basin to the northeast. The wetlands are the only water users downstream from the Project.

Alpine Decree- Segment 8: In concurrence with the Orr Ditch Decree, and Finding of Fact VIII of the Alpine Decree, the duty for the Newlands Project within the Carson Division below Lahontan Reservoir is allocated on the basis of 3.5 AF/Ac to the land for bottom lands and 4.5 AF/Ac to the land for bench lands. Further, the net consumptive use is set at 2.99 AF/Ac in Segment 8. Upon a change in manner of use from the current irrigation use to any other use, the right is limited to the net consumptive use of 2.99 AF/Ac as set by the Court.

County & City Surface Water Rights: Currently Churchill County and the City of Fallon own approximately 1731 AFA of decreed surface water rights from the Truckee and Carson Rivers.

Truckee Carson Irrigation District: In 1989 (USDOI, 1994), the District delivered about 5,700 AF of water to 58 subdivisions for the irrigation of lawns, gardens and pastures, while about 130 pump permits were allowed for commercial, stock and domestic use. Domestic, un-metered pump use of surface water in the Project is limited to 1800 gallons per day. The District (TCID, 1999) delivered 156.6 AF to domestic pump permitees and 321.04 AF to commercial pump permitees.

3.2 LAHONTAN VALLEY GROUND WATER

Estimated Natural Ground water Recharge: According to Glancy & Katzer (1975), the estimated potential ground water recharge for the Carson Desert, excluding Packard Valley within Basin 101 is only 1300 AFA. This recharge occurs as a result of natural precipitation in the form of rain and snow that is received annually at elevations of 7,000' to 8,790' that eventually reaches the ground water aquifers. Since the only mountain ranges that approach these higher elevations in the Basin is the Stillwater Range, the recharge that is estimated to reach the aquifers only recharges those located on the northeastern side of the Valley in the vicinity of the Stillwater Wildlife Area. This estimated recharge, therefore, does not recharge the potable ground water wells that lie up gradient and several miles to the west. The annual precipitation in Lahontan Valley is only about 5", while the potential evapotranspiration for a perennial crop (pasture grasses, alfalfa etc.) approximates 48" (Guitjens, J.C. et al.,1975)

Newlands Irrigation Project Recharge: Glancy & Katzer (1975), indicated the primary source of recharge for the ground water aquifers within the Newlands Project is: "irrigation water that went into ground water storage from canals, distribution ditches, and fields following the start of the Newlands Project in about 1905. Water levels locally rose as much a 50 to 60 feet during the 1905 - 30." Glancy (1981), indicates that: "Aquifers near Fallon, Nevada, all belong to a large interdependent system that can be subdivided into four sub-systems on the basis of hydrologic characteristics." The four sub-systems were further described as the "shallow", "intermediate", "basaltic", and "deep" aquifers.

The "shallow" aquifer(s) is defined as those found in the top 50 feet. Most of the domestic wells, approximated at 4,000 to 4,400 in number, take water from the "shallow" aquifer. The aquifer containing potable water generally underlies, and is adjacent to, the irrigated acreage of the Newlands Project and, therefore, is influenced directly by changes in Project irrigation and conveyance practices. Maurer (1994),

estimates that the “shallow” aquifer may receive 50,000 AFA to 100,000 AFA from the irrigation Project conveyance and irrigation distribution system.

The “intermediate” aquifer has been defined (Glancy, 1981) as the aquifer(s) occurring between 50’ and 500’ to 1,000’. Most of the Community and Non-Community Public Water System and other quasi-municipal wells are developed within this depth range. Maurer (1994) estimates that about 32,000 AFA are recharged into this aquifer depth range from the Project via downward infiltration from the overlying “shallow” aquifer.

The “basaltic” aquifer, lying beneath the City of Fallon and extending to the east and northeast of the city provides the water source for the City of Fallon, the Naval Air Station, Kennametal Industries and the Paiute-Shoshone Indian Reservation and Colony. Wells penetrating the basaltic (volcanic) aquifer system have depths varying between 100’ to over 500’. Glancy (1981), indicated that the ‘basaltic’ aquifer is: “--- recharged mainly by freshwater from the intermediate aquifer but apparently contains a blend of the freshwater and some saline water.” “Further, water from the “basalt” aquifer in areas of large withdrawals contains chemical evidence of modern (post 1953) recharge from surface sources.” “Isotopic evidence suggest that some recharge has transited from the land surface to a depth of at least 500 ft. during the past 25 years” and “(1) The high artesian heads associated with the basalt aquifer suggest that the system is in hydraulic continuity with sources of water near the land surface”. Maurer (1994), indicates that the annual recharge of the “basaltic” aquifer is on the order of 4,000 AFA.

The “deep” aquifer, generally deeper than 500’ to 1,000’ and lying generally beneath the “intermediate” aquifer and beneath and around the “basaltic” aquifer is generally too saline to provide a potable water supply. There is evidence (higher chloride content) in areas of large withdrawals from the “basaltic” aquifer, that water from the “deep” aquifer is intruding this water source. Recent studies (Maurer, 1994) indicate that the chloride concentration is increasing in the basaltic aquifer.

It must be recognized that the estimates of recharge to each of the aquifer systems is approximate. Maurer (1994), states: “Estimates for flow volumes to and from the shallow and intermediate aquifers are based on assumed aquifer properties and could be in error by an order of magnitude or more.” One order of magnitude is equal to a factor of 10.

Permitted, Certificated Ground Water Rights: The State Engineer Water Rights Database, 1998, shows a net amount of about 20,000 AFA of permitted and certificated ground water rights has been granted within the Carson Desert ground water basin or Basin 101. In addition, about 5,500 (Maurer, 1994) unpermitted domestic wells draw water from the shallow and intermediate aquifers. These domestic wells pump approximately 11,000 AFA (Maurer, 1994). The total commitment from the ground water aquifers within Lahontan Valley therefore, approximates 31**,**000 AFA.

City of Fallon Permitted and Certificated Ground Water Rights: Approximately 3,886 AF of permitted and certificated ground water rights are owned by the City (State Engineer, 1998). These rights meet the water demand of the City of Fallon, with a population of approximately 9,000 that are served by four (4) deep ground water wells, which pump from the deep basaltic aquifer.

Other Public Water Systems: Twenty (20) Community and Non-Community Public Water Systems, along with the Naval Air Station have been granted about 4,377 AF of permitted and certificated ground water rights. The Paiute-Shosone Indian Tribe pumps an additional amount of unpermitted ground water for the Colony and the Reservation from two wells penetrating the deep basalt aquifer located within the Colony.

See Table 3.2.1 “Historical Ground Water Supply & Demand for Lahontan Valley (Basin 101)” summarizing the ground water status of Lahontan Valley.

TABLE 3.2.1 HISTORICAL GROUND WATER SUPPLY & DEMAND FOR LAHONTAN VALLEY (BASIN 101)

Supply/Demand	Description	Amount (AFA)
Supply	Natural Precipitation In-Basin Recharge	0 [1]
Supply	Historical Project Recharge to Shallow Aquifer	50,000 – 100,000[2]
Supply Total	Natural Precipitation + Project Recharge	50,000 – 100,000
Demand Permitted	Permitted & Certificated Commercial, Municipal, Quasi-Municipal, & Recreation Rights	8,177[3]
Demand Permitted	Permitted & Certificated Irrigation Rights	5,656[3]
(Demand Permitted)	Permitted & Certificated Industrial Rights	(9,919)[4]
Demand Permitted	Permitted & Certificated "Other" Rights	6,314[3]
Demand Permitted Sub Total	Permitted & Certificated Groundwater Rights	20,147[5]
Demand Un-permitted	Un-permitted Domestic Groundwater wells (estimated at 5,500 wells)	11,000[2]
Total Demand permitted & un-permitted	Permitted, Certificated & Un-permitted Groundwater Rights	31,147[6]

[1] Recharge to the potable groundwater aquifers is considered to be insignificant, since the estimated natural recharge from the Stillwater Mountains occurs only down gradient on the eastern side of the Valley near the Stillwater Wildlife Management Area.

[2] Maurer, 1994

[3] State Engineer Water Rights Database, 1998

[4] Since a large portion of industrial use is geothermal where the water is returned to the source, this amount (9,919 afa) is not included as that lost from the groundwater system.

[5] Permitted and certificated demand of 20,147 afa is that amount lost to the ground water system. i.e. 9,919 afa of industrial water is assumed to be returned to the source.

[6] Total Demand includes permitted, certificated and un-permitted groundwater rights

Due to increased appropriations of ground water in the Lahontan Valley, the State Engineer in July, 1978, designated the Carson Desert (Basin 101) by Order No. 716, thereby limiting the further appropriation of ground water to preferred uses. Subsequently, by Order No. 722, the State Engineer declared that further appropriation of ground water for irrigation purposes is no longer considered a preferred use. Municipal, domestic, recreational, industrial, commercial and stock water, however, are considered to be preferred uses.

In 1995 the State Engineer ordered (Order No. 1116) that further applications for ground water be limited to 4,000 gallons per day for any purpose except irrigation. This action was taken since the ground water basin was being depleted "due to a declining of the present recharge experienced from surface water irrigation and delivery systems due to more efficient irrigation practices and improvements to the delivery system." Later, in Interim Ruling on Standing No. 4602, the State Engineer further stated: "The State Engineer in Order No. 1116 curtailed new appropriations of ground water larger than 4,000 gpd because of the conversion of surface water irrigation water rights to wetlands use, thereby reducing the recharge to the ground water system that is available for capture by wells."

Essentially all further development of the ground water in the Carson Desert, except those appropriations less than 4,000 gallons per day, has been curtailed by the State Engineer due to the imminent reductions in surface water recharge from the Project as a result of changes in irrigation practices, delivery efficiency and the conversion of surface water rights to the lower lying wetland areas such as the Stillwater Wildlife Management Area and the Carson Lake Pasture.

3.3 LEGAL AND ADMINISTRATIVE RESTRICTIONS TO WATER SUPPLY

1967 Operating Criteria and Procedures (1967 OCAP): With the declaration of the Cui-Ui as an endangered species under the Endangered Species Preservation Act, the Secretary of Interior issued the first Newlands Project operating criteria and procedures (OCAP) in 1967. Under the OCAP, the winter diversions for power generation at the Lahontan Dam were eliminated and set the total Newlands Project water right acreage at about, 74,000 acres. This OCAP limited the annual total diversion into the Project for the Truckee and Carson Divisions to 406,000 AF. By the elimination of the winter power generation at Lahontan Dam, the annual diversions from the Truckee River were reduced from over 200,000 AF to about 180,000 AF.

1985 - 1988 Transfers & Petitions: The Pyramid Lake Paiute Tribe has filed protests against several hundred applications filed by water right users within the Newlands Project for a change in place of use with the State Engineer's Office. These applications, filed at the recommendation of the Bureau of Reclamation have been protested by the PLPT citing 'lack of perfection', 'abandonment' or 'forfeiture'. Additionally, the PLPT has filed petitions (U.S. District Court Civil A3 LDG & 183 LDG) against more than 2,000 water users within the Project who the PLPT alleges are irrigating lands that are subject to claims of 'lack of perfection', 'abandonment' or 'forfeiture'. Approximately 8,000 acres or about 28,000 AF, have been challenged by the PLPT on this basis. As a result of the passage of AB 380 and associated negotiations by the 1999 Nevada legislature, the PLPT has agreed to withdraw any challenges to these water rights in exchange for the purchase and retirement of water rights appurtenant to 6,500 acres of land within the District.

1988 Operating Criteria and Procedures (1988 OCAP): Beginning in 1968, a series of lawsuits filed by the PLPT, claiming water was being wasted in the Newlands Project, resulted in a 1973 ruling by Judge Gessel in the U.S, District Court in Washington, D.C., that the Project's total annual diversions be reduced from 406,000 AF to 288,120 AF. At 100% entitlement of water righted land, Project conveyance efficiency was mandated

to increase from 60% to 68.4 % through Project implementation of some 22 water conservation measures. The 1988 OCAP also reduced the maximum storage in Lahontan Reservoir from 317,000 AF (with flash boards) to an end of the month (June) maximum storage target of only 215,000 AF when served by both Rivers. The maximum storage could, however, exceed 215,000 AF if the Carson River alone provided this supply. The Bureau of Reclamation, Fallon Office, however, in a draft report (U.S. Dept. of Interior, 1994) indicated: "that it is questionable whether the 1988 OCAP target efficiencies are obtainable without major capital expenditures." According to preliminary calculations made by TCID at the end of the 2002 irrigation season, the Newlands Project conveyance efficiency reached 70%. (Lahontan Times, 2003) This increased efficiency was due primarily to tighter operation of the delivery system and water measurement devices.

1988 Final Order Bench/Bottom Designation: In a decision by the U.S. District Court (District of Nevada), Civil D-185 BRT, the Court allowed the re-designation of approximately 9,000 acres (USDOI, 1994) of lands within the Carson Division of the Project, previously designated by the Truckee Carson Irrigation District (TCID) as Bench land, with a farm head gate duty of 4.5 AF/Ac, to be downgraded to "Bottom" land having a duty of 3.5 AF/Ac. This Order, in effect, reduced the delivery to the Carson Division farm head gates by about 9,000 AF. Upon appeal to the 9th Circuit Court, this Order was remanded and upheld by the U.S. District Court (District of Nevada, Civil D-185 HDM.

PUBLIC LAW 101-618 (Act): In Section 202 of TITLE II-TRUCKEE-CARSON-PYRAMID LAKE WATER SETTLEMENT, the purposes of this Title include:

"(a) provide for the equitable apportionment of the waters of the Truckee River, Carson River, and Lake Tahoe between the State of California and the State of Nevada,

(b) authorize modifications to the purposes and operation of certain **Federal Reclamation project facilities** to provide benefits to fish and wildlife, municipal, industrial and irrigation users, and recreation;

(c) **authorize acquisition of water rights for fish and wildlife**;

(d) encourage settlement of litigation and claims;

(e) fulfill Federal trust obligations toward Indian tribes;

(f) **fulfill the goals of the Endangered Species Act by promoting the enhancement and recovery of the Pyramid Lake fishery;** and

(g) protect significant wetlands from further degradation and enhance the habitat of many species of wildlife which depend on those wetlands, and for other purposes." (Emphasis added)

Further, Section 205 of the Title instructs the Secretary of Interior to negotiate an operating agreement (Truckee River Operating Agreement or TROA) with the State of California and the State of Nevada to provide for the operation of the Truckee River reservoirs in such a manner to:

"(A) satisfy all applicable dam safety and flood control requirements;

(B) provide for the enhancement of spawning flows available in the Lower Truckee River for the Pyramid Lake fishery in a manner consistent with the Secretary's responsibilities under the Endangered Species Act, as amended;

(**C) carry out the terms, conditions, and contingencies of the Preliminary Settlement Agreement as modified by the Ratification Agreement**. Mitigation necessary … of the States of Nevada and California;

(D) ensure that water is stored in and released from Truckee River reservoirs to satisfy the exercise of water rights in conformance with the *Orr Ditch* decree and *Truckee River General Electric* decree, except for those rights that are voluntarily relinquished by the parties to the Preliminary Settlement Agreement as modified by the Ratification Agreement, or by any other persons or entities, or which are transferred pursuant to State law; and

(E) minimize the Secretary's costs associated with operation and maintenance of Stampede Reservoir." (Emphasis added)

Highlighted provisions all represent the reduction of diversions of Truckee River water to the Newlands Project through the adoption of new operating criteria and procedures for the storage and use of irrigation water on the Project, the retirement of irrigation lands

within the Truckee and Carson Divisions for the enhancement of the fishery on the Lower Truckee River and the Stillwater Wildlife Management Area, and the reduction of water diverted to the NAS Fallon for out lease to ranchers and farmers which contributes to airborne debris and fire control.

PL 101-618: Lahontan Valley Wetlands Water Rights Acquisition: Section 206 - Wetlands Protection, of the Act authorizes the purchase of Carson Division irrigation rights to support 25,000 acres of primary wetland habitat within the Lahontan Valley wetlands. At the time the law was enacted, estimates of up to 125,000 AFA of water rights would be required. The U.S. Fish & Wildlife Service (Service) (USDOI, 1994) has considered four water right acquisition alternatives for meeting the demand of the Lahontan wetlands. In summary, see the following comparison of these proposed water rights acquisition alternatives:

Alternative	Total Acquired Water (AF)	Total Acquired Water Right Acreage (Acres)	Percent of Carson Division Acquired (%)
1	20,000	5,648	10.7
2	100,000	27,995	53.1
3	124,000	34,160	64.7
4	147,000	41,472	78.6

The percent of Carson Division water right acreage acquired for the wetlands is based upon an assumed water right acreage totaling 52,768 acres. Alternatives 1 and 2 depend heavily upon assumed amounts of return flows from the Project as well as terminal spills from Lahontan Dam and/or the Project. Alternative 3 and 4 depend less upon return flows and terminal spills and rely more on acquired rights to meet the demands of the wetlands. In 1993, (USDOI, 1993) the Service also reported to the United States Congress that the Lahontan Valley wetland water rights acquisition program might take from 53 to 78 percent of the currently irrigated Carson Division agricultural land with water rights out of production.

Later, the Service has reported in the Final Environmental Impact Statement (USDOI, 1996) that five alternatives have been considered whereby water right acquisition varies from as little as 20,000 AF for Alternative 1 to 133,500 AF for Alternative 4, which respectively represents 11% and 72% of the water righted lands within the Carson Division. It must be recognized that Alternative 1 will only support about 12,000 acres of wetlands and therefore would not meet the mandated goal of Section 206 of PL 101-618.

It should be noted, in light of the enforcement of the 1997 adjusted OCAP, whereby Project target efficiency is set at 75% in 12 years and the storage of Lahontan is reduced, the amount of drain and terminal spills will be significantly reduced. Due to these anticipated reductions of drain and terminal spills, most of the wetland demand (125,000 AF or more) must be met by acquired irrigation water rights within the Carson Division.

PL 101-618: U.S. Naval Air Station (NAS) Water Use Reduction: About 2,934 acres of land surrounding the NAS has been irrigated to support vegetation, including cropped land, that controls wind-borne debris, which maintains plant growth in a vegetative (wet) condition. This program has been demonstrated to resist burning in event of a controlled forced landing and/or an uncontrolled landing of aircraft on “approach” or “takeoff” flight patterns from base runways. Approximately 10,000 AF of water rights has been used to irrigate this buffer area surrounding the base. According to this Act, water use is mandated to decrease significantly by the adoption of a conservation effort that uses significantly less water. The irrigated acreage, therefore, may be curtailed entirely or reduced to about 398 acres. The resulting reduction in Project diversion for irrigation of these lands may vary from about 14,000 AF to 17,000 AF, assuming a head gate duty of 3.5 AF/A and a conveyance efficiency of 62%.

PL 101-618: Acquisition of Water Rights for Pyramid Lake Fishery: Section 207. “Cui-Ui and Lahontan Cutthroat Trout Recovery and Enhancement Program”, of the Act,

provides that pursuant to the Endangered Species Act (ESA), water rights may be purchased for the support of the Lower Truckee River fishery. While the Act does not quantify the target amount to be acquired, it does appear that the entire Truckee Division (Fernley, Hazen & Swingle Bench) water rights of about 5,900 acres or 26,550 AF is targeted for a buyout. A significant portion (7,430 AF) of this targeted acquisition lies within Churchill County in the Hazen and Swingle Bench areas along the western boundary of the County within Basin 101. While PL 101-618 does not target the amount, the USDOI has stated it could need 110,000 AF or an equivalent benefit of water rights coming from the Newlands Project in support of Cui-Ui recovery.

Water Quality Settlement Agreement (WQA): In 1996 an agreement was reached between the Pyramid Lake Paiute Tribe (PLPT) and the Cities of Reno and Sparks, Washoe County, Washoe County Water Conservation District, and SPPCo to purchase water rights from the Truckee Division of the Project, the Truckee River corridor, and the Truckee Meadows over and above those authorized by P.L. 101-618 for release from upstream Truckee storage during the months of July, August and September to dilute the nutrient content of the Lower Truckee River below the Reno Sparks Treatment Plant. The dilution effect is anticipated to maintain the dissolved oxygen content at a level required by the Lower River fishery. Approximately 24 million dollars of local and Federal moneys have been committed for this effort. Assuming that water rights within the Truckee Division of the Project can be purchased at $1,000 per AF, about 24,000 AF may be purchased and about 5,333 acres of irrigated land retired. There is currently no acquisition of water rights occurring in Fernley within the Truckee Division. Water right owners there apparently are holding on to their assets for dedication to a domestic water supply for Fernley.

The above actions including acquisition of water rights for the Pyramid Lake fishery and acquisition of water rights to improve water quality, both target purchase of water rights from the Truckee Division. The total number of acres of required water rights to satisfy this action exceeds the number of irrigated acres in the Truckee Division. In other words, demand exceeds supply.

PL 101-618: Newlands Project (Project) Improvement: Section 209 of the Act, authorized expansion of the purposes for the operation of the Project. In addition to the existing irrigation purpose of the Project, the following expanded purposes have been authorized:

> "(A) fish and wildlife, including endangered and threatened species;
> including the Fallon Indian Reservation;
> **(B) municipal and industrial water supply in Lyon and Churchill counties, Nevada** (Emphasis added)
> (C) recreation;
> (D) water quality; and
> (E) any other purposes recognized as beneficial under the law of the State of Nevada."

PL 101-618: Project Efficiency Study: Under Section 209, (c) (1) titled "Project Efficiency Study" the Secretary shall study the feasibility of increasing the delivery efficiency from the 1989 efficiency of 70% to 75% under the recommended OCAP within 12 years following the enactment of this Act. Efficiency is defined as head gate deliveries / releases from Lahontan Reservoir.

As reported by the U.S. Department of Interior (USDOI, 1994) in a Project Efficiency Study conducted by the BOR, the baseline diversion to the Project was estimated at 320,000 AF in 1989, a full water year at a delivery efficiency of 62.1. In order to reach an efficiency of 75%, a reduction of 59,100 AF is required. i.e.

Project Efficiency (1989) = 213,878 AF/344,311 AF = 70%

Project Efficiency (target) = 213,878 AF/285,211 AF = 75%

The proposed increase of the Project conveyance efficiency from 70 to 75% would be achieved primarily from the lining of about 54 miles of canals and piping of about 247 miles of laterals to reduce the seepage into the ground water aquifers of the Project.

The estimated capital cost of these improvements ranges from 209 to 321 million dollars.

PL 101-618: Project Efficiency Improvement Influence Upon Ground water: Under Section 209, (c) (2), the Secretary was also instructed to consider the effects of irrigation conveyance efficiency changes upon the ground water resources and wetlands within the Project.

In the USDOI Project Efficiency study (1994), the Bureau indicated that the canal lining would impact ground water in the following manner: "This option (canal lining) could have a significant effect on local ground water because the canals proposed for lining are generally west of the city of Fallon, in the area where the majority of the local aquifer recharge occurs. Lining would eliminate most of the seepage from these main canals, -----". Ground water impacts that can be expected by replacing Project laterals with pipelines, was summed up by the Bureau: "This option (pipe lined laterals) would likely have a significant effect on local ground water because it would eliminate most of the seepage from 246.5 miles of canals and laterals which contribute to the shallow aquifer which supplies water for domestic wells."

PL 101-618: Recoupment: Under Section 209, (h) Settlement of Claims, the USDOI has filed action for recoupment of one million AF for alleged diversions made (1973-1987) from the Truckee River in excess of the interim OCAP's and Judge Gessel's ruling in 1973. See U.S. District Court (District of Nevada) Civil 7-N95-00757 HDM. Under the Act, a settlement must be made between the PLPT and the Project.

Recently, the USDOI (USDOI, 1999) submitted a proposal to the court to recoup 1,500,000 AF of water (principal & interest) over a 30 to 60 year period against 68,400 acres (Project water right acreage of 73,840 – Fallon Indian Reservation acreage of 5,440). Included in the proposal is the requirement that the Project sells Donner Lake storage rights and uses the proceeds to purchase and retire Project water rights. According to this proposal, acreage associated with the wetland acquisition, the water

quality settlement acquisitions, the AB 380 program, the NAS conservation acquisition and other programs that reduce Truckee River diversion into the Project will be deducted from the recoupment base acreage. Additionally, this proposal intends to further reduce the target storage amounts in Lahontan Reservoir (end of June storage maximum of 139,000 AF) in order to reduce Truckee River diversion to the Project. In summary, if most or all of the Project's water rights are retired in accordance with PL 101-618 mandates, very little if any acreage base will remain, thereby satisfying the recoupment claim.

PL 101-618: Pyramid Lake Paiute Tribe (PLPT) Claim for Truckee River Unappropriated Water: Under Section 210 (a) Claims Settlement (B), the PLPT claim for the unappropriated water of the Truckee River is mandated by this Act. Subsequently, under permits 48061 and 48949 and State Engineer Ruling No. 4683 (11/24/98), the PLPT has been granted the unappropriated water on the Truckee River and denied other applications made by SPPCo., Washoe County, the Truckee Carson Conservancy District and the Truckee Carson Irrigation District. (Note: The TCID has appealed the State Engineer's denial of Application 9330, while the other applicants have not appealed this ruling.) The PLPT applications are for a diversion of up to 3,000 cfs and 477,851 AF per annum. Since the Truckee Canal couples the Truckee River and the Carson River, the PLPT is taking actions in both River systems that may influence the amount of unappropriated water in the Truckee River.

OCAP: 1997 Adjusted OCAP: The primary purpose of OCAP's beginning in 1967 through the 1997 adjusted OCAP is to maximize diversions from the Carson River and to minimize diversions made from the Truckee River for the operation of the Project. In the Fact Sheet of December 16, 1997, attached to the Adjusted OCAP, the following statement is made: "This (Adjusted OCAP) allows the rest of Truckee River water to flow to Pyramid Lake where it helps in the restoration of the Lake and recovery of endangered Cui-ui and threatened Lahontan Cutthroat Trout."

OCAP: Acreage Base Adjustments: Projected Project acreage of 64,850 under the 1988 OCAP has been reduced to about 60,000 acres, with lower average water duty per acre due to Bench/Bottom changes. Further, within the text of the adjusted 1997 OCAP, Project acreage of about 59,000 acres was considered.

OCAP: Reduced Lahontan Target Storage: Lahontan Reservoir has a total storage capacity of 317,000 AF with flashboards in place. The 1997 Adjusted OCAP reduces future storage to only 174,000 AF, as controlled by Truckee River diversions, during the maximum runoff period of January through May and 190,000 AF for June. See following table taken from the "Core Assumptions" of Table A, Truckee-Carson Model Results for Adjusted OCAP for 1901-1995 showing the assumptions (irrigated acres & target storage) used in the Truckee Carson River Model. The target storage end-of-the-month amounts are those storage quantities that are attributable to diversion made from the Truckee River. According to this OCAP, releases would only be made from upstream reservoirs on the Truckee River to meet these target storage amounts. Actual storage amounts exceeding the target amount may occur during periods of high Carson River runoff, however, during drought periods, these amounts, or less, would represent the maximum storage allowed during these periods. This change in operation of the Truckee River significantly reduces the amount of water historically allowed to be stored in Lahontan Reservoir for year-to-year carryover. Year-to-year carryover is especially important during drought periods. In effect, the administrative reduction of Lahontan storage amounts results in creation of a "chronic drought condition" under which the Project must now operate. See Table 3.3.1, 1997 Adjusted OCAP Lahontan Storage Assumptions and Limits.

TABLE 3.3.1 1997 ADJUSTED OCAP LAHONTAN STORAGE TARGETS

CORE ASSUMPTIONS	1988 OCAP	1997 ADJUSTED OCAP
Carson Division Acreage Served	60,400 ac	55,075 ac
Truckee Division Acreage Served	4,400 ac	4,000 ac
January - May Storage Target	215,000 af	174,000 af
June Storage Target	215,000 af	190,000 af
July Storage Target	160,000 af	160,000 af
August Storage Target	140,000 af	100,000 af
September Storage Target	120,000 af	64,000 af
October Storage Target	80,000 af	52,000 af
November Storage Target	160,000 af	74,000 af
December Storage Target	210,000 af	101,000 af

Truckee River Operating Agreement (TROA): Under Public Law 101-618, the Secretary of Interior was instructed to negotiate an operating agreement for the Truckee River reservoirs with the States of California and Nevada (States), after consultation with other parties designated by the Secretary or the States. USDOI (1998) indicated that: "TROA is needed to respond to increased demands on the waters of the Truckee River. In particular, TROA is intended to provide for the modified operation of reservoirs in the Truckee River basin to (1) conserve the endangered and threatened fishes of Pyramid Lake---Cui-Ui and Lahontan Cutthroat Trout (LCT)… and (2) provide for future municipal and industrial (M&I) water demands in the Reno-Sparks, Nevada area (Truckee Meadows) during drought conditions." No consideration was given to maintaining or improving the water supply for irrigators who hold water rights on the Truckee River (River), including the Newlands Project.

The proposed TROA was developed by policy, legal and technical representatives of the five mandatory signatories specified in PL 101-618 consisting of: The Secretary of Interior, the States of Nevada and California, SPPCo (now TMWA), and the PLPT. No other water right holders on the River, including the Newlands Project, were included in this decision making process.

Under TROA, reservoir operations and stream flows in the Truckee River basin would be managed through a combination of new operating procedures, an allocation of Lake Tahoe water and Truckee River water between the States and specific provisions of existing or modified court decrees, agreements and regulations. Modifications include: the modification of the "standard Floriston rates", water exchanges among "signatories" between reservoirs could be made and the consumptive use portion of TMWA water not used in one season could be stored in the reservoirs for carryover for other years. These modifications, or changes in storage, timing and flows plus others included in the TROA, appear to be in conflict with the Truckee River Agreement, the Orr Ditch decree and other agreements made between joint owners of stored water. At this time no environmental impact statement has been prepared to address all of the impacts that these modifications of Court decrees, agreements and regulations in operating these reservoirs will have upon other water users other than TMWA and the Tribe.

Should TROA be adopted in its current form, TMWA will gain a significant drought storage supply from Stampede reservoir amounting to about 39,000 AF. The PLPT Tribe will gain additional storage rights for the maintenance of the Pyramid Lake level and for fish spawning flows in the Lower River. In contrast, the Newlands Project will lose the ability to utilize the full storage capacity of Lahontan Reservoir by reducing the Truckee River diversions to Lahontan Reservoir, restricted by the "end of month" storage target amounts set out by the 1997 Adjusted OCAP. The TROA, combined with OCAP, effectively increases the amount of water stored in the California reservoirs for later release for municipal and Pyramid Lake uses and significantly reduces that amount available for the Project.

In summary the potential effects of these State and Federal mandates are summarized in the Table 3.3.2, entitled "Federal, Tribal (PLPT) & State Actions Threatening the Newlands Irrigation Project Irrigated Acreage, Diversion & Storage."

TABLE 3.3.2 FEDERAL, TRIBAL (PLPT) & STATE ACTIONS THREATENING THE NEWLANDS IRRIGATION PROJECT IRRIGATED ACREAGE, DIVERSION & STORAGE

ACTION	PROJECT WATER RIGHT ACREAGE[1] AC	PROJECT DIVERSION[2] AF	MAXIMUM LAHONTAN STORAGE[3] AF	COMMENTS
1967 OCAP[4]	74,000	406,000	317,000	First OCAP & winter hydro power terminated
1973 OCAP[5]		288,120		Interim OCAP
1984 OCAP[6]	62,000	376,000	260,000	Interim OCAP
1988 OCAP[7]	62,000	320,000	215,000	OCAP
1997 Adjusted OCAP[8]	59,000		190,000	OCAP
OCAP Reduction[9]	-15,000	-86,000	-127,000	Reduction between 1967 and 1997
1995 Bench / Bottom Ruling[10]		-15,000		Reduced duty from bench to bottom of 9,000 acres
1985-1988 PLPT lack of perfection & forfeiture & abandonment protests & petitions (1999 AB 380 limitation)[11]	-6,500	-39,000		AB 380, >200 Protests & 2000 petitions
P.L. 101-618 NAS Conservation[12]	-2,900	-14,000 to 17,000		NAS "Conservation" or Retirement
P.L. 101-618 Cui-ui Recovery[13]	-1,700	-10,000		Retirement of Hazen & Swingle Bench irrigation rights
Water Quality Settlement Agreement[14]	-5,000	-32,000		Agreement between upstream effluent dischargers & the PLPT
P.L. 101-618 Wetlands Acquisition[15]	-28,000 to -41,000	-100,000 to -147,000		Acquisition of irrigation rights for sustaining 25,000 acres of Lahontan Valley wetlands
P.L. 101-618 Project delivery efficiency improvements[16]		-66,000		Increase delivery efficiency from 62.1% to 75%

P.L. 101-618 Recoupment[17]	???	-1,500,000	139,000	USDOI proposed recoupment of 1,500,000 AF
P.L. 101-618 PLPT Unappropriated Truckee River[18]	???	???	???	PLPT challenge to all water users of the Carson River
101-618 TROA[19]	???	???	???	Increased upstream storage & modified operation of Truckee River for upstream user benefit
PLPT - Claim 1 & 2[20]		19,000 to 25,000		PLPT applications for unused claims No. 1 and No. 2
TOTAL REDUCTION[21]	**-59,000 to - 72,000**	**-381,000 to -437,000**	**-178,000**	Numerical Reduction
TOTAL PERCENTAGE REDUCTION[22]	**80% - 97%**	**94 - 108%**	**56%**	Percentage Reduction

[1] Project water right acreage as per various OCAP mandated, and other Federal and State rulings or actions. Units rounded to the nearest 100 acres.

[2] Project diversion in acre feet as per various OCAP mandated and other Federal & State rulings and actions. Units rounded to the nearest 1000 acre feet.

[3] Maximum storage is acre feet allowed in Lahontan Reservoir as controlled by Truckee River diversions, as per various OCAP mandates. Units are rounded to the nearest 1000 acre feet.

[4] First OCAP (USDDC, 1967) limiting the Project's diversion and terminating winter power generation at Lahontan & the 26' drop hydroelectric plant and limited the total Project diversion to 406,000 af and water righted acreage to 73,860 ac.

[5] Court opinion (USDDC. 1973) to limit the Project's annual diversion for irrigation to 288,129 AF.

[6] Interim OCAP (USDOI, 1984) limiting irrigated acreage, diversion for irrigation and storage in Lahontan Reservoir.

[7] 1988 OCAP (USDOI, 1988) further defining irrigated acreage, diversion for irrigation and storage in Lahontan Reservoir. End of June storage target is shown as controlled by Truckee River Division.

[8] 1997 Adjusted OCAP (USDOI, 1997) revised 1988 OCAP, including target Truckee River storage maximum amounts in Lahontan Reservoir. End of June storage target is shown.

[9] Reduction in project water right acreage, project diversion and maximum Lahontan storage as controlled by Truckee River Division from 1967 OCAP to 1997 adjusted OCAP.

[10] Bench/Bottom Court (USDCNV, 1995) ruling whereby 9,000 acres of Bench lands at an irrigation headgate duty of 4.5 AF/Ac was downgraded to a bottom designation of 3.5 AF/Ac headgate duty. Resultant reduced Project diversion for irrigation will approximate 14,516 AF, assuming a Project delivery efficiency of 62%.

[11] Based upon agreement associated with AB 380 (1999 Nevada Legislature) whereby 6,500 acres will be purchased and retired on the Project. Assuming an average headgate duty of 3.7 AF/Ac and a project delivery efficiency of 62%, this retirement should reduce the Project delivery for irrigation by approximately 38,790 AF.

[12] As mandated by P.L. 101-618, the Fallon Naval Air Station shall endeavor to reduce or eliminate through "conservation efforts" irrigation on about 2,934 acres of land. This reduction in use through "conservation" or retirement may vary from reducing this acreage to 398 acres or to 0 acres. The resulting reduction in Project diversion for irrigation, assuming a headgate duty of 3.5 AF/Ac and a delivery efficiency of 62% would vary from about 14,316 AF to 16,563 AF.

[13] As mandated by P.L. 101-618, a complete buyout of the Churchill County portion of the Truckee Division (1651 acres) in Hazen and Swingle Bench is anticipated for support of the Cui-Ui recovery program. Assuming a headgate duty of 4.5 AF/Ac and a delivery efficiency of 75%, the reduction in delivery for irrigation from the canal will approximate 9,906 AF.

[14] The Water Quality Settlement Agreement, 1996, set out $24 million for the acquisition of water rights for release during the summer months to dilute the nutrient concentration of the Lower Truckee River. The amount of water and water right acreage (5,373 acres) that may be acquired is estimated by assuming a purchase of the water for $1,000/AF, a duty of 4.5 AF/Ac, a delivery efficiency of 75% and a total of $24 million.

[15] As mandated by P.L. 101-618, the USFWS has considered alternatives varying from the purchase of 100,000 AF (USDOI, 1994 - Alternative 2) to 147,000 AF (USDOI, 1994 - Alternative 4) of Project irrigation water rights for the support of the wetlands.

[16] As directed P.L. 101-618, the Project target delivery target efficiency may be increased from 62.1% to 75% over a certain time frame, thereby decreasing the Project releases for irrigation by an estimated 66,060 AF (USDOI, 1994).

[17] The United States (USDOI, 1999) proposes a recoupment of 1,500,000 AF of Truckee River Water and retirement of the Project's privately owned Donner Lake water rights. Proposed end of June storage target is shown for Lahontan Reservoir.

[18] By permitting the unappropriated waters of the Truckee River to the PLPT, the PLPT may now also challenge the use of water on the Carson River. By allowing these challenges on both rivers, the PLPT has gained additional opportunities to further reduce the amount of water diverted into the Project from the Truckee River.

[19] The TROA, if granted in its present form will increase the water supply for the Truckee Meadows and the Lower Truckee River Fishery and Pyramid Lake and consequently reduce the amount of water available to the Project through the Truckee Canal.

[20] The PLPT made a temporary application for 25,258 acre feet from the Truckee River under claims No. 1 and No. 2. The staff engineer under ruling No. 5185 granted a portion of those applications in the amount of 19,420 acre feet.

[21] Numerical reduction in water right acreage in reference to a base of 74,000 acres of water righted land and reduction in Project diversion in AF from Lahontan Reservoir or the Truckee Canal is respect to a base of 406,000 AF. Assuming all actions in respect to water right acreage and Project diversions are additive. Storage reduction is in reference to Lahontan Reservoir capacity of 317,000 AF.

[22] Percentage reductions in reference to base water right acreage (74,000 acres), base Project diversion (406,000 AF) and base storage (317,000 AF) in Lahontan Reservoir.

DISCUSSION OF THE FEDERAL, TRIBAL (PLPT) & STATE ACTIONS THAT THREATEN THE WATER SUPPLY OF THE NEWLANDS PROJECT

Reduced Project Irrigated Acreage: Assuming all of the threatened actions listed in Table 3.3.2 will act in a cumulative manner, the proposed reduction in Project irrigated acreage varies from 59,000 to 72,000 acres. Based upon a base water right acreage of 74,000 acres, this potentially represents a 80 – 97% reduction in irrigated acreage. The base water right acreage (74,000 acres) is that Project water right acreage set forth by the 1967 OCAP. Additionally, un-quantified impacts of other pending actions such as recoupment, PLPT unappropriated water & TROA are also expected to pose an increased threat to the irrigated acreage of the Project.

The proposed wetland water right acquisition in the Lahontan Valley alone is reported (USDOI, 1994) to vary between 28,000 to 41,000 acres. These respective acquisitions represent about 38% and 55% of the Project's water right acreage of 74,000 acres. Based upon an irrigated acreage of 52,768 acres, the BOR (USDOI, 1994) reports that this range of proposed water right acquisitions will result in a 53% to 79% reduction of the Project's irrigated lands in the Carson Division.

Since many of these proposed actions are dependent and interrelated with other actions (wetlands water right acquisition, efficiency increases, NAS conservation, etc.) and recognizing that some actions may not be entirely realized (water quality agreement, Cui-Ui recovery, NAS conservation, etc.), the final impact upon irrigated acreage has not been accurately quantified at this time.

Reduced Project Diversion for Irrigation: Again, assuming that all of the actions shown in Table 3.3.2 are cumulative, the reduction in irrigation diversions may potentially vary from 381,000 to 437,000 AF. Based upon a diversion rate of 406,000 AF as set forth in the 1967 OCAP, these respective reductions represent an 94% to 108% reduction in Project diversions. If these reductions were compared to the Project

diversions set forth in the 1988 OCAP of 320,000 AF, the reductions would vary from 119% to 137%.

Recognizing that many of these actions are dependent and interrelated, the cumulative demand for reduced Project diversions as shown in Table 3.3.2 may not be achievable. Additionally, several actions have conflicting objectives. Among those apparent conflicting actions are the wetlands acquisition program and the proposed Project delivery efficiency increase from 62.1% to 75%. Since the wetlands have historically been dependent upon agricultural return flows and terminal spills associated with Project delivery efficiencies, improved efficiencies will cause a reduction in return flows, thereby counteracting and reducing the water supply for the wetlands. As a result, more prime agricultural water rights must be purchased to make up for this shortfall. Additionally, the purchase of water rights for wetlands from willing sellers, will in all probability, result in scattered retirement of parcels within the Project area rather than the block retirement of larger areas or an entire area served by one lateral or canal. As a result, achieving improved delivery efficiency will be difficult, if not impossible to attain when most canals and laterals must be operated to serve fewer and scattered water users.

Reduced Project Storage: The storage capacity of Lahontan Reservoir was set by the 1967 OCAP at 317,000 AF. Recently, the United States (USDOJ, 1999) has proposed reducing this capacity (end of June target storage) to 139,000 AF in their arguments presented in the recoupment litigation. This represents a 56% storage reduction in Lahontan Reservoir as controlled by Truckee River diversions. During dry years, this proposed decrease in storage will significantly reduce the water supply for the Carson Division of the Project. Additionally, the United States (USDOJ, 1999) has proposed in this recoupment argument that the Project sell its interest (3,000+ AF) in Donner Lake which further reduces the Project's ability to serve the Truckee Division and augment the storage in Lahontan Reservoir.

Summary: These actions, including: potential changes to the current OCAP; the settlement of the issue of lack of perfection, abandonment or forfeiture of water rights as related to AB 380; NAS conservation; Cui-Ui recovery; water quality agreement; wetland acquisition of water rights; project efficiency targets; recoupment; unappropriated Truckee River water; Truckee River Claim Nos. 1 and 2, and TROA have not been adequately addressed such that their individual or cumulative impacts on the agricultural Project and associated environs including ground water can be clearly established. However, since the potential cumulative reductions brought about by these actions, in terms of water diverted into the Project, are in the order of 94% -108%, the resultant reduction in agricultural productivity and ground water recharge may vary likewise. The proposed wetlands water right acquisitions alone, as reported by the USFWS (USDOI, 1994), account for a 53% - 79% reduction in water right acreage in the Carson Division.

The current Area Manager for the Lahontan Basin Area Office, Elizabeth Ann Rieke, stated at the Carson Water Subconservancy District Information Exchange Day on April 12, 2000, that the Bureau of Reclamation now realizes that the cumulative effect of all Federal actions will mean that no viable agricultural community will remain in the Newlands Project. Based upon this admission, it is clear that the Bureau of Reclamation recognizes that the summary shown in Table 3.3.2 appears to be correct.

3.4 PROJECTED IMPACT UPON GROUND WATER RECHARGE:

Project Diversion Reductions: According to the USGS (Maurer, 1994), the historical recharge to the ground water aquifers within the Lahontan Valley has been estimated to vary from 50,000 AF to 100,000 AF and is directly (Glancy, 1981) related to the diversion of irrigation water into the Project. Upon the implementation of the proposed actions shown in Table 3.3.2, including the wetlands water right acquisition demand, the reduction in irrigation diversions into the Project is estimated conservatively at 94%. Since the recharge is directly related to diversions made into the Project for irrigation, the estimated reduction in recharge will vary between 47,000 AFA (50,000 AFA x 0.94) to 94,000 AFA (100,000 AFA x 0.94). The remaining or resultant recharge is therefore

reduced to about 3,000 AFA (50,000 AFA – 47,000 AFA) to 6,000 AFA (100,000 AFA – 94,000 AFA).

The total amount of committed ground water rights issued by the State Engineer, excluding non-consumptive industrial permits, approximates 20,000 AF. Including the estimated 11,000 AF demand imposed by the un-permitted domestic wells, results in a total demand on the ground water system approximating 31,000 AF. Accordingly, at the current commitments, the ground water resource in Lahontan Valley would be over drafted by approximately 28,000 AFA (31,000 AFA – 3,000 AFA) to 25,000 AFA (31,000 AFA – 6,000 AFA) if the provisions of P.L. 101-618 and other actions shown in Table 3.3.2 are implemented.

It should be noted that the above estimation of the impact that reduced Project diversions will have on the ground water aquifers is based entirely upon a quantitative comparison between historical practices and proposed or mandated diversion reductions. Reductions in the Project diversions and subsequent reduction of seepage from Project's conveyance system will cause water quality degradation to occur, since the annual leaching of salts and contaminates will be reduced. The resulting increase of salts and contaminants will constitute a public health threat to the public drinking water supply of Lahontan Valley.

State Engineer Order No. 1116: The State Engineer, in recognition of the discrepancy between the ground water supply and demand (permitted & un-permitted rights), proposed wetlands buy-out, and uncertainties regarding recharge of Project waters, has ordered that no further ground water applications, excepting those limited to 4,000 gallons per day, be permitted in Lahontan Valley.

3.5 GROUND WATER RESOURCES IN THE DIXIE-FAIRVIEW VALLEY AREA:

The Dixie-Fairview Valley area includes seven valleys in west-central Nevada. These include Fairview Valley, which is a topographically closed basin, Dixie Valley, and five

smaller valleys (Jersey, Pleasant, Eastgate, Cowkick, and Stringaree Valleys) that drain into Dixie Valley. All are hydrologically connected with Dixie Valley in the subsurface and therefore form a closed hydrologic unit.

Annual Recharge: According to Cohen (1963) in a brief appraisal of the ground water hydrology of the Dixie-Fairview area, the recharge to the ground water aquifer system was estimated at 18,000 AF. Later, the USGS undertook a more intensive study of the hydrology of Dixie Valley whereby a ground water modeling approach was taken to more accurately estimate the perennial yield of the Valley. Although these results were not published, the perennial yield was reported to be on the order of 40,000 to 50,000 AF (Durbin, 1986). In 1995 the USGS made another estimate, apparently based upon an empirical water budget method, whereby the perennial yield of the Dixie-Fairview Valley Area was estimated to vary from 21,000 to 31,000 AF (Harrill, 1995). Durbin, upon reviewing the estimates made by the USGS in 1995, and considering updated evapotranspiration rates from the Valley playas and surrounding phreatophyte areas, concludes that the annual recharge of the Valley to be in the order of 40,000-50,000 AF (Durbin, 1996).

Permitted & Certificated Ground Water Rights: According to a certified water rights appraiser (Reno, 1995), the State Engineer has permitted and certificated about **21,570 AF** of ground water for irrigation purposes in the Valley. A portion (7,570 AF) of these rights are beneficially used for irrigation purposes in the northern portion of the valley in Pershing County (WRD, 1996). Additionally about 345 AF of water is available for appropriation in the Valley (WRD, 1996).

Durbin Applications: In 1985 and 1986, Durbin made 13 applications (Applications 49200 through and including 49205 and 49794 through and including 49800) for about 56,472 AF of ground water from the Valley, believing that the annual recharge greatly exceeds the earlier estimates. (Note: Durbin at this time was not associated with the USGS and worked privately for Hydrological Consultants, Inc., a private engineering firm in California.) These applications were made for quasi-municipal use in Lahontan

Valley, the boundaries of the place of use or service area were generally bound on the west at the Churchill/Lyon County line, the north by the northern boundary of the Stillwater Wildlife Management Area, the east by the Stillwater Range, the south by the southern boundary of the Carson Pasture. No protests were filed against these Applications and are in a "ready for action" status with the State Engineer.

Churchill County: In 1995, the 56,472 AF of applications made by Durbin were quit claimed to Churchill County in support of the County's interest in developing a water system for Lahontan Valley. A preliminary Dixie-Fairview Valley importation project was prepared for Churchill County in 1996 (Water Research & Development, 1996) for a 12.8 million gallon per day (MGD) plant whereby alternative routings and capital and operating costs were developed for the diversion of about 14,000 AFA. The capital costs for this project was estimated at about 51 million dollars and annual operating and maintenance cost approximated 2.6 million dollars. No treatment of the ground water was included in this analysis.

Sierra Pacific Power Company: In 1987, SPPCo conducted a preliminary engineering study entitled Preliminary Evaluation of transporting Water from Dixie Valley to the Fallon - Stillwater Area, whereby 15,000 AF of ground water would be delivered to the Stillwater Wildlife Management Area and the City of Fallon. The capital cost of this project was estimated at about 93 million dollars. Later in 1993, SPPCo developed another preliminary project to transport 15,000 AF from Dixie Valley to Lahontan Reservoir. The capital and annual operation and maintenance costs for this larger (95 miles) project were respectively estimated at about 116 million dollars and 4 million dollars.

U.S. Department of Interior: In 1988, Water Research & Development, Inc. made an effort to interest the USFWS to consider the ground water resources in Dixie Valley as an alternative water supply to acquisition of irrigation water rights in Lahontan Valley. In 1991, the USFWS (USDOI, 1991) rejected the consideration of Dixie Valley water due

to several concerns, including the cost of the project and length of time to develop this source of supply.

U.S. Department of Interior: In 1993, the BOR conducted a study whereby 16,300 AF of ground water from Dixie Valley was to be transported to the Stillwater Management Area and to the communities of Fallon and Fernley. The capital and operation and maintenance costs were respectively estimated at about 109 million dollars and 3.4 million dollars. These findings were reported in the Northern Nevada water Augmentation Study, Summary of Findings (USDOI, 1993)

U.S. Navy: The U.S. Navy in establishing a military operations area (MOA) for low level flight operations in the Valley, acquired through a "friendly condemnation" process, about 14,000 AF of irrigation water rights in the Valley formerly owned by civilian farming and ranching interests. The Navy developed a natural resource plan for Dixie Valley, which includes the leasing of about 10,000 acres to civilians for irrigated agricultural and grazing purposes. (US Navy, 1991) Since this acquisition, the Navy has experienced difficulties in maintaining the beneficial use (irrigation) of these water rights due to problems associated with the leasing of these lands to civilians for irrigation purposes. The Navy is developing alternative lease agreements which may encourage the leasing of these lands for irrigation purposes to reputable and bonded agricultural enterprises.

Navy-County Cooperation: Currently there is an ongoing joint effort between the Navy and County to allow the Navy to dedicate these Dixie Valley water rights (14,000 AF) to the County. These water rights would augment the County's Applications for Dixie Valley ground water to support a plan to export Dixie Valley ground water to Lahontan Valley for quasi-municipal purposes. In exchange for this dedication of Navy water rights to the County, the Navy facilities in Dixie Valley and the Naval Air Station (NAS) would be served by the proposed County quasi-municipal system.

4. POPULATION & WATER DEMAND PROJECTION

4.1 POPULATION PROJECTIONS

In 1973, the Nevada Division of Water Planning (State of Nevada, 1973) projected that the population of Churchill County would be 16,000 in year 2000, 17,000 in year 2010, and 18,000 in the year 2020. More recently the Nevada Division of Water Planning (State of Nevada, 1999) has estimated the population of Churchill County to be 26,019 in year 2000, 32,910 in year 2010, and 37,402 in year 2018. The Nevada Division of Water Planning (NDWP), in this recent estimation, assumes a population growth rate of 2.08% annualized between 1998 and 2020.

The State Demographer in this same publication (State of Nevada, 1998) reports a higher population projection for Churchill County at 27,010 in year 2000, 34,720 in year 2010, and 43,620 in year 2018. The State Demographer assumes a somewhat higher annualized population growth rate of 2.91 between 1998 and 2018. See "Churchill County Population Estimates and Forecasts from 1950 through 2018" pages 1 and 2 as reported by the NDWP in summarizing these estimates in tabular form (State of Nevada, 1998). The population estimates made by the State Demographer and NDWP are also shown in graphical form. See "County Population Analysis and Forecasts" graphs showing the relationship between time (1950 to 2018) and population forecasts. See excerpts from "Draft" Churchill County Socioeconomic Overview (Nevada Division of Water Planning, 1999) in Appendix 4.0 Population and Water Demand.

For purposes of estimating the demand for the 25 Year (2000-2025) and the 50 Year (2000-2050) Water Plan, a growth rate of 3% annualized between year 1998 and 2050 is assumed. The total population of Churchill County (County) beginning in 1998 is assumed to be 24,157. See Table 4.1.1 entitled Churchill County Population & Water

Demand Projections (1998-2050) and Figure 4.1.1 showing these projections in graphical form.

TABLE 4.1.1 CHURCHILL COUNTY POPULATION & WATER DEMAND PROJECTIONS (1998 - 2050)

YEAR	FALLON	NAS	FPST	UNINC. COUNTY	COUNTY TOTAL	M&I (MGA)	M&I (AFA)	LIVESTOCK (MGA)	LIVESTOCK (AFA)	TOTAL (AFA)	TOTAL (MGA)
		POPULATION						WATER DEMAND			
1998	7,730	1,659	1,228	13,540	24,157	2,381	7,305	793	2,434	9,739	3,174
1999	7,962	1,684	1,246	13,990	24,882	2,452	7,524	815	2,500	10,024	3,267
2000	**8,201**	**1,709**	**1,265**	**14,453**	**25,628**	**2,526**	**7,750**	**837**	**2,567**	**10,317**	**3,362**
2001	8,447	1,735	1,284	14,932	26,397	2,601	7,982	860	2,638	10,620	3,461
2002	8,700	1,761	1,303	15,425	27,189	2,679	8,222	883	2,710	10,932	3,563
2003	8,961	1,787	1,322	15,933	28,005	2,760	8,469	908	2,786	11,254	3,668
2004	9,230	1,814	1,342	16,458	28,845	2,843	8,723	933	2,864	11,586	3,776
2005	9,507	1,841	1,362	16,999	29,710	2,928	8,984	960	2,944	11,929	3,887
2006	9,792	1,869	1,383	17,557	30,601	3,016	9,254	987	3,028	12,282	4,002
2007	10,086	1,897	1,404	18,133	31,519	3,106	9,531	1,015	3,114	12,646	4,121
2008	10,389	1,925	1,425	18,726	32,465	3,199	9,817	1,044	3,203	13,021	4,243
2009	10,700	1,954	1,446	19,338	33,439	3,295	10,112	1,074	3,296	13,408	4,370
2010	**11,021**	**1,984**	**1,468**	**19,969**	**34,442**	**3,394**	**10,415**	**1,105**	**3,392**	**13,807**	**4,500**
2011	11,352	2,013	1,490	20,620	35,475	3,496	10,728	1,138	3,491	14,219	4,634
2012	11,693	2,043	1,512	21,291	36,540	3,601	11,050	1,171	3,593	14,643	4,772
2013	12,043	2,074	1,535	21,983	37,636	3,709	11,381	1,206	3,700	15,081	4,915
2014	12,405	2,105	1,558	22,697	38,765	3,820	11,723	1,241	3,809	15,532	5,062
2015	12,777	2,137	1,581	23,433	39,928	3,935	12,074	1,279	3,923	15,997	5,213
2016	13,160	2,169	1,605	24,192	41,126	4,053	12,436	1,317	4,041	16,477	5,370
2017	13,555	2,201	1,629	24,974	42,359	4,175	12,810	1,357	4,163	16,972	5,531
2018	13,962	2,234	1,653	25,781	43,630	4,300	13,194	1,398	4,289	17,483	5,697
2019	14,381	2,268	1,678	26,612	44,939	4,429	13,590	1,440	4,419	18,009	5,869
2020	**14,812**	**2,302**	**1,703**	**27,470**	**46,287**	**4,562**	**13,997**	**1,484**	**4,554**	**18,552**	**6,046**
2021	15,256	2,336	1,729	28,354	47,676	4,698	14,417	1,530	4,694	19,111	6,228
2022	15,714	2,372	1,755	29,266	49,106	4,839	14,850	1,577	4,839	19,689	6,416
2023	16,185	2,407	1,781	30,206	50,579	4,985	15,295	1,626	4,989	20,284	6,610
2024	16,671	2,443	1,808	31,175	52,097	5,134	15,754	1,676	5,144	20,898	6,810
2025	**17,171**	**2,480**	**1,835**	**32,174**	**53,660**	**5,288**	**16,227**	**1,729**	**5,304**	**21,531**	**7,017**

2026	17,686	2,517	1,863	33,204	55,269	5,447	16,714	1,783	5,470	22,184	7,230
2027	18,217	2,555	1,890	34,265	56,928	5,610	17,215	1,839	5,642	22,857	7,449
2028	18,763	2,593	1,919	35,360	58,635	5,779	17,731	1,897	5,820	23,551	7,675
2029	19,326	2,632	1,948	36,489	60,394	5,952	18,263	1,957	6,004	24,267	7,909
2030	**19,906**	**2,672**	**1,977**	**37,652**	**62,206**	**6,130**	**18,811**	**2,019**	**6,195**	**25,006**	**8,149**
2031	20,503	2,712	2,006	38,851	64,072	6,314	19,376	2,083	6,392	25,767	8,397
2032	21,118	2,752	2,037	40,087	65,995	6,504	19,957	2,150	6,596	26,553	8,653
2033	21,752	2,794	2,067	41,362	67,974	6,699	20,556	2,218	6,807	27,363	8,917
2034	22,404	2,835	2,098	42,676	70,014	6,900	21,172	2,290	7,026	28,198	9,190
2035	23,077	2,878	2,130	44,030	72,114	7,107	21,807	2,363	7,252	29,059	9,470
2036	23,769	2,921	2,162	45,426	74,278	7,320	22,462	2,440	7,486	29,948	9,760
2037	24,482	2,965	2,194	46,865	76,506	7,540	23,135	2,519	7,729	30,864	10,058
2038	25,216	3,009	2,227	48,348	78,801	7,766	23,829	2,601	7,980	31,809	10,366
2039	25,973	3,055	2,260	49,877	81,165	7,999	24,544	2,685	8,239	32,784	10,684
2040	**26,752**	**3,100**	**2,294**	**51,453**	**83,600**	**8,239**	**25,281**	**2,773**	**8,508**	**33,789**	**11,012**
2041	27,555	3,147	2,329	53,078	86,108	8,486	26,039	2,863	8,786	34,825	11,349
2042	28,381	3,194	2,364	54,752	88,691	8,741	26,820	2,957	9,074	35,895	11,698
2043	29,233	3,242	2,399	56,478	91,352	9,003	27,625	3,054	9,372	36,997	12,057
2044	30,110	3,291	2,435	58,257	94,093	9,273	28,454	3,155	9,681	38,134	12,428
2045	31,013	3,340	2,472	60,091	96,915	9,551	29,307	3,259	10,000	39,307	12,810
2046	31,943	3,390	2,509	61,981	99,823	9,838	30,186	3,367	10,330	40,517	13,204
2047	32,902	3,441	2,546	63,929	102,817	10,133	31,092	3,478	10,672	41,764	13,611
2048	33,889	3,493	2,584	65,936	105,902	10,437	32,025	3,593	11,026	43,051	14,030
2049	34,905	3,545	2,623	68,006	109,079	10,750	32,986	3,713	11,392	44,378	14,462
2050	**35,952**	**3,598**	**2,663**	**70,138**	**112,351**	**11,072**	**33,975**	**3,836**	**11,772**	**45,747**	**14,909**

Assumptions: 3% overall annual population growth, 1.5% growth for NAS & FPST, Fallon population = 0.32 x County Population, 3.5% annual growth rate for dairy cattle, 0% growth rate for beef cattle & 270 gpcd use throughout study period.

FIGURE 4.1.1 CHURCHILL COUNTY POPULATION & WATER DEMAND PROJECTIONS (1998 - 2050)

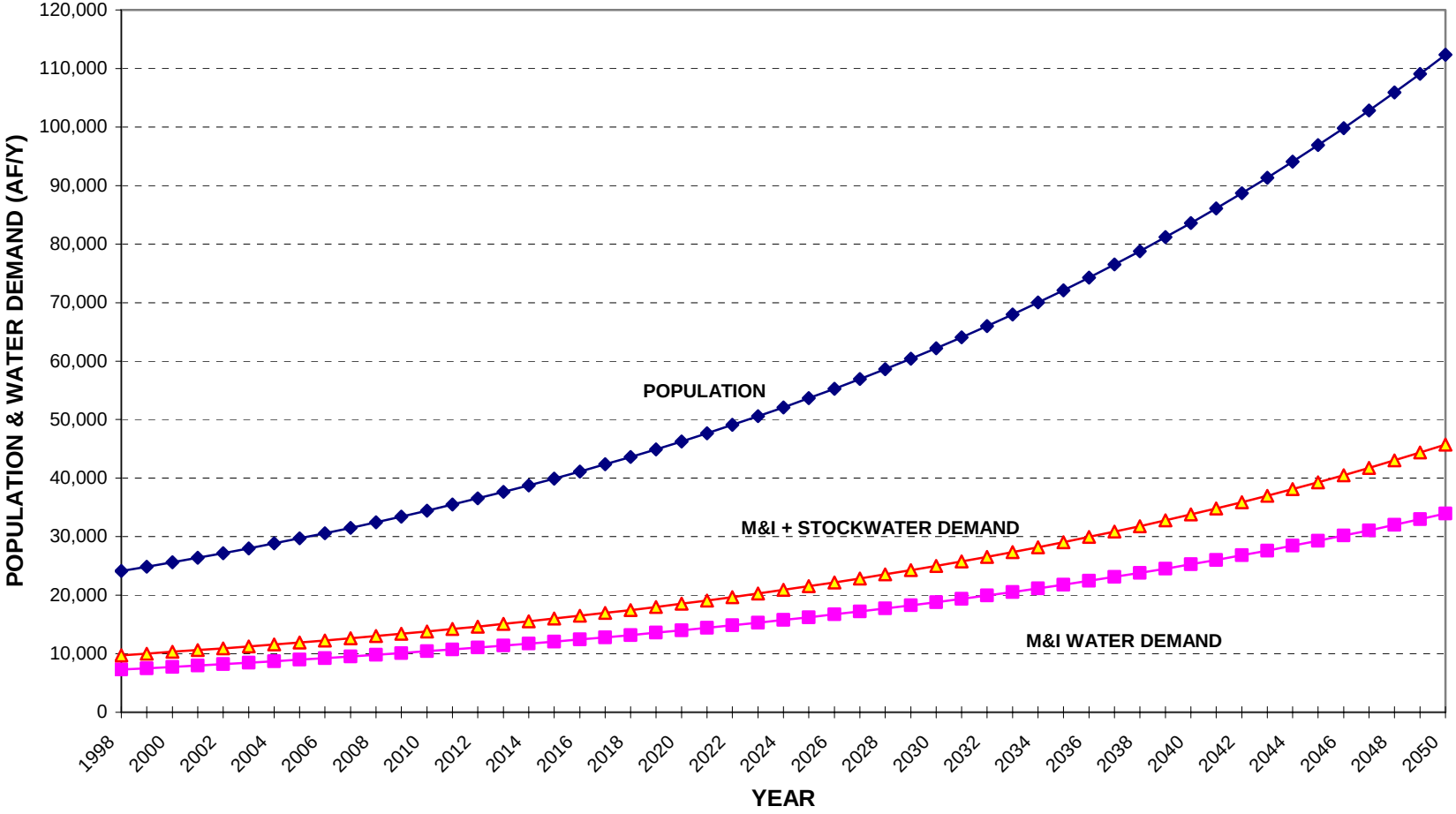
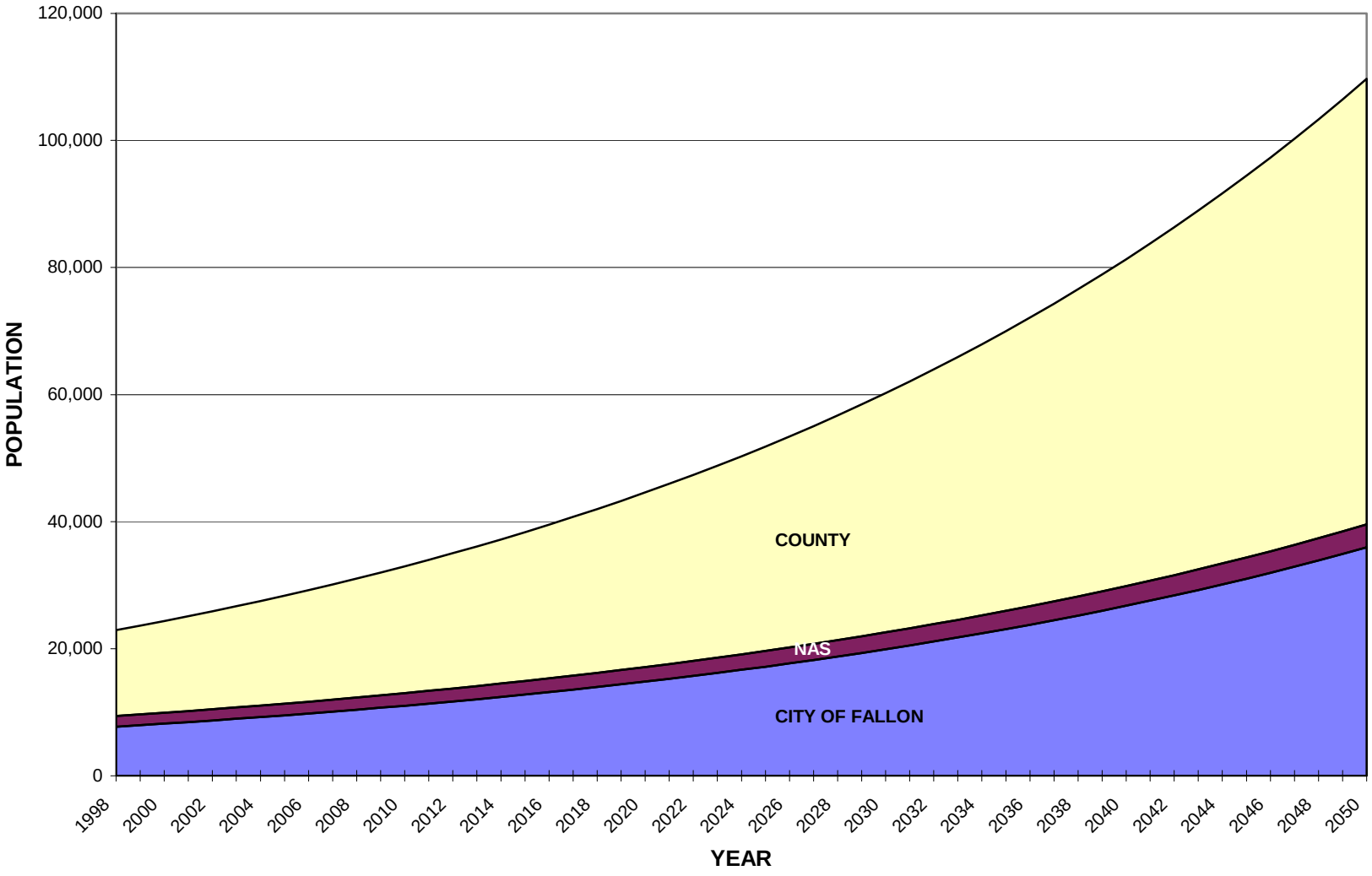


FIGURE 4.1.2 CHURCHILL COUNTY, CITY OF FALLON & FALLON NAVAL AIR STATION POPULATION PROJECTIONS (1998 - 2050)



The population projections made for this Water Plan are in general agreement with other agencies, including the NDWP and the State Demographer over the time frame 1998 - 2018 and Wateresource Consulting Engineers, Inc. (Wateresource, 1995). See Table 4.1.2, showing this tabular comparison.

TABLE 4.1.2 CHURCHILL COUNTY POPULATION PROJECTIONS & COMPARISONS BETWEEN AGENCIES (1998 - 2020)

YEAR	CHURCHILL COUNTY WATER PLAN	STATE DEMOGRAPHER	DIVISION OF WATER PLANNING	WATERESOURCE CONSULTANTS
1998	24,157	25,020	24,576	
2000	25,628	27,010	25,997	27,110
2005	29,710	30,470	29,413	
2010	34,442	34,720	32,474	36,680
2015	39,928	40,170	34,983	
2018	43,630	43,620	36,150	
2020	46,287			49,530

4.2 QUASI-MUNICIPAL & DOMESTIC WATER REQUIREMENTS

According to the NDWP in 1973 (State of Nevada, 1973) in Table 1.8 titled: Per Capita Municipal-Industrial Water Use Growth Patterns for Counties, 1970-2020, the per capita water consumption for Churchill County was projected as follows:

TABLE 4.2.1 PER CAPITA WATER CONSUMPTION FOR CHURCHILL COUNTY[1]

YEAR	1970	1980	1990	2000	2010	2020
GPCD[2]	280	290	300	305	315	320

[1] Use does not include irrigation of commercial operations such as truck gardens, parkways, golf courses, etc.

[2] GPCD = Gallons/capita/day. Per capita use numbers rounded to the nearest 5 GPCD

In another publication, “Nevada Water Facts” published in 1992 by the NDWP, the per capita per day use for the City of Fallon was reported to be 272 gpcd. Earlier, the Carson River Basin Council of Governments (CRBCOG) in 1973 estimated that by the year 2000 the Basin’s urban water needs, assuming the average family size at 3, will be approximately one acre foot per year per residence. This is equivalent to approximately 298 gpcd. More recently, for the period 1979 through 1998, the City of Fallon reports a delivery varying between 241 to 274 gpcd. (City of Fallon Engineer, 1999) See Tabulation of the monthly water deliveries made from the four ground water wells to the City service area for the years 1979 through and including 1998 in Appendix 4.0 Population and Demand Projections. Recently, (Brown & Caldwell, 2003) used 250 gcpd for demand projections associated with residential & commercial development west of Fallon along Highway 50.

For purposes of estimating the water demand in this Water Plan, 270 gallon per capita per day was chosen for planning and design purposes. While this demand may seem rather high, it must be recognized that a portion of this use also meets irrigation requirements of rural, small pasture, garden and ornamentals associated with single family residences that now rely upon domestic wells developed in the shallow (0 -50’) ground water aquifer. In year 2000, it is estimated that in excess of 4,500 rural residences will rely upon shallow domestic wells to supply indoor needs as well as outdoor irrigation demands for small pastures and gardens. Other estimates (Maurer, 1994) indicate that about 5,500 wells are developed in the shallow and intermediate aquifers.

Currently these un-permitted domestic wells may be pumped at a rate not to exceed 1800 gallons per day as set forth by the State Engineer. (NRS 534.180) The maximum pumping allowance of 1800 gallons per day will meet the irrigation needs of about 0.2 acres of pasture in addition to the indoor uses of a single dwelling residence. Expressed on a per capita per day basis and the 1990 census data from the state demographer of 2.57 persons per dwelling, this demand approximates 700 gpcd. Since about one half of the County’s population is rural in nature, excluding NAS and the City

of Fallon, it is reasoned that selecting an average demand figure of 270 gpcd for the entire population, including NAS and the City of Fallon, is realistic. Additionally, approximately two-thirds of the County's population resides in the unincorporated area outside of the Fallon city limits.

In the future, due to reduction in diversions into the Project and retiring of irrigated lands for downstream wildlife purposes, the shallow and intermediate ground water quantity and quality will diminish and degrade, respectively. Due to these actions, the historic outside irrigation demands that were once supplied by ground water sources must in the future be supplied by the proposed Community water system.

In order to conserve water and reduce the demand for meeting both indoor and outdoor uses, the following conservation measures will be considered for adoption in the County Conservation Plan:

1. **Water Measurement**: All quasi-municipal, commercial and domestic services would be metered.
2. **Rate Schedule Incentive**: Monthly billing based upon a tiered pricing system whereby the first block or amount of water would be billed at a lower rate per gallon while succeeding blocks would be billed at higher rates.
3. **Irrigation Scheduling Service**: Provide "real time" evapotranspiration rates based upon meteorological methods (weather station, Etgage, evaporation pan, etc.) for irrigation scheduling.
4. **Education**: Develop published materials and conduct workshops dealing with water use and conservation methods in conjunction with the University of Nevada Cooperative Extension Service and other educational entities.
5. **Uniform Plumbing Fixtures**: By building code ordinance and educational means, encourage the use of low flow and volume plumbing fixtures.
6. **Reuse**: Develop programs for the reuse of domestic gray-water for irrigation purposes and reuse of treated quasi-municipal effluent by land application on green belts, golf courses, parks, etc.

In summary, the annual municipal and Industrial (M&I) projected demand for year 2000, year 2025 and year 2050 according to Table 4.1.1 is:

Year 2000	7,750 AFA
Year 2025 (25 Year Plan)	16,227 AFA
Year 2050 (50 Year Plan)	33,975 AFA

4.3 LIVESTOCK WATER REQUIREMENTS

Beef Cattle & Other Livestock: Beef cattle numbers have varied from 41,000 to over 54,000 in Churchill County (County) over the last 15 years and are not expected to increase significantly in the future. (Nevada Agricultural Statistics Service, 1999 & Nevada Cooperative Extension Service, 1999) For purposes of estimating the water demand for beef cattle and other livestock, an average of 50,000 equivalent beef cattle maintained in the County is assumed to remain constant over the time period 2000 to 2050. At an average use rate of 10 gallon per day per head over the entire year, the annual equivalent consumption for 50,000 head is estimated to be 560 AFA. This demand includes the water requirements of other livestock (sheep, horses, hogs etc.), which make up less than 4 % of the total livestock consumption of water in the County. (Nevada Agricultural Statistics, 1998 & Wateresource, 1995)

Dairy Cattle: The dairy industry in Churchill County has increased rather dramatically for individual years, where the annual increase in numbers of milking cows has increased by as much as 10%. A large portion of this increase is due to California dairymen moving into the County, thereby avoiding higher costs of operation (land & environmental) in California. Adjoining states have also experienced annual growth rates of 10% or higher. Long term (1993-1997) annual growth rate in terms of numbers of milking cows for the State of Arizona is reported at 5.8% (Arizona Agricultural

Statistics Service, 1998) and for the State of Idaho for the period 1980 through 1995 is reported to be 5.7% (Falk, 1998).

In Nevada the annual rate of growth for the period 1986-1998 is reported to be 5.0% (Nevada Agricultural Statistics Service, 1998). According to members of the Nevada Dairy Council in Churchill County, the projected annual rate of increase of milking cows in the County is estimated to range between 3 and 4 percent over the next 25 to 50 years (Nevada Dairy Council, 1998). For purposes of projecting the water requirements for the dairy industry, a conservative 3.5% annualized increase has been assumed. In 1998, about 11,000 head of dairy cows constitute the cowherd in Churchill County (Nevada Agricultural Statistics Service, 1999).

The water requirement per milking cow per/day is reported (Armstrong, 1998) to be 150 gallons/cow/day. This potable water use includes animal wash downs and facility flushing requirements in addition to actual consumption that is associated with modern state of the art dairy operations. Currently, this water supply is provided by ground water wells developed in the shallow and intermediate ground water aquifers. The number of “dry” cows is assumed to be 25% of the milking herd and the number of replacement heifers is assumed to be 50% of the milking herd. The water requirement for “dry” and “replacement” heifers is assumed to be 10 gallons/cow/day.

Based upon these assumptions, the livestock projected demand for the year 2000, year 2025 and year 2050 as shown in Table 4.1.1 is:

Year 2000	2,567 AFA
Year 2025 (25 Year Plan)	5,304 AFA
Year 2050 (50 Year Plan)	11,772 AFA

4.4 FIRE SUPPRESSION REQUIREMENTS

The fire suppression requirements are based upon the Insurance Office (ISO) Grading Schedule for Municipal Fire Protection Manual (Insurance Services Office, 1980) and

requirements and specifications set out by the Churchill County/City of Fallon Volunteer Fire Department (Mr. James Allision, Fire Marshall, 1998). As of June 16, 1997, the City of Fallon has been reclassified from Class 5 to Class 1 whereby a fire flow of 3,500 gallon per minute (gpm) is required to be available at fire hydrants within the City. The remaining rural areas within Lahontan Valley are classified as Class 3, while that area of the County located west of the junction of the Reno Highway and the Carson Highway, is classified as Class 9. See ISO correspondence and map showing the County ISO classifications in Appendix 4.0 (ISO, 1997)

Within the Class 3 rural areas, Fire Marshall Allision indicated that 6,000 gallons of water is required to control most structural fires. Hydrants spaced at one mile spacing within the rural areas and having a 600 gpm delivery capacity at a minimum of 20 psi is required. Hydrants must be 6 inches in diameter, with two 2.5-inch outlets and one 4.5 inch steamer fitted with a 5" "Storz" quick coupling. Tanker trucks having a 6,000 gallon capacity would use these hydrants for their supply.

For commercial structures and clustered houses located within the County, a flow capacity of 500 gpm at a minimum of 20 psi for a duration of 2 hours is required (Allision, 1998). For design purposes (storage & transmission), a fire flow rate of 1,000 gpm for a duration of 2 hours is specified and the minimum pipeline size shall be nominal 8" inside diameter.

4.5 TOTAL COUNTY WATER DEMAND

YEAR 2025: In year 2025, the total water demand (municipal, industrial & livestock) is projected to be 21,531 AF per annum (AFA) or about 7,017 million gallons per annum (MGA). The mean daily demand would be 19,224,657 gal/day (7,017,000,000 gal/yr / 365 days/yr). For design purposes (sizing pumping plants, transmission lines, treatment plants, controls etc.), a factor of 2.0 is used to meet the maximum day demand of the system. In this case, for year 2025 a nominal 40 million gallon per day (MGD) design flow rate is assumed to meet peak daily demand as well as fire flows during the summer

months. According to City of Fallon metered monthly delivery rates, the monthly demand during the summer months is in the order of 1.7 to 1.8 times the mean monthly demand rate. (See City of Fallon monthly delivery amount in Appendix 4.0) Recognizing that the maximum daily rate during the summer months will exceed the mean monthly rate, the use of a factor of 2.0 times the annual demand to estimate the maximum daily demand rate appears reasonable.

YEAR 2050: In year 2050, the total water demand (municipal, industrial & livestock) is projected to be 45,747 AFA or about 14,909 MGA. The mean daily demand would be 40,846,575 gal/day. For design purposes for sizing pumping plants, transmission lines, treatment plants, controls etc., a factor of 2.0 is used to meet the maximum day demand of the system. For year 2050, a nominal 83 MGD equivalent design flow rate is assumed to meet peak daily demand and fire flows during the summer months.

WATER PLAN APPROACH: For purposes of comparing different water supply alternatives, the development of the water system is considered in two phases. The first phase would meet the year 2025 demand whereby a 40 MGD system is developed. The second phase would be a stand alone or parallel system, having a 43 MGD capacity that would be constructed to compliment the first phase 40 MGD system and manifolded into the common distribution system within the service area. With the exception of manifolding into the same distribution system, these two phases (40 MGD and 43 MGD) or plants would have separate supplies, treatment, transmission and control systems, thereby providing a backup system in the event one system or phase became inoperative.

5. WATER QUALITY & TREATMENT

5.1 REGULATION

Safe Drinking Water Act: The State of Nevada Bureau of Health Protection Services (State Bureau) supervises and enforces the water quality of public water systems as mandated by the Safe Drinking Water Act (SDWA). The SDWA is administered by the Environmental Protection Agency (EPA) and was put into action in 1974 as a national program to ensure the potability and palatability of public drinking water supply. The SDWA applies to all community and non-community water supplies, both private and publicly owned, that have 15 or more service connections to serve 25 or more individuals. See Appendix 5.0 for State of Nevada Bureau of Protection Health Services Maximum Contaminant Levels (MCLs) set for regulated inorganic, organic and radionuclides for public water system drinking water.

Surface Water Treatment Rule: In 1989 the Surface Water Treatment rule (SWTR) was included in the SDWA for regulation by filtration and disinfection treatment for turbidity, Giardia lamblia, Legionellae, and heterotrophic bacteria. The rule applies to all pubic community and non-community water systems that use surface water sources or ground water sources directly influenced by surface water. Disinfection is required for all public water systems covered by the SWTR. Filtration treatment is also required for these systems unless the utility can meet certain source water quality requirements, disinfection criteria, and site-specific requirements.

Enhanced Surface Water Treatment Rule: Due, primarily to recent outbreaks of Cryptosporidiosis caused by the pathogen, Cryptosporidium, the Enhanced Surface Treatment Rule (ESWTR) is being developed by the EPA. Crypotsporidium, unlike other pathogens, is highly resistant to disinfection by chlorine, so chlorination is not viable to inactivate Cryptosporidium. Methods to address removal and/or inactivation of Cryptosporidium include more stringent treated-water quality standards with respect to controlling turbidity levels, and the use of alternative disinfectants such as ozone. Two new rules have been adopted which include the Long Term 1 Enhanced Surface Water

Treatment Rule (LT1), the Long Term 2 ESWTR (LT2) and Stage 2 disinfection Byproducts Rule (DBR). These more recent rules have been included in the treatment alternatives presented in this Plan, however the latter two rules are not expected to have a significant effect on the water supply treatment systems for Churchill County. The LT1 became final in January 2002 and the purpose was to increase public health protection by reducing the risk of exposure to microbiological pathogens such as Cryptosporidium (Crypto) and E. coli. Risk reduction was accomplished by tightening the regulations on filter performance. The purpose of LT2 is largely to close certain loopholes in LT1 regarding treatment control. LT2 will also establish requirements for analyzing and quantifying the source water supplies for Crypto and E. coli for surface water systems. Where elevated levels of Crypto or E. coli are present in the source water supply, additional treatment such as ultraviolet light, chlorine dioxide, or ozone treatment may be required.

Arsenic Rule: The new arsenic rule, effective in 2006, has set the MCL at 10 ppb. The previous MCL for arsenic was set at 50 ppb. The World Heath Organization has suggested a "guideline" MCL for arsenic be 10 ppb based upon a 1:60,000 risk of skin cancer. In anticipation of the Arsenic Rule, and also as a result of it, significant research and development work has taken place in the water treatment industry to develop new arsenic removal technologies and to refine previously known arsenic removal technologies. This research has produced several promising new arsenic treatment methods, and additional information regarding a process that was described as Oxidation-Adsorption-Filtration (O-A-F) in the 1999 report. The O-A-F process was included in the EPA's list of Best Available Technologies (BATs) for arsenic removal. That process has been studied extensively since 1999. The EPA referred to the process as Modified Coagulation / Filtration, but the process is essentially the same as the O-A-F process described in the 1999 report. The process will be referred to as Modified Coagulation / Filtration (MCF) in this updated report.

Radon: Currently, the State has not adopted an MCL for radon. The State, however, has considered the adoption of an MCL of 4,000 pico curies/l, while the EPA has

considered a lower MCL of 300 pico curies/l. According to the National Academy of Sciences, the primary risk associated with radon is when it is dispersed in the atmosphere as opposed to a much smaller risk when radon is carried by water. The Academy, therefore, recommends that an effort to control radon in air be instituted, rather than enforce an MCL on water supplies.

The EPA has allowed the State to waive an MCL for radon in water, providing the State institutes a "Multi-Media Program" in conjunction with public water suppliers to educate the public in matters related to the monitoring and control of radon in the air.

Fluoride: The MCL for fluoride is 2.0 ppm. Excessive amounts of fluoride above the MCL have been established as the cause of dental fluorosis, which is mottling, or disfiguring discoloration of the teeth.

5.2 WATER QUALITY

Lahontan Reservoir Surface Water: The Surface water quality of Lahontan Reservoir, as reported in the "Nevada Rural Communities Water and Wastewater Plan" (Walters, 1972) is characterized as good, with turbidities ranging from 5.5 NTU up to 14.0 NTU and total dissolved solids less than 300 mg/l, with moderate color and alkalinity, and arsenic at 0.02 ppm. See "Water Analysis of Lahontan Reservoir at Dam Site", "Water Quality Criteria" (Lahontan Reservoir & Fallon Wells) and "Seasonal Variation of Certain Quality Criteria For Carson River Downstream From Lahontan Dam" and "Water Conditions At Dam Site, Lahontan Reservoir" in Appendix 5.0. More recent results provided by the Nevada Division of Environmental Protection (NDEP) show turbidities as measured at Lahontan dam outlet, ranging from 2 NTU to 65 NTU, averaging 13.6 NTU for the period June, 1990 to January, 1995. For the period from March 1995 to November, 1999, the turbidity measured at this point varied from 5 NTU to 90 NTU, averaging 31 NTU. Total dissolved solids (TDS) as reported by NDEP ranged from 200 ppm to 500 ppm, averaging 300 ppm. Arsenic concentrations as measured again at the outlet of Lahontan Dam averaged 17.3 ppb for the period June 1990 to November 1999. Interestingly, the arsenic concentration of the Truckee Canal,

measured at its discharge point into Lahontan Reservoir, averaged 14 ppb for the period January 1991 to November 1999. See summary data from NDEP in Appendix 5.0. Trihalomethane precursors are present in these surface waters. Any proposed treatment process must not, therefore, form trihalomethanes (THM). Cryptosporidium as well as Giardia, legionellae and heterotrophic bacteria are also assumed to be present in these surface waters. Additionally, seasonal accumulations of algae occur in the Reservoir and must be mechanically separated and treated to maintain treatment plant influent flow rates and control odor and color levels in the finished water.

Basalt Aquifer Ground Water: Ground water quality of the basaltic aquifer used by the City of Fallon, the Naval Air Station, Kennametal Industries and the Fallon Indian Tribe is generally good and meets the State of Nevada MCL criteria, excepting arsenic, which is currently set at 0.05 mg/l or 50 ppb. The reported arsenic concentrations of these deep basalt wells typically average about 0.10 mg/l or 100 ppb. While the arsenic concentration of this ground water source exceeds the current MCL for arsenic by a factor of two, there have been no documented or undocumented adverse human health effects attributed to this water supply by domestic users in Lahontan Valley (BHPS, 1988).

Due to the relatively high ratio of sodium to calcium and magnesium and a relatively high total dissolved solids (TDS) concentration of about 550 mg/l, this source of water is somewhat limited as an irrigation source for turf and ornamentals. Due to the high sodium adsorption ratio (SAR) reflecting the ratio of sodium to calcium and magnesium, reduced infiltration or ponding may occur on heavier soils.

Shallow & Intermediate Aquifer Ground Water: Based upon the tabulation of 2792 water quality reports on file with the Nevada Bureau of Health and Protective Services, for wells developed in the shallow and intermediate aquifers in Lahontan Valley, 40% exceeded a recommended MCL (500 ppm) for total dissolved solids, 34% exceeded the current MCL (0.05 ppm) for arsenic, 29% exceeded the MCL (0.10 ppm) for manganese and 21% exceeded the MCL (10 ppm) for nitrate. In respect to arsenic at the 2006 MCL

of 10 ppb, about 68% of the water samples exceed this MCL. See Table 5.2 "Historic Lahontan Valley Underground Water Quality & MCL Exceedence" and Appendix 5.2 for complete tabulation of these water quality reports presented and sorted by township, range and section in Lahontan Valley.

TABLE 5.2 HISTORICAL LAHONTAN VALLEY UNDERGROUND WATER QUALITY & MCL EXCEEDENCE[1]

CONSTITUENT	MCL (ppm)	NO. OF RECORDS WHICH EXCEED MCL'S[2]	% OF RECORDS WHICH EXCEED MCL's
TDS	500	1103	40%
MAGNESIUM	150	30	1%
SULFATE	250	368	13%
CHLORIDE	400	117	4%
NITRATE	10	590	21%
FLOURIDE	2	203	7%
ARSENIC:			
Current Standard	0.05	955	34%
2006 EPA Standard	0.01	1898	68%
Detection Level	0.002	2656	95%
IRON	0.6	188	7%
MANGANESE	0.1	810	29%
COPPER	1	2	0%
ZINC	5	1	0%
BARIUM	2	0	0%
COLOR	15	342	12%
pH	6.5-8.5	506	18%

[1] See Appendix 5.2 which is a tabulation of the water quality records sorted by Township, Range & Section.

[2] There are a total of 2792 records in the data base, however some of them are duplicate wells sampled at different dates.

Dixie Valley Ground Water: Based upon current MCLs, the water quality of the ground water in the Settlement area within Dixie Valley is good. Upon review of 9 well analyses, the average TDS is 306 ppm and individual wells vary from 236 ppm to 355 ppm. Higher TDS (in the order of 800 ppm to 1900 ppm) is reported in 2 wells located 17 to 20 miles north of the settlement area. (Areas to the north near the playa are not

included in the proposed well field for the Dixie Valley Ground Water Development Project.).

Arsenic concentrations for the 9 wells in the Settlement area average 15 ppb which exceed the current standard of 10 ppb. The concentration of arsenic in these 9 analyses varies from < 0.003 ppm to 0.025 ppm. The average Fluoride concentration for the 9 wells is 4.42 ppm, which exceeds the State MCL of 2.0 ppm. Individual well fluoride concentrations vary from from 0.30 ppm to 9.12 ppm and out of the 9 individual wells, 6 wells exceed the MCL for fluoride.

5.3 WATER TREATMENT

The following treatment processes are based upon treating the raw water to meet the current MCLs set forth by the State and to meet the anticipated Enhanced Surface Water Treatment Rule. Regarding arsenic, the assumed treatment will result in a concentration of 2.0 ppb for the finished water. No treatment is considered for the removal of radon from ground water based upon the State's proposed "Multi-Media Program" for air quality control of this constituent.

With regard to surface water (Lahontan Reservoir), conventional treatment processes are followed, whereby all constituents, including arsenic, would be treated to meet the MCL of 2.0 ppb. Additionally, surface water treatment will include ozone treatment to assure the removal and/or deactivation of Cryptosporidium and the prevention of trihalomethanes (THM).

Ground water treatment within Lahontan Valley for arsenic and manganese is presented as an option and is based upon the typical water quality analyses of the intermediate aquifer and basalt aquifer. Ground water treatment within Dixie Valley is based upon limited water analyses taken from the Settlement area. Treatment for fluoride and arsenic is presented as an option in the event treatment for these constituents is required. Assuming the ground water source meets all MCLs, an option is also presented for both the Lahontan Valley as well as Dixie Valley for wellhead disinfection

treatment only.

Well Head Disinfection Treatment of Ground Water: Under conditions where the ground water quality meets the primary and secondary drinking standards set by the State Bureau of Health Protection Services (State of Nevada) and acceptable standards for irrigation of agricultural crops and ornamentals, treatment of the water is limited to disinfection by chlorination to control bacterial contamination in the delivery and distribution conveyance system. Treatment is achieved by the injection of chlorine gas into the discharge stream of the ground water well. Contact time is achieved within the conveyance system (pipeline) prior to introduction into the distribution system. Based upon water quality analyses taken in Lahontan Valley from the shallow and intermediate aquifers and in Dixie Valley, a significant portion of the wells meet the current MCLs set by the State of Nevada. See Appendix 5.2.

Drinking water standards are expressed in terms of maximum contaminate levels (MCLs) criteria set for certain inorganic, organic, and radionuclides constituents and related parameters. These include: pH, color, turbidity, and bacterial occurrence and concentration. Additionally, acceptable agricultural and ornamental water quality standards, including total dissolved solids (TDS), calcium, magnesium, sodium, sodium absorption ratio (SAR), and boron, must be met for successful irrigation of agricultural crops, turf, and ornamentals. See Appendix 5.0 for drinking water standards (MCLs) and agricultural/ornamental irrigation standards and criteria.

Treatment of Manganese Removal from Ground Water in the Intermediate Aquifer: Manganese is present in the Intermediate Ground Water Aquifer at concentrations up to 1.22 parts per million (ppm). For aesthetic reasons, water containing manganese is objectionable since precipitation occurs at the point of use when atmospheric oxygen is brought into contact with the water. Precipitation of manganese causes brown to black stains in plumbing fixtures and objectionable tastes in drinking water and beverages. Water containing manganese also stains clothing as well as sidewalks and structures. Water containing less than about 0.1 ppm manganese is not objectionable. The State

of Nevada enforces a secondary standard for this constituent at an MCL of 0.1 ppm.

Additionally, higher concentrations of manganese result in the potential growth of microorganisms in the distribution system. These accumulations reduce pipeline capacity, require higher chlorine dosages, and deplete dissolved oxygen levels. Sloughing or re-suspension of these accumulations at high flows causes high turbidities and complaints of discolored or “black” colored water.

The method chosen for removing manganese is an adsorption/filtration process using chlorine as an oxidant and oxide-coated media, accomplished in a two step process. The coated media may be silica sand or “manganese greensand”, a proprietary media having an oxide coating. In most cases up to 99% of the backwash water may be recycled. Capital and annual O & M costs have been developed (Nolty, 2003) for well head treatment plants capable of treating discharges of 500 gpm, and 1,000 gpm. See Appendix 5.3 for complete description of this method of treatment, associated facilities and capital and annual O & M costs.

Treatment of Arsenic Removal from Ground Water from the Deep or Intermediate Aquifers: The deep ground water aquifer yields water with an arsenic concentration averaging about 0.10 ppm, which is ten times as high as the current MCL for arsenic. Some intermediate aquifers yield water with arsenic concentrations varying from 0.10 ppm to 0.33 ppm, while other shallow and intermediate aquifers yield concentrations of arsenic varying from zero to other levels below the current MCL of 0.01 ppm. Since the EPA has set the MCL for arsenic at 10 ppb, this has been used to develop the cost data for this study.

The method of treatment selected to remove arsenic is a Modified Coagulation/Filtration (MCF) process. In this process, arsenite must first be oxidized to the arsenate state with chlorine, ozone, or other commonly used oxidant. Then, coagulation chemicals are added (alum, iron salts [ferric sulfate or ferric chloride], or polymers) to destabilize the suspended particles to produce filterable solids. Iron salts, especially ferric chloride,

have usually been found to be more effective than alum, and are also effective over a wider pH range than alum. Polymers are usually employed in addition to iron salts to enhance the effectiveness of the coagulation process and to reduce the required dosage of iron salts. This process is more “operator friendly” than ion exchange methods since acids and caustics are not required, and further, the capital and operating costs are considerably less than for ion exchange using activated alumina.

Capital and O&M costs have been developed for wellhead plants having a discharge of 1,000 gpm utilizing the MCF process. Additionally, capital and O&M costs for larger central plants with capacities of 8, 17 and 40 MGD are based upon the method of treating surface water by conventional methods of chemical coagulation, rapid/high energy mixing, flocculation, sedimentation, filtration, and disinfection. These facilities do not include the screening devices for separation of debris and algae from the raw surface water.

Treatment of Arsenic and Manganese Removal from Ground Water from the Intermediate Aquifer: The intermediate ground water aquifer water has manganese concentrations from 0.24 to 1.22 ppm both, with and without arsenic ranging from 0.10 ppm to 0.33 ppm. Capital and O&M costs associated with the recommended treatment process assumes treatment for arsenic to less than 10 ppb ppb and manganese to 0.10 ppm.

The preferred method of treatment for both manganese and arsenic on a wellhead basis (500 gpm and 1000 gpm) is the MCF method as described for arsenic removal. For a larger central plant of 40 MGD, the treatment facility will, by necessity, be similar to the conventional surface water treatment plant, excluding the screening of raw water for debris and algae.

Treatment of Lahontan Reservoir Surface Water: Generally, the water quality of Lahontan Reservoir is good. See Table 5-1 in Appendix 5.0 from the “Nevada Rural Communities Water and Wastewater Plan, 1972. Turbidities range from 5.5 NTU up to

14.0 NTU, total dissolved solids (TDS) at less than 300, with moderate color and alkalinity. Arsenic concentrations however approximate 17 ppb which exceeds the MCL of 10 ppb for this constituent. As stated in the water treatment appendix, the EPA addressed the Crypto issue in LT1 by tightening the regulations on filter performance. The use of ozone to inactivate Crypto will not be required unless, per the expected requirements of LT2, elevated levels of Crypto are present in the source water. However, given that there is seasonal algae present in the Lahontan Reservoir, and because algae frequently cause disinfection byproducts when chlorine is used, the treatment scheme recommended for this water supply includes ozone disinfection to mitigate the potential DBP formation problem.

Approximately 50% of the 20 ppb of arsenic in this surface water source must be removed to achieve the MCL of 10 ppb. Data developed at numerous locations since the 2000 report, including conventional plants, indicate that up to 95% of the arsenic can be effectively removed by the filters in a conventional treatment plant through the oxidation filtration process by feeding ferric chloride. Data indicates that the percentage of arsenic removed is a function of the amount of ferric chloride used.

Conventional treatment consisting of chemical coagulation followed by rapid high energy mixing, flocculation, sedimentation, filtration and disinfection is the only viable option that is widely accepted for treatment of the surface water from Lahontan Reservoir. Due to the varying thermocline (See Figure 5-1 Water Conditions at Dam Site - Lahontan Reservoir in Appendix 5.0) it is recommended to construct an intake along side the existing irrigation intake structure that is capable of taking water at different depths. Vertical low-head, high discharge, propeller-pumps would discharge the water over the dam and to the treatment plant located on the right bank of the River below the dam. The raw water would be diverted through bar racks and thence through a traveling screen and a dissolved-air flotation mechanism for removal of finer materials

and seasonal algae. Ozonation facilities are included to ensure that Cryptosporidium inactivation can be accomplished and THM formation is prevented. Chlorination facilities are included along the with ozonation facilities in order to provide a chlorine residual in the transmission, distribution, conveyance and storage system. See Appendix 5.3 for complete description of this process. Two plant sizes are considered, one for 20 MGD and a second at 40 MGD.

Treatment for Fluoride and Arsenic for Dixie Valley Ground Water: Some of the ground water analyses from ground water wells in Dixie Valley (Valley) in the Settlement Area have fluoride concentrations in the range of 9.12 ppm. The State of Nevada MCL for fluoride is 1.8 ppm. If upon test pumping of existing wells in the Valley, or upon the development of new wells, results in fluoride concentrations higher than the MCL, treatment for this constituent must be considered. Additionally, some wells in the Valley have arsenic concentrations in the range of 15 to 25 ppb. Since the MCL for arsenic has been set at 10 ppb, treatment for removal of this constituent must also be made.

An ion exchange method using activated alumina and pH adjustment is required for fluoride and arsenic removal. Such treatment includes oxidization with chlorine to change trivalent arsenic to a pentavalent form. The three plant sizes considered are 1500 gpm wellhead treatment, 18 MGD, and 40 MGD central plants.

For purposes of comparing different water sources of varying water quality, the following water treatment alternatives are considered: (1) Ground water disinfection at the well head at 1000 gpm, (2) Lahontan Valley ground water removal of manganese at the well head at 1000 gpm, (3) Lahontan Valley ground water removal of arsenic at the well head at 1000 gpm, (4) Lahontan Valley ground water removal of arsenic and manganese at the well head at 1000 gpm and at a central 40 MGD plant, (5) Lahontan Reservoir surface water treatment by conventional treatment at 40 MGD, and (6) Dixie Valley ground water treatment for fluoride and arsenic by a 40 MGD plant. Table 5.3 summarizes the capital and annual O&M costs associated with these water treatment alternatives.

TABLE 5.3 WATER TREATMENT ALTERNATIVE CAPITAL & ANNUAL O&M COSTS

TREATMENT PLANT ALTERNATIVE	PLANT / TREATMENT / SIZE	CAPITAL COST[1] $x1000	ANNUAL O&M COST[1] $x1000
Groundwater Disinfection[2]	Well Head Chlorination 1000gpm	$30	$10
Groundwater Manganese Removal[3]	Well Head Adsorption/Filter 1000 gpm	$1,129	$145
Groundwater Arsenic Removal[4]	Well Head MCF 1000 gpm	$1,133	$200
Groundwater Manganese & Arsenic Removal[5]	Well Head MCF 1000 gpm	$1,133	$200
Groundwater Manganese & Arsenic Removal[6]	Conventional 40 MGD	$37,376	$4,115
Surface Water Conventional[7]	Conventional 40 MGD	$42,981	$2,789
Dixie Valley Groundwater Fluoride & Arsenic Removal[8]	Ion Exchange 40 MGD	$28,212	$1,937

[1] Based upon 2002 costs in $x1000

[2] Treatment of the groundwater by chlorination at the well head. Contact will be achieved within the pipeline.

[3] Treatment of Lahontan Valley groundwater for the removal of manganese by an adsorption/filtration process using a proprietary (manganese greensand oxide or silica sand.

[4] Treatment of Lahontan Valley groundwater for the removal of arsenic by an Modified Coagulation / Filtration (MCF) process.

[5] Treatment of Lahontan Valley groundwater for the removal of arsenic and manganese by MCF process.

[6] Treatment of Lahontan Valley groundwater for the removal of arsenic and manganese at a central plant by conventional methods similar to the conventional surface water treatment, excepting debris/algae separation.

[7] Treatment of Lahontan Reservoir surface water by conventional methods consisting of chemical coagulation, rapid/high energy mixing, flocculation, sedimentation, filtration, and disinfection with seasonal debris & algae separation.

[8] Treatment of Dixie Valley groundwater for the removal of fluoride and arsenic by an ion exchange method.

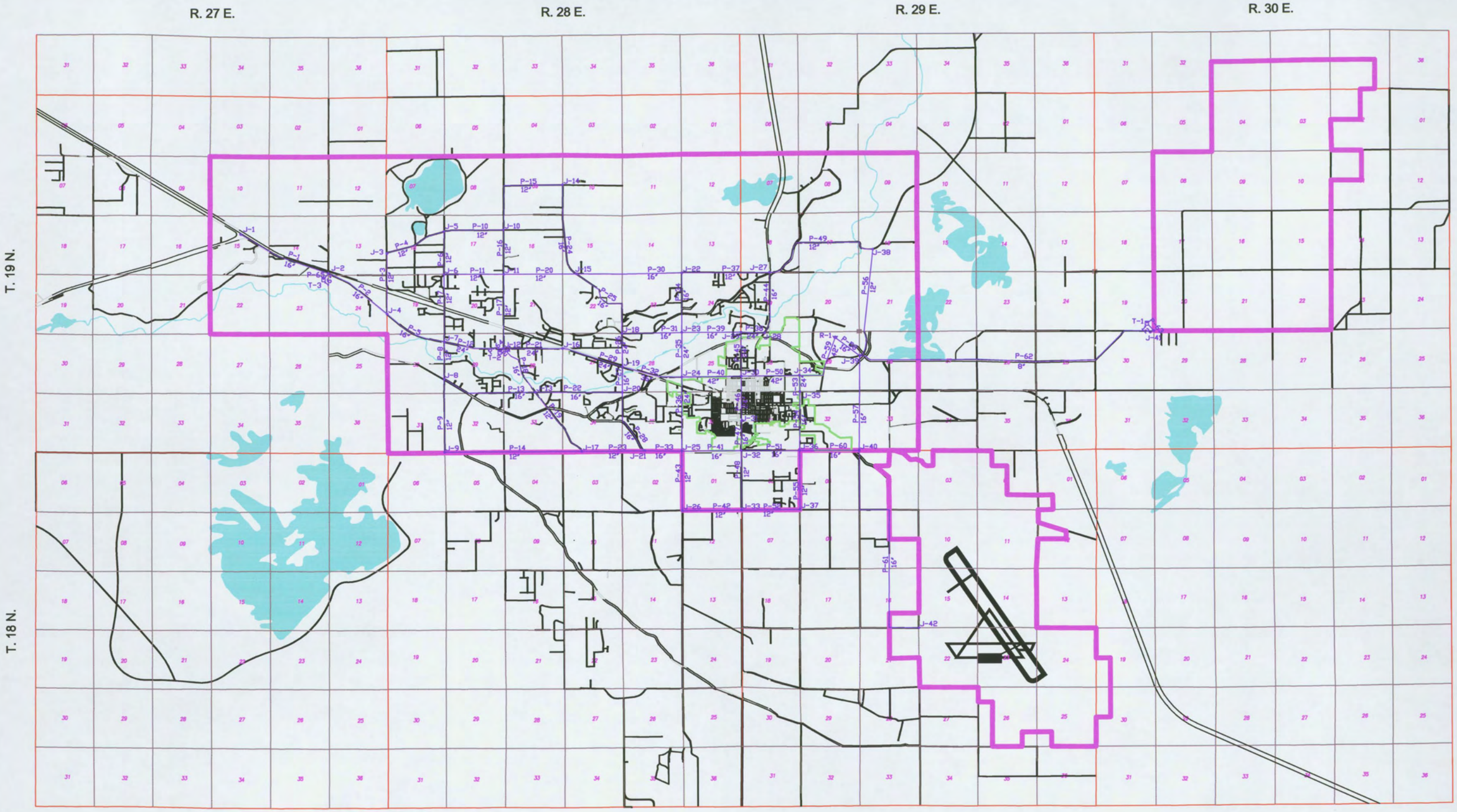
6. DISTRIBUTION / TRANSMISSION SYSTEM

6.1 SERVICE AREA

2025 Service Area: The 2025 service area of the proposed Community Water System encompasses approximately 81 square miles which includes the City of Fallon (City), Naval Air Station Fallon (NAS) and the Fallon Paiute Shoshone Tribe (FPST). Of this area, the City and unincorporated county encompass approximately 56 square miles which extend west to the "Y" at the intersection of Highway 50 and Alternate 50, north to Soda Lake, east to the S-Line Reservoir and south to Sheckler Road. See the boundary of the 2025 service area depicted on Map 6.1.1. It was assumed that the entire 2025 County population would reside within the boundary of the 2025 service area, resulting in a conservative distribution system design. The slope of the service area is relatively flat from the west at the "Y" (4,027') to the east toward the S-Line Reservoir (3,945') and from the north at Soda Lake (4,022') to the south toward Sheckler Road and Highway 95 (3,965'). Rattlesnake Hill (4,180'), a basalt cinder cone located approximately two miles northeast of the City, is the only anomaly to the relatively flat topography which makes it an ideal location for water storage. The City, NAS and FPST currently have storage tanks on Rattlesnake Hill. It is proposed that the Community Water System be designed in a manner that will allow manifolding service to the City, the NAS and the FPST, should these entities choose to be serviced by the Community System.

2050 Service Area: The 2050 service area of the proposed Community Water System encompasses approximately 204 square miles which includes the City, NAS and the FPST. Of this area, the City and unincorporated county encompass approximately 179 square miles which extend west to Hazen, the Truckee Canal and Lahontan Reservoir, north to Hazen, Jacobs Road and Peraldo Lane, east to the FPST and south to southern boundary of T.18N. See the boundary of the 2050 service area depicted on Map 6.1.2. It was assumed that the entire 2050 County population would reside within the boundary of the 2050 service area, resulting in a conservative distribution system

design. The slope of the service area is relatively flat from the west at Lahontan Reservoir (4,142') to the east toward the FPST (3,900') and from the north at Soda Lake (4,022') to the south toward the southern boundary of the NAS (3,920').



LEGEND:

- 2025 SERVICE AREA BOUNDARY
- FALLON CITY LIMITS
- P-1 / 16" — PIPELINE ALIGNMENT, PIPE NO. & DIAMETER
- J-1 — PRESSURE JUNCTION NODE
- T-1 — ELEVATED STORAGE TANK

NO.	REVISION	DATE	BY

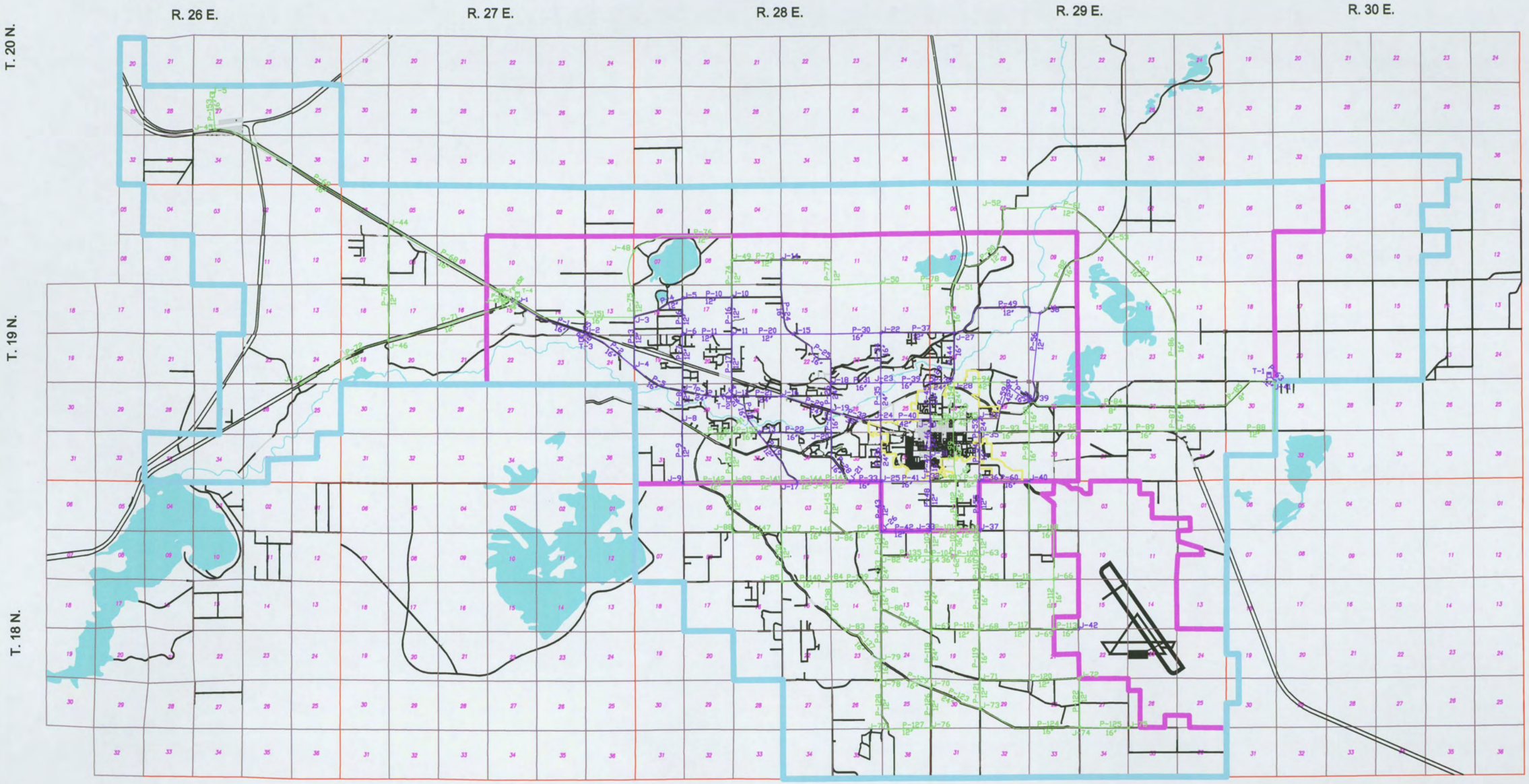
SCALE:
1" = 9,000'
1 : 108,000

DESIGNED: CCM
DRAWN: CCM
CHECKED: CNM

WRD WATER RESEARCH & DEVELOPMENT, INC.
P.O. BOX 5007 * RENO, NV 89513-5007 * (775) 747-1100
ENGINEERING * HYDROLOGY * ENVIRONMENT * AGRICULTURE

6.1.1 CHURCHILL COUNTY WATER PLAN 2025 DISTRIBUTION SYSTEM LAYOUT AND SERVICE AREA

FILE NAME: 2025CCDist0ys11x17.dwg
JOB NO. 02-67D
DATE: March 11, 2003
SHEET 1 OF 1



LEGEND:

- 2025 SERVICE AREA BOUNDARY
- 2050 SERVICE AREA BOUNDARY
- FALLON CITY LIMITS
- P-1 16" 2025 PIPELINE ALIGNMENT, PIPE NO. & DIAMETER
- P-1 16" 2050 PIPELINE ALIGNMENT, PIPE NO. & DIAMETER
- J-1 PRESSURE JUNCTION NODE
- T-1 ELEVATED STORAGE TANK
- PMP-1 BOOSTER PUMP

NO.	REVISION	DATE	BY

SCALE:
1" = 11,000'
1:132,000

DESIGNED: CCM
DRAWN: CCM
CHECKED: CNM

WRD WATER RESEARCH & DEVELOPMENT, INC.
P.O. BOX 5007 * RENO, NV 89513-5007 * (775) 747-1100
ENGINEERING * HYDROLOGY * ENVIRONMENT * AGRICULTURE

6.1.2 CHURCHILL COUNTY WATER PLAN 2050 DISTRIBUTION SYSTEM LAYOUT AND SERVICE AREA

FILE NAME: 2050CCDistSys11x17.dwg
JOB NO. 02-67D
DATE: March 11, 2003
SHEET 1 OF 1

6.2 DEMAND DISTRIBUTION

Quasi-Municipal Demand: As documented in Section 4.2, the overall County per capita quasi-municipal water demand used is 270 gpcd, however metered use for the NAS and the FPST was used since they differed substantially from the overall County. A rate of 350 gpcd was used for the NAS, 170 gpcd for the FPST and 270 gpcd for the City and unincorporated County, which yields a rate of 270 gpcd for the overall County. The City and overall County were assumed to grow at a rate of 3% annually, while the NAS and FPST were assumed to grow at a rate of 1.5% annually which seemed reasonable to each of these entities.

The distribution of the quasi-municipal demand was based primarily on existing County zoning within the service areas and any physical limitations to growth such as rivers/canals, wetlands, lakes, etc. Land ownership within the service areas was not considered in determining the demand distribution. A GIS map containing parcel base, existing zoning, streets/roads, canals, Township, Range and sections along with a 7/31/98 aerial photograph mosaic prepared by NDOT was utilized to determine the total potential number of dwelling units (DU) within the service areas. This tool was used to determine the developable acreage within each section of the unincorporated County of the service areas and then divided by the respective zoning densities to calculate the number of potential DU per section. These calculations are tabulated in Table 6.2.1. The Fallon Urban Area 2020 Transportation Plan was also utilized as a guide for where potential quasi-municipal growth will occur.

TABLE 6.2.1 TOTAL NUMBER OF POTENTIAL DWELLING UNITS (DU) BASED UPON EXISTING ZONING BY SECTION, TOWNSHIP & RANGE

SEC	TWN	RNG	R-R	A-3	A-2	A-1-E	A-1, C-1, C-2, M-1, M-E	E-1	R-1, R1-MH	R-2	EXISTING # DU	TOTAL # POTENTIAL DU
			20 Ac	10 Ac	5 Ac	2.5 Ac	1 Ac	0.5 Ac	0.16 Ac	0.12 Ac		
							2025 SERVICE AREA					
10	19	27	480				160				0	184
11	19	27		640							0	64
12	19	27		640							0	64
13	19	27		480			160				0	208
14	19	27		415			225				0	267
15	19	27		270			370				0	397
22	19	27	160	480							0	56
23	19	27		634			6				0	69
24	19	27		460			180				0	226
1	18	28			510		130				0	232
7	19	28		310							0	31
8	19	28		490							0	49
9	19	28		640							0	64
10	19	28		540							0	54
11	19	28		640							0	64
12	19	28		480							0	48
13	19	28		640							0	64
14	19	28		480							0	48
15	19	28		280				280			0	588
16	19	28		160	480						0	112
17	19	28		160	480						0	112
18	19	28		260	340						0	94
19	19	28			290		350				0	408
20	19	28			115		525				0	548
21	19	28			390		250				0	328
22	19	28						640			0	1280
23	19	28						640			0	1280
24	19	28						560			0	1120
25	19	28					9	180	120	40	0	1452
26	19	28					130	360		26	0	1067
27	19	28					110	495			0	1100
28	19	28					380	230			0	840
29	19	28			25		460				0	465
30	19	28			515		80				0	183
31	19	28			640						0	128
32	19	28			545		60				0	169
33	19	28			410		145	60			0	347
34	19	28			365		80	170	6		0	531
35	19	28			60		35	410	95	19	0	1619
36	19	28					15		145		0	921
6	18	29					640				0	640
6	19	29		320							0	32
8	19	29		640							0	64
9	19	29		600							0	60
16	19	29		600							0	60
17	19	29		640							0	64

18	19	29		585		55					0	81
19	19	29		280			4	316			0	664
20	19	29		120		37	35				0	62
21	19	29		230							0	23
28	19	29		320							0	32
29	19	29		140			112			2	0	143
30	19	29					15	20			0	55
31	19	29					106		92	28	0	914
32	19	29			425		2		37	28	0	552
33	19	29			640						0	128
										2025 Subtotal:	**0**	**20,454**
							2050 SERVICE AREA					
1	19	26	640								0	32
2	19	26	640								0	32
3	19	26	480	160							0	40
4	19	26	240	80							0	20
10	19	26	520								0	26
11	19	26	640								0	32
12	19	26	640								0	32
13	19	26		640							0	64
14	19	26	640								0	32
22	19	26	280								0	14
23	19	26	600				40				0	70
24	19	26	480	160							0	40
25	19	26		480							0	48
26	19	26	520	120							0	38
27	19	26		460							0	46
34	19	26	320								0	16
35	19	26		160							0	16
20	20	26	320								0	16
25	20	26	120								0	6
26	20	26	520	80							0	34
27	20	26					600				0	600
28	20	26	540								0	27
29	20	26	300								0	15
32	20	26	220	10							0	12
33	20	26		640							0	64
34	20	26	320	320							0	48
35	20	26					600				0	600
36	20	26	50								0	3
1	19	27		520							0	52
2	19	27	240	400							0	52
3	19	27	640								0	32
4	19	27	640								0	32
5	19	27	160								0	8
6	19	27	180	70							0	16
7	19	27		640							0	64
8	19	27		360							0	36
9	19	27									0	0
16	19	27	480								0	24
17	19	27		640							0	64
18	19	27		640							0	64

19	19	27		320		0	32
20	19	27		320		0	32
21	19	27		300		0	30
2	18	28			640	0	128
3	18	28			640	0	128
4	18	28			640	0	128
5	18	28		320	320	0	96
6	18	28		560		0	56
7	18	28		340		0	34
8	18	28		320	320	0	96
9	18	28			640	0	128
10	18	28			640	0	128
11	18	28			640	0	128
12	18	28			640	0	128
13	18	28			640	0	128
14	18	28			640	0	128
15	18	28			640	0	128
16	18	28		160	480	0	112
17	18	28		560		0	56
21	18	28		400	80	0	56
22	18	28		240	400	0	104
23	18	28		640		0	64
24	18	28		640		0	64
25	18	28		640		0	64
26	18	28		640		0	64
27	18	28		600		0	60
34	18	28		480		0	48
35	18	28		640		0	64
36	18	28		640		0	64
1	19	28		40		0	4
2	19	28		280		0	28
3	19	28		160		0	16
4	19	28		240		0	24
5	19	28		480		0	48
6	19	28		600		0	60
1	18	29			370	0	74
2	18	29			280	0	56
3	18	29			35	0	7
4	18	29			310	0	62
5	18	29			640	0	128
7	18	29			640	0	128
8	18	29		640		0	64
9	18	29		480		0	48
12	18	29		340	200	0	74
13	18	29	320	320		0	48
16	18	29		560		0	56
17	18	29		640		0	64
18	18	29			640	0	128
19	18	29		640		0	64
20	18	29		640		0	64
21	18	29		480		0	48
26	18	29		160		0	16
27	18	29		640		0	64
28	18	29		640		0	64
29	18	29		640		0	64
30	18	29		640		0	64
31	18	29		640		0	64

32	18	29		640				0	64
33	18	29		640				0	64
34	18	29		460		180		0	226
35	18	29		520		120		0	172
36	18	29		560				0	56
1	19	29		480				0	48
2	19	29		640				0	64
3	19	29		640				0	64
4	19	29		480				0	48
5	19	29		480				0	48
6	19	29		80				0	8
10	19	29		480				0	48
11	19	29		640				0	64
12	19	29		640				0	64
13	19	29		640				0	64
14	19	29		400				0	40
15	19	29		80		80		0	88
22	19	29		40				0	4
23	19	29		320				0	32
24	19	29		640				0	64
25	19	29		640				0	64
26	19	29		640				0	64
27	19	29		480				0	48
34	19	29			640			0	128
35	19	29			635			0	127
36	19	29	80	330	160	60		0	129
6	19	30		560				0	56
7	19	30		640				0	64
18	19	30		640				0	64
19	19	30		640				0	64
30	19	30		640				0	64
31	19	30		280				0	28
							2050 Subtotal:	**0**	**8,802**
							2025 + 2050 TOTAL:	**0**	**29,255**

ZONING LEGEND:

LABEL	PARCEL SIZE (AC)	DESCRIPTION
R-R	20	Rural Resource
A-3	10	Third Agriculture
A-2	5	Second Agriculture
A-1	1	First Agriculture
A-1-E	2.5	Extended First Agriculture
E-1	0.5	First Estates
R-1	0.16	Single Family Residential
R1-MH	0.16	Single Family Mobile Home
R-2	0.12	Multiple Residential
C-1	1	Residential Commercial
C-2	1	General Commercial
M-1	1	General Industrial
M-E	1	Limited Industrial

The total number of DU were multiplied by the unincorporated County persons per household (PPH) of 2.78 to arrive at the potential population who could reside within the service areas excluding the NAS, FPST and the existing City limits. The projected 2025 and 2050 populations for the NAS, FPST and the existing City limits were then subtracted from the County total to arrive at a population to be distributed within the unincorporated County. The ratio of these numbers to the total potential population within the unincorporated County yielded a factor of 0.695 for 2025 and 1.184 for 2050. These factors were then applied to the total potential number of DU shown in Table 6.2.1 and reported in columns (2) and (3) of Table 6.2.2 for each section within the respective service areas. Therefore, the 2025 unincorporated County service area is assumed to be developed at 69.5% of its potential and the 2050 unincorporated County service area must increase existing zoning densities by 18.4% to accommodate future growth. The 2025 and 2050 populations and quasi-municipal water demands for each section within the service areas are tabulated in columns (4), (5), (6) and (9) of Table 6.2.2.

Livestock Demand: The livestock demand in year 2000 shown in Table 4.1.1 of 837 MGA was distributed within the boundaries of the 2025 service area shown on Map 6.1.1 and the difference between the 2050 and 2000 demands (3,000 MGA) was distributed outside of the 2025 service area but within the 2050 service area shown on Map 6.1.2. The 837 MGA year 2000 livestock demand was distributed evenly at 33.5 MGA/section throughout 25 sections zoned either Second Agriculture (A-2) having a minimum parcel size of five acres or Third Agriculture (A-3) with a minimum parcel size of ten acres. These areas are located primarily north of the City and the allocation by section, Township and Range is shown in column (7) of Table 6.2.2. The difference between the 2050 and 2000 demands of 3,000 MGA was distributed evenly at 60 MGA/section throughout 50 sections which are zoned either A-2 or A-3 and are tabulated in column (10) of Table 6.2.2. These areas include the locations of the existing 23 dairies within the County and are primarily south and east of the City and a small amount in the Swingle Bench area west of the City. The total average annual

demand including quasi-municipal and livestock by section, Township and Range is shown in columns (8) and (11) of Table 6.2.2. Note in the low density zoned areas, the livestock demand exceeds the quasi-municipal demands which will dictate the pipeline design in those areas.

TABLE 6.2.2 DISTRIBUTION OF POPULATION & DEMAND WITHIN 2025 & 2050 SERVICE AREAS

SEC	TWN	RNG	(1) TOTAL # POTENTIAL DU	(2) 2025 DU#	(3) 2050 DU#	(4) 2025 POPULATION	(5) 2050 POPULATION	(6) 2025 M&I DEMAND (MGA)	(7) 2025 LIVESTOCK DEMAND (MGA)	(8) 2025 TOTAL AVERAGE ANNUAL DEMAND (GPM)	(9) 2050 M&I DEMAND (MGA)	(10) 2050 LIVESTOCK DEMAND (MGA)	(11) 2050 TOTAL AVERAGE ANNUAL DEMAND (GPM)
							2025 SERVICE AREA						
10	19	27	184	128	218	355	605	35		67	60		113
11	19	27	64	44	76	124	211	12		23	21		39
12	19	27	64	44	76	124	211	12	34	87	21	34	103
13	19	27	208	145	246	402	684	40	34	139	67	34	192
14	19	27	267	185	315	515	877	51		96	86		164
15	19	27	397	276	470	767	1,306	75		144	129		245
22	19	27	56	39	66	108	184	11		20	18		35
23	19	27	69	48	82	134	228	13		25	22		43
24	19	27	226	157	267	436	744	43		82	73		139
1	18	28	232	161	275	448	763	44		84	75		143
7	19	28	31	22	37	60	102	6		11	10		19
8	19	28	49	34	58	95	161	9	34	81	16	34	94
9	19	28	64	44	76	124	211	12	34	87	21	34	103
10	19	28	54	38	64	104	178	10	34	83	17	34	97
11	19	28	64	44	76	124	211	12	34	87	21	34	103
12	19	28	48	33	57	93	158	9	34	81	16	34	93
13	19	28	64	44	76	124	211	12	34	87	21	34	103
14	19	28	48	33	57	93	158	9	34	81	16	34	93
15	19	28	588	409	696	1,136	1,935	112	34	276	190	34	426
16	19	28	112	78	133	216	368	21	34	104	36	34	133
17	19	28	112	78	133	216	368	21	34	104	36	34	133
18	19	28	94	65	111	182	309	18	34	98	30	34	122
19	19	28	408	283	483	788	1,342	78		148	132		251
20	19	28	548	381	649	1,058	1,803	104		198	178		338
21	19	28	328	228	388	633	1,079	62	34	182	106	34	266
22	19	28	1280	889	1515	2,472	4,211	243		463	415		789
23	19	28	1280	889	1515	2,472	4,211	243		463	415		789
24	19	28	1120	778	1325	2,163	3,685	213		405	363		690
25	19	28	1452	1009	1719	2,805	4,778	276		525	470		895
26	19	28	1067	741	1262	2,060	3,509	203		386	346		657
27	19	28	1100	764	1302	2,125	3,619	209		398	356		678

28	19	28	840	584	994	1,622	2,764	160		304	272		518
29	19	28	465	323	550	898	1,530	88		168	151		287
30	19	28	183	127	217	353	602	35	34	130	59	34	177
31	19	28	128	89	151	247	421	24	34	110	41	34	143
32	19	28	169	117	200	326	556	32	34	125	55	34	168
33	19	28	347	241	411	670	1,142	66	34	189	112	34	278
34	19	28	531	369	628	1,025	1,745	101		192	172		327
35	19	28	1619	1125	1916	3,127	5,327	308		586	525		998
36	19	28	921	640	1090	1,779	3,031	175		333	298		568
6	18	29	640	445	757	1,236	2,106	122		232	207		394
7	19	29	32	22	38	62	105	6	34	75	10	34	83
8	19	29	64	44	76	124	211	12	34	87	21	34	103
9	19	29	60	42	71	116	197	11	34	85	19	34	101
16	19	29	60	42	71	116	197	11	34	85	19	34	101
17	19	29	64	44	76	124	211	12	34	87	21	34	103
18	19	29	81	56	95	155	265	15	34	93	26	34	113
19	19	29	664	461	786	1,282	2,185	126		240	215		409
20	19	29	62	43	73	119	203	12		22	20		38
21	19	29	23	16	27	44	76	4		8	7		14
28	19	29	32	22	38	62	105	6		12	10		20
29	19	29	143	99	169	276	469	27		52	46		88
30	19	29	55	38	65	106	181	10		20	18		34
31	19	29	914	635	1082	1,766	3,008	174		331	296		564
32	19	29	552	383	653	1,065	1,815	105		200	179		340
33	19	29	128	89	151	247	421	24	33	110	41	33	143
2025 County Subtotal[1]:			**20,454**	**14,210**	**24,206**	39,504		3,889	837	8,992			
2025 NAS Fallon Subtotal:						2,480		317		603			
2025 FPST Subtotal:						1,835		114		217			
2025 City of Fallon Subtotal[2]:						9,841		969		1,843			
2025 TOTAL:						**53,660**		**5,288**	**837**	**11,655**			

2050 SERVICE AREA

1	19	26	32		38		105				10		20
2	19	26	32		38		105				10		20
3	19	26	40		47		132				13		25
4	19	26	20		24		66				6		12
10	19	26	26		31		86				8		16
11	19	26	32		38		105				10		20
12	19	26	32		38		105				10		20
13	19	26	64		76		211				21		39

14	19	26	32	38	105	10		20
22	19	26	14	17	46	5		9
23	19	26	70	83	230	23		43
24	19	26	40	47	132	13		25
25	19	26	48	57	158	16		30
26	19	26	38	45	125	12		23
27	19	26	46	54	151	15		28
34	19	26	16	19	53	5		10
35	19	26	16	19	53	5		10
20	20	26	16	19	53	5		10
25	20	26	6	7	20	2		4
26	20	26	34	40	112	11		21
27	20	26	600	710	1,974	194		370
28	20	26	27	32	89	9		17
29	20	26	15	18	49	5		9
32	20	26	12	14	39	4		7
33	20	26	64	76	211	21		39
34	20	26	48	57	158	16		30
35	20	26	600	710	1,974	194		370
36	20	26	3	3	8	1		2
1	19	27	52	62	171	17		32
2	19	27	52	62	171	17		32
3	19	27	32	38	105	10		20
4	19	27	32	38	105	10		20
5	19	27	8	9	26	3		5
6	19	27	16	19	53	5		10
7	19	27	64	76	211	21	60	154
8	19	27	36	43	118	12		22
9	19	27	0	0	0	0		0
16	19	27	24	28	79	8		15
17	19	27	64	76	211	21	60	154
18	19	27	64	76	211	21		39
19	19	27	32	38	105	10		20
20	19	27	32	38	105	10		20
21	19	27	30	36	99	10		18
2	18	28	128	151	421	41	60	193
3	18	28	128	151	421	41	60	193
4	18	28	128	151	421	41	60	193
5	18	28	96	114	316	31	60	173
6	18	28	56	66	184	18		35
7	18	28	34	40	112	11		21

8	18	28	96	114	316	31	60	173
9	18	28	128	151	421	41	60	193
10	18	28	128	151	421	41	60	193
11	18	28	128	151	421	41	60	193
12	18	28	128	151	421	41	60	193
13	18	28	128	151	421	41	60	193
14	18	28	128	151	421	41	60	193
15	18	28	128	151	421	41	60	193
16	18	28	112	133	368	36	60	183
17	18	28	56	66	184	18		35
21	18	28	56	66	184	18		35
22	18	28	104	123	342	34	60	178
23	18	28	64	76	211	21	60	154
24	18	28	64	76	211	21	60	154
25	18	28	64	76	211	21	60	154
26	18	28	64	76	211	21	60	154
27	18	28	60	71	197	19		37
34	18	28	48	57	158	16		30
35	18	28	64	76	211	21	60	154
36	18	28	64	76	211	21	60	154
1	19	28	4	5	13	1		2
2	19	28	28	33	92	9		17
3	19	28	16	19	53	5		10
4	19	28	24	28	79	8		15
5	19	28	48	57	158	16		30
6	19	28	60	71	197	19		37
1	18	29	74	88	243	24		46
2	18	29	56	66	184	18		35
3	18	29	7	8	23	2		4
4	18	29	62	73	204	20		38
5	18	29	128	151	421	41		79
7	18	29	128	151	421	41	60	193
8	18	29	64	76	211	21	60	154
9	18	29	48	57	158	16		30
12	18	29	74	88	243	24		46
13	18	29	48	57	158	16		30
16	18	29	56	66	184	18		35
17	18	29	64	76	211	21	60	154
18	18	29	128	151	421	41	60	193
19	18	29	64	76	211	21	60	154
20	18	29	64	76	211	21	60	154

21	18	29	48	57	158	16		30
26	18	29	16	19	53	5		10
27	18	29	64	76	211	21	60	154
28	18	29	64	76	211	21	60	154
29	18	29	64	76	211	21	60	154
30	18	29	64	76	211	21	60	154
31	18	29	64	76	211	21	60	154
32	18	29	64	76	211	21	60	154
33	18	29	64	76	211	21	60	154
34	18	29	226	267	744	73	60	253
35	18	29	172	204	566	56	60	220
36	18	29	56	66	184	18		35
1	19	29	48	57	158	16		30
2	19	29	64	76	211	21		39
3	19	29	64	76	211	21		39
4	19	29	48	57	158	16		30
5	19	29	48	57	158	16		30
6	19	29	8	9	26	3		5
10	19	29	48	57	158	16	60	144
11	19	29	64	76	211	21		39
12	19	29	64	76	211	21		39
13	19	29	64	76	211	21		39
14	19	29	40	47	132	13		25
15	19	29	88	104	290	29	60	168
22	19	29	4	5	13	1		2
23	19	29	32	38	105	10	60	134
24	19	29	64	76	211	21	60	154
25	19	29	64	76	211	21	60	154
26	19	29	64	76	211	21	60	154
27	19	29	48	57	158	16	60	144
34	19	29	128	151	421	41	60	193
35	19	29	127	150	418	41	60	192
36	19	29	129	153	424	42	60	194
6	19	30	56	66	184	18		35
7	19	30	64	76	211	21		39
18	19	30	64	76	211	21	60	154
19	19	30	64	76	211	21	60	154
30	19	30	64	76	211	21	60	154
31	19	30	28	33	92	9		17

2050 County Subtotal[1]:	**29,255**	**34,623**	96,252	9,478	3,837	25,333
2050 NAS Fallon Subtotal:			3,598	460		875
2050 FPST Subtotal:			2,662	165		314
2050 City of Fallon Subtotal[2] :			9,841	970		1,845
2050 TOTAL:			**112,353**	**11,072**	**3,837**	**28,367**

[1] A portion of these subtotals will include the City of Fallon assuming the ratio of city population / overall county population remains at 32%

[2] Per communication w/ Larry White on 2/22/01, he estimated the undeveloped areas within the current 2000 City Limit boundaries could potentially add 20% to the population/demand if fully utilized (I.e. 2000 population = 8201 x 1.20 = 9841)

Column (1) = Computed in Table 6.2.1
Column (2) = Col (1) x 0.695
Column (3) = Col (1) x 1.184
Column (4) = Col (2) x 2.78 persons per household (pph)
Column (5) = Col (3) x 2.78 pph
Column (6) = Col (4) x 270 gpcd x 365 / 1,000,000
Column (7) = 837 MGA distributed evenly at 34 MGA/section throughout 25 sections zoned A-2 or A-3
Column (8) = (Col (6) + Col (7)) x 1.9026
Column (9) = Col (5) x 270 gpcd x 365 / 1,000,000
Column (10) = 3837 MGA distributed throughout 75 sections zoned A-2 or A-3
Column (11) = (Col (9) + Col (10)) x 1.9026

Pipeline Layout: The next step in allocating the demand distribution is to layout the distribution mains throughout the service areas. The intent of this chapter is to develop the design and estimated costs of a conceptual County distribution/transmission system at the master planning level, not to design it to the service line (subdivision) level since there are too many unknown variables at this time to do this. However, a cost estimate is made for the subdivision distribution based upon the number of service connections.

The alignment of the distribution mains were laid out in looped system whenever possible to increase system reliability over a branched system. Generally the mains were laid out on a one-mile grid, except in the very low density areas, along right-of-ways associated with exiting roads/streets, canals or along section lines. The Fallon Urban Area 2020 Transportation Plan was also utilized as it identified the alignment of new roadways where water mains could be routed. In the looped portions of the system, the intersections of the mains are referred to as nodes or junctions which demands can be allocated to. In the branched portion of the system, a junction is assigned approximately every mile except in the low density areas. There are a total of 42 junctions for the 2025 system and 91 junctions for the 2050 system, which includes the nodes within the 2025 system. Refer to Maps 6.1.1 and 6.1.2 for junction locations and pipeline alignment for the 2025 and 2050 systems. In the Water and Wastewater Facilities Plan prepared by Brown & Caldwell (2003), they sized pipelines adjacent to Highway 50 west of Fallon which are too small to be considered transmission lines, however they could be utilized for the subdivision level distribution systems described in Section 6.5. Once the junction locations were established, the demands identified in columns (8) and (11) of Table 6.2.2 for each section within the service areas could be allocated to the junctions. This was done by prorating the sectional demands to the nearest junction including the demands for the City, NAS and FPST. The junction demands are summarized in the WaterCAD® water distribution network model outputs in Appendix 6.0.

6.3 EXISTING SYSTEMS

The City, NAS and FPST each currently have stand alone supply, treatment, storage and distribution systems which lie within the boundaries of the 2025 and 2050 service areas. The design of the proposed Community Water distribution/transmission system will allow each of these entities to be connected and wholesaled water should they choose to do so at some point in the future. If this were to occur, it was assumed that each of these entities would be responsible for the distribution and annual O&M within their respective service areas. Meetings were held with each entity to gather information about their systems. Following is a brief summary of each of their systems.

City of Fallon: The City is currently served by four ground water wells completed in the basalt aquifer having a combined capacity of 2,365 MGA. These wells are located within the current City limits and are connected to a figure-eight high pressure (100 psi) transmission system and two ground level storage tanks located on the top of Rattlesnake Hill having a combined volume of 2.8 million gallons with a high water elevation of 4,180.5 feet. There are no booster pumps on the system. The transmission system primarily consists of sections of 12” ductile iron pipe which are approximately fifteen years old. There are also sections of 12” and 14” concrete pipe nearly thirty years old and 10” steel pipe which is over sixty years old. The transmission system is connected to the distribution system through nine 2” and 8” pressure reducing valves (PRV) in parallel which drop the pressure to 55-60 psi. The distribution system has pipes ranging from 2”-12” consisting of cast iron, concrete, ductile iron and PVC. The age of the pipelines vary from 60 - 70 years old to new. The City is currently in the process of manifolding their four wells to a new arsenic water treatment plant to comply with the new arsenic rule of 10 ppb to serve their needs as well as those of the NAS.

The current demand for the City is 2.0 MGD on an average annual basis and maximum day is approximately 3.9 MGD and based on limited data, the peak hour demand is 1.6 times the daily use. The average annual per capita demand is 270 gpcd. The current

City limits and associated service area are shown on Maps 6.1.1 and 6.1.2. The City has experienced 2 - 3% growth and this trend is anticipated to continue. It is estimated that the undeveloped areas within the current City limits could potentially add 20% to the total demand if fully utilized. If water were wholesaled to the City, the estimated current O&M cost associated with transmission, existing storage, distribution, PRV's, meters and fire hydrants is $800,000 (Larrry White, 2/20/02). This cost inflated at an anticipated growth rate of 3% is $1.6 million in 2025 and $1.8 million for the 2025 – 2050 increment.

Fallon Paiute-Shoshone Tribe: The FPST is currently served from two ground water wells completed in the basalt aquifer having a combined capacity of 368 MGA. These wells are located to the northeast of the City at the foot of Rattlesnake Hill. They serve approximately sixty customers at the Fallon Indian Colony (Colony) located near the wells, 240 customers at the Fallon Indian Reservation (Reservation) located approximately six miles east of Rattlesnake Hill and twenty non-Indian customers. The operating pressures at the Colony are 45-50 psi and 60-65 psi at the Reservation. Their storage facilities consist of a 250,000 gallon ground level storage tank on the west side of Rattlesnake Hill with a high water elevation of 4,084 feet and a 125,000 gallon elevated storage tank on the Reservation with a high water elevation of 4,033 feet. The Reservation and Colony are served by an 8" PVC line which runs from the wells and the 250,000 gallon storage tank. The distribution system within the Reservation consists of pipes ranging from 4-8" with a maximum age of twenty years. There are no booster pumps on the system.

The current demand for the FPST is 0.22 MGD on an average annual basis and the peaking factors are similar to the City. The average annual per capita demand is approximately 170 gpcd and an annual growth rate of 1.5% seemed reasonable (Bill DuBois, 2/01). If water were wholesaled to the FPST, the estimated current O&M cost associated with transmission, existing storage, distribution, PRV's, meters and fire hydrants is $70,000 (George Martinez, 2/13/02). This cost inflated at an anticipated growth rate of 1.5% is $100,000 in 2025 and $45,000 for the 2025 – 2050 increment.

Naval Air Station- Fallon: The NAS is currently served from three ground water wells completed in the basalt aquifer which are located approximately four miles northwest of the station (half mile west of the intersection of Stark Land and Crook Road). These wells are connected to a 1.4 million gallon ground level storage tank on Rattlesnake Hill with a high water elevation of 4,152 feet and the distribution system located on the Station through piping ranging in size from 14-16 inches. The NAS also has two 500,000 gallon ground level storage tanks located on the Station for emergency backup and fire protection. Operating pressures throughout the Station's distribution system are required to be at least 60 psi. There are several booster pumps on the Station consisting of (4) 600 GPM – 50 HP electric pumps; (2) Cummins 1900 GPM – 240 HP diesel or electric pumps; (2) 1900 GPM – 240 HP electric pumps; (1) electric sump pump; and (4) variable speed controllers. There are approximately 213,000 linear feet of distribution piping throughout the Station ranging in size from 1-18 inches with ages varying from 1957 to 1996, when the Rattlesnake Hill tank and associated pipeline was installed. The NAS has recently entered into an agreement whereby the City will be supplying them with water once their new arsenic treatment plant is on line.

The current demand for the NAS is approximately 0.60 MGD on an average annual basis serving approximately 530 connections. The peaking factors are similar to the City and the average annual per capita demand is approximately 350 gpcd. An annual growth rate of 1.5% seemed reasonable for the Station. If water were wholesaled to the NAS, the estimated current O&M cost associated with transmission, existing storage, distribution, PRV's, meters, fire hydrants and pumps is $130,000 (Del Pursel, 2/5/02). This cost inflated at an anticipated growth rate of 3% is $186,000 in 2025 and $84,000 for the 2025 – 2050 increment.

In summary, the total combined existing storage volume for the City, FPST and the NAS is 5.575 million gallons which will be included in the storage requirements under Nevada Administrative Code (NAC) sections 445A.6674 – 445A.6675. The existing pipelines

from the storage facilities on Rattlesnake Hill to the FPST and NAS will be utilized in the design of the Community water distribution/transmission system.

6.4 REGULATORY REQUIREMENTS & DESIGN PARAMETERS

Fire Flow & Pressure Requirements: Fire flows and associated residual pressure requirements are set by the Insurance Services Office (ISO) Grading schedule for Municipal Fire Protection Manual (Insurance Services Office, 1980) and specifications set out by the Churchill County Volunteer Fire Department (Mr. James Allision, Fire Marshall, 1998). The City of Fallon has been recently reclassified from Class 5 to 1, whereby a fire flow of 3,500 gpm is required to be maintained at fire hydrants with a residual pressure of 20 pounds per-square-inch (psi). The remaining rural areas remain in Class 3. Within this class, the Fire Marshall requires 6,000-gallons to control structural fires and hydrants must be placed on one (1) mile spacing and have a delivery capacity of 600 gpm at a 20 psi residual pressure. In the more densely populated areas of one acre or less, a fire hydrant spacing of 500 feet is used. Utilizing these fire hydrant spacing requirements yields a total of 1,160 hydrants for the year 2025 and an additional 805 hydrants for year 2050. For commercial structures and clustered residential developments, a flow capacity at each hydrant must be 600 gpm for a duration of two (2) hours at a 20 psi residual pressure. The minimum nominal pipe size used in the design of the system is 12 inches, excepting the existing 8” PVC line which services the FPST.

The standards for design and construction of a public water system must comply with the provisions of NAC 445A.65505 – 445A.6731 and the Standard Specifications for Public Works Construction. NAC 445A.6672 specifies that the residual pressure in the distribution system be (a) at least 20 psi during conditions of fire flow and fire demand during maximum day demand; (b) at least 30 psi during peak hour demand; and (c) at least 40 psi during maximum day demand. High head losses should also be avoided by maintaining normal water velocities at less than eight (8) feet per second during all conditions of flow other than fire flow. NAC 445A.6711 also specifies that the zones of

pressure of a distribution system must be designed in such a manner that the static pressure at the lowest ground elevation of the zone do not exceed 100 psi. If a zone of pressure may potentially exceed that pressure, the head in the zone must be controlled by the installation of a pressure regulator downstream from the service connection for each user of water in the zone. The system will be designed in such a manner that the static pressures do not exceed 100 psi.

Storage: According to NAC 445A.6674 – 445A.6675, (1999) the design, construction, and operation and maintenance of a new public water system in the State of Nevada must meet the following storage requirements. Given a projected 2025 County population of 53,660 people, with a rate of 2.6 pph, results in 20,638 residential equivalents. A 2050 population of 112,351 results in 43,213 residential equivalents.

Operating Storage: Assuming metered service, 700 gallon per residential equivalent is required. (NAC 445A. 66745)

Year 2025: 20,638 res. equiv. x 700 gal./res.equiv. = 14,446,600 gallons

Year 2050: 43,213 res. equiv. x 700 gal./res.equiv. = 30,249,100 gallons

Emergency Reserve Storage: 0.75 of Operating Storage is required to meet emergency storage. (NAC 445A. 6675)

Year 2025: 14,446,600 gal x 0.75 = 10,834,950 gallons

Year 2050: 30,249,100 gal x 0.75 = 22,686,825 gallons

Fire Flows: 600 gpm for a duration of 2 hours. (Churchill County Fire Marshall)

600 gal/min x 60 min/hr x 2 hr = 72,000 gallons

Total Storage Requirement:

Year 2025: 14,446,600 + 10,834,950 + 72,000 = 25,353,550 gallons

Year 2050: 30,249,100 + 22,686,825 + 72,000 = 53,007,925 gallons

Year 2050 Increment: 53,007,925 - 25,353,550 = 27,654,375 gallons

Additional Storage Requirement: (5.575 million gal. existing, NAS+FPST+City)

Year 2025: 25,353,550 - 5,575,000 = 19,778,550 gallons

Year 2050: 53,007,925 - 5,575,000 = 47,432,925 gallons

Year 2050 Increment: 47,432,925 - 19,778,550 = 27,654,375 gallons

Residential Service Connections: The number of unincorporated County residential service connections, including meters is estimated from year 2025 and 2050 population projections, using 2.78 pph or service connection. For 2025 this calculation yields 11,573 connections (32,174 people / 2.78 pph) and for the year 2050 increment the result is 13,657 connections (70,140 – 32,174 people / 2.78 pph).

Livestock Service Connections: The number of livestock service connections for year 2025 were based upon the current number of farms/ranches prorated based upon the size of the 2025 service area compared to the 2050 service area plus the current number of dairies. This analysis yields approximately 120 stock/dairy service connections for the year 2025. For the 2050 increment, the number of farms/ranches was prorated based upon the size of the service areas plus the projected increase in the number of dairies. The increase in the number of dairies was calculated from Table 4.1.1 livestock demands and individual dairy demands. These calculations resulted in 340 stock/dairy service connections for the year 2050 increment.

Commercial Service Connections: The number of commercial service connections for 2025 and 2050 were based upon the current number of commercial customers within the City and the County and then increased by the ratio of population to businesses to forecast the future (Rex Massey, 1/31/02). These calculations yield 330 commercial connections in 2025 and 360 for the year 2050 increment.

6.5 WaterCAD® NETWORK HYDRAULIC ANALYSIS & SYSTEM DESIGN

Alternative water development Projects, having treatment facilities outside the service area, could be manifolded into the distribution system at a number of points. Projects, having outside service area treatment are: 7.4 Project Lahontan Reservoir Development, 7.5 Project Recharge Storage & Recovery Development, and 7.6 Dixie Valley Ground Water Importation Development. Other Project developments, having individual ground water well sources that meet all of the MCLs and thereby require only wellhead disinfection, may also be manifolded directly into the distribution system. Other Project developments, having inside service area treatment at the load center, located in Section 25, T.19N., R.28E. would manifold finished water into the distribution system at the load center (treatment plant). Those Projects, having inside service area treatment at a central plant would be: 7.1 Historical Ground Water Development, 7.2 Project Conjunctive Surface and Ground Water Development, and 7.3 Project Induction Well Development. For purposes of comparing all alternative water resource projects in the same manner, the distribution/transmission system was designed assuming the source emanates from the load center located in 25, T.19N., R.28E. In reality, the design of the distribution/transmission system will vary somewhat depending upon the source location of the raw water.

Water Distribution Network Models: A computer network hydraulic analysis was performed utilizing WaterCAD® (v.4.5 – Haestad Methods) which is capable of running inside AutoCAD to design and analyze the performance of the distribution/transmission system. A water distribution model is a mathematical description of a real-world system which replicates the dynamics of an existing or proposed system for the purpose of evaluating a system before it is actually built. Water distribution network simulations are used for a variety of purposes such as:

- Long-range master planning, including both new development & rehabilitation
- Fire protection studies
- Water quality investigations

- Energy management
- System design
- Daily operational uses including operator training, emergency response and troubleshooting

The main purpose of constructing the water distribution model was to assist in master planning, fire protection analysis and system design. Simulations can either be steady-state or extended period. Steady-state simulations represent a snapshot in time and are used to determine the operating behavior of a system under static conditions, essentially the long-term behavior of a system once it has achieved equilibrium. Tank and reservoir levels, hydraulic demands, and pump and valve operation remain constant and define the boundary conditions of the simulation. A steady state simulation provides information regarding the equilibrium flows, pressures, and other variables defining the state of the network for a unique set of hydraulic demands and boundary conditions. This type of analysis can be useful to analyze specific worst-case conditions such as peak demand times, fire protection usage, and system component failures in which the effects of time are not particularly significant. The mathematical construct of a steady state can be a very useful tool by enabling designers to predict the response to a unique set of hydraulic conditions. The steady state simulations under a variety of hydraulic demands were utilized in the design of the distribution/transmission system. Extended period simulations (EPS) are used to evaluate system performance over time. This type of analysis allows the user to model tanks filling and draining, regulating valves, opening and closing, and pressure and flow rates changing throughout the system in response to varying demand conditions. This type of simulation is more applicable to troubleshooting/analyzing existing systems or where more detailed data is available beyond the long range master planning level of detail, therefore extended period simulations were not utilized in this modeling and design effort.

In constructing a water distribution model, the user must decide the level of skeletonization to be employed in simulating the pipe network. There are no absolute criteria for determining whether a pipe should be included in the model, but it is safe to

say that all models are most likely skeletonized to some decree. Water distribution networks vary drastically from one system to another and modeling judgment plays a role in the creation of a solution. For a small-diameter system, such as a household plumbing for fire sprinkler system, small differences in estimated flow rate may have perceptible effects on the system head losses. For a large city system, however, the effects of water demanded by an entire subdivision may be insignificant. Therefore, since the scope of this design is on the master planning or regional level, a broader level of skeletonization was employed. Refer to Section 6.2 (Pipeline Layout) for the criteria utilized in the layout of the pipelines.

Once the pipeline layout and corresponding node/junctions were laid out in WaterCAD as detailed in Section 6.2, various data sets were input into the model. The average annual water demands in GPM were input for each junction along with the elevation which was derived from the GIS mapping and interpolation from the 7.5' USGS topographic quad sheets. Initially, nominal pipeline diameters of 12-42" were somewhat arbitrarily selected based upon the surrounding junction demands which would be refined through the model runs. Pipeline lengths were calculated automatically through the AutoCad – WaterCAD graphical user interface which utilized the GIS mapping of the service areas. WaterCAD utilizes the Hazen-Williams expression to calculate head loss which is a function of pipeline length, diameter, flow rate and the Hazen-Williams pipe carrying capacity factor, C. Higher C-factors represent smoother pipes (with higher carrying capacities) and lower C-factors describe rougher pipes. Pursuant to the Uniform Design and Construction Standards for Water Distribution Systems for Clark County, NV, Section 2.03.04, a C-factor of 130 was used in the model for all pipes regardless of diameter. This is somewhat conservative considering that the C-factor for new PVC is 150. The majority of the additional storage required identified in Section 6.4 was modeled as a reservoir located on Rattlesnake Hill with a hydraulic grade elevation of 4,152 feet which coincides with the high water elevation of the NAS 1.4 million gallon tank. In reality this "reservoir" would be ground level storage tank(s), however since all of the simulations were steady state, the tank water levels were assumed to remain constant. Additional regulating elevated storage tanks having capacities of 500,000

gallons each were also employed at the desired locations and hydraulic grades based upon the model runs. For the 2050 system, a four million gallon ground level storage tank located above Hazen at a hydraulic grade of 4,142 feet was included.

Model Runs: Numerous model runs representing various demand scenarios were made to predict a variety of parameters including: hydraulic grade, pressures, residual pressures, direction of flow, pipe discharge, headloss, headloss gradient, velocity and whether each junction/node met the desired fire flow requirements. The three demand scenarios which were evaluated and modeled are as follows:

1. Average annual demand
2. Peak hour demand = 3 X average annual demand
3. Peak day demand + fire flows = 2 X average annual demand + fire flows

Pipe sizes and alignment, storage tank locations and hydraulic grade elevations were adjusted as a result of the various model runs so as to meet the design criteria outlined in Section 6.4. The final output from the model for the 2025 and 2050 systems are shown in Appendix 6.0 and include the following reports:

1. Average annual (Base) steady state junction report
2. Peak hour steady state junction report
3. Peak day fire flow junction report
4. Average annual (Base) steady state pipe report
5. Peak hour steady state pipe report
6. Peak day fire flow pipe report
7. Peak day fire flow analysis report
8. Pipe cost report

The 2025 system includes a total of 42 junctions, 65 pipes, three 500,000 gallon elevated storage tanks, 18.3 million gallons of additional ground level storage located on Rattlesnake Hill, all located within one pressure zone. The 2050 system includes 91

junctions, 146 pipes, four 500,000 gallon elevated storage tanks, 41.4 million gallons of additional ground level storage located in pressure zone 1 on Rattlesnake Hill (Fallon area) and 4 million gallons of ground level storage located in pressure zone 2 (Hazen – Swingle Bench area). The 2050 system also includes a booster pump (3,500 GPM x 100' TDH) station located in the vicinity of the "Y" at the intersection of highway 50 and Alternate 50 to boost the pressures from zone 1 to zone 2. The locations and sizes of these various components are shown on Maps 6.1.1 and 6.1.2 and Appendix 6.0.

Costs: The majority of the cost associated with the distribution system is that associated with the piping. The inch diameter foot (IDF) unit costs for the pipelines shown in Table 7.0.1 were input into the model to calculate the individual pipe costs which are reported in the pipe cost report of Appendix 6.0 for each system. The costs associated with pipeline crossings of rivers, canals, railroads and highways are $30,000, $10,000, $20,000 and $20,000 each respectively, which were also included in the pipe cost report. These crossing costs were adapted from Watersource, 1977 and adjusted per the Engineering News and Review construction cost index. The GIS mapping was utilized to determine the number and type of crossings associated with each pipe in the systems. The costs associated with fittings and controls were assumed to be 5% of the pipeline costs.

In summary, the cost associated with the 2025 service area transmission/distribution system not including storage is $28.1 million and the cost associated with the 2050 system is $64.5 million. Therefore, since the 2050 system includes the 2025 system the incremental cost for the 2050 system is $36.4 million ($64.5 - $28.1 million).

As discussed earlier, the design of a distribution system down to the subdivision level of detail was beyond the scope of work and impractical due to the numerous uncertainties associated the future growth and zoning densities in Churchill County. A rough estimate of the subdivision distribution costs is made to include in the financial planning (Section 8.0) of this report, in particular the annual O&M associated with these systems since upon dedication of the system, the County would be responsible for this cost.

These subdivision level distribution costs were adapted from subdivision development costs prepared by Lumos and Associates where they looked at the various costs associated with 20, 40 and 80 acre developments each with lot sizes of 0.33, 0.50 and one acre in size. The cost associated with the subdivision distribution system was approximately $3,000 per parcel assuming a lot size of one acre. This unit cost was used along with the projected number of residential service connections in the unincorporated County to estimate these costs. For the 2025 system this cost approximates $34.7 million and for the 2050 increment, the cost approximates $41 million.

7. ALTERNATIVE WATER RESOURCES & TREATMENT

Six (6) major water supply and treatment alternatives have been developed and compared from an engineering, environmental, administrative/legal and economic basis. The supply alternatives are: (7.1) Historic Lahontan Ground Water Aquifer Development; (7.2) Conjunctive Use of Surface and Ground Water; (7.3) Delivery of Surface Water by Carson River Induction Wells; (7.4) Surface Water Diversion & Treatment at Lahontan Reservoir; (7.5) Recharge, Storage & Recovery of Surface Water; and (7.6) Dixie-Fairview Area Ground Water Importation. Additionally, a (7.7) "Other" category is also discussed which includes alternatives that at this time, due to economic, environmental and/or administrative and legal reasons, do not appear to be ready for serious consideration.

7.1 Historic Ground Water Development: Under this alternative, it is assumed that the historic ground water recharge (50,000 AFA to 100,000 AFA) contributed by the Newlands Project (Project) conveyance system will not change and/or the ground water may be mined, thereby allowing additional ground water wells to be constructed to divert this recharge and/or stored ground water for the Community Water System. This alternative assumes that the Project's size and diversion amounts will not be reduced significantly by the wetlands wildlife buy out and other Federal actions and/or the decision is made to mine the ground water of the Valley. If the State Engineer is assured that the historical recharge will remain whole and/or alternatively is assured that the County has the ability to develop other replacement water resources, Order No.1116 may be waived or modified such that conditional and temporary permits may be granted to meet Phase I (21,531 AFA) and perhaps Phase II (24,216 AFY) . Under this alternative, it is assumed that no purchase of ground water rights would be required, and that only the permitting costs for making the appropriations for ground water would be considered. Both Phases delineated here include "with" and "without" treatment for arsenic and manganese. Treatment is considered at the wellhead as well as a central treatment plant.

7.2 Project Conjunctive Surface and Ground Water Development: Under this alternative, Project surface water irrigation rights would be purchased or dedicated to the Community Water System and delivered by the Project via canal and lateral by infiltration to the ground water aquifers adjacent to these conveyance structures. Diversion would be made by ground water wells located near or adjacent to the delivering conveyance system and the discharge conveyed to a treatment plant (arsenic & manganese) and thence to the Community distribution system, or directly to the distribution system if treatment for arsenic and manganese is not required. The ground water well diversion would be made over the entire year, while the recharge process would occur during the irrigation period (March 15 - November 15). It is assumed that the State Engineer Order No. 1116 would be modified and/or waviers would be granted to allow conjunctive use of the resource. Treatment on a wellhead basis and for larger central treatment plants is considered.

7.3 Project Induction Well Development: Under this alternative, Project surface water irrigation rights would be purchased or dedicated to the Community Water System and delivered by the Project via release into the Carson River channel below the Carson Dam for infiltration into the ground water near the River. Induction wells constructed near the River would divert the infiltrated surface water for conveyance to a central treatment plant and thence to the distribution system or directly to the distribution system if treatment is not required. Again it is assumed that Order No. 116 would be considered and a waiver would be issued to allow for this type of diversion. Treatment is considered on a wellhead basis and by a central treatment plant.

7.4 Project Lahontan Reservoir Development: Under this alternative, Project surface water irrigation rights would be purchased or dedicated to the Community Water System and diverted from Lahontan Reservoir, treated at a central plant located near the Reservoir and thence conveyed to the distribution system. Treatment would be by conventional means, consisting of chemical treatment, flocculation, sedimentation, filtration, and disinfection.

7.5 Project Recharge, Storage & Recovery Development: Under this alternative, Project surface irrigation rights would be purchased or dedicated to the Community Water System for diversion from Lahontan Reservoir and recharged into the Lahontan alluvial fan by contour basins. The stored surface water in the ground water aquifers would subsequently be recovered by ground water wells manifolded to the distribution system. Consideration must be given to permitting of the recovery wells in respect to existing State Engineer rulings and orders (e.g. Order 1116). No treatment, excepting disinfection at the wellhead, is anticipated under this alternative.

7.6 Dixie Valley Ground Water Importation Development: This alternative proposes that ground water pumped within Dixie Valley would be conveyed by pipeline to the Community Water System in Lahontan Valley. The County currently holds about 56,500 AF of ground water applications from this Valley that are in good standing with the State Engineer's Office. The Navy also holds about 14,000 AF of permits and certificates of ground water rights in this Valley that may be available for augmenting the Community Water System. A hydrologic study to further document the annual ground water inflow and outflow (discharge), which may include development of a pilot well field would be undertaken to further evaluate the Valley's annual recharge and discharge capabilities. This information will be required to assure the State Engineer that the annual perennial yield of the Valley is greater than is now administratively recognized.

7.7 Other: Other alternatives including the commingling of the Basalt Aquifer with surface water for peaking purposes, developing the Basalt Aquifer as a sole source, importing Upper Carson River water, and recharging the Basalt Aquifer with surface water are considered in this section.

Common Basis of Comparison: For purposes of comparison, all alternatives are designed to deliver water to a common load center. The location of the common load center has preliminarily been chosen to be located along the S Line Canal within the NW 1/4 of Section 25, T. 19N, R. 28E, M.D.B.&M. For alternatives requiring treatment for arsenic and manganese, this load center was also chosen as the location for a

central treatment plant. The design operating pressure at this load center is such that it would allow integration with the existing Navy, Tribal and City storage structures located on Rattlesnake Hill, should the Community Water System be integrated with these existing facilities. Capital costs include surface water diversion structures, recharge basins, ground water wells, treatment plants, pumping stations, conveyance structures, power line and other improvements associated with the alternative projects. Operation and maintenance (O&M) costs include those associated with the capital improvements and power costs for operating these facilities. Land, water right and permitting costs are also included. See Table 7.0.1 showing the facilities (improvements) and services and the associated O&M costs as well as the source of reference for these estimates.

TABLE 7.0.1 WATER SUPPLY PROJECT COST ESTIMATING CRITERIA

ITEM	FACILITIES DESCRIPTION	UNITS	UNIT CAPITAL COSTS	ANNUAL O&M COSTS
1	Lahontan Diversion Works	LS	$2,000,000	5% x capital costs
2	6-10" Ductile Iron Pipelines	IDF	$3.50	1% x capital costs
3	12-18" Ductile Iron Pipelines	IDF	$4.30	1% x capital costs
4	24-30" Ductile Iron Pipelines	IDF	$5.00	1% x capital costs
5	36-42" Ductile Iron Pipelines	IDF	$5.50	1% x capital costs
6	Pipeline Controls & Fittings	%	5% x pipe capital	10% x capital costs
7	Production Wells (16" x 400')	EA	$200,000	5% x capital costs
8	Production Wells (12" x 200')	EA	$100,000	5% x capital costs
9	Observation Wells (4" x 200')	EA	$2,000	5% x capital costs
10	Well Head Disinfection (<500 gpm)	EA	$15,000	33% x capital costs
11	Well Head Disinfection (>500 gpm)	EA	$30,000	33% x capital costs
12	Production Well Turbine & Driver	EHP	$300	5% x capital costs
13	Booster Pump & Driver	EHP	$400	5% x capital costs
14	Three Phase Power w/I Project	MI	$75,000	1% x capital costs
15	Three Phase Power- Rural	MI	$60,000	1% x capital costs
16	Energy Cost	KWh	n/a	0.06 x KWh
17	Lahontan Valley Groundwater Well Head Treatment for Manganese Removal (1000 gpm)	EA	$1,129,000	$145,000
18	Lahontan Valley Groundwater Well Head Treatment for Arsenic Removal (1000 gpm)	EA	$1,133,000	$200,000
19	Lahontan Valley Groundwater Well Head Treatment for Arsenic & Manganese Removal (1000 gpm)	EA	$1,133,000	$200,000
20	Lahontan Valley Groundwater Treatment for Arsenic & Manganese Removal w/ centralized 40 MGD Treatment Plant	LS	$37,376,000	$4,115,000
21	40 MGD Surface Water Treatment Plant	LS	$42,981,000	$2,789,000
22	Dixie Valley Groundwater Treatment for Fluoride & Arsenic Removal w/ centralized 40 MGD Treatment Plant	LS	$28,212,000	$1,937,000

23	Storage Tanks	GAL	0.23	10% x capital costs
24	Fire Hydrants	EA	$1,500	5% x capital costs
25	Service Connection & Meter	EA	$1,000	10% x capital costs
26	Service Area Transmission System	LS	$28,090,000	5% x capital costs
27	Groundwater Modeling	MI	$7,100	10% x capital costs
28	Recharge Basins (0-5% Slope)	AC	$5,000	10% x capital costs
29	Recharge Basins (5-9% Slope)	AC	$15,000	10% x capital costs
30	Environmental & Permitting	%	10% x capital costs	
31	Engineering & Planning	%	10% x capital costs	
32	Contingency	%	20% x capital costs	
33	Land Purchase (waterrighted)	AC	$2,500	
34	Land Purchase (non-waterrighted)	AC	$300	
35	Project Surface Water Rights	AF	$1,000	
36	Water Right Applications	EA	$1,250	
37	Water Right Permits	AF	$2.00	

1. Intake inlet structure constructed adjacent to existing TCID inlet structure with multiple inlets at four depths and multiple high discharge/low head, open impeller pumps. Preliminary design and cost based upon BOR communication in Sacramento & U.S. Bureau of Reclamation Cost Estimating Handbook. O & M costs estimated at 5% of capital costs.

2-5. Cost of ductile iron with “Tyton” couplers and installation. Graduated costs in terms of inch diameter foot (IDF). Reference: Montgomery Watson, Sierra Pacific Power Co. (SPPCo.), R-Supply Company, Quillici Construction Co., and WRD construction experience.

6. Pipeline controls and fitting capital cost assumed to approximate 5% of pipeline materials and installation capital cost. Annual O & M costs estimated at 10% of the capital cost of the controls and fittings. Ref. WRD construction experience.

7. Production well: 16’’ nominal diameter casing & screen, gravel enveloped by 400’ deep, 26” conductor x 100’ & sanitary seal and water depth access and enclosure for discharge works. Includes transformers & service drop to pump panel. Reference: Sargent/Humboldt Drilling companies, SPPCo. & WRD experience.

8. Production well: 12” nominal diameter casing & screen, gravel enveloped by 200’ deep, 20” conductor x 100’ sanitary seal and water depth access and enclosure for discharge works. Includes transformer and service drop to pump panel. Reference: Sargent/Humboldt Drilling companies, SPPCo. & WRD experience.

9. Observation well: 4” nominal diameter x 200’ deep. Reference: Andreason, Nevada Drilling Companies & WRD experience.

10-11. Well head chlorination with chlorine gas. $15,000/well for 0 to 500 gpm and $30,000 for 500 - 3,000 gpm. O & M costs including cost of materials (chlorine gas) is estimated at 33% x capital cost. Reference: Sierra Chemical & SPPCo..

12. Line shaft deep turbine well pump, motor driver and enclosure. Cost for equipment/materials and installation is estimated at $300/EHP. Overall pumping plant efficiency assumed at 65%. Reference:

Carson Pump Company pump & motor driver costs adjusted as per the Construction Cost Index (CCI) and pump & materials ratio to installation & enclosure costs assumed to be 2/5 and 3/5, respectively.

13. Inline booster pump station equipped with either centrifugal or short coupled turbine pumps, motor driver and enclosure. Cost for equipment/materials and installation is estimated at $400/EHP. Overall pumping plant efficiency assumed at 55%. Reference: Mitchell, Lewis & Staver Co. pump & motor driver costs adjusted per the (CCI) as published by the Engineering News Record. Pump & materials ratio to installation & enclosure costs assumed to 2/5 and 3/5, respectively.

14-15. Cost (materials & construction) for extension and/or upgrade to 34.5 KV power line to serve three phase, 220/440volt demand to pumping stations and/or treatment plants. The higher cost of $75,000 per mile applies to easements within the Truckee-Carson Irrigation District and controlled by U.S. Bureau of Reclamation right-of-way permitting. The lower cost of $60,000 per mile applies to easements either within the Nevada Department of Transportation (NDOT) right of ways, Bureau of Land Management lands , and Navy military reservation areas. Reference: SPPCo. Customer Service Engineering in Fallon & Reno.

16. Power cost at SPPCo.'s Electric Rate Schedule GS-3 for "Large General Service" at a weighted mean rate of $0.06/KWh. The weighted mean includes the per month per meter and demand costs as well as the energy charges per KWh. Reference: SPPCo., Fallon Office.

17. Well head treatment of Lahontan Valley ground water at 1000 gpm discharge for removal of manganese. Treatment method is by an adsorption and filtration process using a proprietary green sand media. Reference: Nolte Engineering

18. Well head treatment of Lahontan Valley ground water at 1000 gpm discharge for removal of arsenic. Treatment method is by a modified coagulation/filtration (MCF) process. Reference: Nolte Engineering.

19. Well head treatment of Lahontan Valley ground water at 1000 gpm discharge for removal of arsenic and manganese. Treatment is achieved by the MCF process. Reference: Nolte Engineering.

20. Central Plant treatment of Lahontan Valley ground water at 40 MGD discharge for removal of arsenic and manganese. Reference: Nolte Engineering.

21. Lahontan Surface Water Treatment Plant at 40 MGD discharge for meeting all MCLs. Reference: Nolte Engineering & WRD.

22. Central treatment plant of Dixie Valley ground water at 40 MGD for the removal of fluoride and arsenic. Reference: Nolte Engineering.

23. Steel bolted storage tank above ground, cost based upon 7 million gallon capacity per tank. Reference: Columbian & Pittsburg Tank Companies.

24. 6" x (2) 2.5" outlets & (1) 4.5" steamer with a 5" "Storz" quick coupling fire hydrant. Reference: Specification by James Allision, Fire Marshall and costs by R-Supply Company.

25. Average service connections, including meter for 3/4 and 1 inch service, materials & installation. Reference: R-Supply Company & Western Nevada Supply Company.

26. Service Area Transmission System: see cost estimates developed in Chapter 6.

27. Ground water modeling (Unit Response Function) documenting ground water wells (induction wells or conjunctive use wells) influence upon adjacent river channel or irrigation canal. Cost of modeling based upon length of reach of adjacent river channel or canal. Reference: Durbin & Associates.

28-29. Recharge Basins constructed on the contour on varying slopes (0 to 9%) for purposes of recharging surface water into ground water storage. Cost based upon amount of cut and fill and associated control structures. Reference: WRD and A&K Construction Company.

30. Estimated cost of environmental and permitting is assumed to be 10% of the Plant Capital Cost Sub Total. Reference: WRD experience.

31. Estimated cost of engineering and planning is assumed to be 10% of the Plant Capital Cost Sub Total. Reference: WRD experience.

32. Contingency cost to cover cost under-estimation and/or construction changes upon final and specification of the Project. Reference: WRD experience.

33-34. Land easements based upon purchase price for pipelines, power lines, treatment facilities, pumping plants etc. Reference: Western Farm and Ranch Service 1995 Appraisal.

35. Irrigation Project (Truckee Carson Irrigation District) surface water right estimated value at $1,000 per acre foot and based upon the duty (3.5 or 4.5 acre foot/acre). Reference: WRD estimation based upon the following supporting documentation:

Truckee Carson Leasing Authority (TCLA), 1995, have agreements from Sierra Pacific Power Co and the City of Sparks to lease irrigation rights for respectively, $212 and $220 per acre foot per year. (TCLA, 1995) The indicated value of these water rights derived by capitalizing the net return at 10% return on investment is $2,125 and $2,200 per acre foot, respectively.

Vincent J. Asta, MAI, 1992 appraised surface water rights on the lower Carson River on the Ghiglia Ranch at $1400 per acre foot. (Asta, 1992)

Western Farm & Ranch Service (G.W. Reno), 1998 reports that water rights on the Farm District Road have sold from $889 to $1111 per acre foot. (Personal communication with J.W. Reno)

Truckee Carson Irrigation District (1998). The TCID, in 1998, has placed a value on Donner Lake storage rights at $2500 per acre foot. (Personal communication with Lyman McConnell, 1998)

36. State Engineer cost is $250/application and assumed cost of water right survey & filing at $1,000/survey assuming they were done in bulk. Reference: State Engineer & WRD experience.

37. State Engineer permit fees. Reference: State Engineer.

For budgeting purposes, each alternative also includes a transmission system (conveyance, service connections, fire hydrants, storage etc.) that was designed at a master planning level and is shown in Chapter 6. This transmission system provides the conveyance manifold-system and associated fixtures and pumping-plants required to provide water service generally within the boundaries of the Newlands Project.

Hydraulic Design: The hydraulic demand of the system is based upon Phase I, a 25 Year Plan and Phase II, a 50 Year Plan. Phase I is based upon the water demand for the 25 year quasi-municipal and livestock demand in year 2025 of 21,531 AFA. Phase II is based upon the quasi-municipal and livestock demand in year 2050 of 45,747 AFA. See Table 4.1.1 showing the quasi-municipal and livestock projections from 1998 to

2050. The plant improvements and associated costs of Phase Phase II and I are considered independently and are additive such that Phase I meets the 2000-2025 year demand while Phase II meets the 2025-2050 demand.

Phase I (25 Year Plan) average demand is estimated at 13,350 gallons per minute (gpm). Under peak-day demand, the peak-rate is assumed to be 26,700 gpm or twice the average demand. For hydraulic design purposes, the peak-day demand of **26,700 gpm** is used. In terms of peak-demand per-day, this peak-rate approximates 38.5 million gallons per day (MGD). For treatment plant design purposes, a **40 MGD** plant size is assumed.

Phase II (50 Year Plan) average demand is estimated at 15,015 gpm. Under peak-day-demand, the peak-rate is assumed to be 30,030 gpm or twice the average demand. For hydraulic design purposes, the peak-day demand of **30,030 gpm** is used. In terms of peak-demand per-day, the peak-rate approximates 43.2 MGD. For treatment plant design purposes a **43 MGD** plant size is assumed.

7.1 HISTORIC GROUND WATER DEVELOPMENT

Water Resource Quantity & Quality: Under the historic operation and management of the Newlands Project (Project), the annual recharge from the Project to the ground water aquifers is estimated to vary from 50,000 AFA to 100,000 AFA. This project alternative assumes that the Project will be operated in such a manner as to sustain the historical recharge rate to the ground water aquifers. In order to sustain this historical recharge, the numerous actions taken by the Departments of Interior and Justice must be terminated and/or mitigated including the proposed buy-out of a major portion of the Project for wetlands and wildlife purposes. Alternatively, this alternative may be followed, recognizing that the historic recharge may be significantly reduced due to Federal actions, thereby allowing the mining of the non-renewable ground water resource.

Projected primary areas of quasi-municipal development are assumed to progress to the west of the City of Fallon, paralleling U.S. Hwy 50 toward the "Y" intersection of U.S. Hwy 50 and U.S. Hwy 50 Alternate, thence south to Sheckler Road, north in the vicinity of Rice Road and east about a mile east of the City limits. The proposed well-field for Phase I and II of this Proposed Project is aligned along the Carson River channel and the S-Line Canal and bounded generally on the north by Rice Road, the east by Rattlesnake Hill, the south by Sheckler Road and the west by the Sheckler Cutoff Road. This type of development would result in the development of ground water near the greatest demand areas for quasi-municipal and industrial development. Water from the well-field would be manifolded to a Community distribution system for distribution to rural and other quasi-municipal users within the Community Water System service area. Under this alternative, a portion of the rural domestic water users, with private wells that meet public health standards, would probably continue to divert ground water from the shallow and/or intermediate aquifers as historically practiced. Since water levels in the shallow and intermediate aquifers are expected to drop as a result of the numerous federal actions and the widespread quasi-municipal pumping, some of these private domestic wells may dry up.

Ground water quality, meeting public health standards, occurs primarily in the western portion of Lahontan Valley where recharge from Project irrigation (conveyance system seepage) and the Carson River occurs. Poorer ground water quality, on the other hand, occurs in areas of discharge in the eastern portion of the Valley and deteriorates down gradient toward the Carson Pasture and the Stillwater Wildlife Management Area.

Ground water studies were conducted in Lahontan Valley (Glancy, 1981; Maurer, 1994; Lico, 1994 & WRD, 1998) along the western portion of the Valley. Areas adjacent to the Carson River channel and associated "buried meander channels" that are located along the upper reaches of the North Branch and the South Branch of the Carson River, appear to be the most productive and exhibit water quality that meets most of the maximum contaminate levels (MCLs) as set for public water systems. Since the MCLs for manganese and/or arsenic may be exceeded in some areas of this proposed well

development area, wellhead treatment for manganese and arsenic is an option that is considered.

Environmental & Permitting: Projected environmental and permitting expenditures for gaining easements for power line extensions & upgrades and conveyance structures through the Project, many regulated by the BOR, are expected to be substantial and are estimated to approach 25% of the capital cost of improvements (SPPCo, 1999). Power line extensions and/or upgrades to service three phase 220/440-volt ground water wells would be served from the main "backbone" of SPPCo's system, located along Rice Road, U.S. Hwy 50, Sheckler Road, Sheckler Cutoff and U.S. Hwy 95. Ground water permits, assuming that the State Engineer rescinds Order No. 1116, should not represent any significant permitting problems, assuming the Project's diversion for irrigation and areas of irrigation are not significantly reduced. On the other hand, the decision may be made to go ahead and allow further development of the ground water by mining the ground water, in light that the Federal actions will proceed and diminish the ground water resource. Assuming the County can develop alternative water resources, the State Engineer may grant conditional or temporary permits to develop this diminishing ground water supply, and thereby allow continued growth in the County.

Project Description: Phase I of the Project is proposed to develop 21,531 AF of ground water per year meeting a peak-day-demand at a flow rate of 26,700 gpm. The proposed well field includes 27-wells located immediately to the north and west of the City, where conceptually four (4) wells would be located in each section and separated by one half-mile (0.5 mile) intervals. The maximum pumping capacity, or production of each well, is assumed to be 1,000 gpm. See Map 7.1 for proposed location of these wells. Phase II of the Project is proposed to develop an additional 24,216 AFA at a peak-day-demand of 30,030 gpm. Under Phase II, an additional 30-wells are proposed at 1000 gpm per well to be sited generally to the west of Phase I wells. Well spacing and concentration is assumed to be the same as for Phase I.

Ground Water Wells: The proposed ground water wells are designed to be 500' deep by 12" to 16" diameter gravel enveloped structures with 100 foot sanitary seal and equipped with well disinfection facilities. If the MCLs for manganese and/or arsenic are exceeded, the wells will be equipped with a wellhead treatment facility. The deep turbine or submersible well pumping-plant horsepower is based upon an average pumping lift of 100', a total dynamic head (TDH) of 377', and a pumping plant efficiency of 65%. Average electrical horsepower demand per well will approximate 146 HP.

Power: Power line extension and/or upgrades (replacement of conductors etc.) to serve individual wells with three-phase 220/440-volt service from the main feeder power lines having higher voltage (60,000 to 12,500 volts), are included and based upon a cost per mile. The cost of the service drop and transformers for each well is included in the cost of the ground water well construction. See Table 7.0.1 for explanation of charges.

Transmission System: For purposes of manifolding the ground water wells together and to serve outlying rural areas within the County, a transmission system (conveyance, pumping plants, storage, fire hydrants & service connections) is included. See Chapter 6 for details.

Treatment Plant: The design of the well treatment for manganese and arsenic is based upon a design and specification as developed by Nolte, (2003). See Section 5.0 and Appendix 5.3. Two alternative treatment plant sizes are considered. The first alternative is the 1,000 gpm well head treatment for these constituents. The estimated capital and annual O&M costs are shown in Table 7.1.1. The second alternative includes the treatment at a single 40 MGD plant located centrally within the well field. The second alternative requires additional facilities for the conveyance of the discharge from each well to a central treatment plant. From a central treatment plant, the treated water would be discharged into the distribution system. Capital and O&M costs for the second alternative are shown in Table 7.1.2 for Phase I (40 MGD) and for Phase II (43 MGD) in Table 7.1.3.

TABLE 7.1.1 HISTORIC LAHONTAN VALLEY GROUND WATER DEVELOPMENT PROJECT CAPITAL & O&M COST FOR PHASE I, YEAR 2025 (21,531 AFA)

ITEM[1]	DESCRIPTION	UNIT COST	UNIT	QUANTITY	CAPITAL COSTS[2] $x1,000,000	ANNUAL O&M COSTS[3] $x1000
1	Production Wells	$200,000	EA	27	$5.40	$270.00
2	Well Head Disinfection	$30,000	EA	27	$0.81	$267.30
3	Production Well Turbine	$300	HP	3,942	$1.18	$59.13
4	Three-Phase Power Extension	$75,000	MI	14	$1.05	$10.50
5	Power Consumption	$0.06	KWh	12,772,080		$766.32
6	Ground Level Storage	$0.23	GAL	18,278,550	$4.20	$420.41
7	Elevated Storage	$2.00	GAL	1,500,000	$3.00	$300.00
8	Service Area Transmission System	$28,090,000	LS	1	$28.09	$1,404.50
9	Manganese & Arsenic Treatment	$1,133,000	EA	27	$30.59	$5,400.00
10	**Capital Subtotal:**				**$43.74**	
10a	**Capital Subtotal:**				**$73.52**	
11	Subdivision Distribution[4]	$3,000	CON	11,573	$34.72	$1,735.95
12	Residential Service & Meter[4]	$1,000	EA	11,573	$11.57	$1,157.30
13	Commercial Service & Meter[4]	$1,000	EA	330	$0.33	$33.00
14	Stock/Dairy Service & Meter[4]	$4,000	EA	120	$0.48	$48.00
15	Fire Hydrants[4]	$1,500	EA	1,160	$1.74	$87.00
16	Fallon Distribution O&M[5]					$1,618.10
17	FPST Distribution O&M[5]					$100.07
18	NAS Distribution O&M[5]					$185.84
19	Environmental & Permitting	Capital x 10%	%		$4.37	
19a	Environmental & Permitting	Capital x 10%	%		$7.35	
20	Engineering & Planning	Capital x 10%	%		$4.37	
20a	Engineering & Planning	Capital x 10%	%		$7.35	
21	Contingency	Capital x 20%	%		$8.75	
21a	Contingency	Capital x 20%	%		$14.70	
22	**Subtotal:**				**$61.23**	**$8,463.42**
22a	**Subtotal:**				**$102.92**	**$13,596.12**
23	Irrigated Land	$2,500	AC	120	$0.30	
24	Water Right Applic. & Survey	$1,250	APP	27	$0.03	
25	Water Right Permit	$2	AF	21,531	$0.04	
26	**TOTAL:**				**$61.61**	**$8,463.42**
26a	**TOTAL:**				**$103.30**	**$13,596.12**

[1] Item numbers which include a subletter include well head treatment for manganese and arsenic and those without subletters is without well head treatment for these constituents

[2] 2001 capital costs in millions of dollars

[3] 2001 O&M costs in thousands of dollars per year

[4] Assume developer will pay capital cost, therefore not included in capital subtotals. Upon dedication the water purveyor will pay the annual O&M

[5] Estimated O&M for transmission, distribution, commercial & residential services, hydrants & existing storage

TABLE 7.1.2 HISTORIC LAHONTAN VALLEY GROUND WATER DEVELOPMENT PROJECT CAPITAL & O&M COST FOR PHASE I, YEAR 2025 (21,531 AFA) WITH CENTRALIZED 40 MGD ARSENIC & MANGANESE TREATMENT PLANT

ITEM	DESCRIPTION	UNIT COST	UNIT	QUANTITY	CAPITAL COSTS[1] $x1,000,000	ANNUAL O&M COSTS[2] $x1000
1	Production Wells	$200,000	EA	27	$5.40	$270.00
2	Production Well Turbine	$300	HP	3,942	$1.18	$59.13
3	Three-Phase Power Extension	$75,000	MI	14	$1.05	$10.50
4	Power Consumption	$0.06	KWh	12,772,080		$766.32
5	10" Pipeline	$3.50	IDF	23,760	$0.83	$8.32
6	12" Pipeline	$4.30	IDF	21,120	$1.09	$10.90
7	18" Pipeline	$4.30	IDF	10,560	$0.82	$8.17
8	24" Pipeline	$5.00	IDF	5,280	$0.63	$6.34
9	30" Pipeline	$5.00	IDF	10,560	$1.58	$15.84
10	Controls & Fittings	Pipe Capital x 5%	%		$0.25	$24.78
11	Ground Level Storage	$0.23	GAL	18,278,550	$4.20	$420.41
12	Elevated Storage	$2.00	GAL	1,500,000	$3.00	$300.00
13	Service Area Transmission System	$28,090,000	LS	1	$28.09	$1,404.50
14	40 MGD Manganese & Arsenic Treatment Plant	$37,376,000	LS	1	$37.38	$4,115.00
15	**Capital Subtotal:**				**$85.51**	
16	Subdivision Distribution[3]	$3,000	CON	11,573	$34.72	$1,735.95
17	Residential Service & Meter[3]	$1,000	EA	11,573	$11.57	$1,157.30
18	Commercial Service & Meter[3]	$1,000	EA	330	$0.33	$33.00
19	Stock/Dairy Service & Meter[3]	$4,000	EA	120	$0.48	$48.00
20	Fire Hydrants[3]	$1,500	EA	1,160	$1.74	$87.00
21	Fallon Distribution O&M[4]					$1,618.10
22	FPST Distribution O&M[4]					$100.07
23	NAS Distribution O&M[4]					$185.84
24	Environmental & Permitting	Capital x 10%	%		$8.55	
25	Engineering & Planning	Capital x 10%	%		$8.55	
26	Contingency	Capital x 20%	%		$17.10	
27	**Subtotal:**				**$119.71**	**$12,385.47**
28	Irrigated Land	$2,500	AC	120	$0.30	
29	Water Right Applic. & Survey	$1,250	APP	27	$0.03	
30	Water Right Permit	$2	AF	21,531	$0.04	
31	**TOTAL:**				**$120.09**	**$12,385.47**

[1] 2001 capital costs in millions of dollars

[2] 2001 O&M costs in thousands of dollars per year

[3] Assume developer will pay capital cost, therefore not included in capital subtotals. Upon dedication the water purveyor will pay the annual O&M

[4] Estimated O&M for transmission, distribution, commercial & residential services, hydrants & existing storage

TABLE 7.1.3 HISTORIC LAHONTAN VALLEY GROUND WATER DEVELOPMENT PROJECT CAPITAL & O&M COST FOR PHASE II, YEAR 2050 (24,216 AFA) WITH CENTRALIZED 43 MGD ARSENIC & MANGANESE TREATMENT PLANT

ITEM	DESCRIPTION	UNIT COST	UNIT	QUANTITY	CAPITAL COSTS[1]	ANNUAL O&M COSTS[2]
					$x1,000,000	$x1000
1	Production Wells	$200,000	EA	30	$6.00	$300.00
2	Production Well Turbine	$300	HP	4,380	$1.31	$65.70
3	Three-Phase Power Extension	$75,000	MI	15	$1.13	$11.25
4	Power Consumption	$0.06	KWh	14,371,466		$862.29
5	10" Pipeline	$3.50	IDF	21,120	$0.74	$7.39
6	12" Pipeline	$4.30	IDF	18,480	$0.95	$9.54
7	18" Pipeline	$4.30	IDF	21,120	$1.63	$16.35
8	24" Pipeline	$5.00	IDF	10,560	$1.27	$12.67
9	30" Pipeline	$5.00	IDF	2,640	$0.40	$3.96
10	42" Pipeline	$5.50	IDF	2,640	$0.61	
11	Controls & Fittings	Pipe Capital x 5%	%		$0.28	$28.00
12	Ground Level Storage	$0.23	GAL	27,154,375	$6.25	$624.55
13	Elevated Storage	$2.00	GAL	500,000	$1.00	$100.00
14	Service Area Transmission System	$36,464,000	LS	1	$36.46	$1,823.20
15	43 MGD Manganese & Arsenic Treatment Plant	$40,179,000	LS	1	$40.18	$4,423.63
16	**Capital Subtotal:**				**$98.21**	
17	Subdivision Distribution[3]	$3,000	CON	13,657	$40.97	$2,048.55
18	Residential Service & Meter[3]	$1,000	EA	13,657	$13.66	$1,365.70
19	Commercial Service & Meter[3]	$1,000	EA	360	$0.36	$36.00
20	Stock/Dairy Service & Meter[3]	$4,000	EA	340	$1.36	$136.00
21	Fire Hydrants[3]	$1,500	EA	805	$1.21	$60.38
22	Fallon Distribution O&M[4]					$1,769.85
23	FPST Distribution O&M[4]					$45.12
24	NAS Distribution O&M[4]					$83.80
25	Environmental & Permitting	Capital x 10%	%		$9.82	
26	Engineering & Planning	Capital x 10%	%		$9.82	
27	Contingency	Capital x 20%	%		$19.64	
28	**Subtotal:**				**$137.49**	**$13,833.92**

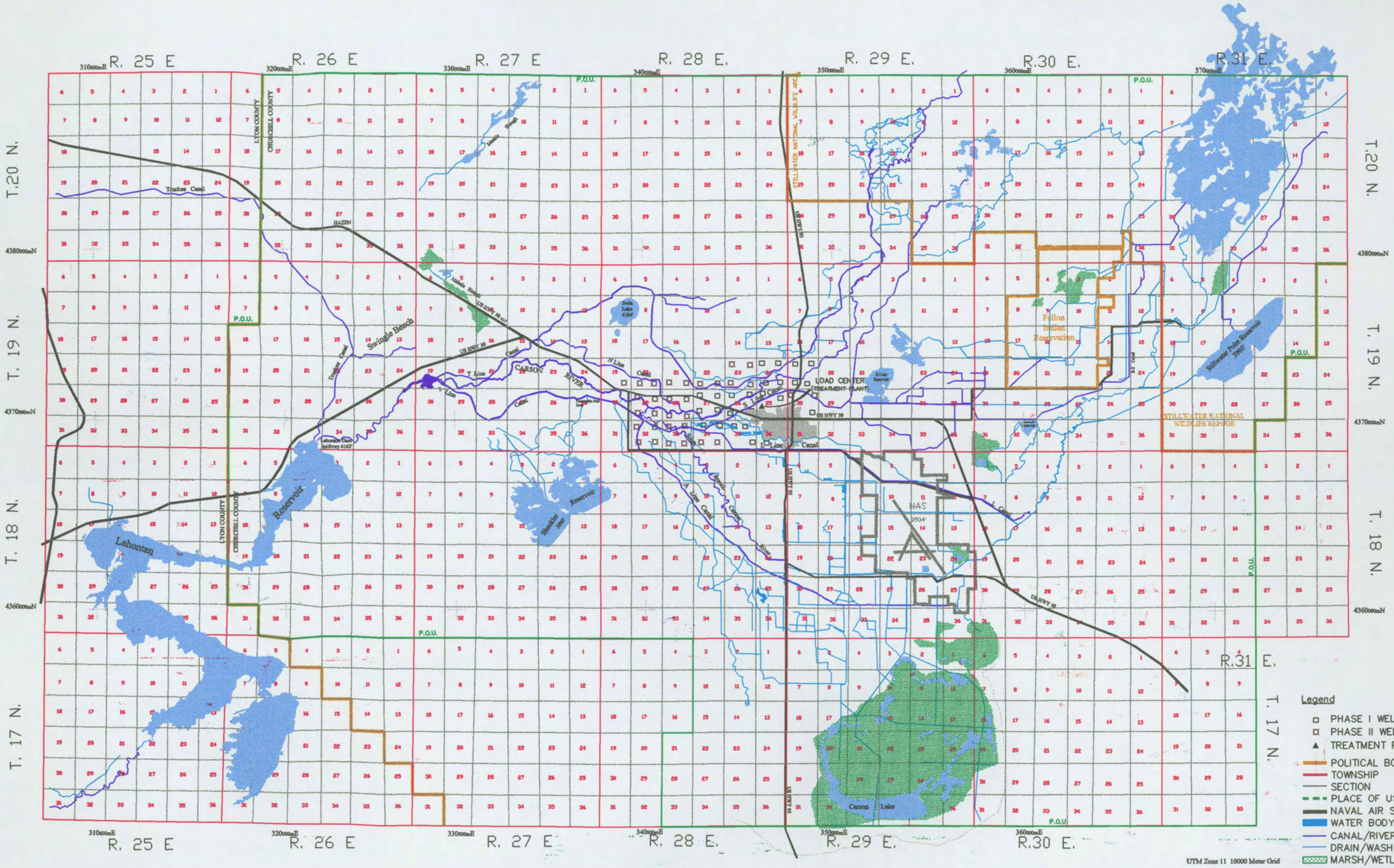
29	Irrigated Land	$2,500	AC	120	$0.30	
30	Water Right Applic. & Survey	$1,250	APP	30	$0.04	
31	Water Right Permit	$2	AF	24,216	$0.05	
32	**TOTAL:**				**$137.88**	**$13,833.92**

[1] 2001 capital costs in millions of dollars

[2] 2001 O&M costs in thousands of dollars per year

[3] Assume developer will pay capital cost, therefore not included in capital subtotals. Upon dedication the water purveyor will pay the annual O&M

[4] Estimated O&M for transmission, distribution, commercial & residential services, hydrants & existing storage



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CHECKED CNM

WRD WATER RESEARCH & DEVELOPMENT, INC.
P.O. BOX 9086 * RENO, NV 89507-9086 * (775) 747-1100
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T.17–20N, R.25–31E, M.D.B.&M.

7.1 CHURCHILL COUNTY WATER PLAN
HISTORIC LAHONTAN VALLEY
GROUND WATER DEVELOPMENT

FILE NAME Fig_7-1.dwg
JOB NO. 99-67D
DATE January 5, 2000
SHEET 1 OF 1

7.2 PROJECT CONJUNCTIVE SURFACE AND GROUND WATER DEVELOPMENT

Water Resource Quantity & Quality: According to the "Newlands Project Efficiency Study" (USDI,1994) conducted by the U.S. Bureau of Reclamation (BOR) in 1993, the highest seepage rates of the Project's canal system were measured on the upper or west side of the Project where the soils are the coarsest and ground water gradient is downward. The seepage rates are much lower on the eastern or lower portion of the Project where the ground water gradient is upwards and the soils are finer grained. Based upon limited ponding studies, conducted by the BOR in 1993 from April through June, Project losses over this relatively short period of time were estimated at 61,000 AF, while seepage losses for selected canal sections (portions of the V, A, L, L-1,T, and S canals) over this same period of time were approximated at 37,000 AF. Other seepage data reported earlier by the BOR in 1989, indicated that the seasonal or annual seepage rate for the Carson Division of the Project was on the order of 79,000 AF. Since the ponding tests were conducted in early 1993, following a six-year drought, the BOR recognizes that these measured rates should be reduced about 40% to reflect the seepage rates experienced during a series of normal or above normal water supply years. The seepage rates for the entire length of the V-Line, the S-Line from the head works at the V-Line to the S-Line Reservoir, the A-line from the head works at the V-Line to A-17, and the L-line from the head works to its terminus at the sixth and final check structure, were estimated to be about 61,000 AF as based upon the 1993 ponding measurements, while the more conservative estimate of seepage is about 40% of this amount or about 23,000 AF. Since the actual amount of seepage occurring from these upper canals is somewhat uncertain at this time, the lower estimate (23,000 AFA) is chosen for purposes of meeting Phase I demand of 21,531 AFA for the County Wide Water System. Phase II may be considered at a later time, based upon the performance of Phase I.

Under Phase I, it is proposed to construct a series of ground water production wells along these major conveyance structures (canals) to intercept the seepage for meeting the quasi-municipal demand of the County Wide Water System. Project surface

irrigation water rights would be acquired by purchase or dedication and an application filed for a change in the manner of use of this water from irrigation to quasi-municipal use. A recharge, storage and recovery permit may also be required by the State Engineer to administer the use of these waters conjunctively.

The water quality of the water seeping from the canal system, if intercepted in a relatively short period of time and within a short distance from the canal source, may meet public water supply standards. On the other hand, depending upon the length of the seepage-water flow-path and transmissibility of the aquifer materials, affecting the residence time that the seepage-water is in contact with the aquifer media, some constituents, including arsenic and/or manganese, may exceed the maximum contaminant levels (MCLs). In these cases where the MCLs are exceeded, treatment at the well head or at a central treatment plant is considered.

Environmental & Permitting: Projected environmental and permitting requirements for citing production ground water wells, pipelines, power line extensions and upgrades through the Project are expected to be substantial. Environmental impacts that must be addressed include the possibility of well interference between the Project wells and existing domestic and permitted ground water wells. In situations where a conjunctive wells pumpage adversely impacts existing ground water supplies, the impacted supply must be mitigated by replacement of the supply through the County Wide System and /or the construction of a new well that is not impacted by the conjunctive well. Permitting for the ground water wells will be subject to the State Engineer Order 1116 modification and/or waiver consideration.

Since the present electrical distribution system in Lahontan Valley only has capacity and transmission facilities for providing three phase, 220/440-volt service along U.S. Hwy 50, U.S. Hwy 95 and Rice Road, the construction of extension lines and upgrading existing power lines is required to power this proposed alternative's deep turbine well pumps and booster pumps (SPPCo., 1999). In addition to the costs of construction and materials associated with power line extensions and upgrades, easements, mostly over

Federally (U.S. Bureau of Reclamation) owned land must be obtained for both extensions of new line as well as upgrades. Due to the complexities of gaining easements for power line extensions and upgrades over Federally controlled properties, the cost of gaining these permits are estimated at 25% of capital costs. (SPPCo., 1999)

The change in the manner of delivery (production wells harvesting seepage from canals) of Project surface water from the canal system to the production wells for quasi-municipal use is expected to be thoroughly reviewed by State and Federal regulating agencies. Most importantly, the methods and monitoring of this type of delivery must be coordinated with the Truckee-Carson Irrigation District (TCID) in such a manner as not to adversely impact other Project irrigation rights. State Engineer permits for change in manner of use will be based upon the existing irrigation head gate duty of 3.5 or 4.5 AF/Ac and reduced to 2.99 AF/Ac for the proposed quasi municipal use. (Alpine Decree, 1980) TCID canal seepage measurements and correlating recovery well metering will be required in order to monitor and control diversions.

Project Description: Phase I of the Project is proposed to develop 21,531 AF annually and be capable of meeting a peak day demand of 26,700 gpm. It is proposed to construct 113 ground water production wells (1/4 mile spacing) along approximately a 28-mile reach of the V-line from the diversion dam to its terminus, the A-Line from its headworks to the A-17 Lateral, L-Line from its headworks to its sixth and terminal structure and the S-line from its headworks to the S-Line Reservoir. The production wells would be constructed in a manner to allow recovery of surface water that has infiltrated from the adjacent canal system. These wells would be manifolded together such that the combined discharge can be delivered to a treatment plant (load center) located in section 25, T.19N, R.28E, M.D.B&M. along the S-Line canal. See Map 7.2 for conceptual layout of this system. In the event that the water did not have to be treated, the individual wells (with wellhead disinfection facilities) could be manifolded directly into the County Wide Distribution System. One hundred and five booster pumping plants would be sited on 1/4 mile spacing on portions of the V-line, the A-Line,

the L-Line and the S-Line canals to meet pipeline friction head-loss requirements and elevation head for conveying the discharge to the treatment plant.

Pilot Testing and Modeling: Initially, several production ground water wells and associated observation wells should be installed and operated over an irrigation season for at least a year to determine the feasibility of this method of delivery. This initial investigation should also include a lithographic borehole sampling of the areas considered for citing the production wells and measurement of canal seepage losses over these reaches. Water quality analyses should also be taken from the boreholes to ascertain the potablity of this resource. Upon determination of the feasibility of this method of delivery, a "Unit Response Function" ground water model should be developed to document and quantify the amount of canal seepage and the recovery by production wells.

Ground Water Wells & Pumps: For purposes of establishing a preliminary design, a well spacing of about 1/4 mile has been selected to recover the seepage or recharge from the adjacent canal system. The conceptual well is specified as a 12" diameter x 200' deep, screened and gravel enveloped structure. The actual depth of the wells will vary depending upon the lithography of each site. The discharge of each well under peak-day demand will approximate 236 gpm. The deep turbine pumps will be sized to deliver the peak day demand of 236 gpm against a TDH of about 153 feet. Assumed maximum pumping lifts are estimated at 100 feet. Average peak day horsepower demand of the ground water well turbine pumps approximates 15 HP per well. Total peak day horsepower demand for 109 wells (without booster capacity) deep turbine pumps is estimated at 1,635 HP. There are 105 booster centrifugal pumps with a horsepower peak-day demand estimated at 1,485 HP.

Manifold Pipeline System: Approximately 29-miles of a common manifold pipeline is required to commingle and convey the individual well discharge to the treatment plant. These conveyance pipelines would consist of: 6", 8", 12", 18", 24", and 42" diameter nominal sizes.

Power: Power line extensions and/or upgrades (replacement of conductors, etc.) to serve individual well pumps with three phase, 220/440-volt service from the main feeder power lines of the existing SPPCo system is approximated at 29-miles.

Transmission System: For purposes of manifolding the ground water wells together and to serve outlying rural areas within the County, a transmission system (conveyance, pumping plants, storage, fire hydrants & service connections) is included. See Chapter 6 for details.

Treatment Plant: The design of a central 40 MGD treatment for manganese and arsenic is based upon a design and specification as developed by Nolte, 2003. See Section 5.0 and Appendix 5.3 for complete description and specification of this treatment plant. The proposed treatment plant is sited along the S-Line canal within Section 25, T.19N., R.28E, M.D.B.&M., which is centrally located within the projected municipal and commercial development within the County. See Table 7.2.1, which tabulates the capital and O & M cost, associated with this alternative.

TABLE 7.2.1 PROJECT CONJUNCTIVE USE OF SURFACE & GROUND WATER CAPITAL & O&M COST FOR PHASE I, YEAR 2025 (21,531 AFA)

ITEM[1]	DESCRIPTION	UNIT COST	UNIT	QUANTITY	CAPITAL COSTS[2]	ANNUAL O&M COSTS[3]
					$x1,000,000	$x1000
1	Production Wells	$100,000	EA	113	$11.30	$565.00
2	Well Head Disinfection	$15,000	EA	113	$1.70	$559.35
3	Observation Wells	$2,000	EA	226	$0.45	$22.60
4	6" Pipeline	$3.50	IDF	15,840	$0.33	$3.33
5	8" Pipeline	$3.50	IDF	15,840	$0.44	$4.44
6	12" Pipeline	$4.30	IDF	31,680	$1.63	$16.35
7	18" Pipeline	$4.30	IDF	30,360	$2.35	$23.50
8	24" Pipeline	$5.00	IDF	33,000	$3.96	$39.60
9	42" Pipeline	$5.50	IDF	22,440	$5.18	$51.84
10	Controls & Fittings	Pipe Capital x 5%	%		$0.70	$69.52
11	Production Well Turbine	$300	HP	1,635	$0.49	$24.53
12	Booster Pumps	$400	HP	1,485	$0.59	$29.70
13	Three-Phase Power Extension	$75,000	MI	29	$2.18	$21.75
14	Power Consumption	$0.06	KWh	10,194,538		$611.67
15	Groundwater Modelling	$7,100	MI	28.2	$0.20	$20.02
16	Ground Level Storage	$0.23	GAL	18,278,550	$4.20	$420.41
17	Elevated Storage	$2.00	GAL	1,500,000	$3.00	$300.00
18	Service Area Transmission System	$28,090,000	LS	1	$28.09	$1,404.50
19	Manganese & Arsenic Treatment	$37,376,000	LS	1	$37.38	$4,115.00
20	**Capital Subtotal:**				**$66.80**	
20a	**Capital Subtotal:**				**$102.48**	
21	Subdivision Distribution[4]	$3,000	CON	11,573	$34.72	$1,735.95
22	Residential Service & Meter[4]	$1,000	EA	11,573	$11.57	$1,157.30
23	Commercial Service & Meter[4]	$1,000	EA	330	$0.33	$33.00
24	Stock/Dairy Service & Meter[4]	$4,000	EA	120	$0.48	$48.00
25	Fire Hydrants[4]	$1,500	EA	1,160	$1.74	$87.00
26	Fallon Distribution O&M[5]					$1,618.10
27	FPST Distribution O&M[5]					$100.07
28	NAS Distribution O&M[5]					$185.84
29	Environmental & Permitting	Capital x 10%	%		$6.68	
29a	Environmental & Permitting	Capital x 10%	%		$10.25	
30	Engineering & Planning	Capital x 10%	%		$6.68	
30a	Engineering & Planning	Capital x 10%	%		$10.25	
31	Contingency	Capital x 20%	%		$13.36	
31a	Contingency	Capital x 20%	%		$20.50	
32	**Subtotal:**				**$93.52**	**$9,153.35**
32a	**Subtotal:**				**$143.47**	**$12,709.00**

33	Irrigated Land	$2,500	AC	120	$0.30	
34	Non-Irrigated Land	$300	AC	330	$0.10	
35	Water Rights	$1,000	AF	25,204	$25.20	
36	Water Right Applic. & Survey	$1,250	APP	113	$0.14	
37	Water Right Permit	$2	AF	25,204	$0.05	
38	**TOTAL:**				**$119.32**	**$9,153.35**
38a	**TOTAL:**				**$169.27**	**$12,709.00**

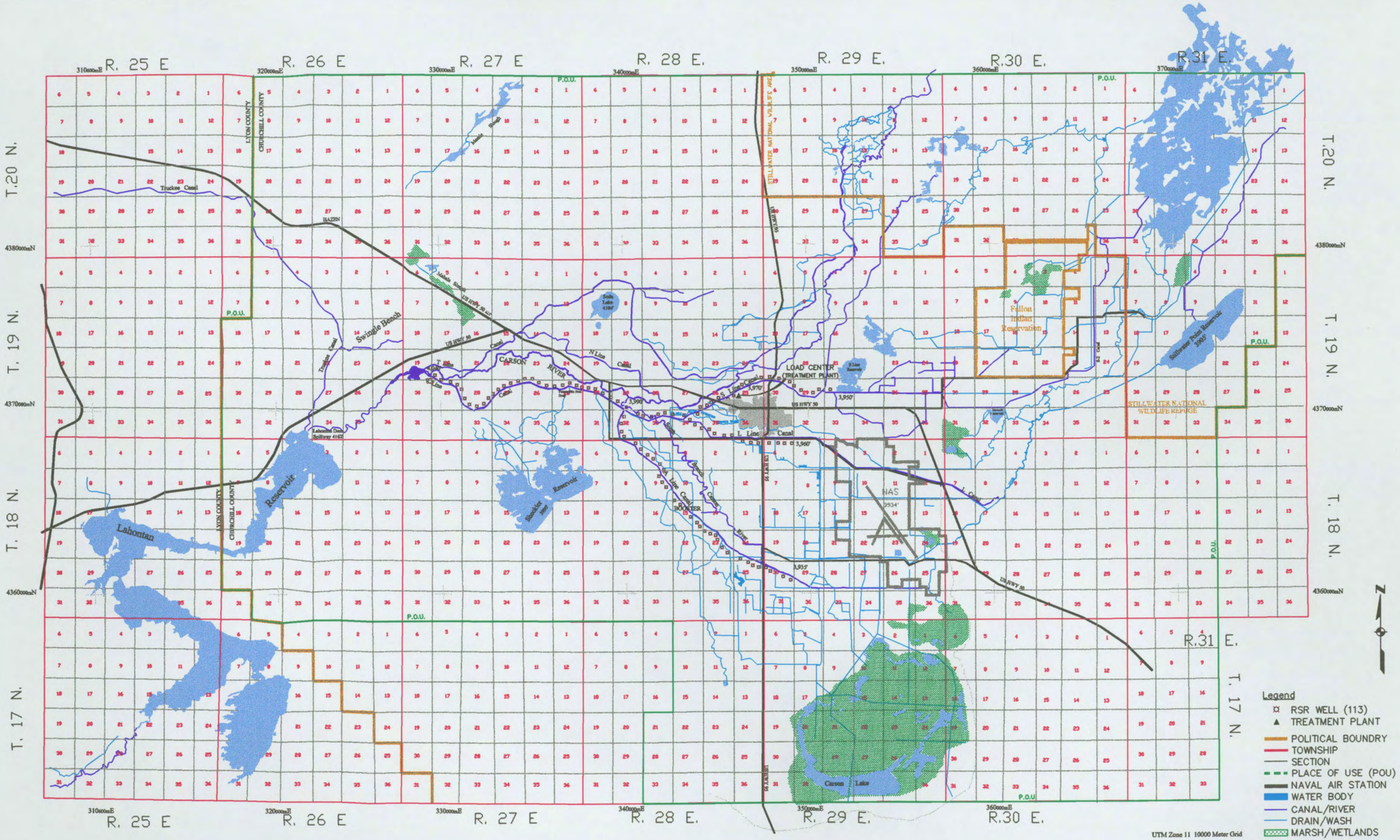
[1] Item numbers which include a subletter include centralized treatment for manganese and arsenic and those without subletters is without treatment for these constituents.

[2] 2001 capital costs in millions of dollars

[3] 2001 O&M costs in thousands of dollars per year

[4] Assume developer will pay capital cost, therefore not included in capital subtotals. Upon dedication the water purveyor will pay the annual O&M

[5] Estimated O&M for transmission, distribution, commercial & residential services, hydrants & existing storage



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1"=1.5 MILES
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T.17–20N, R.25–31E, M.D.B.&M.

7.2 CHURCHILL COUNTY WATER PLAN PROJECT CONJUNCTIVE SURFACE AND GROUND WATER DEVELOPMENT

FILE NAME Fig_7-2.dwg
JOB NO. 99-67D
DATE January 5, 2000
SHEET 1 OF 1

7.3 PROJECT INDUCTION WELL DEVELOPMENT

Water Resource Quantity & Quality: Under this proposed alternative, surface irrigation water rights would be acquired by purchase or dedication and released from Lahontan Dam into the Carson River (River) channel and would be subsequently diverted for quasi-municipal purposes by induction wells sited along and within ¼-mile of the River channel or within nearby buried and active meanders of the River. It is assumed that surface water within the River channel would infiltrate and flow underground to the induction wells at sufficient rates to allow the induction wells to pump on the order of several hundred-gallons per minute. Under conditions of lower transmissivity, the spacing of wells may have to be decreased and the number of wells increased in order to obtain the desired cumulative pumping rate.

Since the source of the water is of relatively good quality, the discharge or production from the induction wells is expected to approach the quality of the River water, thereby reducing treatment requirements to disinfection at the well head prior to introduction into the distribution system. In the event that the quality of the discharge from the induction wells does not meet the MCLs for arsenic and/or manganese, treatment at a central plant is also considered.

Environmental & Permitting: Environmental impacts of this Project alternative may include interference between the Project's induction wells and existing domestic and/or permitted ground water wells. In situations where induction well pumpage adversely impacts existing ground water wells, the adversely impacted supply may be mitigated by replacement of the supply through the County Wide System and/or the construction of a new well that is not impacted by the induction well. State Engineer permitting will require the change of manner of use from irrigation to quasi-municipal use. Additionally, State Engineer Order No. 1116 must be modified and/or waived as per State Engineer consideration. No change in point of diversion (POD) is anticipated, since the POD will remain at the point of release from Lahontan Dam. The State Engineer will require the metering of the discharge of the induction wells and a measure and documentation that

the source of the induction well discharge is from the River and not from the ground water source.

Since new power lines must be constructed and existing transmission facilities upgraded to serve the induction wells, easements, mostly located on BOR owned land, must be obtained. Due to the complexities of gaining easements from Federally controlled lands, the associated cost is estimated at about 25% of the capital cost of the improvements (SPPCo, 1999)

Project Description: Phase I of the Project is proposed to develop 21,531 AF of discharge annually to meet the 2025 demand. Phase II is proposed to develop an additional 24,216 AF to meet the 2050 annual demand of 45,747 AF.

Under Phase I, the peak daily demand approximates 26,700 gpm. Assuming each proposed induction well is capable of producing 1,000 gpm, 27-induction wells will be required. It is proposed to site the wells at 1/2-mile intervals along the River. The upper segment, begins at well #1 located below and near the Carson Dam and continues along the “right bank” of the River to the load center (or treatment plant) in Section 25, T.19N., R.28E. near the River channel at Well #22. This segment includes 21-wells. A lower segment, including 6-wells, is aligned along the “right bank” of the River beginning in Section 20, T.19N., R.29E. at well #27 and progresses southwesterly to the load center at well #22. A pipeline system is designed to manifold the 27 induction wells together into a common mainline. Additionally, 24-inline booster pumps are proposed for installation along the mainline to convey the discharge from the wells to the load center. See Map 7.3 showing the layout of Phase I.

While Phase II is not specifically addressed at this time, it is anticipated that the additional wells for this Phase could be inter-spaced between the 27-wells of Phase I and aligned along the opposite side of the River on the “left bank”. At an anticipated discharge rate of 1,000 gpm per well, Phase II would require an additional 30-wells aligned along the River to meet an additional peak day discharge of about 30,000 gpm.

Phase II would represent a separate “stand alone” system that could be operated either independently of Phase I or be operated concurrently with the Phase I system with cross over manifolding and controls. The ability to commingle both Phases would provide a degree of system redundancy.

Pilot Testing and Modeling: Prior to the adoption of this Project, several induction wells and associated observation wells should be installed and operated over an irrigation season for at least a year to determine the feasibility of this method of delivery. This investigation should include a lithographic borehole sampling along the proposed reaches of the River to document the order of transmissivity of the aquifer materials associated with the River channel(s). Additionally, the rate of seepage losses should be measured on the River channel(s). Water Quality sampling should also be taken in conjunction with the borehole sampling. Upon the establishment of the feasibility of this method of delivery, a “Unit Response Function” ground water model analysis should be developed to document and quantify the River seepage response to the induction well pumpage.

Ground Water Wells & Pumps: For purposes of establishing a preliminary design, a well spacing of about ½-mile has been selected to recover the seepage or recharge from the adjacent River channel. The conceptual well would be a 16” diameter x 400’ deep, gravel-enveloped well with a 100’ sanitary-seal equipped with wellhead disinfection. If water quality meets all public health requirements, no treatment other than wellhead disinfection would be required prior to introduction into the distribution system. While the actual discharge of each well will vary, depending upon the occurrence and nature of the aquifer materials, it is assumed for purposes of this preliminary design that an average discharge per well is in the order of 1,000 gpm. Assuming a mean pumping lift of 100’ and a discharge head of about 50’, each well pump is designed to develop a TDH of 150’. At 1,000 gpm against a TDH of 150’ and an overall pumping plant efficiency of 65%, the mean electrical horsepower of each well turbine pump approximates 58 HP. Total horsepower demand to meet peak-day-demand for the 27 well pumps is approximately 1570 HP (27 well x 58HP/well).

Additionally, 24-inline booster pumps, averaging 31 HP/pump, under peak-day-demand will result in a total horsepower demand of 852 HP.

Manifold Pipeline System: Approximately 13-miles of common main pipeline is required to manifold the 27 wells together and convey water to the load center or treatment plant. The nominal pipe sizes required include 10,560 feet of 12", 18,480 feet of 18", 10,560 feet of 24", 18,480 feet of 30" and 10,560 feet of 36."

Power: Power line extension and upgrades to serve individual wells with three-phase 220/440-volt power is estimated at 14-miles.

Transmission System: For purposes of manifolding directly from individual wells to the distribution system via the above described mainline where treatment is limited to well-head disinfection, or if water must be treated at a central treatment plant in Section 25, T.19 N., R.28E. The transmission system is described in Chapter 6.

Treatment Plant: The design of a central 40 MGD treatment plant to treat manganese and arsenic is based upon a design and specifications as developed by Nolte, (2003). See Section 5.0 and Appendix 5.3 for a complete description of this treatment plant. The proposed location of the treatment plant is co-terminus with the load center, located in Section 25, T.19 N., R.28E. See Table 7.3.1, which tabulates the capital and O & M cost, associated with this alternative.

TABLE 7.3.1 PROJECT INDUCTION WELL DEVELOPMENT CAPITAL & O&M COSTS FOR PHASE I, YEAR 2025 (21,531 AFA)

ITEM[1]	DESCRIPTION	UNIT COST	UNIT	QUANTITY	CAPITAL COSTS[2]	ANNUAL O&M COSTS[3]
					$x1,000,000	$x1000
1	Production Wells	$200,000	EA	27	$5.40	$270.00
2	Well Head Disinfection	$30,000	EA	27	$0.81	$267.30
3	Observation Wells	$2,000	EA	54	$0.11	$5.40
4	12" Pipeline	$4.30	IDF	10,560	$0.54	$5.45
5	18" Pipeline	$4.30	IDF	18,480	$1.43	$14.30
6	24" Pipeline	$5.00	IDF	10,560	$1.27	$12.67
7	30" Pipeline	$5.00	IDF	18,480	$2.77	$27.72
8	36" Pipeline	$5.50	IDF	10,560	$2.09	$20.91
9	Controls & Fittings	Pipe Capital x 5%	%		$0.41	$40.53
10	Production Well Turbine	$300	HP	1,570	$0.47	$23.55
11	Booster Pumps	$400	HP	852	$0.34	$17.04
12	Three-Phase Power Extension	$75,000	MI	14	$1.05	$10.50
13	Power Consumption	$0.06	KWh	7,913,837		$474.83
14	Groundwater Modelling	$7,100	MI	14.0	$0.10	$9.94
15	Ground Level Storage	$0.23	GAL	18,278,550	$4.20	$420.41
16	Elevated Storage	$2.00	GAL	1,500,000	$3.00	$300.00
17	Service Area Transmission System	$28,090,000	LS	1	$28.09	$1,404.50
18	Manganese & Arsenic Treatment	$37,376,000	LS	1	$37.38	$4,115.00
19	**Capital Subtotal:**				**$52.08**	
19a	**Capital Subtotal:**				**$88.65**	
20	Subdivision Distribution[4]	$3,000	CON	11,573	$34.72	$1,735.95
21	Residential Service & Meter[4]	$1,000	EA	11,573	$11.57	$1,157.30
22	Commercial Service & Meter[4]	$1,000	EA	330	$0.33	$33.00
23	Stock/Dairy Service & Meter[4]	$4,000	EA	120	$0.48	$48.00
24	Fire Hydrants[4]	$1,500	EA	1,160	$1.74	$87.00
25	Fallon Distribution O&M[5]					$1,618.10
26	FPST Distribution O&M[5]					$100.07
27	NAS Distribution O&M[5]					$185.84
28	Environmental & Permitting	Capital x 10%	%		$5.21	
28a	Environmental & Permitting	Capital x 10%	%		$8.86	
29	Engineering & Planning	Capital x 10%	%		$5.21	
29a	Engineering & Planning	Capital x 10%	%		$8.86	

30	Contingency	Capital x 20%	%		$10.42	
30a	Contingency	Capital x 20%	%		$17.73	
31	**Subtotal:**				**$72.92**	**$8,290.31**
31a	**Subtotal:**				**$124.11**	**$12,138.01**
32	Irrigated Land	$2,500	AC	100	$0.25	
33	Non-Irrigated Land	$300	AC	0	$0.00	
34	Water Rights	$1,000	AF	25,204	$25.20	
35	Water Right Applic. & Survey	$1,250	APP	27	$0.03	
36	Water Right Permit	$2	AF	25,204	$0.05	
37	**TOTAL:**				**$98.46**	**$8,290.31**
37a	**TOTAL:**				**$149.65**	**$12,138.01**

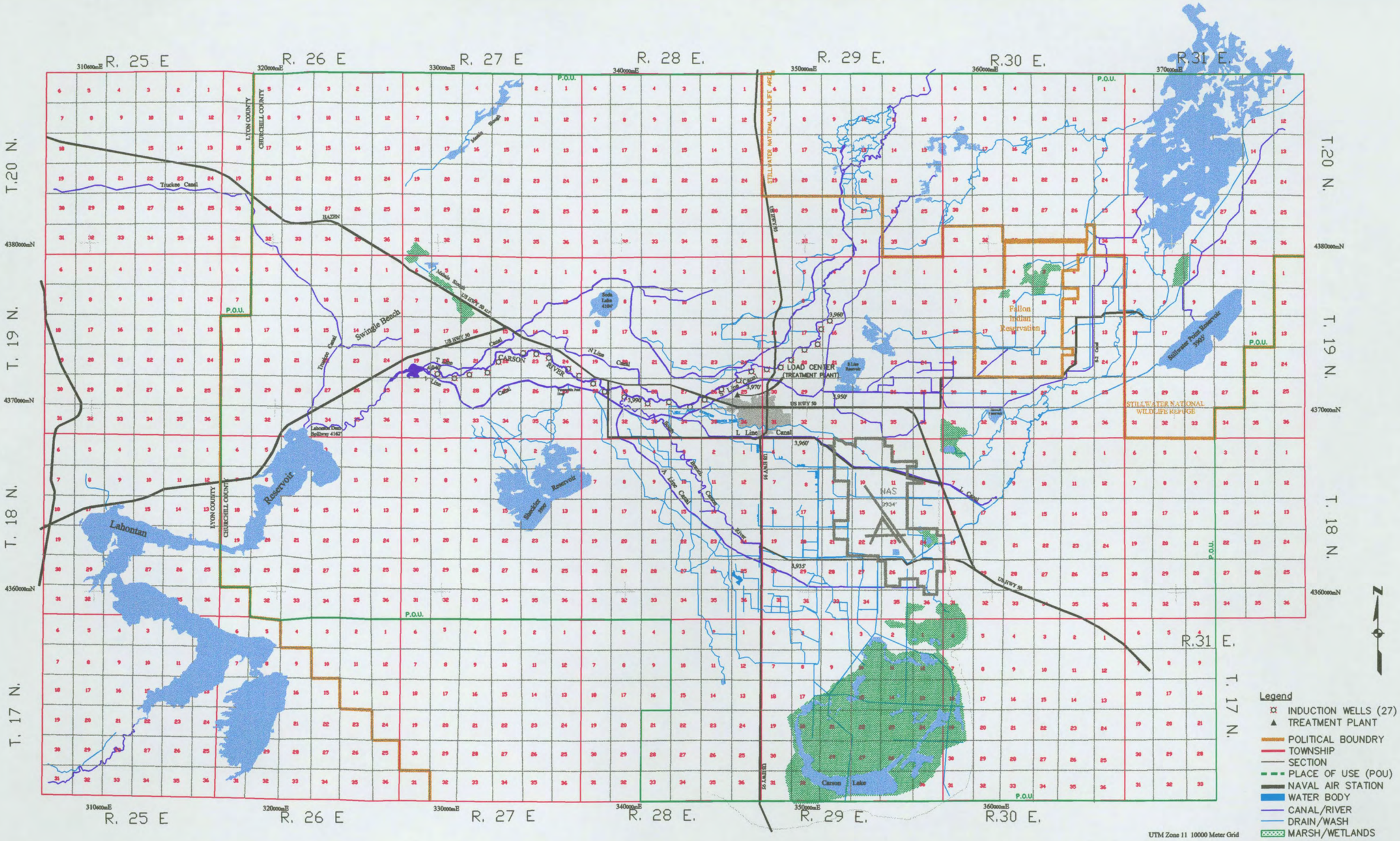
[1] Item numbers which include a subletter include centralized treatment for manganese and arsenic and those without subletters is without treatment for these constituents.

[2] 2001 capital costs in millions of dollars

[3] 2001 O&M costs in thousands of dollars per year

[4] Assume developer will pay capital cost, therefore not included in capital subtotals. Upon dedication the water purveyor will pay the annual O&M

[5] Estimated O&M for transmission, distribution, commercial & residential services, hydrants & existing storage



Legend

- INDUCTION WELLS (27)
- TREATMENT PLANT
- POLITICAL BOUNDRY
- TOWNSHIP
- SECTION
- PLACE OF USE (POU)
- NAVAL AIR STATION
- WATER BODY
- CANAL/RIVER
- DRAIN/WASH
- MARSH/WETLANDS

UTM Zone 11 10000 Meter Grid

NO.	REVISION	DATE	BY

SCALE
1"=1.5 MILES
1:94040
0 — 1"
0 — 25mm

DESIGNED CNM
DRAWN MMS
CHECKED CNM

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T.17–20N, R.25–31E, M.D.B.&M.

7.3 CHURCHILL COUNTY WATER PLAN PROJECT INDUCTION WELL DEVELOPMENT

FILE NAME Fig_7-3.dwg
JOB NO. 99-67D
DATE January 5, 2000
SHEET 1 OF 1

7.4 PROJECT LAHANTON RESERVOIR DEVELOPMENT

Water Resource Quantity & Quality: Utilizing this alternative, Newlands Project surface irrigation water rights would be purchased or donated and application for a change of use from irrigation to quasi-municipal use would be made with the State Engineer. The water would be diverted from Lahontan Reservoir through an inlet structure in the Reservoir and pumped to a treatment plant located near the Dam on the right bank of the Carson River. From the treatment plant, the water would be pumped by mainline to the distribution system within the service area. Plant capacities of 40 MGD and 43 MGD have been described for Phases I and II, respectively. For purposes of comparing alternative water resources and treatment, a main transmission pipeline delivers water to a central load-center in Section 25, T.19N., R.28E., located northwest of the City of Fallon.

Surface water quality at Lahontan Reservoir is characterized as good, with turbidities ranging from 5.5 to 14.0 NTU, total dissolved solids less than 300 mg/l, with moderate color and alkalinity. Trihalomethane precursors are present, which will require a treatment process that will not form trihalomethanes. Arsenic is present at a level of 0.02 mg/l, or 20 PPB. The surface treatment plant, requiring conventional treatment will consist of chemical treatment, sedimentation, filtration, and disinfection. The plant must meet the requirements the Surface Treatment Rule of 1989 and the Enhanced Surface Water Treatment Rule.

Environmental & Permitting: Significant impacts of this proposed Project (Phases I & II) may be the decreasing and degrading of existing ground water resources in the Lahontan Valley resulting from removal of relatively large amount of acreage (15,300 acres) and water (53,500 AF) from irrigation. Other impacts of this Project will include acquisition of easements and construction disturbance during the installation of water and power transmission facilities.

Permits for changing the manner of use from irrigation to quasi-municipal use will be required by the State Engineer. Pursuant to the Alpine Decree, 1980, the change in manner of use from irrigation to quasi-municipal use will reduce the amount diverted for this use to 2.99 AF/Ac. Consequently, about 25,204 AF and 28,346 AF, respectively will have to be purchased to meet the demand for Phases I and II. Easement permits for the location of transmission and distribution pipelines and power will also be required from both private and public entities.

Project Description: Phase I of the Project is proposed to develop 21, 531 AF of water to meet the annual demand in year 2025 and an additional 24,216 AF in year 2050. Design rates of flow are 25,700 gpm and 30,030 gpm, respectively for Phase I and II.

It is proposed that the diversion be made through a vertical intake structure fitted with multiple inlet gates to facilitate the intake of raw water at different depths, thereby enabling the diversion of the highest quality water depending on seasonal variation. The structure would be located near the existing Newlands Project irrigation inlet structure and would be operated separately and independently from the irrigation releases. Vertically mounted open impeller and/or trash pump(s) would pump the water from the inlet structure over the right bank portion of the dam to the treatment plant located generally to the northeast of the dam. The proposed treatment plant would be a conventional type, consisting of chemical treatment (ozone), flocculation, sedimentation, filtration, and disinfection. A second pumping plant would be located at the discharge point of the treatment plant to convey the finished water by a mainline (42”) to the distribution system and load center. The proposed main transmission line for Phase I would essentially follow U.S. Hwy 50 about 17 miles to the load-center located near the City of Fallon. Phase II would include a second 42”, 16-mile main line routed to the east and north to the load-center, thereby completing a looped mainline system from which the distribution system can be manifolded. See Map 7.4 for general layout of the proposed system. The pumping plant serving the main transmission conveyance system is designed to develop 120 psi at the load center.

Capital and Annual O & M Costs: See Tables 7.4.1 and 7.4.2 showing the capital and annual operational and maintenance cost associated with Phase I and Phase II.

TABLE 7.4.1 PROJECT LAHONTAN RESERVOIR DEVELOPMENT CAPITAL & O&M COST FOR PHASE I, YEAR 2025 (21,531 AFA) WITH CENTRALIZED 40 MGD SURFACE WATER TREATMENT PLANT

ITEM	DESCRIPTION	UNIT COST	UNIT	QUANTITY	CAPITAL COSTS[1]	ANNUAL O&M COSTS[2]
					$x1,000,000	$x1000
1	Lahontan Reservoir Diversion Works	$2,000,000	LS	1	$2.00	$100.00
2	40 MGD Surface Water Treatment Plant	$42,981,000	LS	1	$42.98	$2,789.00
3	Mainline Booster Pumps	$400	HP	4,082	$1.63	$81.64
4	Power Consumption	$0.06	KWh	7,770,120		$466.21
5	42" Pipeline	$5.50	IDF	89,760	$20.73	$207.35
6	Controls & Fittings	Pipe Capital x 5%	%		$1.04	$103.67
7	Three-Phase Power Extension	$75,000.00	MI	8.5	$0.64	$6.38
8	Ground Level Storage	$0.23	GAL	18,278,550	$4.20	$420.41
9	Elevated Storage	$2.00	GAL	1,500,000	$3.00	$300.00
10	Service Area Transmission System	$28,090,000	LS	1	$28.09	$1,404.50
11	**Capital Subtotal:**				**$104.32**	
12	Subdivision Distribution[3]	$3,000	CON	11,573	$34.72	$1,735.95
13	Residential Service & Meter[3]	$1,000	EA	11,573	$11.57	$1,157.30
14	Commercial Service & Meter[3]	$1,000	EA	330	$0.33	$33.00
15	Stock/Dairy Service & Meter[3]	$4,000	EA	120	$0.48	$48.00
16	Fire Hydrants[4]	$1,500	EA	1,160	$1.74	$87.00
17	Fallon Distribution O&M[4]					$1,618.10
18	FPST Distribution O&M[4]					$100.07
19	NAS Distribution O&M[4]					$185.84
20	Environmental & Permitting	Capital x 10%	%		$10.43	
21	Engineering & Planning	Capital x 10%	%		$10.43	
22	Contingency	Capital x 20%	%		$20.86	
23	**Subtotal:**				**$146.04**	**$10,844.41**
24	Irrigated Land	$2,500	AC	73	$0.18	
25	Non-Irrigated Land	$300	AC	71	$0.02	
26	Water Right Applic. & Survey	$1,250	APP	720	$0.90	
27	Water Right Permit	$2	AF	25,204	$0.05	
28	Project Water Rights	$1,000	AF	25,204	$25.20	
29	**TOTAL:**				**$172.38**	**$10,844.41**

[1] 2001 capital costs in millions of dollars

[2] 2001 O&M costs in thousands of dollars per year

[3] Assume developer will pay capital cost, therefore not included in capital subtotals. Upon dedication the water purveyor will pay the annual O&M

[4] Estimated O&M for transmission, distribution, commercial & residential services, hydrants & existing storage

TABLE 7.4.2 PROJECT LAHONTAN RESERVOIR DEVELOPMENT CAPITAL & O&M COST FOR PHASE II, YEAR 2050 (24,216 AFA) WITH CENTRALIZED 43 MGD SURFACE WATER TREATMENT PLANT

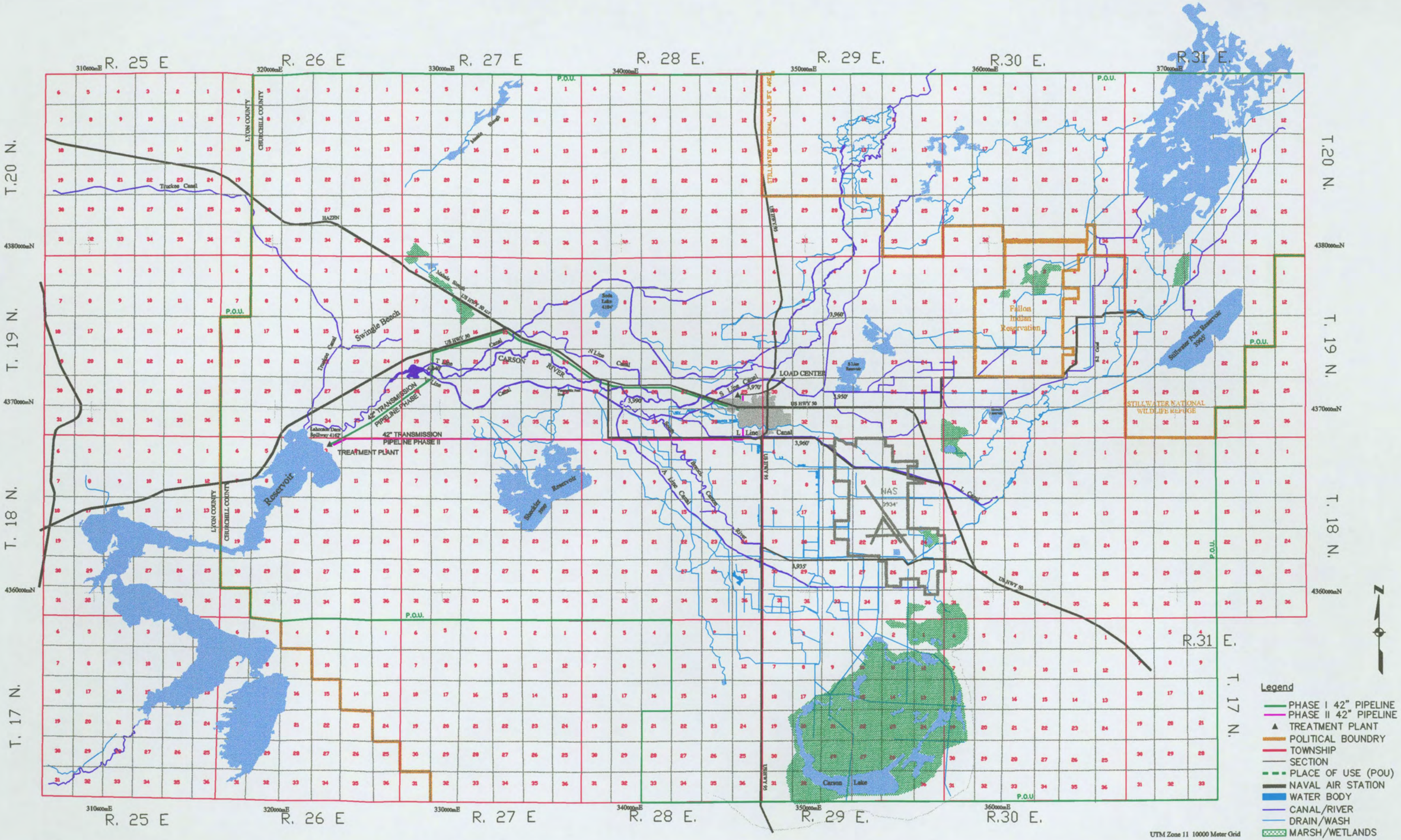
ITEM	DESCRIPTION	UNIT COST	UNIT	QUANTITY	CAPITAL COSTS[1]	ANNUAL O&M COSTS[2]
					$x1,000,000	$x1000
1	Lahontan Reservoir Diversion Works	$500,000	LS	1	$0.50	$25.00
2	43 MGD Surface Water Treatment Plant	$46,204,600	LS	1	$46.20	$2,998.18
3	Mainline Booster Pumps	$400	HP	5,433	$2.17	$108.66
4	Power Consumption	$0.06	KWh	9,331,928		$559.92
5	42" Pipeline	$5.50	IDF	84,480	$19.51	$195.15
6	Controls & Fittings	Pipe Capital x 5%	%		$0.98	$97.57
7	Three-Phase Power Extension	$75,000.00	MI	0.0	$0.00	$0.00
8	Ground Level Storage	$0.23	GAL	27,154,375	$6.25	$624.55
9	Elevated Storage	$2.00	GAL	500,000	$1.00	$100.00
10	Service Area Transmission System	$36,464,000	LS	1	$36.46	$1,823.20
11	**Capital Subtotal:**				**$113.08**	
12	Subdivision Distribution[3]	$3,000	CON	13,657	$40.97	$2,048.55
13	Residential Service & Meter[3]	$1,000	EA	13,657	$13.66	$1,365.70
14	Commercial Service & Meter[3]	$1,000	EA	360	$0.36	$36.00
15	Stock/Dairy Service & Meter[3]	$4,000	EA	340	$1.36	$136.00
16	Fire Hydrants[3]	$1,500	EA	805	$1.21	$60.38
17	Fallon Distribution O&M[4]					$1,769.85
18	FPST Distribution O&M[4]					$45.12
19	NAS Distribution O&M[4]					$83.80
20	Environmental & Permitting	Capital x 10%	%		$11.31	
21	Engineering & Planning	Capital x 10%	%		$11.31	
22	Contingency	Capital x 20%	%		$22.62	
23	**Subtotal:**				**$158.31**	**$12,077.62**
24	Irrigated Land	$2,500	AC	40	$0.10	
25	Non-Irrigated Land	$300	AC	98	$0.03	
26	Water Right Applic. & Survey	$1,250	APP	810	$1.01	
27	Water Right Permit	$2	AF	28,346	$0.06	
28	Project Water Rights	$1,000	AF	28,346	$28.35	
29	**TOTAL:**				**$187.82**	**$12,077.62**

[1] 2001 capital costs in millions of dollars

[2] 2001 O&M costs in thousands of dollars per year

[3] Assume developer will pay capital cost, therefore not included in capital subtotals. Upon dedication the water purveyor will pay the annual O&M

[4] Estimated O&M for transmission, distribution, commercial & residential services, hydrants & existing storage



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ENGINEERING * HYDROLOGY * ENVIRONMENT * AGRICULTURE

T.17–20N, R.25–31E, M.D.B.&M.

7.4 CHURCHILL COUNTY WATER PLAN PROJECT LAHONTAN RESERVIOR DEVELOPMENT

FILE NAME Fig_7-4.dwg
JOB NO. 99-67D
DATE January 5, 2000
SHEET 1 OF 1

7.5 PROJECT RECHARGE, STORAGE & RECOVERY DEVELOPMENT

Background: Recharge, storage and recovery (RSR), is the process of recharging a ground water aquifer with surface water and storage for subsequent recovery by ground water production wells. In effect, the ground water aquifer is functioning as a storage reservoir. Recharge can be achieved by infiltration of surface water into the ground water aquifer by direct injection through injection wells or by indirect means through natural features such as stream channels or artificially through constructed contour basins, trenches, ponds or other means. If water is injected into the ground water directly by the use of injection wells, the water must be treated so the injection water quality is equal to, or better than, that of the receiving ground water. On the other hand, surface waters do not have to be treated if the method of recharging is indirect by the use of natural channels, constructed basins or trenches, since the soil profile filters and/or adsorbs and removes organic material and organisms in the process of infiltration. With respect to inorganic constituents, however, the surface source water concentration of constituents must be equal to, or better than, that of the receiving ground water.

Water Resource and Quality: This proposed alternative will consider the purchase or dedication of surface irrigation water rights and diversion from Lahontan Reservoir to a recharge area for infiltration into the ground water aquifer(s) for storage and subsequent recovery for quasi-municipal use. Raw water would be pumped from the reservoir and conveyed by pipeline to the recharge area. Production wells within the recharge area would then recover the stored surface water from the ground water aquifer(s) and would be subsequently conveyed by main pipeline to the distribution system.

Lahontan Reservoir water quality is characterized as good, with turbidities ranging from 5.5 NTU up to 14 NTU, total dissolved solids less than 300 mg/l, with moderate color and alkalinity and seasonal algae blooms. Average arsenic approximates 17 ppb.

Environmental and Permitting: Approximately 5,300 acres of land, located on the alluvial fan of the Dead Camel Range have been selected for the proposed recharge area for Phases I and II. Phase I will require about 2500 acres while Phase II will require about 2800 acres. Approximately one half of the area is owned by the United States and managed by the Bureau of Reclamation. The remaining privately owned area is undeveloped excepting a few scattered non-irrigated homesteads and a sprinkler irrigated agricultural area occupying about 737 acres. The ground water certificated and permitted rights associated with this irrigated area approximate 2950 acre feet. State Engineer Order 1116 must be modified and/or waived to allow this RSR project to proceed. An environmental impact statement may be required for this proposed Project. Additionally, the impact of removing up to 25,204 AF (Phase I) and 28,346 AF (Phase II), from irrigation head gate duties, will impact adjacent ground water resources and must be assessed. Other impacts of this Project will include acquisition of easements and construction disturbance associated with Project facilities (pumping plants, pipelines, power lines etc.).

Permits for changing the manner of use from irrigation to quasi-municipal use will required by the State Engineer in addition to a permit for the RSR phase of the Project. It is assumed that the full head-gate duty of the irrigation rights may be applied to the infiltration area and that the recovery by production wells will be limited to the consumptive use of 2.99 AF per acre. Based upon this assumption and a head gate duty of 3.5 AF per acre, 25,204 AF and 28,346 AF respectively, will be applied to the recharge area under Phase I and II. Easement permits for location of Project facilities (pumping plants, pipelines, power lines etc.) will be required from both public and private entities.

Project Description: Phase I of the Project is proposed to develop 21,531 AF to meet the annual demand for year 2025 and under Phase II, an additional 24,216 AF development is proposed to meet the year 2050 annual demand. This demand for both Phases is that amount that will be recovered from the recharge area by production wells.

Primary considerations for the selection of a ground water recharge site include: topography, the ability of the site to infiltrate water to the storage aquifers, the storage capacity or specific yield of the receiving aquifers, depth to the water table and the water quality of the receiving ground water aquifer.

Upon review of the ground water depth and occurrence within Lahontan Valley (WRD, 1998), there appears to be only one general site that may be suitable for the development of a large-scale recharge, storage and recovery (RSR) project. This area, approximating 7,000 acres, is located on the northern alluvial fan of the Dead Camel Mountains, east of Lahontan Reservoir, south of the V-Line canal and west of the bad lands located to the west of Sheckler Reservoir. See 7.5 Project Recharge, Storage & Recovery Development Map for general location of the proposed recharge area and associated features.

Other areas considered for RSR, include the Swingle Bench and Hazen. These areas, however, were found to be unsuitable due to the limitation of area, generally poor water quality of the ground water (Arsenic, manganese, high total dissolved solids, iron etc.) and relatively shallow (30' - 60') water tables. Other areas within Lahontan Valley located further east in the Valley were not considered due to the occurrence of shallow (5 to 20 feet) static water tables and a generally upward hydraulic gradient.

Specifically, the potential recharge area lies within Sections 29, 30, 31 and 32, T.19N., R.27E., Sections 5, 6, 7, 8,16,17,19, and 20 of T.18N., R.27E., Sections 35 and 36 of T.19N., R.26E. and Section 1 and 2 of T.18N., R.26E. and is bounded on the west by the Rock Dam irrigated lands along the Carson River, on the north by the V-Line canal, on the east by Bad Lands and the south by steeper topography associated with the alluvial fan of the Dead Camel Mountains.

The depth to water table in this area varies from about 50 to 117 feet in the northern area (Sections 29 and 31, T.19N., R.27E.) as measured in ground water irrigation wells

developed in this area. According to a ground water study (WRD, 1982) conducted in 1982, the water table in Sections 29 and 31 appear to be recharged by the V-Line Canal and the depth to ground water increases with increasing distance south from the Canal. The depth to static water table within this proposed area, further to the south and higher on the alluvial fan, is reported to be in the order of 300 feet where a few scattered domestic wells are located. (Evans, 1988). WRD recently completed a RSR pilot project which indicated favorable results for this site.

Topographically**,** the proposed recharge area slopes to the north and east. On the northern portion of the proposed RSR area, the slopes vary between 1 and 1.25 percent. Further to the south, the slopes increase to 5% and further up the fan the slopes increase to about 13%. These slopes (1 to 5%) are adaptable for the construction of contour infiltration basins. (Ref. USGS 7.5 quadrangle topographic maps: Lahontan Dam, Nevada and Sheckler Reservoir, Nevada)

The Soil Conservation Service (SCS) has mapped (Dollarhide, 1975) the soils (0 - 60”) of this proposed recharge area as predominately Bango-Stumble (BK) sandy loams, loamy sands and the Tipperary Sand (TnA & TnC) Associations. These soil associations respectively, exhibit infiltration rates varying from 0.2 to 0.6-inches per hour and 6.0 to over 20-inches per hour in the top 60-inches of the profile. Assuming a conservative (low) infiltration rate of 0.20-inches per hour, 10-feet or 120-inches could be infiltrated in about 600-hours or 25-days (120”/0.20”/Hr). Since this amount of water can be infiltrated in less than a month, there appears to be minimal time constraints for this process, thereby allowing the rotation of water between basins and allowing ample “rest” time between applications.

The specific yield, as estimated by Cohan, 1963 on a textural basis are reported to be less than 1% for clay, 19% for silt, 20-28% for sand, and 18-19% for gravel. Glancy, 1986 estimated, conservatively, a specific yield at 10% for the inter-bedded alluvial and lacustrine deposits in Lahontan Valley. Assuming this conservative (low) specific yield of 0.10 and a mean aquifer unsaturated depth of 100 feet (0.10 x 100’ = 10’),

approximately 10 AF per acre can be stored in the proposed recharge area. Based upon these assumptions, about 2500 acres and 2800 acres respectively of recharge area will be required to store Phase I (25,000 AF) and II (28,000 AF) annual recharge.

The general slope of the proposed recharge area varies from about 1% to 5%. Contour basins are proposed as the method of impounding and infiltrating the surface water into the ground water aquifer(s). Contour basins having a 2:1 dry slope, a 4:1 wet slope, and a 20 foot berm by 10 feet high cross section have been chosen to contain the infiltration water. On the 1% slopes, the spacing or width of contour basins would be about 800 feet, while on the 5% sloping areas the basins width would be about 160 feet. Phase I contour basins will be sited primarily on 1 to 2% slopes, while Phase II basins will be sited on 2 to 5% slopes.

Recharge Area: Phase I recharge area would be located within Sections 1 and a portion of 2, T.18N., R.26E., a portion of Section 36, T.19N., R.26E. and Section 31 T.19N., R.27E., encompassing about 2,500 acres and generally located east of Lahontan Reservoir and south of the V-Line Canal. Phase II would be expanded generally to the east and north and would include a portion of Section 29, Section 30, portion of Section 32, T.19N., R.27E., and a portion of Section 5 and Section 6, T.18N., R.27E., encompassing about 2,800 acres. Total potential recharge area for Phase I and II approximates 5,300 acres (2,500 + 2,800). .

Lahontan Supply Pump Station: A pump station is sited within Section 34, T.19N., R.26E., from which influent supply water from Lahontan Reservoir (mean elevation 4100') is pumped from the TCID outlet penstock. The penstock would be modified and valved in such a manner that influent could be delivered to the RSR pumping station during both the non-irrigation and irrigation seasons. For both Phases, the mean discharge rate of this pumping plant taking raw water from the penstock and delivering to the infiltration area, approximates 16,000 gpm or about 36 cfs. The electrical horsepower (EHP) demand for Phases I and II are 1469 EHP and 2204 EHP,

respectively. This power demand is required to lift the water from the reservoir and to meet head loss in the 36” pipeline distribution system serving the infiltration basins.

Recharge Distribution System: The Lahontan pump station delivers influent, or raw water, from the reservoir through a 36” pipeline distribution system to the individual infiltration basins. About 26 miles and 31 miles of pipeline are required for this delivery system for Phase I and Phase II, respectively. Each basin would be equipped with several delivery gates enabling the application of water in a rapid and uniform manner. The delivery and application of influent water would be made much in the same manner, as it is to Project irrigated lands. (i.e., large border irrigation with high flow rates (20 - 35 cfs) introduced over relatively short periods of time (4 - 6 hr.)).

Recharge Recovery Pump Stations: For Phase I and Phase II, 26 and 30 ground water wells would be constructed, respectively over the recharge area and spaced on a one-half-mile grid. Line-shaft driven, deep turbine pumps, installed in each of these wells, would be capable of discharging about 1000 gpm against a TDH of 250 feet. The electrical horsepower (EHP) demand under peak day condition will require about 100 EHP per pump. Each of the production wells would be manifolded together in a delivery system consisting of 10”, 12”, 18”, 30”, 36” and 42” diameter pipelines. This system of pipelines would commingle and convey the total discharge to a central point, located near the northwestern corner of the infiltration area, near the Carson Dam. For Phases I and II, about 13 miles and 10 miles, respectively, of pipeline are required to manifold these wells together.

Treatment Plant: In the event that the surface water stored in the ground requires treatment, a central treatment plant may be located near the Carson Dam. For purposes of capital and annual O & M cost comparison, a 40 MGD and a 43 MGD plant is considered for the removal of arsenic along with no treatment, except for disinfection at the well head. Water quality would be monitored in the event the discharge constituent concentrations were less than the maximum contaminate levels (MCLs) set by the State.

Booster Pump Station: A booster pump station is proposed to be sited near the Carson Dam where the production well discharge from the RSR area is conveyed pressurizing the load center located in Section 25, T.19N., R.28E. near the City of Fallon. For Phase I, a 13.5-mile 42" pipeline is proposed and routed along U.S. Hwy 50 from the vicinity of the Carson Dam to the load center. For Phase II, a 14.5-mile 42" pipeline is routed to the east from the RSR aligned along Sheckler Road and thence to the load center. The respective EHP demand to meet peak daily demand rates for Phases I and II is approximated at 4,168 EHP and 5,226 EHP. The booster pump stations are designed to deliver 26,700 gpm and 30,030 gpm, respectively for Phase I and II against respective TDH's of 340' and 379' to meet pipeline head losses and develop 120 psi at the load center.

Power: About 8.5 miles of 34.5 KV, three-phase 220/440-volt Power line extension/ upgrade is required from the vicinity of the "Y" at the intersection of U.S. Hwy 50 and Alt. U.S. Hwy 50 to Lahontan Dam. For Phase I, an additional 14.5-miles of power line extension is required to service the production wells within the RSR area. For Phase II an additional 20-miles of power line extension is required.

Transmission System: For purposes of manifolding the ground water wells together and to serve outlying rural areas within the County, a transmission system (conveyance, pumping plants, storage, fire hydrants & service connections) is included. See Chapter 6 for details.

Capital and Operation & Maintenance Costs: These costs have been developed for Phase I and Phase II in Tables 7.5.1 and 7.5.2 respectively.

TABLE 7.5.1 PROJECT RECHARGE, STORAGE & RECOVERY CAPITAL & O&M COSTS FOR PHASE I, YEAR 2025 (21,531 AFA)

ITEM[1]	DESCRIPTION	UNIT COST	UNIT	QUANTITY	CAPITAL COSTS[2]	ANNUAL O&M COSTS[3]
					$x1,000,000	$x1000
1	Lahontan Diversion Structure	$700,000	LS	1	$0.70	$35.00
2	Lahontan Diversion Pump Station	$400	HP	1469	$0.59	$29.38
3	10" Pipeline	$3.50	IDF	22,387	$0.78	$7.84
4	12" Pipeline	$4.30	IDF	19,589	$1.01	$10.11
5	18" Pipeline	$4.30	IDF	8,395	$0.65	$6.50
6	30" Pipeline	$5.00	IDF	2,798	$0.42	$4.20
7	36" Pipeline	$5.50	IDF	148,685	$29.44	$294.40
8	42" Pipeline	$5.50	IDF	76,876	$17.76	$177.58
9	Controls & Fittings	Pipe Capital x 5%	%		$2.50	$250.31
10	Production Wells	$200,000	EA	26	$5.20	$260.00
11	Well Head Disinfection	$30,000	EA	26	$0.78	$257.40
12	Production Well Turbine	$300	HP	2,600	$0.78	$39.00
13	Booster Pumps	$400	HP	4,168	$1.67	$83.36
14	Three-Phase Power Extension	$75,000	MI	23	$1.73	$17.25
15	Power Consumption	$0.06	KWh	31,714,161		$1,902.85
16	Recharge Basins	$5,000	AC	2,500	$12.50	$1,250.00
17	Ground Level Storage	$0.23	GAL	18,278,550	$4.20	$420.41
18	Elevated Storage	$2.00	GAL	1,500,000	$3.00	$300.00
19	Service Area Transmission System	$28,090,000	LS	1	$28.09	$1,404.50
20	40 MGD Arsenic Treatment	$37,376,000	LS	1	$37.38	$4,115.00
21	**Capital Subtotal:**				**$111.80**	
21a	**Capital Subtotal:**				**$148.39**	
22	Subdivision Distribution[4]	$3,000	CON	11,573	$34.72	$1,735.95
23	Residential Service & Meter[4]	$1,000	EA	11,573	$11.57	$1,157.30
24	Commercial Service & Meter[4]	$1,000	EA	330	$0.33	$33.00
25	Stock/Dairy Service & Meter[4]	$4,000	EA	120	$0.48	$48.00
26	Fire Hydrants[4]	$1,500	EA	1,160	$1.74	$87.00
27	Fallon Distribution O&M[5]					$1,618.10
28	FPST Distribution O&M[5]					$100.07
29	NAS Distribution O&M[5]					$185.84

30	Environmental & Permitting	Capital x 10%	%		$11.18	
30a	Environmental & Permitting	Capital x 10%	%		$14.84	
31	Engineering & Planning	Capital x 10%	%		$11.18	
31a	Engineering & Planning	Capital x 10%	%		$14.84	
32	Contingency	Capital x 20%	%		$22.36	
32a	Contingency	Capital x 20%	%		$29.68	
33	**Subtotal:**				**$156.52**	**$11,715.33**
33a	**Subtotal:**				**$207.75**	**$15,572.93**
34	Irrigated Land	$2,500	AC	640	$1.60	
35	Non-Irrigated Land	$300	AC	1,860	$0.56	
36	Water Rights	$1,000	AF	25,204	$25.20	
37	Water Right Applic. & Survey	$1,250	APP	720	$0.90	
38	Water Right Permit	$2	AF	25,204	$0.05	
39	**TOTAL:**				**$184.83**	**$11,715.33**
39a	**TOTAL:**				**$236.07**	**$15,572.93**

[1] Item numbers which include a subletter include centralized treatment for arsenic and those without subletters is without treatment for this constituent.

[2] 2001 capital costs in millions of dollars

[3] 2001 O&M costs in thousands of dollars per year

[4] Assume developer will pay capital cost, therefore not included in capital subtotals. Upon dedication the water purveyor will pay the annual O&M

[5] Estimated O&M for transmission, distribution, commercial & residential services, hydrants & existing storage

TABLE 7.5.2 PROJECT RECHARGE, STORAGE & RECOVERY CAPITAL & O&M COSTS FOR PHASE II, YEAR 2050 (24,216 AFA)

ITEM[1]	DESCRIPTION	UNIT COST	UNIT	QUANTITY	CAPITAL COSTS[2]	ANNUAL O&M COSTS[3]
					$x1,000,000	$x1000
1	Lahontan Diversion Structure	$100,000	LS	1	$0.10	$5.00
2	Lahontan Diversion Pump Station	$400	HP	2204	$0.88	$44.08
3	10" Pipeline	$3.50	IDF	25,186	$0.88	$8.82
4	12" Pipeline	$4.30	IDF	19,589	$1.01	$10.11
5	18" Pipeline	$4.30	IDF	2,798	$0.22	$2.17
6	30" Pipeline	$5.00	IDF	5,597	$0.84	$8.40
7	36" Pipeline	$5.50	IDF	174,874	$34.63	$346.25
8	42" Pipeline	$5.50	IDF	76,560	$17.69	$176.85
9	Controls & Fittings	Pipe Capital x 5%	%		$2.76	$276.29
10	Production Wells	$200,000	EA	30	$6.00	$300.00
11	Well Head Disinfection	$30,000	EA	30	$0.90	$297.00
12	Production Well Turbine	$300	HP	3,000	$0.90	$45.00
13	Booster Pumps	$400	HP	5,226	$2.09	$104.52
14	Three-Phase Power Extension	$75,000	MI	20	$1.50	$15.00
15	Power Consumption	$0.06	KWh	41,280,055		$2,476.80
16	Recharge Basins	$15,000	AC	2,800	$42.00	$4,200.00
17	Ground Level Storage	$0.23	GAL	27,154,375	$6.25	$624.55
18	Elevated Storage	$2.00	GAL	500,000	$1.00	$100.00
19	Service Area Transmission System	$36,464,000	LS	1	$36.46	$1,823.20
20	43 MGD Arsenic Treatment	$40,179,200	LS	1	$40.18	$4,423.63
21	**Capital Subtotal:**				**$156.10**	
21a	**Capital Subtotal:**				**$195.38**	
22	Subdivision Distribution[4]	$3,000	CON	13,657	$40.97	$2,048.55
23	Residential Service & Meter[4]	$1,000	EA	13,657	$13.66	$1,365.70
24	Commercial Service & Meter[4]	$1,000	EA	360	$0.36	$36.00
25	Stock/Dairy Service & Meter[4]	$4,000	EA	340	$1.36	$136.00
26	Fire Hydrants[5]	$1,500	EA	805	$1.21	$60.38
27	Fallon Distribution O&M[5]					$1,769.85
28	FPST Distribution O&M[5]					$45.12
29	NAS Distribution O&M[5]					$83.80

30	Environmental & Permitting	Capital x 10%	%		$15.61	
30a	Environmental & Permitting	Capital x 10%	%		$19.54	
31	Engineering & Planning	Capital x 10%	%		$15.61	
31a	Engineering & Planning	Capital x 10%	%		$19.54	
32	Contingency	Capital x 20%	%		$31.22	
32a	Contingency	Capital x 20%	%		$39.08	
33	**Subtotal:**				**$218.54**	**$16,409.43**
33a	**Subtotal:**				**$273.54**	**$20,536.06**
34	Irrigated Land	$2,500	AC	360	$0.90	
35	Non-Irrigated Land	$300	AC	2,440	$0.73	
36	Water Rights	$1,000	AF	28,346	$28.35	
37	Water Right Applic. & Survey	$1,250	APP	810	$1.01	
38	Water Right Permit	$2	AF	28,346	$0.06	
39	**TOTAL:**				**$249.59**	**$16,409.43**
39a	**TOTAL:**				**$304.58**	**$20,536.06**

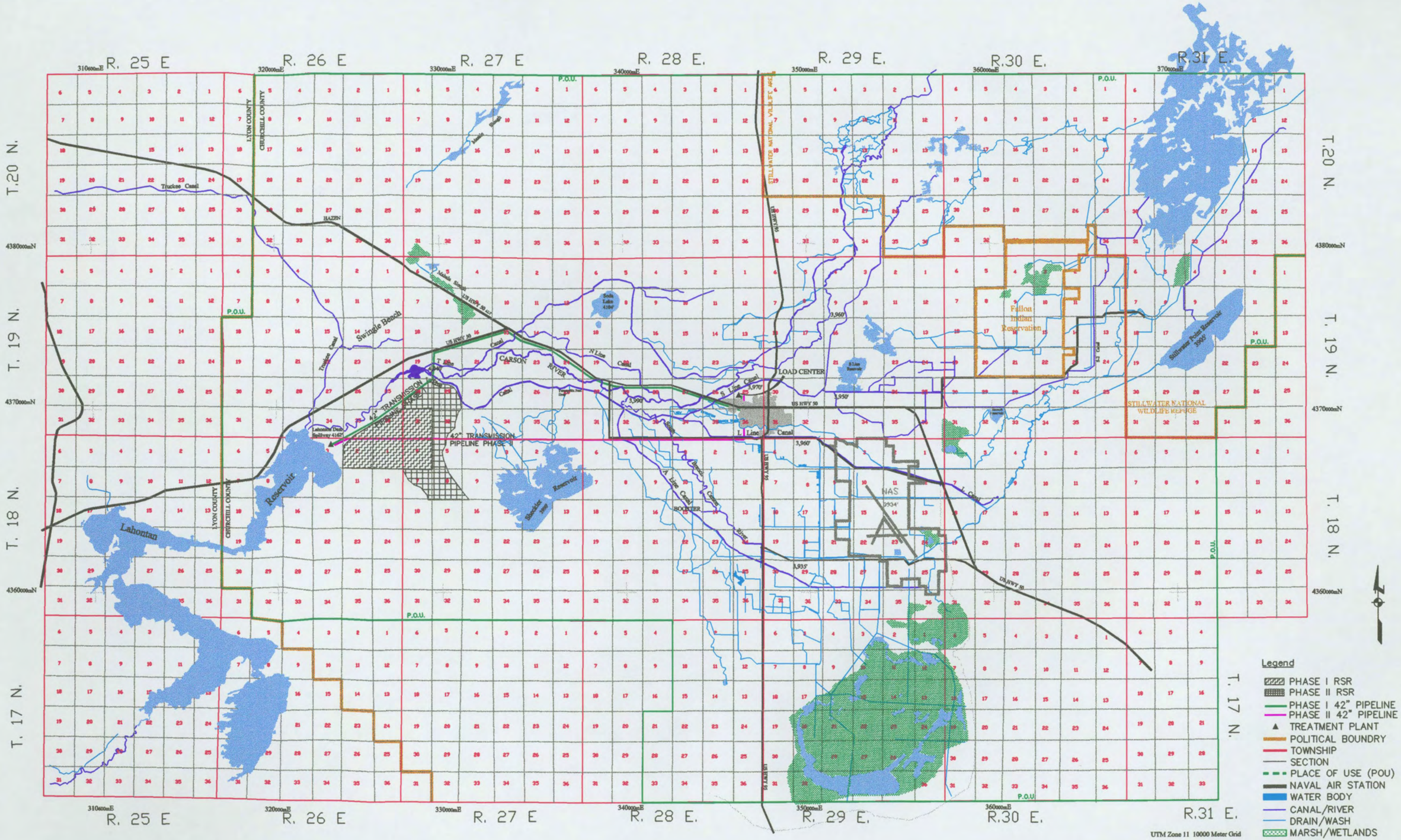
[1] Item numbers which include a subletter include centralized treatment for arsenic and those without subletters is without treatment for this constituent.

[2] 2001 capital costs in millions of dollars

[3] 2001 O&M costs in thousands of dollars per year

[4] Assume developer will pay capital cost, therefore not included in capital subtotals. Upon dedication the water purveyor will pay the annual O&M

[5] Estimated O&M for transmission, distribution, commercial & residential services, hydrants & existing storage



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T.17–20N, R.25–31E, M.D.B.&M.

7.5 CHURCHILL COUNTY WATER PLAN PROJECT RECHARGE, STORAGE AND RECOVERY DEVELOPMENT

FILE NAME Fig_7-5.dwg
JOB NO. 99-67D
DATE January 5, 1999
SHEET 1 OF 1

7.6 DIXIE-FAIRVIEW AREA GROUND WATER IMPORTATION

Water Resource Quantity & Quality: The Dixie-Fairview Area (Valley) lies about 60 highway miles to the east of Lahontan Valley within Churchill and Pershing Counties. This Valley is the lowest valley in the northern and central Nevada area. The Valley floor elevations range from about 3400' to 3470' or about 550' lower than the valley floor in Lahontan Valley. The annual perennial ground water yield has been estimated by the USGS to be about 31,000 AF (Harrill, 1995) while other estimates (Durbin, 1996) suggest that the yield is in the order of 40,000 to 50,000 AFA. Currently, the State Engineer has permitted about 14,000 AF for irrigation purposes in the southern portion of the Valley in Churchill County. The U.S. Navy (Navy) now has ownership of these water rights following condemnation of the land and water rights originally owned and perfected by civilian farmers and ranchers. The Navy now has reserved rights to the Valley for a Military Operations Area (MOA) for low altitude, supersonic combat- aircraft training purposes. As a result of the Navy's condemnation actions and formation of this MOA, very little civilian activity, except a geothermal plant and some mining, is located in the Valley.

Churchill County owns 56,472 AF of ground water right applications (Applications 49200-49205 and 49794-49800), having priority dates of 1985 and 1986. These Applications are in "good standing" with the Nevada State Engineer and are ready for permitting. No protests were lodged against these applications and little or no environmental impacts are anticipated with development of these water rights. Currently, there is a joint effort ongoing whereby the Navy water rights may be dedicated to the Community Water System in exchange for quasi-municipal water service to the Naval Air Station in Fallon and their Dixie Valley facilities.

The water quality of the ground water in the Valley generally meets the maximum contaminate levels (MCLs) for a public water supply as set by the Nevada Bureau of Health and Protection. In some wells, however, the fluoride content does exceed the

MCL of 1.8 mg/l. The arsenic levels of the existing ground water wells varies from 3 ppb to 25 ppb.

Environmental Impact & Permitting: Proposed pipeline easements are primarily aligned along highway rights of way whereby the buried pipeline poses little or no adverse impact or safety concerns (NDOT, 1998). Phase I well field and a portion of the mainline are aligned along the State Route 121 (S.R. 121) right of way. Phase II, extending about 50 miles north of U.S. 50, will be located primarily on Bureau of Land Management (BLM) property, thereby requiring permitting for easements from the BLM. From a point about 8 miles north of U.S. 50, along the S.R. 121 right of way, the pipeline is routed in a southwesterly direction about 12 miles across the U.S. Naval Reservation to the intersection with the U.S. 50 right of way at the "T" intersection with S.R. 839 at the base of the Stillwater Range. From this point at the base of the Stillwater Range, the proposed pipeline is aligned along the Highway 50 right of way for about 32 miles to the load center near the City of Fallon. Some additional easements, and perhaps land acquisitions, will be required at the Sand Springs Pass summit for the storage facilities. Some permitting may be required to cross the Naval Reservation and/or the BLM land.

Pursuant to Senate Bill 108, as enacted by the 1999 Nevada Legislative session, which amended NRS 533.370, the State Engineer must consider the following section before permitting an inter-basin transfer: 533.370 (4) (a) whether the applicant has justified the need to import the 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 being effectively 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 future growth and development in the basin from which the water is exported; and (e) any other factor the State Engineer determines to be relevant. Since there were no protests filed against the Applications made for the export of ground water from Dixie Valley to the

service area within Lahontan Valley and the water is being taken from a military operations area where water fowl and civilian uses are incompatible with military activities, there appears to be little or no adverse environmental impact upon either Dixie or Lahontan Valley resulting from this proposed Project. The need to import water is justified to allow growth to proceed, especially if the actions outlined in Table 3.3.2 are implemented, which threaten Project diversions, irrigated acreage, storage limits in Lahontan Reservoir and ground water recharge in Lahontan Valley. Because of the unique situation in Dixie Valley, whereby growth will be virtually non-existent due to the Navy's military operations, it is not anticipated that the enactment of Senate Bill 108 will jeopardize an inter-basin transfer.

Power line construction will be required along SR 121 for about 34 miles extending from U.S. 50 to Well #1 at the northern end of the Well Field. The easement for this power would be aligned along SR 121 and along existing power easements on SR 121 for the Oxbow Geothermal transmission power lines. Again, there does not appear to be any significant environmental impact resulting from this power line extension. Phase II will require about 16 miles of additional power line extension to service the northern end of the well field.

Phase I Project Description: Phase I of the Project is proposed to develop 21,531 AF of ground water per year at an average demand flow rate of 13,350 gpm. For design purposes, a flow rate of 26,700 gpm is used to design the well field, conveyance system, pumping stations, and pumping plant. The system design includes a 25-mile well field with ten (10) ground water wells and a 44-mile mainline conveying the discharge to the load center near the City of Fallon. Total horsepower demand for this system approximates 18,707 horsepower (EHP).

Ground Water Wells: Ten (10) ground water wells spaced from one mile to 4.5 miles along a 25-mile long mainline, constitutes the well field. The well field is located in the southern portion of Valley, south of the Valley playa and aligned along State Route 121. This well field has a north-south orientation with the Settlement Area where ground

water has been developed (14,000 AF) by civilians for irrigation purposes under the Desert Land Act and Cary Land Act. These lands and water rights are now controlled and owned by the Navy. See Map 7.6 showing the layout of the well field and pumping stations. Well #1, at the lowest point of the well field, is sited at a ground elevation of 3445' while Well #10, sited at a ground elevation of 4100' results in an elevation gain within the well field of about 655'. The ground water wells are specified as being 400' deep by 16" diameter gravel enveloped structures with 100-foot sanitary seal. Wells are equipped with wellhead disinfection facilities under the non-treatment for fluoride and arsenic alternative. If fluoride and arsenic are treated at a central plant, no wellhead disinfection will be required. While recognizing that most of the existing wells in the Valley are artesian, a pumping lift of 100 feet is assumed for design purposes. Actual pumping lifts are expected to range from 50' to 70' while the mean discharge per well is projected to be about 2700 gpm. These estimates of discharge and pumping lifts are based upon pump tests conducted for the Navy (Kercheval Engineers, 1996) and earlier pump tests conducted by the University of Nevada (University of Nevada Cooperative Extension Service, 1978) on existing wells in the Valley.

Ground Water Well Pumps: Well #1 deep turbine pump is designed to draw 241 horse power (HP) to pump 2700 gpm against a total dynamic head (TDH) of 230'. The TDH includes the pumping lift, the elevation head difference between Well #1 and Well #2 Booster, the friction head loss resulting from the pumping of 2700 gpm through 5,280' of 12" pipeline (Schedule 40 steel) and the required pressure head (46') at the suction inlet of Booster #2. Assumed overall pumping plant efficiency is 65% for the deep turbine well pumps and 55% for the inline booster pumping stations. The remaining well pumping plants (#2 - #10) are designed to draw 153 HP each pumping 2700 gpm against a TDH of 146 feet. Electric motor drivers, powered by 220/440-volt three-phase 34.5 KV service are specified for all of the ground water deep turbine and booster pumps. The total horsepower demand for the ten (10) deep turbine ground water pumps is calculated at 1618 HP.

Inline Booster Pumps: Nine (9) inline booster pumps respectively manifolded with Well #2 through & including Well #10 demand about 12,626 HP to overcome pipeline friction losses and elevation gain as the discharge is pumped along the mainline. Each well pump discharge, excepting Well #1 is manifolded immediately downstream of the respective booster pump suction intake. Booster pumps are specified as either short-coupled turbines or horizontal centrifugal type. A tenth booster (Frenchman Booster) located on the 42" mainline along Highway 50 at the intersection of Highway 50 and State Route 839 requires an additional 4,463 HP. The Frenchman Booster at 4274' lifts the discharge to Sand Spring Summit to an elevation of 4610'. See Table 7.6.1 Schedule of ground water well and booster horsepower demand.

TABLE 7.6.1 PHASE I DIXIE-FAIRVIEW AREA GROUND WATER WELL & BOOSTER PUMP HORSEPOWER SCHEDULE

PUMP DESCRIPTION	WELL HORSE POWER (EHP)	BOOSTER HORSE POWER (EHP)
Well #1	241	
Well #2	153	
Booster #2		253
Well #3	153	
Booster #3		249
Well #4	153	
Booster #4		927
Well #5	153	
Booster #5		545
Well #6	153	
Booster #6		1688
Well #7	153	
Booster #7		807
Well #8	153	
Booster #8		1468
Well #9	153	
Booster #9		2722
Well #10	153	
Booster #10		3967
Frenchman Booster		4463
Totals:	**1,618**	**17,089**

Power: A 34.5 KV distribution power line, operated by Sierra Pacific Power Company (SPPCo) is aligned along the entire length of U.S. 50 from Drumm Summit to Lahontan Valley. Approximately thirty four (34) miles of 34.5 KV distribution power line must be constructed to the north, extending 34 miles from U.S. 50 along SR 121 to service the well field well, booster pumping plants, and treatment plant. The Frenchman Booster plant can be serviced directly from the existing 34.5 KV power line along U.S. 50. Under this proposed ground water well-pump diversion and conveyance by booster pumping stations; no substations are required within the well field or at the Frenchman

Booster. Some substation changes may have to be made in the Fallon area (SPPCo., 1996), however.

Alternatively, power may become available from the Oxbow Power 230 KV transmission power line that parallels SR 121 and extends over Sand Springs Summit. If this alternative was considered, substations would be required to reduce the 230 KV transmission voltage to 34.5 KV voltage.

Pipeline: The pipeline within the well field is made up of 12", 18", 24", 30", 36" and 42" pipes beginning at Well #1 through and including Well #10 over a 25-mile distance. From Well #10 to the load center in Section 25, T.19N., R.28E., the 42" mainline extends an additional 45 miles. The total length of the pipeline (well field and mainline) approximates 70 miles. See Table 7.6.3 showing the linear amounts of pipeline specified for this proposed Project.

Treatment Plant: Under the alternative whereby treatment for fluoride and/or arsenic is required, the proposed plant would be located just downstream of Booster Pump #10 along SR 121 where the total discharge of the well field could be treated.

Storage & Service: Approximately one-half of the total storage requirement of about 19,000,000 gallons is proposed to be sited at the summit of Sand Springs Pass, thereby allowing a significant amount of storage reserve that can be made available to the service area with gravity head. Under peak-day-demand (26,700 gpm) the operating pressure at the load center at the City will approximate 120 psi and about 27 psi at the Rattlesnake storage tanks. On the western side of the service area, under peak-day-demand, the operating pressure in the vicinity of Bench Road will approximate 60 psi.

Land Acquisition: Land acquisition for siting of the booster and well stations, the treatment plant and storage facilities are estimated at 120 acres. Most of this land, except for a portion of land for storage on Sand Springs Summit is in BLM ownership.

Phase II Project Description: Phase II of the Project is proposed to develop 24,216 AF of ground water per year at an average demand flow rate of 15,015 gpm. For design purposes, a flow rate of 30,030 gpm is used to specify the well field, conveyance system, pumping station and treatment plant improvements. The system design includes a 35.6-mile well field with 11 wells and a 52.9-mile mainline to convey the discharge to the load center in the City of Fallon. Total horsepower (HP) demand for this system approximates 24,553 HP. The actual placement of Phase II will be based upon the pumping results gained from Phase I. Consequently, the layout as shown in Map 7.6 may not represent the final layout of Phase II. The layout of the Phase II well field is conservative (longer) and represents a "worst case" scenario with the two well fields for Phase I and Phase II separated to the extent shown on Map 7.6. Such a separation may be necessary to extract a total of (21,531 + 24,216) 45,747 AFA from the ground water aquifer without well interference.

Ground Water Wells: For Phase II, eleven (11) ground water wells (#11 through & including #21) are spaced from two to seven miles along a 35.6-mile well field mainline or manifold. The elevation gain within the well field (Wells #13 & 14 to Well #21) is approximately 460 feet where the elevation varies from 3410' to 3870'. This well field parallels the Phase I well field and is offset to the east. Wells for Phase II are spaced 1.5 to 3.0 miles from Phase I wells. This portion of the Phase II well field also traverses the "Settlement Area" where high-production ground water wells have been developed in the past and have a documented performance history (Kercheval Engineers, 1996 & UNR, 1978). Additionally, the Phase II well field extends north from the Phase I well field about 16 miles where Wells #11, #12, #13, and #14 are sited. The wells are specified in the same manner as for Phase I where the design discharge is 2700 gpm.

Ground Water Well Pumps: Phase II, Well #11 deep turbine pump is designed to draw 558 HP while the other ten (10) ground water wells are designed to draw 153 HP each. Total ground water well horsepower demand for all 11 Phase II well pumping plants approximates 2,088 HP. The same assumptions (pumping lift, pressure head, friction losses etc.) are made in sizing these pumps as in Phase I.

Inline Booster Pumps: Ten (10) inline booster pumps, respectively, manifolded with Wells #12 through and including #21, demand 17,515 HP to overcome pipeline friction losses and elevation gain as the discharge is pumped along the well field manifold pipeline and mainline to the Frenchman booster station. The eleventh (11) booster (Frenchman Booster), at the base of the Stillwater Range demands an additional 4,950 HP. See Table 7.6.2 Phase II Dixie-Fairview Area Ground Water Well and Booster Pump Horse Power Schedule.

TABLE 7.6.2 PHASE II DIXIE-FAIRVIEW AREA GROUND WATER WELL & BOOSTER PUMP HORSEPOWER SCHEDULE

PUMP DESCRIPTION	WELL HORSE POWER (EHP)	BOOSTER HORSE POWER (EHP)
Well #11	558	
Well #12	153	
Booster #12		721
Well #13	153	
Booster #13		167
Well #44	153	
Booster #14		417
Well #15	153	
Booster #15		434
Well #16	153	
Booster #16		744
Well #17	153	
Booster #17		1050
Well # 18	153	
Booster #18		1349
Well #19	153	
Booster #19		1952
Well # 20	153	
Booster #20		1736
Well # 21	153	
Booster #21		8945
Frenchman Booster		4950
Totals:	**2,088**	**22,465**

Power: Approximately 38 miles of 34.5 KV distribution power line must be constructed to service the well field of Phase II. This additional extension starting at SR 121 in the vicinity of Well #10, would extend about 12 miles north of U.S. 50 and continue northward 38 miles to service the Phase II well field.

Pipeline: The pipeline within the well field, will be made up of 12”, 18”, 24”, 30”, and 42” diameters beginning at Well #11 through and including Well #21 over a 35-mile

distance. From Well #21 to the load center in Section 25, T. 19N, R.28E, the 42" mainline extends an additional 53 miles. The routing of the mainline within the service area, is to the south of the Fallon Naval Station in a westerly direction and north along U.S. 95 to the load center near the City, thereby allowing a looping of the main service pipelines with the Phase I mainline that follows the right of way of U.S. 50 all the way into the City. See Map 7.6. Also see Table 7.6.4 Dixie Valley Ground Water Importation Project Capital and O&M Cost for Phase II, year 2050, showing the linear amount of pipeline specified for this phase of the proposed Project.

Treatment Plant: Under the alternative whereby treatment for fluoride and/or arsenic is required, the proposed Phase II treatment plant component would be located in the vicinity and downstream of Well # 21, thereby treating the total discharge of Phase II.

Storage & Service: Approximately one-half (10,000,000 gal) of the total storage requirement of about 20,000,000 gallons, is proposed to be sited at the summit of Sand Springs Pass, thereby allowing a significant amount of storage reserve that can be made available under gravity head. Under peak day demand, the operating pressure at the load center will approximate 120 psi and about 27 psi at the Rattle Snake storage tanks. While the Phase II well field and mainline may be operated separately from the Phase I system, the two systems may be commingled and looped to afford improved service (pressure & discharge) to the entire service area.

Summary: See Tables 7.6.3 and 7.6.4, which summarize the capital and O & M cost associated with Phases I and II respectively. Tables 7.0.2 and 7.0.3 summarize the capital and O & M costs associated with Phases I and II for all the projects described in Sections 7.1 - 7.6.

TABLE 7.6.3 DIXIE VALLEY GROUND WATER IMPORTATION PROJECT CAPITAL & O&M COSTS FOR PHASE I, YEAR 2025 (21,531 AFA)

ITEM[1]	DESCRIPTION	UNIT COST	UNIT	QUANTITY	CAPITAL COSTS[2]	ANNUAL O&M COSTS[3]
					$x1,000,000	$x1000
1	Production Wells	$200,000	EA	10	$2.00	$100.00
2	Well Head Disinfection	$30,000	EA	10	$0.30	$99.00
3	12" Pipeline	$4.30	IDF	5,280	$0.27	$2.72
4	18" Pipeline	$4.30	IDF	13,200	$1.02	$10.22
5	24" Pipeline	$5.00	IDF	26,400	$3.17	$31.68
6	30" Pipeline	$5.00	IDF	34,480	$5.17	$51.72
7	36" Pipeline	$5.50	IDF	29,040	$5.75	$57.50
8	42" Pipeline	$5.50	IDF	261,360	$60.37	$603.74
9	Controls & Fittings	Pipe Capital x 5%	%		$3.79	$378.79
10	Production Well Turbine	$300	HP	1,618	$0.49	$24.27
11	Booster Pumps	$400	HP	17,089	$6.84	$341.78
12	Three-Phase Power Extension	$60,000	MI	34	$2.04	$20.40
13	Power Consumption	$0.06	KWh	61,124,748		$3,667.48
14	Ground Level Storage	$0.23	GAL	18,278,550	$4.20	$420.41
15	Elevated Storage	$2.00	GAL	1,500,000	$3.00	$300.00
16	Service Area Transmission System	$28,090,000	LS	1	$28.09	$1,404.50
17	40 MGD Fluoride & Arsenic Treatment	$28,212,000	LS	1	$28.21	$1,937.00
18	**Capital Subtotal:**				**$126.50**	
18a	**Capital Subtotal:**				**$154.41**	
19	Subdivision Distribution[4]	$3,000	CON	11,573	$34.72	$1,735.95
20	Residential Service & Meter[4]	$1,000	EA	11,573	$11.57	$1,157.30
21	Commercial Service & Meter[4]	$1,000	EA	330	$0.33	$33.00
22	Stock/Dairy Service & Meter[4]	$4,000	EA	120	$0.48	$48.00
23	Fire Hydrants[4]	$1,500	EA	1,160	$1.74	$87.00
24	Fallon Distribution O&M[5]					$1,618.10
25	FPST Distribution O&M[5]					$100.07
26	NAS Distribution O&M[5]					$185.84

27	Environmental & Permitting	Capital x 10%	%		$12.65	
27a	Environmental & Permitting	Capital x 10%	%		$15.44	
28	Engineering & Planning	Capital x 10%	%		$12.65	
28a	Engineering & Planning	Capital x 10%	%		$15.44	
29	Contingency	Capital x 20%	%		$25.30	
29a	Contingency	Capital x 20%	%		$30.88	
30	**Subtotal:**				**$177.10**	**$12,479.47**
30a	**Subtotal:**				**$216.18**	**$14,317.47**
31	Non-Irrigated Land	$300	AC	120	$0.04	
32	Water Right Applic. & Survey	$1,250	APP	10	$0.01	
33	Water Right Permit	$2	AF	21,531	$0.04	
34	**TOTAL:**				**$177.19**	**$12,479.47**
34a	**TOTAL:**				**$216.27**	**$14,317.47**

[1] Item numbers which include a subletter include centralized treatment for fluoride and arsenic and those without subletters is without treatment for these constituents.

[2] 2001 capital costs in millions of dollars

[3] 2001 O&M costs in thousands of dollars per year

[4] Assume developer will pay capital cost, therefore not included in capital subtotals. Upon dedication the water purveyor will pay the annual O&M

[5] Estimated O&M for transmission, distribution, commercial & residential services, hydrants & existing storage

TABLE 7.6.4 DIXIE VALLEY GROUND WATER IMPORTATION PROJECT CAPITAL & O&M COSTS FOR PHASE II, YEAR 2050 (24,216 AFA)

ITEM[1]	DESCRIPTION	UNIT COST	UNIT	QUANTITY	CAPITAL COSTS[2]	ANNUAL O&M COSTS[3]
					$x1,000,000	$x1000
1	Production Wells	$200,000	EA	11	$2.20	$110.00
2	Well Head Disinfection	$30,000	EA	11	$0.33	$108.90
3	12" Pipeline	$4.30	IDF	31,680	$1.63	$16.35
4	18" Pipeline	$4.30	IDF	36,960	$2.86	$28.61
5	24" Pipeline	$5.00	IDF	27,984	$3.36	$33.58
6	30" Pipeline	$5.00	IDF	24,288	$3.64	$36.43
7	36" Pipeline	$5.50	IDF	32,736	$6.48	$64.82
8	42" Pipeline	$5.50	IDF	331,056	$76.47	$764.74
9	Controls & Fittings	Pipe Capital x 5%	%		$4.72	$472.26
10	Production Well Turbine	$300	HP	2,088	$0.63	$31.32
11	Booster Pumps	$400	HP	22,465	$8.99	$449.30
12	Three-Phase Power Extension	$60,000	MI	38	$2.28	$22.80
13	Power Consumption	$0.06	KWh	80,226,436		$4,813.59
14	Ground Level Storage	$0.23	GAL	27,154,375	$6.25	$624.55
15	Elevated Storage	$2.00	GAL	500,000	$1.00	$100.00
16	Service Area Transmission System	$36,464,000	LS	1	$36.46	$1,823.20
17	43 MGD Fluoride & Arsenic Treatment	$30,327,900	LS	1	$30.33	$2,082.28
18	**Capital Subtotal:**				**$157.31**	
18a	**Capital Subtotal:**				**$187.30**	
19	Subdivision Distribution[4]	$3,000	CON	13,657	$40.97	$2,048.55
20	Residential Service & Meter[4]	$1,000	EA	13,657	$13.66	$1,365.70
21	Commercial Service & Meter[4]	$1,000	EA	360	$0.36	$36.00
22	Stock/Dairy Service & Meter[4]	$4,000	EA	340	$1.36	$136.00
23	Fire Hydrants[5]	$1,500	EA	805	$1.21	$60.38
24	Fallon Distribution O&M[5]					$1,769.85
25	FPST Distribution O&M[5]					$45.12
26	NAS Distribution O&M[5]					$83.80

27	Environmental & Permitting	Capital x 10%	%		$15.73	
27a	Environmental & Permitting	Capital x 10%	%		$18.73	
28	Engineering & Planning	Capital x 10%	%		$15.73	
28a	Engineering & Planning	Capital x 10%	%		$18.73	
29	Contingency	Capital x 20%	%		$31.46	
29a	Contingency	Capital x 20%	%		$37.46	
30	**Subtotal:**				**$220.23**	**$15,045.84**
30a	**Subtotal:**				**$262.23**	**$17,019.22**
31	Non-Irrigated Land	$300	AC	120	$0.04	
32	Water Right Applic. & Survey	$1,250	APP	11	$0.01	
33	Water Right Permit	$2	AF	24,216	$0.05	
34	**TOTAL:**				**$220.33**	**$15,045.84**
34a	**TOTAL:**				**$262.32**	**$17,019.22**

[1] Item numbers which include a subletter include centralized treatment for fluoride and arsenic and those without subletters is without treatment for these constituents.

[2] 2001 capital costs in millions of dollars

[3] 2001 O&M costs in thousands of dollars per year

[4] Assume developer will pay capital cost, therefore not included in capital subtotals. Upon dedication the water purveyor will pay the annual O&M

[5] Estimated O&M for transmission, distribution, commercial & residential services, hydrants & existing storage

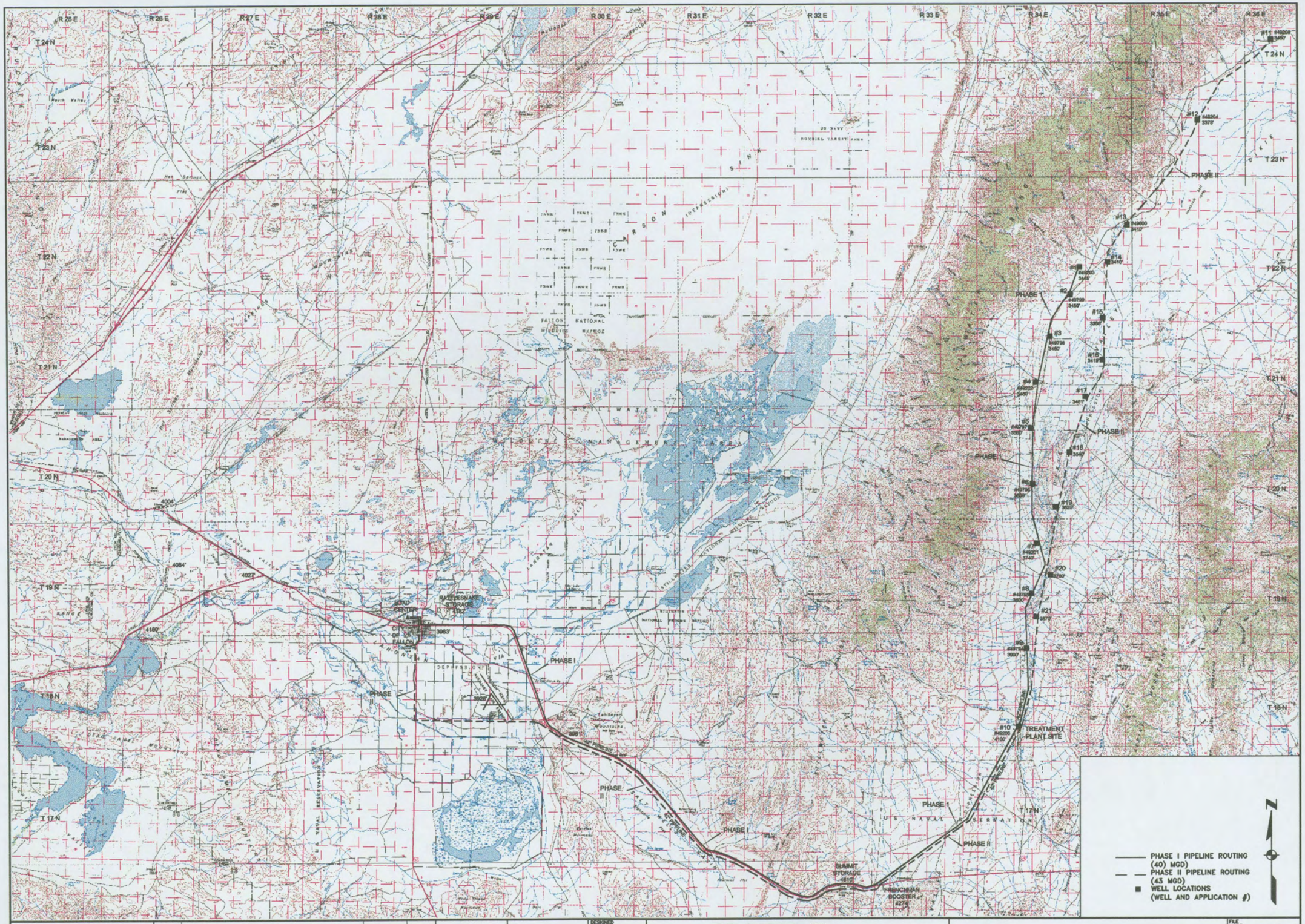
TABLE 7.0.2 SUMMARY OF COSTS OF THE VARIOUS WATER SUPPLY ALTERNATIVES FOR PHASE I, YEAR 2025 (21,531 AFA)

ITEM	TABLE	DESCRIPTION	CAPITAL COSTS $x1,000,000	O&M COSTS $x1,000,000
		Historic Lahontan Valley Ground Water:		
1	7.1.1	Historic Lahontan Valley Ground Water Development w/ Disinfection only	$61.61	$8.46
2	7.1.1	Historic Lahontan Valley Ground Water Development w/ Well Head Treatment for Arsenic & Manganese	$103.30	$13.60
3	7.1.2	Historic Lahontan Valley Ground Water Development w/ Centralized 40 MGD Treatment Plant for Arsenic & Manganese	$120.09	$12.39
		Conjunctive Use of Surface & Ground Water:		
4	7.2.1	Conjunctive Use of Surface & Ground Water w/ Disinfection only	$119.32	$9.15
5	7.2.1	Conjunctive Use of Surface & Ground Water w/ Centralized 40 MGD Treatment Plant for Arsenic & Manganese	$169.27	$12.71
		Induction Well Development:		
6	7.3.1	Induction Well Development w/ Disinfection only	$98.46	$8.29
7	7.3.1	Induction Well Development w/ Centralized 40 MGD Treatment Plant for Arsenic & Manganese	$149.65	$12.14
		Lahontan Reservoir:		
8	7.4.1	Lahontan Reservoir w/ Centralized 40 MGD Surface Water Treatment Plant	$172.38	$10.84
		Recharge, Storage & Recovery:		
9	7.5.1	Recharge, Storage & Recovery w/ Disinfection only	$184.83	$11.72
10	7.5.1	Recharge, Storage & Recovery w/ Centralized 40 MGD Treatment Plant for Arsenic	$236.07	$15.57
		Dixie Valley Ground Water Importation:		
11	7.6.3	Dixie Valley Ground Water Importation w/o Treatment	$177.19	$12.48
12	7.6.3	Dixie Valley Ground Water Importation w/ Centralized 40 MGD Arsenic & Fluoride Treatment Plant	$216.27	$14.32

TABLE 7.0.3 SUMMARY OF COSTS OF THE VARIOUS WATER SUPPLY ALTERNATIVES FOR PHASE II, YEAR 2050 (24,216 AFA)

ITEM	TABLE	DESCRIPTION	CAPITAL COSTS $x1,000,000	O&M COSTS $x1,000,000
		Historic Lahontan Valley Ground Water:		
1	7.1.3	Historic Lahontan Valley Ground Water Development w/ Centralized 43 MGD Treatment Plant for Arsenic & Manganese	$137.88	$13.83
		Conjunctive Use of Surface & Ground Water:		
2	7.2.1[1]	Conjunctive Use of Surface & Ground Water w/ Centralized 43 MGD Treatment Plant for Arsenic & Manganese	$190.38	$14.29
		Induction Well Development:		
3	7.3.1[1]	Induction Well Development w/ Centralized 43 MGD Treatment Plant for Arsenic & Manganese	$168.31	$13.65
		Lahontan Reservoir:		
4	7.4.2	Lahontan Reservoir w/ Centralized 43 MGD Surface Water Treatment Plant	$187.82	$12.08
		Recharge, Storage & Recovery:		
5	7.5.2	Recharge, Storage & Recovery w/ Centralized 43 MGD Treatment Plant for Arsenic	$304.58	$20.54
		Dixie Valley Ground Water Importation:		
6	7.6.4	Dixie Valley Ground Water Importation w/ Centralized 43 MGD Arsenic & Fluoride Treatment Plant	$262.32	$17.02

[1] These capital & O&M costs were prorated based upon the cost of Phase I



NO.	REVISION	DATE	BY

SCALE
1:100,000
1"=1.58 MILES
1"=8,333 FEET

DESIGNED CNM
DRAWN MMS
CHECKED CNM

WRD WATER RESEARCH & DEVELOPMENT, INC.
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7.6 CHURCHILL COUNTY WATER PLAN
DIXIE VALLEY GROUND WATER IMPORTATION DEVELOPMENT

FILE NAME Dbd_Tiff_1-00B.dwg
JOB NO. 99-67D
DATE January 5, 2000
SHEET 1 OF 1

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7.7 OTHER

Upstream Carson River Sources: Currently a study is underway, sponsored by the Carson Water Sub-conservancy District (District), to investigate the feasibility of a Regional Supply System, whereby Carson River waters would be treated in Douglas County and distributed to the other member counties of the District, including Churchill County. While the study to determine the feasibility of forming a Regional effort should be supported, it was not included in this analysis due to lack of information. Information required to further evaluate this alternative includes: Quantification of a firm water supply, surface upstream storage feasibility, feasibility of upstream ground water storage, economics of transmission of treated water some 70 + miles to Fallon, potential long-term demand in all Counties, political feasibility of using Douglas County water in Churchill County, cost of water rights, and many other elements which must be evaluated.

Recharge and Treatment of Basalt Aquifer: The USGS is investigating the feasibility of recharging the basalt aquifer directly with surface water by injection wells. This alternative was not included at this time due to a lack of the following factors that may influence the feasibility of this alternative. These factors include: water supply is uncertain (recharge from upper aquifers) and is dependent upon irrigation Project, which is subject to droughts and Federal regulations, two (2) costly treatment processes may also be required. Injected surface water must be treated prior to injection in addition to treating the pumped water for arsenic. The chemical reaction of mixing surface water with basalt water is also unknown.

Basalt Aquifer for meeting peak demands: While the basalt aquifer may be blended with a new water supply, this practice will be limited due to the lower arsenic MCL that will set a 10ppb in 2006. (i.e. At a MCL of 10 ppb, a 1:10+ ratio of basalt aquifer water a 100 ppb to water source completely free of arsenic would be required to reach a theoretical concentration less than 20 ppb.)

8. FINANCIAL PLANNING (Prepared by Rex Massey)

The development of a water system poses unique challenges for the residents of Lahontan Valley. Unlike most municipal water systems that serve urbanized areas, the proposed alternatives in Section 7.0 will have to be developed to serve relatively low density rural areas as well as more urbanized areas in the County. This situation is in response to the federal government's on-going efforts to purchase and reallocate much, if not all, of the surface water rights in the Lahontan Valley area and thereby eliminate a significant portion of ground water recharge and historic uses of ground water. The financial costs incurred by the residents of Lahontan Valley are the hidden cost of the federal government's water purchase and reallocation program. In other words the Churchill County residents must mitigate the significant adverse impacts imposed by the federal government and more specifically the U.S. Department of Interior.

The financial feasibility analysis focuses upon the ability of system's customer base to fund construction, maintain system operational requirements, and fund administrative costs associated with the various water supply alternatives needed to mitigate adverse impacts to the ground water system. The analyses attempts to determine future revenues that will be needed to meet the projected annualized expenditures of the alternatives presented in Section 7.0. The cost estimates in Section 7.0 were developed for systems designed to serve the entire population at a specific point in time (2025 and 2050). Although the cost estimates were developed for relatively large centralized water systems serving the entire Lahontan Valley, a system serving a smaller customer base could be implemented.

8.1 METHODOLOGY & APPROACH

The feasibility analysis uses system cost estimates in Section 7.0 to determine whether or not projected monthly user and system access fees can meet total annualized expenditures of the various alternatives. The primary focus of this analysis is to determine which, if any, of the proposed water supply alternatives can be considered

reasonably feasible for future development. A comparison of rates charged by other communities will help determine the feasibility of the water system alternatives.

Water rate structures tend to vary among systems in Nevada and that many systems now have metered rates, it is difficult to make direct comparisons among the rate structures. Instead, estimates of total average water charges per month were used as a direct comparison. For many of the smaller water systems in the State an average monthly charge for a residential customer was $30-$40 per month. Larger urban water systems generally have higher rates. For example, Washoe County currently (2002) has a residential flat rate of $60 per month. The newly formed Truckee Meadows Water Authority that provides service primarily to the metropolitan areas of Reno/Sparks has a flat rate of $49.19 per month (2001). Washoe County Utilities currently (2002) charges $4,200 for a residential system connection fee. Residential water connection fees charged by other communities include: Carson City $3,334, Douglas County $4,400, and Lyon County (Dayton) $5,330.

The analysis considers the feasibility of alternatives under a consolidated operation with other entities in Lahontan Valley as well as a utility operated for the unincorporated county service area only. There are numerous service area combinations that could ultimately be implemented for Lahontan Valley.

Ideally, the financial evaluation of alternatives should be made on the basis of full cost pricing. Full cost pricing for public and private utilities occurs when user fees are set to recover all of the costs associated with providing services – capital, operations, maintenance, debt service, and replacement. Charging the full costs for environmental facilities and services helps to ensure that the demand for the facilities and services is proportionate with the cost of providing them, and that they are both environmentally and financially self-sustaining.

The financial evaluation of alternatives was made on the basis of full cost pricing. Preliminary costs estimates were made for the following:

- Debt service for major infrastructure improvements-See Section 7.0.

- Annual maintenance and operational costs.

- Administrative expenses for general management and billing.

- Maintenance and operational cost estimates for NAS, City of Fallon, and the Fallon Tribes.

- Annual maintenance and operation expenses for project level infrastructure.

- Depreciation Expense.

Cost estimates were even made for future maintenance and operation of project level infrastructure the County or regional water provider would be required to maintain. Much of this infrastructure has yet to be built and such cost estimates are very preliminary in nature. In each case the feasibility analysis only considers the most expensive water treatment option for the alternatives described in Section 7.0.

Phase I Development and Implementation: Under the simulated approach, Phase I alternatives will be constructed and completed by the end of 2010. The system will manifold water to the City of Fallon, Fallon Navy Air Station and the Tribal Lands. These three areas will be the initial customer base for the system. It is assumed that there will be very few customers (commercial and residential) in the unincorporated county that will be able to connect to the system at the start of operations. However, this situation could change as the County implements policies that either require or provide incentives for new development to provide water system infrastructure and service connections for new residential dwelling units and commercial establishments.

Customers not served by an existing municipal water system will require a period of

time to be brought onto the system. The analysis assumes a period of 10 years for all customers in the Phase I service areas to be connected to the system. As a result, nearly all customers not currently served by a municipal water system will be connected to the system by 2020 under Phase I. Development in the service area after the water systems are in place will be connected immediately including new growth within the City of Fallon, NAS, and Tribal lands.

The analysis assumes that existing customers of the City of Fallon, NAS, and the Fallon Tribes will not pay a system connection fee. Only new customers in these service areas will be required to pay the stated system connection fee.

8.2 RESULTS

A very simplified approach is to look at the system costs and the number of customers to be served and determine the required system connection and monthly service fee required to meet the annual financial obligations. Table 8.2 shows the results for phase I serving a 2025 population.

TABLE 8.2 SYSTEM ACCESS & MONTHLY SERVICE FEES REGIONAL WATER SYSTEM FOR AN EQUIVALENT DWELLING UNIT

ALTERNATIVE	COST[1]	INTEREST[2]	ANNUAL O&M[3]	CONNECTION FEE PER EDU[4]	O&M CHARGE PER MONTH[5]	DEPRECIATION CHARGE PER MONTH[6]	DEBT SERVICE CHARGE PER MONTH[7]	TOTAL MONTHLY SERVICE CHARGE[8]
Historic Ground water	$120.09	$112.00	$12.0	$3,888.80	$33.43	$10.80	$9.39	$54.31
Conjunctive Use	$143.47	$133.80	$12.3	$4,645.90	$34.27	$12.20	$12.91	$59.21
Induction Wells	$124.11	$115.73	$11.8	$4,018.98	$32.65	$10.46	$11.16	$54.23
Lahontan Reservoir	$146.04	$136.19	$11.8	$4,729.12	$32.00	$13.14	$12.25	$54.53
Recharge, Storage & Recovery	$207.75	$193.74	$15.2	$6,727.44	$42.10	$17.98	$18.69	$78.21
Dixie Valley	$216.27	$201.65	$14.2	$7,003.34	$38.59	$18.86	$19.45	$76.18

1. Alternative costs not including water right acquisition and other adjustments (in millions).
2. Interest expense-total interest charges associated with development of alternatives (in millions).
3. Annual operations and maintenance costs-See Section 7.0. (in millions).
4. Connection fee-alternative costs divided by number of equivalent dwelling units served (30,881).
5. Operations and maintenance- Annual operation and maintenance charges divided by 12 months divided by equivalent dwelling units served (30,881).
6. Depreciation-Alternative costs divided by 360 months divided by equivalent dwelling units served (30,881).
7. Debt service is the interest expense divided by 360 months divided by equivalent dwelling units served (30,881).
8. Total monthly service charge required for O&M, Depreciation, and Debt Service.

Table 8.2 shows the total cost of the alternative, the interest expense to finance the improvements, and annual operations and maintenance requirements. Table 8.2 assumes that the initial capital costs of the alternatives will be funded entirely by system access fees. Access fee would have to range from $3,900 to $7,000 per equivalent dwelling unit (EDU) based upon the various alternatives. The calculation of equivalent dwelling units is described in the financial appendix. An EDU converts all water users to a common base of a residential equivalent dwelling unit. Although the connection fee would theoretically cover the capital cost of each alternative, uncertainties exist with respect to build-out of the system, rate of customer connection and method of payment. For many customers connection fees may have to be amortized over a period of years.

The interest expense, annual operations and maintenance costs, and deprecation are included in the monthly service fee. The depreciation expense is calculated by using a 30-year straight-line depreciation schedule. The total monthly service fee would have to range from approximately $54 per month to $76 per month per EDU. As compared to other communities, the monthly service fee and connection fee appears reasonable under Phase I. Because the number of people served and the alternative costs are relatively similar, Phase II results would not differ substantially from results in Table 8.2.

It is unlikely the system will be implemented all at once. Phasing the development will be required to coincide with the incremental growth of the system overtime unless federal activities create a situation where more immediate action is needed. The results in Table 8.2 ignore the annual cash flow requirements of the system which is critical to meeting financial obligations. In fact the timing of revenue generation to meet annual expenditure requirements may ultimately serve to limit the size and extend the duration of system build-out. Also, the results assume that everyone will pay connection fees including those already served by existing municipal water systems. Politically, this situation may not be possible. If we assume that existing water system customers would not pay connection fees, the required fees could double.

The build-out of a large regional system may be more accurately represented in a simulated development approach that considers the implementation of the alternatives according to a schedule and makes specific assumptions about the timing of growth and development in Lahontan Valley. The financial appendix describes this approach in more detail. The simulated approach would best describe a demand scenario that requires all users to connect to a centralized system over a relatively short period of time similar to a situation that may occur if Federal agencies are successful in reallocating nearly all Newlands Project water rights from irrigation to some other use (See Section 3). The simulated approach can give some indication of whether or not a short-term build-out of a centralized water system could occur.

The simulated approach also considers the operation of a water system both as a consolidated operation including various entities in Churchill County. A consolidated operation would include all jurisdictions in Churchill County including the City of Fallon, NAS, and the Fallon Tribes. More specific information including assumptions about each approach can be found in the financial appendix.

Results from the Simulated Analysis: The alternatives described in Section 7.0 are the long-term supply options available to Lahontan Valley. Historic ground water use over the long-term as the principal source of municipal and industrial water could be jeopardized in light of federal plans to change the place and manner of use of Newlands Project irrigation water. Ultimately, Lahontan Valley will need to move towards one of the supply options identified in Section 7.0. The scope of such a system in terms of the population served and the size of the service area will be dictated by many factors that are difficult to predict with any certainty at this point.

System alternatives are designed to accommodate a 2025 and a 2050 population in Lahontan Valley. Therefore, the costs represent an entire system fully built-out to serve the 2025 and 2050 populations under a consolidated utility. A consolidated utility operation assumes that all entities including Churchill County, the City of Fallon, the U.S. Navy, and the Fallon Tribes operate the system as one utility.

Phase I Development and Implementation: Under the simulated approach, Phase I alternatives will be constructed and completed by the end of 2010. The system will manifold water to the City of Fallon, Fallon Navy Air Station and the Tribal Lands. These three areas will be the initial customer base for the system. It is assumed that there will be very few customers (commercial and residential) in the unincorporated county that will be able to connect to the system at the start of operations. However, this situation could change as the County implements policies that either require or provide incentives for new development to provide water system infrastructure and service connections for new residential dwelling units and commercial establishments.

Customers not served by an existing municipal water system will require a period of time to be brought onto the system. The analysis assumes a period of 10 years for all customers in the Phase I service areas to be connected to the system. As a result, nearly all customers not currently served by a municipal water system will be connected to the system by 2020 under Phase I. Development in the service area after the water systems are in place will be connected immediately including new growth within the City of Fallon, NAS, and Tribal lands.

The analysis assumes that existing customers of the City of Fallon, NAS, and the Fallon Tribes will not pay a system connection fee. Only new customers in these service areas will be required to pay the stated system connection fee.

Phase II Development and Implementation: Because Phase I is designed for a 2025 population and its associated demand, Phase II alternatives will have to be constructed soon after. Some amount of lag time is built into the Phase I system because it assumes that the entire existing population of Churchill County (53,660) will be on the system by 2025. However, there might be as many as 11,800 people living in the 2050 service area and in outerlying areas of the County not served by Phase I. Therefore, the system design and associated costs are somewhat conservative in that they are an overestimate both in terms of costs and number of persons served. The Phase I

alternatives are capable of accommodating additional growth in the service area, perhaps through 2030. Therefore, Phase II alternatives will be constructed in a manner that it becomes available by 2030.

The feasibility analysis relies upon projecting the future total annual expenditures for debt, operating, and administrative costs for each alternative. A combination of average monthly charges and system connection fees should provide sufficient revenues to cover the annual projected costs associated with each alternative.

In order to determine the reasonableness of future projected system charges and ultimately the financial feasibility of the proposed alternatives, the rate structure required to meet the financial obligations of each alternative is compared against “base rates.” The base rate establishes monthly service charges and one-time service access fees for an EDU that could be implemented today if a system were in operation. The base rate monthly service and system connection fees are assumed to be at levels acceptable to a majority of current and future system users. The base rates are inflated three percent annually through 2050 creating a base rate curve for monthly service and system connection fee charges. For example, a total monthly service charge of $81 per month in 2010 is the same as $60 per month in 2001. A more conservative estimate of future base rates charges uses average annual increases to determine rates avoiding the exponential growth associated with compounding increases.

It does appear that based upon preliminary estimates, Lahontan Valley could pursue alternatives presented in Section 7.0 with the exception of Dixie Valley. The Dixie Valley alternative is an option best suited for a larger population base encompassing all users in Lahontan Valley. The fixed cost associated with the transmission pipeline requires a substantial customer base. A sizeable customer base in the unincorporated county is needed before adequate revenues would be available to support the Dixie Valley alternative.

Implementing water supply alternatives that serve a regional population over a very

short period of time may be difficult to achieve without substantial subsidies for construction and operation. Again, the need to develop a water supply alternative over a short period of time that serves most of Lahontan Valley would be driven primarily by federal actions and the implementation of PL101-618. Similarly, costs associated with having to convert domestic wells to a municipal water system would also be attributed to federal actions in Lahontan Valley.

Figure 8.2.1 and Figure 8.2.2 shows the results of the simulated development scenario for Phase I. The figures show projected system connection fees and monthly operating fees needed to fund annual expenditures compared against project base rates. A summary of findings for the alternatives is contained below.

Conjunctive Use, Induction Well Development, Lahontan Reservoir, and Historic Ground water Development: The four alternatives along with historic ground water develop are feasible in terms of the monthly service and system access charges needed to support annual system expenditures under a consolidated utility operation and an unincorporated county service area only option. Historic ground water development and induction well development are the least cost alternatives available to the County (See Table 8.2).

FIGURE 8.2.1 COMPARISON OF ALTERNATIVES
MONTHLY CHARGES PER EDU

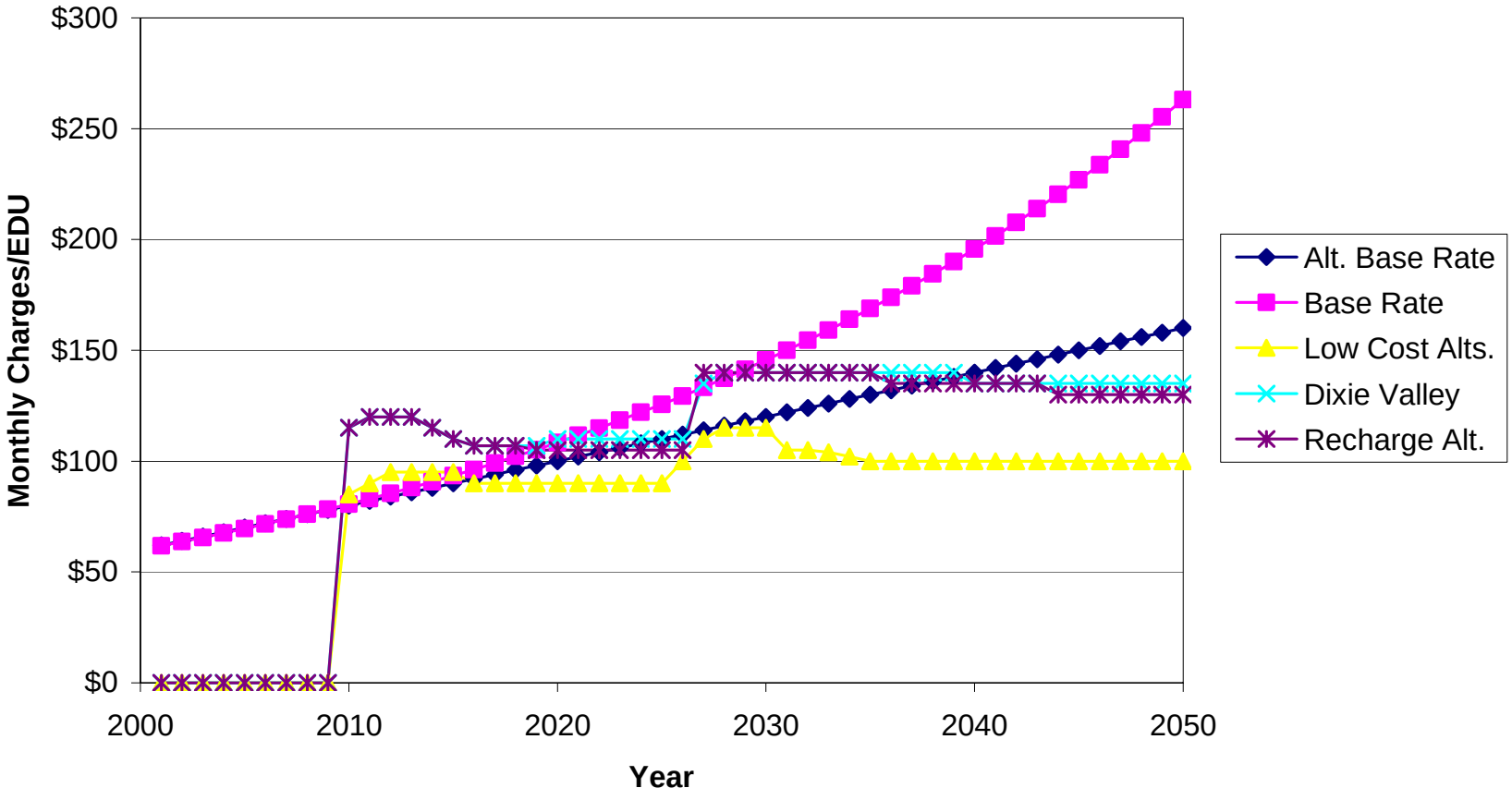
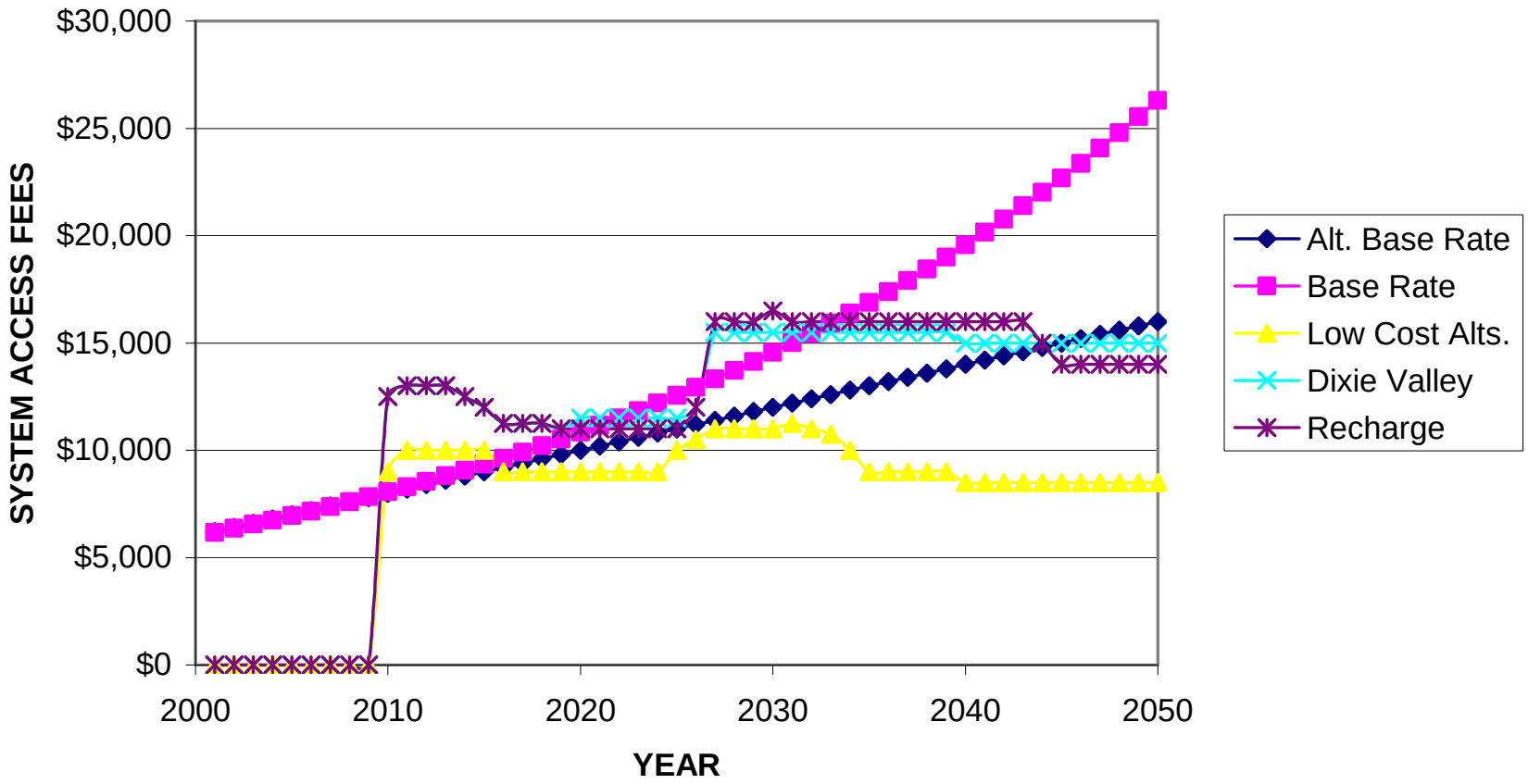


FIGURE 8.2.2 COMPARISON OF ALTERNATIVES

SYSTEM ACCESS FEES



The projected rates remain below the base rate curves with the exception of the initial years of operation (See Figure 8.2.1 and 8.2.2). The rate structure for the four alternatives is represented as the low cost alternatives in Figure 8.2.1 and Figure 8.2.2 Figure 8.2.1 shows the monthly service fees to meet projected annual expenditures.

Even the least cost alternatives under a simulated implementation approach will require subsidies to cover projected revenue shortfalls. Subsidies are required because there are not enough revenues available to cover the annual expenditures (O&M expenditures, depreciation, and debt service). The development of a water supply alternative that serves the entire region will be heavily dependent upon connection fees and well conversions to help meet annual financial obligations.

Another advantage both financially and operationally for these four alternatives is that they can be built out as the population and customer base demands commensurate with the financial ability to support associated expenditures. These alternatives would be amenable to operation under a county only service area scenario assuming they could be implemented in phrases over a long period of time.

Recharge, Storage and Recovery and Dixie Valley Alternative: These two alternatives are the most expensive of the alternatives proposed in section 7.0. The costs of the alternatives require monthly user charges and system access fees that are relatively high (Table 8.2). Evaluating the alternatives under a simulated development scenario suggests that sizable subsidies will be needed to meet financial obligations, if the entire system had to be developed over a very short period of time. Annual revenue requirements cause projected rates to remain above the base rate curves in Figure 8.2.1 and Figure 8.2.2. These alternatives were not considered for County only operation although the recharge, storage and recovery alternative could be phased in over time.

The Dixie Valley alternative requires a sizable population base to support its

development and operation. It is difficult to implement Dixie Valley in phases due to the cost associated with the transmission pipeline. Dixie Valley is truly a regional water supply alternative that can serve the community sometime within the next 20 to 25 years.

8.3 MUNICIPAL WATER SYSTEMS & RELATED DEVELOPMENT ISSUES

Additionally, there are other factors that have some influence on the development of a water system. They include:

Acquisition of water rights: The costs to all customers can be greatly reduced if water rights are acquired prior to implementation of the system. The analysis in this section assumes that the County will have sufficient water rights and that the system users will not finance future acquisitions. The water right dedication ordinance remains an effective means to achieve a near-term water supply for the Lahontan Valley regardless of the alternative ultimately selected.

Project level infrastructure development: The infrastructure required to serve new development will not be a cost incurred to implement the system. Cost estimates in Section 7.0 assume that developers of individual projects will provide the necessary infrastructure as new residential development occurs in Lahontan Valley. Including development or project level infrastructure would greatly increase alternative cost estimates in Section 7.0. Even more difficult would be an attempt to estimate the costs required to retrofit residential and commercial development with water system infrastructure at some later point in time. In order to be able to provide future water service at a reasonable cost, it is critical for Churchill County to now consider infrastructure requirements for new residential and commercial development.

Residential development density: Requirements for residential development to provide water and or wastewater infrastructure at the project level may require higher densities to offset the additional development cost burden. Higher density development in general

is more favorable financially for the construction and operation of a municipal water system. Churchill County needs to consider ways to provide for higher density development in areas likely to be served by a municipal water system.

Cost to connect existing well owners - As the system builds out over time significant costs could be incurred to serve or convert existing domestic wells to a municipal water system. It is likely that such costs may well exceed the stated system access fees and that individual well owners may have a higher financial burden as compared to others being served by the system. It is unknown to what extent the system as a whole could participate financially in the conversion of domestic wells. Maintaining existing surface irrigation recharge is critical to the water quality and water available to domestic wells and potentially a significant financial burden that can easily range from $50 to $100 million in 2002. Creation of more domestic wells could add to the future financial burden if federal actions to change the place and manner of water use are fully achieved.

8.4 CONCLUSIONS

Due to the magnitude of capital costs associated with each alternative and depending on the number of customers, financing the majority of water system development over a relatively short period of time is unlikely. In others words, there are financial constraints to actual construction and development of the project. The amount of financing available for water system development will likely be dependent upon revenue generating capabilities, existing debt obligations, project level infrastructure requirements and costs incurred for the conversion of domestic well owners. It may be very difficult for Lahontan Valley to respond quickly and provide water service to a large number of customers over a short period of time unless supplemental funding was provided. Such funding to support the operation and regional build-out of a system could be as much as $100 million not including the costs associated with converting domestic well owners to a municipal system. As a result, a realistic course of action over the near-term would be continued use of ground water resources combined with

infrastructure requirements for new development.

Without the City of Fallon, NAS, and the Tribes, Churchill County currently has little or no customer base for which to support major debt obligations associated with construction of water supply alternatives. As a result, building a water system incrementally is the most likely course for the unincorporated area. The continued use of historic ground water resources must be made available until a sizeable customer base can be established to support the development of a centralized water system. Most new development would have to rely upon individual treatment, storage and distribution systems utilizing ground water resources. As a customer base begins to form in the unincorporated county, the development of a centralized water supply system as described in Section 7.0 will become feasible. Reliance on historic uses of ground water supply as a basis for a municipal water system in the unincorporated areas will need to continue over the short-term.

Finally, it is important to consider the magnitude of expenditures for the various alternatives over time. The development of a water system should be considered in terms of the overall burden to the community at large. There are sizeable differences among the cost of each alternative. However, costs should not be the only factor in the selection of a water system alternative. Overall, water supply security in terms of the reliability of the water source, future regulatory requirements and associated costs, and the costs to treat, deliver and maintain a system are factors that need to be weighed against the overall costs.

9. RECOMMENDATIONS

A number of factors influence both the need and ability to construct and operate water and waste water systems in unincorporated Churchill County. The principal factor behind the need to provide such services is the actions set forth by the Federal government to acquire Newlands Project water either through outright purchase or regulatory measures that restrict water use. Table 3.3.2 identifies Federal, tribal and state actions threatening the Newlands projected irrigated acreage, diversion and storage.

As federal, state, tribal, and upstream Truckee River interests seek to eliminate much of the surface irrigation and hence 95% of the ground water recharge in the Lahontan Valley, the unincorporated county continues to rely upon individual domestic wells and septic systems. This continued dependence on domestic wells and individual septic systems has been further entrenched by the inability to obtain new ground water permits and the lack of municipal sewer and water systems serving the urbanizing areas of Lahontan Valley. The current situation presents Churchill County with many difficult challenges with respect to developing water and or wastewater services in the unincorporated areas.

As discussed in Section 8.0, the ability to develop water and wastewater services faces financial constraints as well. Unfortunately, financial constraints preclude the development of large-scale regional water and wastewater systems over a relatively short period of time. It may be possible to secure some level of grant funding for the construction of water treatment and distribution systems. Known sources of grant funding generally falls well below the required capital needed to develop alternatives described in Section 7.0.

Development of a regional water system serving a majority of the population in unincorporated areas is not a viable option unless Churchill County takes steps now to move in that direction. Postponing water system development will only create greater

difficulties in the future as most water users in the unincorporated area will have come to rely on individual well and septic systems. Conversion from individual wells to a regional water system can be very expensive and is estimated to range from $10,000 to $20,000 per housing unit in addition to costs for source development and treatment.

The current situation requires Churchill County to proceed with the following steps over the next several years:

- Continue use of historic ground water resources for municipal and industrial purposes. Petition the Nevada State Engineer to lift moratorium on additional ground water permits and issue revocable well permits for municipal use only.

- Require new development (commercial and residential) to provide appropriate water and or wastewater systems, particularly in urbanizing areas of unincorporated Churchill County.

- Establish a utility division within Churchill County to operate newly created water and wastewater systems.

- Establish processes and procedures to acquire and operate private water systems, if approached by individual system owners.

- Provide options for higher density development with water and or waste water systems of offset associated costs.

- Continue dedication of surface water rights to the County.

The goal of Churchill County is to establish individual municipal and domestic water services in the urbanizing areas that are cost effective, built to county determined specifications and operated until such time that a regional water treatment and distribution system can be constructed to serve a relatively large number of customers.

Regional water distribution alternatives were described in Section 7.0. The alternatives were originally designed to meet the needs of a 2025 population and 2050. It is unlikely the system will be implemented all at once. Phasing the development will be required to coincide with the incremental growth of the system over time unless Federal activities create a situation where more immediate action is needed. The development of each alternative appears feasible given an adequate number of customers to support system financial obligations. The rate structures along with system connection fees are adequate to support 2025 and 2050 regional water system alternatives.

Churchill County needs to continue to further evaluate water supply alternatives over the next several years. Suggested activities include:

Dixie Valley Water Quality: Conduct a sampling of water quality of all existing wells in Dixie Valley for constituents influencing portability. Specifically, these analyses would assist in determining if treatment for fluoride and/or arsenic is required.

Recharge, Storage & Recovery (RSR) Water Quality: Conduct water quality sampling of all wells (irrigation & domestic) in the Dead Camel alluvial fan area for constituents, including arsenic and manganese. Based upon a limited number of samples taken from domestic wells in the northern portion of this area, arsenic and manganese is not present in amounts exceeding anticipated MCL's. Also conduct quarterly water level measurements on the domestic, irrigation and monitor wells analyzed in the recently completed RSR pilot project study. These measurements will further the understanding of the hydraulic connection between the V-Line, Carson River and the adjacent ground water aquifer.

Lahontan Valley Ground Water Well Development: With the exception of some work done by the USGS, there has been very little lithologic or water quality sampling, relative to depth, conducted within the shallow or intermediate aquifers in the Valley. Water quality reported for wells constructed in the Valley only represents the quality at

the bottom of the well, since typically the wells are constructed with the perforations or intake at the bottom of the well.

It is recommended to drill test holes drilled by a “dual tube” or equivalent method, such that lithologic and water quality samples can be collected at specific depths. By this method, aquifers or zones of good quality and production can be identified and developed, while those zones or aquifers that are of poor quality can be isolated and not developed. Subsequently, a production well should be constructed and aquifer-pumping tests conducted.

Expanded Ground Water Study: Under a contract with the County, a larger ground water quality database (2792 analyses) has been established and sorted with respect to location (section, township & range) within Lahontan Valley. Additionally, several hundred well-logs of quasi-municipal, irrigation, commercial and domestic wells have been cataloged showing at what depth these wells are taking water. It is suggested that an attempt be made to combine and reconcile these two databases to ascertain the lesion and depths where good water quality may be expected to occur.

Recharge, Storage & Recovery Pilot Study: A pilot study has recently been completed indicating that the Dead Camel site is a favorable location for an artificial recharge project (See report completed by WRD entitled: Churchill County Lahontan Alluvial Fan Recharge, Storage & Recovery (RSR) Pilot Project, June 30, 2003). This study recommended the county pursue negotiations with the Brown Sand Farms, Inc. to appraise the farm and associated ground water rights and perhaps purchase the operation as a potential long term water supply. It was also suggested that a more in depth pilot study be conducted whereby small infiltration basins be constructed and run for a period of time to further assess the long term feasibility of this site to infiltrate and store water. Quarterly water level measurements were also recommended to further the understanding of the hydraulic connection between the V-Line canal, Carson River and the adjacent ground water aquifer.

Conjunctive Use of Surface & Ground Water Pilot Study: Conduct a pilot study to ascertain the preliminary feasibility of diverting water from a canal into an adjacent ground water induction well. Initially, a well constructed near a canal along with observation wells would be pumped to determine the source of the water and to define the hydraulic connection between the induction well and the adjacent canal.

Induction Well Pilot Study: Conduct a pilot study to ascertain the preliminary feasibility of diverting water from the Carson River channel into an adjacent induction well. Initially, an induction well would be constructed near the River along with observation wells and pumped to determine the source of the water and to define the hydraulic connection between the induction well and the adjacent river.

Water Treatment Pilot Studies: As described in Appendix 5.0 by Nolte, pilot studies should be made using the specific water source for each of the treatment methods described prior to final treatment method selection.

Lahontan Valley Ground Water Well Development: With the exception of some work done by the USGS, there has been very little lithographic or water quality sampling, relative to depth, conducted within the shallow or intermediate aquifers in the Valley. Water quality reported for wells constructed in the Valley only represents the quality at the bottom of the well, since typically the wells are constructed with the perforations or intake at the bottom of the well.

Acquire Water Treatment Load Center property: Suggest that the County consider acquiring approximately 20 acres within the NW1/4 of Section 25, T.19N, R.28E, M.D.B.&M. to assure access to property to locate a load center for water treatment facility.

County Wastewater Plan: It is recommended that the County consider developing a wastewater treatment plan, including reuse facility for the County that would coordinate with the Water Resource Plan.

Implementing these alternatives will require all or a portion of the County owned surface water rights. Ultimately, such rights will need to be supplemented with a more reliable long-term water supply that is available from Dixie Valley. Although this is the most costly alternative, it is the only one which represents a new water supply for the Lahontan Valley and does not depend upon flows from either the Truckee or Carson Rivers. Dixie Valley ground water importation received the highest subjective evaluation among the six available alternatives (See Table 1.1.2). Conceivably, Dixie Valley could be implemented within the next 25 years given that incremental efforts to develop municipal water systems in unincorporated Churchill County proceed in a timely manner.

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VOLUME I
APPENDICES

4.0 POPULATION & WATER DEMAND
5.0 WATER TREATMENT
6.0 DISTRIBUTION SYSTEM
8.0 FINANCIAL PLANNING
9.0 WATER PLAN REVIEW & RESPONSE

October 9, 2003

WATER
RESEARCH &
DEVELOPMENT, INC.
P.O. BOX 5007 * RENO, NV 89513-5007 * (775) 747-1100
ENGINEERING * HYDROLOGY * ENVIRONMENT * AGRICULTURE

Final Report Churchill County Water Resource Plan
25 Year 2000-2025
50 Year 2025-2050

APPENDIX 4.0

POPULATION & WATER DEMAND

APPENDIX 4.0
POPULATION & WATER DEMAND

CHURCHILL COUNTY SOCIOECONOM IC OVERVIEW

An Overview Of Historic, Geographic, Hydrologic, Water Use and Socioeconomic Trends and Conditions For the Use In The Nevada State Water Plan

February 1999

Churchill County Socioeconomic Overview

An Overview of Historic, Geographic, Hydrologic, Water Use and Socioeconomic Trends and Conditions for Use in the Nevada State Water Plan

February 1999

Nevada Division of Water Planning
Department of Conservation and Natural Resources

Churchill County Population Estimates

Population Estimates (1950-1997) and Forecasts (1998-2020)—July 1st (Persons)

Year	Demographer Estimates and Forecasts	Year-Year Change in Population (Persons)	Year-Year Percent Change	Share of Total State Population	Estimates and NDWP Modified Forecasts	Year-Year Change in Population (Persons)	Year-Year Percent Change	Share of Total State Population
1950	6,188	–	–	3.84%	6,188	–	–	3.84%
1951	6,300	112	1.81%	3.81%	6,300	112	1.81%	3.81%
1952	6,300	0	0.00%	3.58%	6,300	0	0.00%	3.58%
1953	6,400	100	1.59%	3.47%	6,400	100	1.59%	3.47%
1954	6,500	100	1.56%	3.25%	6,500	100	1.56%	3.25%
1955	6,900	400	6.15%	3.13%	6,900	400	6.15%	3.13%
1956	7,100	200	2.90%	2.96%	7,100	200	2.90%	2.96%
1957	7,100	0	0.00%	2.85%	7,100	0	0.00%	2.85%
1958	7,200	100	1.41%	2.78%	7,200	100	1.41%	2.78%
1959	7,500	300	4.17%	2.70%	7,500	300	4.17%	2.70%
1960	8,505	1,005	13.40%	2.96%	8,505	1,005	13.40%	2.96%
1961	8,716	211	2.48%	2.93%	8,716	211	2.48%	2.93%
1962	8,640	(76)	-0.87%	2.74%	8,640	(76)	-0.87%	2.74%
1963	8,608	(32)	-0.37%	2.55%	8,608	(32)	-0.37%	2.55%
1964	8,744	136	1.58%	2.43%	8,744	136	1.58%	2.43%
1965	8,984	240	2.74%	2.32%	8,984	240	2.74%	2.32%
1966	9,367	383	4.26%	2.32%	9,367	383	4.26%	2.32%
1967	9,568	201	2.15%	2.33%	9,568	201	2.15%	2.33%
1968	9,516	(52)	-0.54%	2.22%	9,516	(52)	-0.54%	2.22%
1969	10,382	866	9.10%	2.16%	10,382	866	9.10%	2.16%
1970	10,650	268	2.58%	2.15%	10,650	268	2.58%	2.15%
1971	11,200	550	5.16%	2.15%	11,200	550	5.16%	2.15%
1972	11,600	400	3.57%	2.12%	11,600	400	3.57%	2.12%
1973	11,900	300	2.59%	2.09%	11,900	300	2.59%	2.09%
1974	11,900	0	0.00%	1.99%	11,900	0	0.00%	1.99%
1975	12,000	100	0.84%	1.94%	12,000	100	0.84%	1.94%
1976	12,000	0	0.00%	1.86%	12,000	0	0.00%	1.86%
1977	12,100	100	0.83%	1.78%	12,100	100	0.83%	1.78%
1978	12,800	700	5.79%	1.78%	12,800	700	5.79%	1.78%
1979	13,600	800	6.25%	1.78%	13,600	800	6.25%	1.78%
1980	13,917	317	2.33%	1.74%	13,917	317	2.33%	1.74%
1981	14,390	473	3.40%	1.70%	14,390	473	3.40%	1.70%
1982	14,480	90	0.63%	1.66%	14,480	90	0.63%	1.66%
1983	14,610	130	0.90%	1.63%	14,610	130	0.90%	1.63%
1984	14,810	200	1.37%	1.61%	14,810	200	1.37%	1.61%
1985	15,120	310	2.09%	1.58%	15,120	310	2.09%	1.58%
1986	15,400	280	1.85%	1.55%	15,400	280	1.85%	1.55%
1987	16,710	1,310	8.51%	1.61%	16,710	1,310	8.51%	1.61%
1988	17,790	1,080	6.46%	1.62%	17,790	1,080	6.46%	1.62%
1989	17,990	200	1.12%	1.55%	17,990	200	1.12%	1.55%
1990	18,100	110	0.61%	1.46%	18,100	110	0.61%	1.46%
1991	18,330	230	1.27%	1.41%	18,330	230	1.27%	1.41%
1992	19,210	880	4.80%	1.43%	19,210	880	4.80%	1.43%
1993	19,850	640	3.33%	1.42%	19,850	640	3.33%	1.42%
1994	20,570	720	3.63%	1.38%	20,570	720	3.63%	1.38%
1995	21,640	1,070	5.20%	1.37%	21,640	1,070	5.20%	1.37%
1996	22,580	940	4.34%	1.34%	22,580	940	4.34%	1.34%
1997	23,860	1,280	5.67%	1.34%	23,860	1,280	5.67%	1.34%
1998	25,020	1,160	4.86%	1.33%	24,579	719	3.02%	1.34%
1999	26,030	1,010	4.04%	1.33%	25,300	720	2.93%	1.33%

Churchill County Population Estimates

Population Estimates (1950-1997) and Forecasts (1998-2020)—July 1st (Persons)

Year	Demographer Estimates and Forecasts	Change in Population (Persons)	Percent Change	Share of Total State Population	Estimates and NDWP Modified Forecasts	Change in Population (Persons)	Percent Change	Share of Total State Population
2000	27,010	980	3.76%	1.33%	26,019	720	2.85%	1.31%
2001	27,780	770	2.85%	1.31%	26,737	718	2.76%	1.30%
2002	28,620	840	3.02%	1.30%	27,453	715	2.68%	1.29%
2003	29,130	510	1.78%	1.28%	28,164	711	2.59%	1.28%
2004	29,910	780	2.68%	1.27%	28,869	706	2.51%	1.27%
2005	30,470	560	1.87%	1.26%	29,568	699	2.42%	1.26%
2006	31,240	770	2.53%	1.26%	30,258	690	2.34%	1.26%
2007	31,830	590	1.89%	1.24%	30,939	681	2.25%	1.25%
2008	32,660	830	2.61%	1.24%	31,609	670	2.17%	1.25%
2009	33,680	1,020	3.12%	1.24%	32,266	657	2.08%	1.25%
2010	34,720	1,040	3.09%	1.25%	32,910	644	2.00%	1.25%
2011	35,770	1,050	3.02%	1.25%	33,539	629	1.91%	1.25%
2012	36,850	1,080	3.02%	1.25%	34,151	612	1.83%	1.25%
2013	37,970	1,120	3.04%	1.25%	34,745	594	1.74%	1.25%
2014	39,050	1,080	2.84%	1.25%	35,320	575	1.65%	1.25%
2015	40,170	1,120	2.87%	1.25%	35,875	555	1.57%	1.25%
2016	41,320	1,150	2.86%	1.25%	36,407	533	1.49%	1.25%
2017	42,470	1,150	2.78%	1.25%	36,917	510	1.40%	1.25%
2018	43,620	1,150	2.71%	1.25%	37,402	485	1.32%	1.26%
2019	--	--	--	--	37,862	460	1.23%	1.26%
2020	--	--	--	--	38,296	434	1.15%	1.26%

Growth Rate Analysis:		
Average Annual Rates of Change by Specific Time Period (percent)	1950-1997	2.91%
	1950-1960	3.23%
	1960-1970	2.27%
	1970-1980	2.71%
	1980-1990	2.66%
	1990-1997	4.03%

Forecast Periods:			State Demographer	NDWP Modified Forecast
	1998-2018	2.91%	2.16%	
	1998-2008	2.90%	2.59%	
	2008-2018	2.91%	1.74%	

Sources: Nevada Office of the State Demographer (forecasts effective April 13, 1998); Nevada Division of Water Planning (Clark County population forecasts based on Clark County Department of Comprehensive Planning forecasts; Washoe County population forecasts based on forecasts provided by the Washoe County Department of Community Development).

APPENDIX 4.O
POPULATION & WATER DEMAND

CHURCHILL COUNTY ISO CLASSIFICATION

REC'D JUN 19 1997

INSURANCE SERVICES OFFICE, INC.
111 N. CANAL STREET SUITE 950 CHICAGO, ILLINOIS 60606-7270 (312) 930-0070 (800) 444-4554 FAX: (312) 930-0017

June 16, 1997

KEN TEDFORD
JUN 19 1997
MAYOR'S OFFICE

Mr. Ken Teford, Mayor
City of Fallon
55 Williams Avenue
Fallon, NV 89406

RE: Public Fire Protection
City of Fallon, Nevada

Dear Mayor Tedford:

We wish to thank you, Fire Chief William Lawry, Water Superintendent Larry White and others for the cooperation given to our representative during our recent survey. We have completed our evaluation of the fire insurance classification for your city and advise that the protection class has improved to Class 1.

Formerly Class 5 applied. The new classification may result in a decrease in advisory property insurance calculations for many insured properties within the city. The new classification will be effective on August 1, 1997. The change may affect properties to a degree depending upon the type of building construction, the hazards of occupancy and other factors. Insurance policyholders should contact their agent or company to determine the effect this change in classification might have on their policies.

Class 1applies to properties in the city with a needed fire flow of 3,500 gpm or less. The private and public protection at properties in the city may vary from the city classification.

The purpose of our visit was to gather information needed to determine a public protection classification which may be used to develop advisory property insurance calculations. This survey was not conducted for property loss prevention or life safety purposes and no life safety or property loss prevention recommendations will be made.

We are attaching a copy of the results of the hydrant flow tests witnessed during our survey. Also attached are the Improvement Statements.

If you have any questions concerning the new classification, please let us know.

Very truly yours,

Ronald D. Kepler

Ronald D. Kepler
Manager

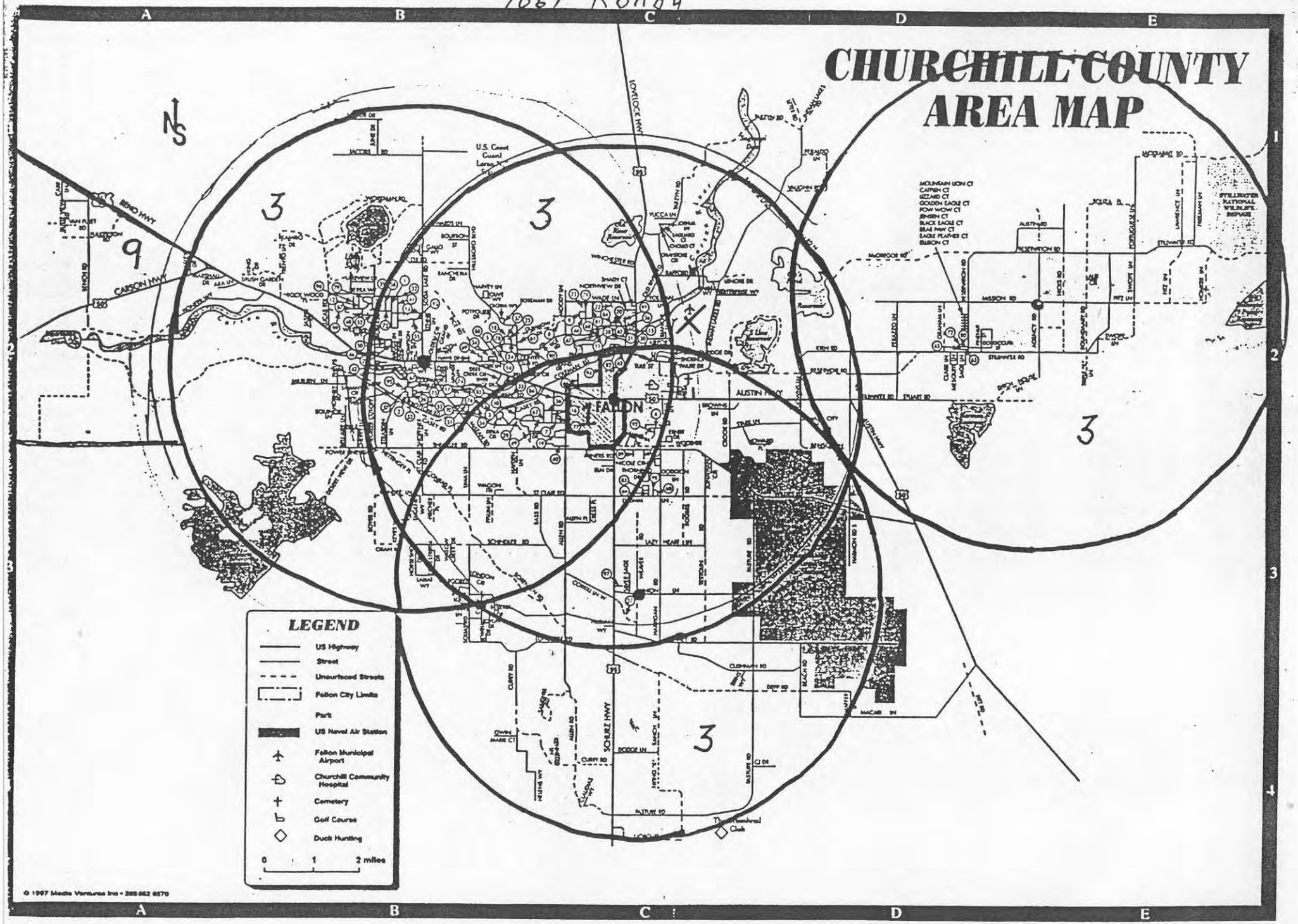
mg

Encl.

427-3491

7061 Ronda

CHURCHILL COUNTY AREA MAP



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APPENDIX 4.O
POPULATION & WATER DEMAND

CITY OF FALLON MONTHLY
WATER METER DELIVERIES
1979-1998

Usage	WELL 1	WELL 2	WELL 3	WELL 4	TOTAL
Jan-79					23,215,800
Feb-79					19,971,700
Mar-79					25,353,540
Apr-79					39,103,960
May-79					56,460,800
Jun-79					60,618,000
Jul-79					64,750,400
Aug-79					51,694,700
Sep-79					44,900,700
Oct-79					34,870,500
Nov-79					21,098,500
Dec-79					19,010,200
TOTAL 1979	0	0	0		461,048,800
Jan-80					21,270,000
Feb-80					18,570,700
Mar-80					21,150,100
Apr-80					41,432,700
May-80					37,010,300
Jun-80					55,016,300
Jul-80					60,295,465
Aug-80					57,618,093
Sep-80					39,503,294
Oct-80					33,052,972
Nov-80					20,129,000
Dec-80					22,310,400
TOTAL 1980	0	0	0		427,359,324
					0
Jan-81					16,732,100
Feb-81					19,358,700
Mar-81					24,363,700
Apr-81					44,535,800
May-81					38,830,400
Jun-81					73,552,100
Jul-81					66,754,380
Aug-81					54,132,107
Sep-81					53,248,968
Oct-81					25,051,900
Nov-81					19,491,577
Dec-81					22,349,229
TOTAL 1981	0	0	0		458,400,961
					0
Jan-82					19,809,128
Feb-82					19,574,605
Mar-82					23,489,861
Apr-82					37,240,870
May-82					45,485,800
Jun-82					48,522,300
Jul-82					62,324,900

Usage	WELL 1	WELL 2	WELL 3	WELL 4	TOTAL
Aug-82					59,823,100
Sep-82					36,760,500
Oct-82					25,098,000
Nov-82					18,242,400
Dec-82					20,855,700
TOTAL 1982	0	0	0		417,227,164
					0
Jan-83					17,729,600
Feb-83					18,153,800
Mar-83					23,865,428
Apr-83					29,878,376
May-83					46,818,500
Jun-83					63,061,233
Jul-83					60,603,598
Aug-83					48,779,739
Sep-83					46,542,087
Oct-83					26,412,420
Nov-83					19,731,457
Dec-83					23,123,418
TOTAL 1983	0	0	0		424,699,656
					0
Jan-84					17,230,686
Feb-84					20,809,142
Mar-84					27,527,435
Apr-84					34,435,428
May-84					58,283,710
Jun-84					58,730,084
Jul-84					64,253,814
Aug-84					67,313,217
Sep-84					42,400,160
Oct-84					28,195,029
Nov-84					22,592,226
Dec-84					21,252,710
TOTAL 1984	0	0	0		463,023,641
					0
Jan-85					22,029,197
Feb-85					27,388,572
Mar-85					22,465,294
Apr-85					42,262,682
May-85					55,496,231
Jun-85					77,632,917
Jul-85					58,328,598
Aug-85					71,004,863
Sep-85					35,280,183
Oct-85					31,567,978
Nov-85					22,936,111
Dec-85					26,633,029
TOTAL 1985	0	0	0		493,025,655
					0

Usage	WELL 1	WELL 2	WELL 3	WELL 4	TOTAL
Jan-86					21,352,979
Feb-86					19,470,279
Mar-86					31,616,944
Apr-86					47,224,755
May-86					59,433,835
Jun-86					65,506,543
Jul-86					76,717,847
Aug-86					71,300,839
Sep-86					44,702,400
Oct-86					36,636,600
Nov-86					26,780,800
Dec-86					24,757,557
TOTAL 1986	0	0	0		525,501,378
					0
Jan-87					0
Feb-87					0
Mar-87					0
Apr-87					0
May-87					0
Jun-87					0
Jul-87					0
Aug-87					0
Sep-87					0
Oct-87					0
Nov-87					0
Dec-87					0
TOTAL 1987	0	0	0		0
					0
Jan-88					0
Feb-88					0
Mar-88					0
Apr-88					0
May-88					0
Jun-88					0
Jul-88					0
Aug-88					0
Sep-88					0
Oct-88					0
Nov-88					0
Dec-88					0
TOTAL 1988	0	0	0		0
					0
Jan-89	13,131,400	3,933,800	7,412,400		24,477,600
Feb-89	12,488,300	14,502,800	10,084,600		37,075,700
Mar-89	11,426,500	15,735,100	8,973,500		36,135,100
Apr-89	13,208,000	25,562,000	21,853,000		60,623,000
May-89	27,577,100	16,409,200	15,928,800		59,915,100
Jun-89	18,220,000	36,347,000	19,340,000		73,907,000
Jul-89	23,955,100	39,137,500	26,976,900		90,069,500

Usage	WELL 1	WELL 2	WELL 3	WELL 4	TOTAL
Aug-89	24,938,300	29,110,700	18,230,000		72,279,000
Sep-89	23,302,000	15,280,000	20,157,000		58,739,000
Oct-89	11,208,700	11,403,400	19,650,200		42,262,300
Nov-89	10,389,100	11,428,700	11,245,800		33,063,600
Dec-89	8,535,600	11,697,100	9,380,200		29,612,900
TOTAL 1989	198,380,100	230,547,300	189,232,400		618,159,800
Jan-90	11,338,900	8,711,600	9,147,700		29,198,200
Feb-90	12,750,700	13,504,200	908,500		27,163,400
Mar-90	21,700,800	19,678,800	428,100		41,807,700
Apr-90	16,050,100	15,308,400	15,116,700		46,475,200
May-90	22,771,000	19,390,100	18,809,200		60,970,300
Jun-90	33,668,200	28,019,500	16,335,600		78,023,300
Jul-90	36,522,500	38,512,900	17,321,000		92,356,400
Aug-90	26,949,600	27,731,700	25,016,600		79,697,900
Sep-90	23,987,700	18,365,400	22,395,500		64,748,600
Oct-90	16,164,400	19,127,000	12,990,500		48,281,900
Nov-90	12,650,700	11,371,400	9,039,300		33,061,400
Dec-90	10,827,500	10,672,700	10,770,200		32,270,400
TOTAL 1990	245,382,100	230,393,700	158,278,900		634,054,700
Jan-91	11,435,400	11,954,500	11,056,500		34,446,400
Feb-91	9,509,000	14,356,300	4,240,900		28,106,200
Mar-91					30,476,400
Apr-91					41,819,600
May-91					50,110,300
Jun-91					72,304,700
Jul-91					86,880,300
Aug-91	28,220,400	27,546,600	14,743,100		70,510,100
Sep-91	19,706,000	21,038,500	3,811,000		44,555,500
Oct-91	39,260,000	4,828,300	1,374,300		45,462,600
Nov-91	17,896,700	0	13,027,400		30,924,100
Dec-91	14,200,400	0	14,317,900		28,518,300
TOTAL 1991	140,227,900	79,724,200	62,571,100		564,114,500

Usage	WELL 1	WELL 2	WELL 3	WELL 4	TOTAL
Jan-92	2,617,700	9,971,800	15,233,700		27,823,200
Feb-92	6,891,200	12,912,300	6,789,000		26,592,500
Mar-92	20,575,400	5,759,900	11,083,400		37,418,700
Apr-92	26,654,600	28,219,300	0		54,873,900
May-92	35,613,400	35,813,200	0	0	71,426,600
Jun-92	34,131,000	36,631,900	0	2,303,600	73,066,500
Jul-92	39,731,000	44,512,000	2,515,200	0	86,758,200
Aug-92	19,642,400	3,759,700	12,785,700	47,542,000	83,729,800
Sep-92	34,459,500	0	18,628,600	7,388,000	60,476,100
Oct-92	25,559,700	0	22,770,800	0	48,330,500
Nov-92	15,614,200	0	15,322,800	0	30,937,000
Dec-92	15,073,200	0	11,242,000	0	26,315,200
TOTAL 1992	276,563,300	177,580,100	116,371,200	57,233,600	627,748,200
Jan-93	15,843,600	0	13,798,900	0	29,642,500
Feb-93	15,206,700	0	9,259,600	0	24,466,300
Mar-93	17,486,300	0	14,137,700	0	31,624,000
Apr-93	27,678,500	0	20,224,300	0	47,902,800
May-93	29,350,400	0	21,004,100	15,010,000	65,364,500
Jun-93	7,371,200	0	5,798,200	50,040,000	63,209,400
Jul-93	34,006,900	3,795,300	36,874,900	7,540,000	82,217,100
Aug-93	50,000,000	7,000,000	30,000,000	5,000,000	92,000,000
Sep-93	41,283,200	4,231,200	29,156,500	3,520,000	78,190,900
Oct-93	24,238,400	0	18,570,000	0	42,808,400
Nov-93	19,413,300	0	13,930,200	0	33,343,500
Dec-93	19,215,500	0	12,131,900	0	31,347,400
TOTAL 1993	301,094,000	15,026,500	224,886,300	81,110,000	622,116,800
Jan-94	19,620,100	0	11,665,500	0	31,285,600
Feb-94	19,292,100	1,248,800	9,991,000	615,000	31,146,900
Mar-94	26,806,100	0	20,285,800	0	47,091,900
Apr-94	30,066,800	0	22,732,500	0	52,799,300
May-94	35,342,200	2,883,700	26,889,200	0	65,115,100
Jun-94	10,160,200	39,043,700	26,109,400	14,663,000	89,976,300
Jul-94	3,624,700	20,105,100	17,367,500	56,168,000	97,265,300
Aug-94	15,520,900	23,594,200	19,065,800	47,305,000	105,485,900
Sep-94	11,579,200	0	17,361,300	42,339,000	71,279,500
Oct-94	7,987,600	24,400	0	41,985,000	49,997,000
Nov-94	5,601,600	532,500	14,157,300	11,690,000	31,981,400
Dec-94	0	0	1,107,100	28,166,000	29,273,100
TOTAL 1994	185,601,500	87,432,400	186,732,400	242,931,000	702,697,300

Usage	WELL 1	WELL 2	WELL 3	WELL 4	TOTAL
Jan-95	0	0	29,172,600	0	29,172,600
Feb-95	4,412,300	0	23,037,300	6,000	27,455,600
Mar-95	0	0	34,814,100	0	34,814,100
Apr-95	2,845,300	0	40,960,900	2,242,000	46,048,200
May-95	4,213,800	0	41,398,300	0	45,612,100
Jun-95	29,983,700	1,078,800	34,876,300	45,000	65,983,800
Jul-95	49,989,100	0	39,266,000	0	89,255,100
Aug-95	25,774,100	6,800	38,503,100	25,713,000	89,997,000
Sep-95	1,012,600	50,800	29,799,400	38,736,000	69,598,800
Oct-95	5,277,500	0	41,989,000	5,871,000	53,137,500
Nov-95	0	0	38,760,000	0	38,760,000
Dec-95	18,300	34,200	31,057,500	18,000	31,128,000
TOTAL 1995	123,526,700	1,170,600	423,634,500	72,631,000	620,962,800
Jan-96	0	1,600	30,196,000	143,000	30,340,600
Feb-96	350,500	0	7,191,400	21,029,000	28,570,900
Mar-96	52,200	40,100	11,766,300	25,341,000	37,199,600
Apr-96	11,065,200	82,900	33,730,100	13,069,000	57,947,200
May-96	18,553,500	321,600	31,905,000	17,724,000	68,504,100
Jun-96	44,604,500	419,300	35,058,600	2,546,000	82,628,400
Jul-96	54,332,500	0	42,838,500	2,220,000	99,391,000
Aug-96	53,733,000	13,909,000	21,486,700	4,599,000	93,727,700
Sep-96	51,650,800	22,981,500	8,600	2,383,000	77,023,900
Oct-96	37,755,800	5,730,800	6,939,600	6,329,000	56,755,200
Nov-96	2,457,300	0	32,673,700	0	35,131,000
Dec-96	0	0	32,560,500	0	32,560,500
TOTAL 1996	274,555,300	43,486,800	286,355,000	95,383,000	699,780,100
Jan-97	0	0	32,279,500	0	32,279,500
Feb-97	10,063,900	0	19,961,700	0	30,025,600
Mar-97	7,074,400	0	23,764,800	15,442,000	46,281,200
Apr-97	49,757,500	52,000	8,808,300	3,541,000	62,158,800
May-97	43,140,300	15,980,400	21,785,200	2,294,000	83,199,900
Jun-97	51,210,000	21,444,100	7,711,300	0	80,365,400
Jul-97	53,640,000	26,075,100	20,133,400	0	99,848,500
Aug-97	50,430,100	39,862,100	6,764,600	0	97,056,800
Sep-97	37,509,900	35,835,300	26,500	0	73,371,700
Oct-97	29,220,000	28,090,000	0	0	57,310,000
Nov-97	37,673,800	4,880,700	0	0	42,554,500
Dec-97	957,700	53,900	31,644,200	26,000	32,681,800
TOTAL 1997	370,677,600	172,273,600	172,879,500	21,303,000	737,133,700
Jan-98	0	0	32,810,000	0	32,810,000
Feb-98	0	0	29,760,000	0	29,760,000
Mar-98	0	0	36,260,000	32,000	36,292,000
Apr-98	0	7,655,400	38,860,000	0	46,515,400
May-98	0	12,008,600	43,510,000	0	55,518,600
Jun-98	0	27,501,400	42,250,000	0	69,751,400
Jul-98	2,030,600	31,650,000	40,630,000	27,674,000	101,984,600

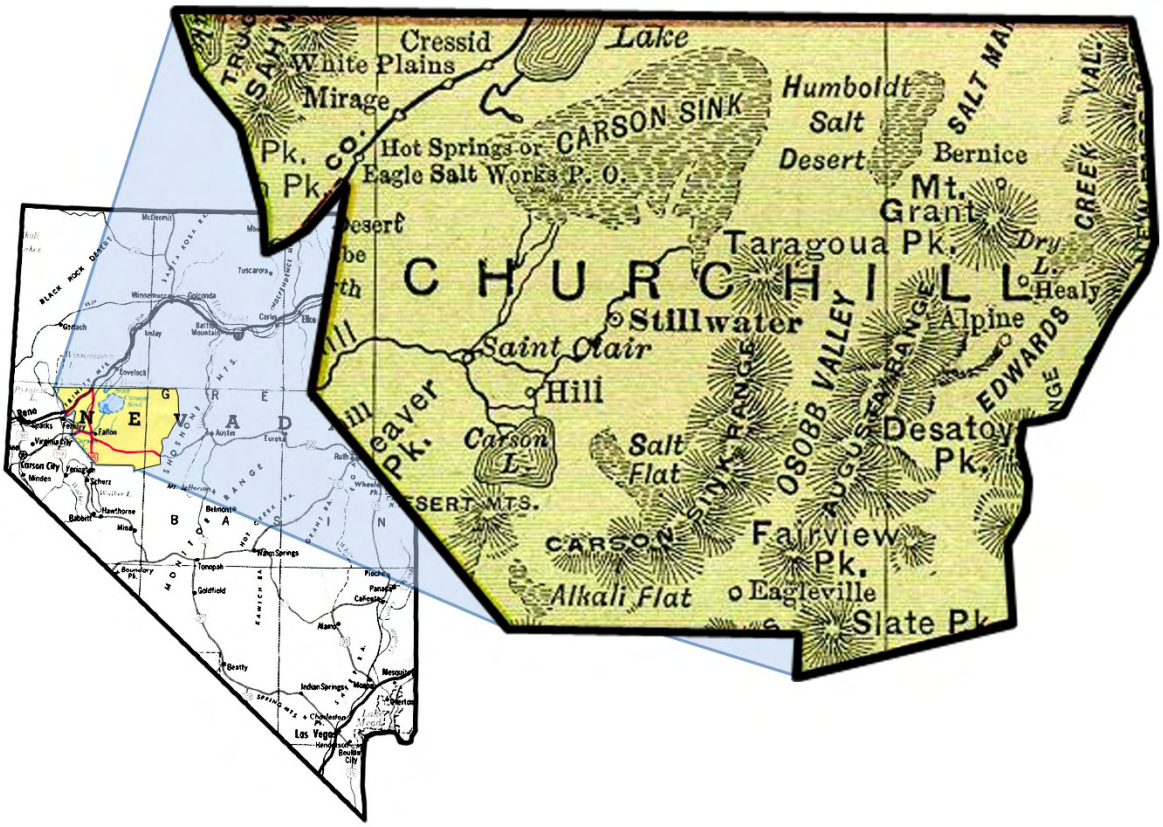
Usage	WELL 1	WELL 2	WELL 3	WELL 4	TOTAL
Jan-95	0	0	29,172,600	0	29,172,600
Feb-95	4,412,300	0	23,037,300	6,000	27,455,600
Mar-95	0	0	34,814,100	0	34,814,100
Apr-95	2,845,300	0	40,960,900	2,242,000	46,048,200
May-95	4,213,800	0	41,398,300	0	45,612,100
Jun-95	29,983,700	1,078,800	34,876,300	45,000	65,983,800
Jul-95	49,989,100	0	39,266,000	0	89,255,100
Aug-95	25,774,100	6,800	38,503,100	25,713,000	89,997,000
Sep-95	1,012,600	50,800	29,799,400	38,736,000	69,598,800
Oct-95	5,277,500	0	41,989,000	5,871,000	53,137,500
Nov-95	0	0	38,760,000	0	38,760,000
Dec-95	18,300	34,200	31,057,500	18,000	31,128,000
TOTAL 1995	123,526,700	1,170,600	423,634,500	72,631,000	620,962,800
Jan-96	0	1,600	30,196,000	143,000	30,340,600
Feb-96	350,500	0	7,191,400	21,029,000	28,570,900
Mar-96	52,200	40,100	11,766,300	25,341,000	37,199,600
Apr-96	11,065,200	82,900	33,730,100	13,069,000	57,947,200
May-96	18,553,500	321,600	31,905,000	17,724,000	68,504,100
Jun-96	44,604,500	419,300	35,058,600	2,546,000	82,628,400
Jul-96	54,332,500	0	42,838,500	2,220,000	99,391,000
Aug-96	53,733,000	13,909,000	21,486,700	4,599,000	93,727,700
Sep-96	51,650,800	22,981,500	8,600	2,383,000	77,023,900
Oct-96	37,755,800	5,730,800	6,939,600	6,329,000	56,755,200
Nov-96	2,457,300	0	32,673,700	0	35,131,000
Dec-96	0	0	32,560,500	0	32,560,500
TOTAL 1996	274,555,300	43,486,800	286,355,000	95,383,000	699,780,100
Jan-97	0	0	32,279,500	0	32,279,500
Feb-97	10,063,900	0	19,961,700	0	30,025,600
Mar-97	7,074,400	0	23,764,800	15,442,000	46,281,200
Apr-97	49,757,500	52,000	8,808,300	3,541,000	62,158,800
May-97	43,140,300	15,980,400	21,785,200	2,294,000	83,199,900
Jun-97	51,210,000	21,444,100	7,711,300	0	80,365,400
Jul-97	53,640,000	26,075,100	20,133,400	0	99,848,500
Aug-97	50,430,100	39,862,100	6,764,600	0	97,056,800
Sep-97	37,509,900	35,835,300	26,500	0	73,371,700
Oct-97	29,220,000	28,090,000	0	0	57,310,000
Nov-97	37,673,800	4,880,700	0	0	42,554,500
Dec-97	957,700	53,900	31,644,200	26,000	32,681,800
TOTAL 1997	370,677,600	172,273,600	172,879,500	21,303,000	737,133,700
Jan-98	0	0	32,810,000	0	32,810,000
Feb-98	0	0	29,760,000	0	29,760,000
Mar-98	0	0	36,260,000	32,000	36,292,000
Apr-98	0	7,655,400	38,860,000	0	46,515,400
May-98	0	12,008,600	43,510,000	0	55,518,600
Jun-98	0	27,501,400	42,250,000	0	69,751,400
Jul-98	2,030,600	31,650,000	40,630,000	27,674,000	101,984,600

Usage	WELL 1	WELL 2	WELL 3	WELL 4	TOTAL
Aug-98	0	1,041,500	36,190,000	60,326,000	97,557,500
Sep-98	0	14,418,500	34,950,000	19,101,000	68,469,500
Oct-98	0	6,210,000	42,610,000	0	48,820,000
Nov-98	0	0	34,840,000	0	34,840,000
Dec-98	155,200	71,500	35,450,000	64,000	35,740,700
Total 1998	2,185,800	100,556,900	448,120,000	107,197,000	658,059,700

APPENDIX 5.0

WATER TREATMENT

CHURCHILL COUNTY WATER SUPPLY TREATMENT
FINAL REPORT



FEBRUARY 2003

NOLTE

BEYOND ENGINEERING

CHURCHILL COUNTY WATER SUPPLY TREATMENT STUDY

FINAL REPORT

February 2003

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Figure 6 System Site Plan – 8 MGD Fluoride Removal Plant

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APPENDIX

Final Report, July 1999 – Churchill County Water Supply Treatment, Gilmore Engineering

UPDATED REPORT ON
CHURCHILL COUNTY WATER SUPPLY TREATMENT
FEBRUARY 2003

Introduction and Overview

Since the original Churchill County Water Supply Treatment report was completed in 1999, the US Environmental Protection Agency (EPA) has adopted several new regulations regarding drinking water. Two new rules that affect portions of the original report are the Long Term 1 Enhanced Surface Water Treatment Rule (LT1) and the Arsenic Rule. In addition, the EPA is expected to propose two more rules before the end of 2002, which are the Long Term 2 ESWTR (LT2) and the Stage 2 Disinfection Byproducts Rule (DBR). However, the latter two rules are not expected to have a significant effect on the water supply treatment systems for Churchill County.

The LT1 became final in January 2002. The purpose of the LT1 was to increase public health protection by reducing the risk of exposure to microbiological pathogens such as cryptosporidium (crypto) and E. coli. Risk reduction was accomplished by tightening the regulations on filter performance. The purpose of LT2 is largely to close certain loopholes in LT1 regarding treatment control. LT2 will also establish requirements for analyzing and quantifying the source water supplies for crypto and E. coli for surface water systems. Where elevated levels of crypto or E. coli are present in the source water supply, additional treatment such as ultraviolet light, chlorine dioxide, or ozone treatment may be required.

The Stage 1 Disinfectants and Disinfection Byproducts Rule established Maximum residual disinfectant level goals (MRDLGs) for chlorine (4 mg/L), chloramines (4 mg/L), and other oxidants, as well as Maximum contaminant level goals (MCLGs) for four trihalomethanes and for total trihalomethanes, and other disinfection byproducts. The Stage 2 Disinfection Byproducts Rule also will close certain loopholes in the Stage 1 DBR. The requirements of the Stage 1 Rule were incorporated into the 1999 report.

The Arsenic Rule established a Maximum Contaminant Level (MCL) of 10 µg/L (micrograms per liter) for arsenic. The previous MCL was 50 µg/L (µ/L, or micrograms per liter, is used interchangeably with parts per billion, or ppb in this report). In anticipation of the Arsenic Rule, and also as a result of it, significant research and development work has taken place in the water treatment industry to develop new arsenic removal technologies and to refine previously known arsenic removal technologies. This research has produced several promising new arsenic treatment methods, and additional information regarding a process that was described as Oxidation-Adsorption-Filtration (O-A-F) in the 1999 report. The O-A-F process was included in the EPA's list of Best Available Technologies (BATs) for arsenic removal. That process has been studied extensively since 1999. The EPA referred to the process as Modified Coagulation / Filtration, but the process is essentially the same as the O-A-F process described in the 1999 report. The process will be referred to as Modified Coagulation / Filtration (MCF) in this updated report.

A complete list and discussion of the BATs and other arsenic removal technologies are included in this report in Section 5.0.1.

This updated report addresses the affects of the above new rules and technologies. Several sections of the 1999 report were unaffected by both regulatory changes and by technological advances in the relevant treatment process. In these sections, the only report revisions reflect updated capital and O&M costs. These sections include 6.0 – Fluoride Removal Treatment, and 7.0 – Manganese Removal Treatment, plus the pertinent cost sections. In the Manganese Removal Treatment process, the building size was increased to accommodate the larger sodium hypochlorite equipment, and also to reflect more widely available filtration equipment.

This updated report was prepared by revising the affected portions of the 1999 report. The new or revised text is shown in italics. The 1999 report is included as an appendix.

UPDATED REPORT ON
CHURCHILL COUNTY WATER SUPPLY TREATMENT
FEBRUARY 2003

1.0 Background

In conjunction with the potable water plan being developed for Churchill County, Nevada, that that *may eventually* supply the City of Fallon, the Naval Air Station at Fallon, and Kennametal Industries, plus the rural community through the year 2050, four alternatives have been defined as a possible source of supply, all of which require treatment:

1. Surface water from Lahontan Reservoir, which would require conventional treatment consisting of chemical treatment, sedimentation, filtration, and disinfection. Also, algae and debris removal would be required seasonally. The water quality, as defined by Table 5-1 from the Nevada Rural Communities Water and Wastewater Plan, 1972, can be characterized as good, with turbidities ranging from 5.5 NTU up to 14.0 NTU, total dissolved solids less than 300 mg/L, with moderate color and alkalinity. This water supply can easily be treated with conventional treatment. Trihalomethane precursors are present, which will require a treatment process that will limits the formation of trihalomethanes. Arsenic is also present at a level of 0.02 mg/L, or 20 parts per billion (ppb) (ppb and µg/L are used interchangeably). Plant capacities of 18.1 million gallons per day and 37.9 million gallons per day are considered.

2. The Basalt Groundwater Aquifer, which is the current source of supply for the City of Fallon, the Naval Air Station, and Kennametal Industries. This water, again as defined in Table 5- 1, typically has arsenic at average concentrations of 0.10 parts per million (ppm), which is *10 times above the new MCL of 10 µ/L).* Other than arsenic, this water supply is of reasonably good quality, with Total Dissolved Solids of just under 500 mg/L. Three plant sizes will be considered, one at 1000 gallons per minute, the second at 8.29 million gallons per day, and the third at 17.36 million gallons per day.

3. Groundwater from Dixie Valley. Operating wells in Dixie Valley can be characterized as low in TDS, low hardness, but with high fluoride levels up to over 9 ppm. The average fluoride concentration in the mineral analyses for nine wells that were analyzed is 4.42. This is above the MCL of 2.0 ppm allowed by the State of Nevada. Fluoride removal plants would be required to treat this water. Three plant sizes will be considered, one at 1500 gallons per minute, the second at 18.1 million gallons per day, and the third at 37.9 million gallons per day.

   Arsenic concentrations for the 9 wells in the Settlement area average 15 ppb which exceeds the current standard of 10 ppb. The concentration of arsenic in these 9 analyses varies from 3 to 25 ppb.

4. The Intermediate Groundwater Aquifer. With this option, a series of smaller treatment plants would be constructed at the wellheads in areas as needed. The Intermediate Groundwater Aquifer water supply, as determined by analyses of existing well water samples, has

manganese concentrations from 0.24 up to 1.22 ppm, both with no arsenic and with arsenic from 0. 10 ppm to 0.33 ppm. *These concentrations are above the current Maximum Contaminant Level (MCL) of 10 ppb*. Two treatment plant sizes are to be considered, at 500 and 1000 gallons per minute.

2.0 Tasks

This report will include the following:

1. A detailed description of the viable treatment processes available.

2. A detailed listing of the individual components of the processes used as the basis for projected capital costs.

3. A typical facility layout of the processes used as the basis for projected capital costs.

4. A detailed, itemized construction cost estimate.

5. A detailed, itemized operational and maintenance cost estimate.

3.0 Treatment Processes

Treatment processes will be considered for the following:

1. Surface water treatment for water from Lahontan Reservoir, plant capacity 18.1 million gallons per day.

2. Surface water treatment for water from Lahontan Reservoir, plant capacity 37.9 million gallons per day.

3. Arsenic bearing water from the Basalt Groundwater Aquifer, arsenic levels approximately 0.10 mg/L, plant capacity 1000 gallons per minute.

4. Arsenic bearing water from the Basalt Groundwater Aquifer, arsenic levels approximately 0.10 mg/L, plant capacity 8.29 million gallons per day.

5. Arsenic bearing water from the Basalt Groundwater Aquifer, arsenic levels approximately 0.10 mg/L, plant capacity 17.36 million gallons per day.

6. Fluoride and Arsenic bearing water from Dixie Valley, fluoride levels approximately 7.50 mg/L, as approximately 15 ppb, plant capacity 1500 gpm.

7. Fluoride and Arsenic bearing water from Dixie Valley, fluoride levels approximately 7.50 mg/L, As approximately 15 ppb, plant capacity 18.1 million gallons per day.

8. Fluoride and Arsenic bearing water from Dixie Valley, fluoride levels approximately 7.50 mg/L, As approximately 15 ppb, plant capacity 37.9 million gallons per day.

9. Manganese bearing water from the Intermediate Groundwater Aquifer, at levels up to 1.22 mg/L, plant capacity 500 gallons per minute.

10. Manganese bearing water from the Intermediate Groundwater Aquifer, at levels up to 1.22 mg/L, plant capacity 1000 gallons per minute.

11. Manganese and arsenic bearing water from the Intermediate Groundwater Aquifer, at Mn levels up to 1.22 mg/L, and arsenic levels up to 0.33 mg/L, plant capacity 500 gallons per minute.

12. Manganese and arsenic bearing water from the Intermediate Groundwater Aquifer, at Mn levels up to 1.22 mg/L, and arsenic levels up to 0.33 mg/L, plant capacity 1000 gallons per minute.

13. Manganese and arsenic bearing water from the Intermediate Groundwater Aquifer, at Mn levels up to 1.22 mg/L, and arsenic levels up to 0.33 mg/L, plant capacity 40 MGD.

4.0 Surface Water Treatment

Surface water treatment for the plant capacities indicated, for source water from Lahontan Reservoir, is required to meet the requirements of the Surface Water Treatment Rule enacted into law in 1989. Conventional treatment, consisting of chemical treatment, flocculation, sedimentation, filtration, and disinfection is the only treatment option that is widely accepted. Newer technologies for the flocculation and sedimentation steps have been introduced in recent years, but as of this date have not been in use long enough to establish a successful track record on a variety of source waters. Filtration and disinfection processes have remained relatively unchanged over the years, with the exception that some recently constructed plants use higher rate filters (op to 7 gpm per square foot) than historically used. In this report, to take the conservative approach, the historically used filter rates (5 gpm per square foot) will be the basis of sizing and costs.

As stated in the Introduction to this report, the EPA addressed the crypto issue in LT1 by tightening the regulations on filter performance. The use of ozone to inactivate crypto will not be required unless, per the expected requirements of LT2, elevated levels of crypto are present in the source water. However, given that there is seasonal algae present in the Lahontan Reservoir, and because algae frequently cause disinfection byproducts when chlorine is used, the treatment scheme recommended for this water supply includes ozone disinfection to mitigate the potential DBP formation problem.

Approximately *50%* of the 20 ppb of arsenic in this surface water source must be removed to achieve the *MCL of 10 ppb*. *Data developed at numerous locations since the 1999 report, including conventional plants, indicate that up to 95% of the arsenic can be effectively removed by the filters in a conventional treatment plant through the oxidation filtration process by feeding ferric chloride. Data indicates that the percentage of arsenic removed is a function of the amount of ferric chloride used.*

4.1 Conventional Treatment

Conventional treatment consists of chemical coagulation, followed by rapid, high energy mixing, flocculation, sedimentation, filtration, and disinfection. For this water supply, with seasonal debris and algae, protective bar racks upstream of traveling water screens to remove the large objects are included, along with dissolved air flotation to remove the seasonal algae. In addition, ozonation disinfection facilities are included. Chlorination facilities are included along with the ozonation facilities in order to provide a chlorine residual in the system distribution piping and storage facilities.

In addition to the conventional treatment components described above, an intake structure is required with raw water pumps, trash bar racks, and a traveling water screen to remove floating trash, debris, and large fish from the raw water source. Raw water pumps will deliver flow to the headworks of the treatment trains, from which point the flow through the plant is by gravity into the below grade clearwell. Dissolved air flotation to remove seasonal algae would be required.

Clearwell storage of filtered water for chlorine contact time, backwash water pumping, product water pumping, an administration building, a laboratory, and a maintenance building are also included to provide a complete plant.

The surface water treatment plant cost data in this report is based on the plant capacity being divided into two trains, each of which could be operated independently of the other, per the requirements of the Surface Water Treatment Rule. Further, within each train, the rapid mix, flocculation, and sedimentation basins would be constructed in pairs, allowing one of the pairs to be shut down while the other operates. This feature allows shutdown of one fourth of the plant for maintenance.

The rapid mix basins, flocculation basins, sedimentation basins and filters would be constructed of reinforced concrete, not enclosed in a building. The filter pipe galleries would be housed and covered. All components of the plant except for the rapid mix basins, flocculation basins, sedimentation tanks, filters and bulk chemical storage tanks would be housed.

In addition to the above components, alum sludge disposal facilities are required. Four techniques are applicable for handling and disposal of alum sludges:

- Disposal to sanitary sewer
- Lagooning, air drying, and hauling to landfill
- Sand bed drying and hauling to landfill
- Centrifuge dewatering and hauling to landfill

Disposal to a sanitary sewer requires no capital cost for facilities, and the annual cost charged by the sanitary district is often lower than the operation and maintenance cost of the other alternatives. However, some sanitary districts decline to accept the sludge outright, or maintain the right to decline after accepting the sludge for a number of years. Taking the conservative

approach, the capital and operational costs of alum sludge disposal in this report are based on sand bed drying and hauling to landfill.

4.1.1 DESCRIPTION OF COMPONENTS

- Raw Water Intake/Bar Rack/Traveling Water Screen

  The protective bar racks have bars spaced at 3 to 4 inches, and are fixed in place in the raw water intake/traveling water screen structure (see Figure 1). The intake should be constructed in the deepest water economically available, and should be equipped with several intake ports at different elevations, each of which could be closed depending on seasonal variations.

- Chemical Storage and Feeding System

  Bulk storage tanks for alum, sodium hydroxide (caustic soda), and polymer are included. Tanks would be located where convenient to truck access. Feeding systems would consist of flow paced metering pumps, with backup pumps for each chemical. Flow calibration chambers would be provided for each pump.

- Rapid Mixing

  Two mechanically mixed basins, with mechanical mixers, are included, one for each treatment train. Detention time in the basins is 1 minute, with mixers having a velocity gradient "G" of 700 sec^{-1}.

- Flocculation

  Two flocculation basins, one per treatment train, are included. Each basin would have two compartments, with a total of 30 minutes detention time for the two basins. Each compartment would have four vertical turbine flocculators. The first compartment turbine flocculators would have a velocity gradient “G” of 75 sec^{-1}, and the second a “G” value of 25 sec^{-1}.

- Sedimentation Basins

  Sedimentation basins would be horizontal flow type, rectangular or square in shape depending on the plant flow rate, with sludge removal scrapers. Rectangular basins are typically constructed with length to width ratios of 3:1 to 5:1, with depths of 8 to 10 feet. Sludge collectors for square basins are typically circular clarifiers with corner sweeps, with the basin bottoms sloped toward the center sludge discharge at slopes of 8 to 10%.

  The sedimentation basin design overflow rate would be 600 gallons per day per square foot, and the design weir overflow rate would be 20,000 gallons per day per linear foot.

- Filters

  Gravity filters would be constructed based on a 5 gpm/square foot flow rate. Filter media would be either mixed media or dual media type, with air/water wash underdrains. Filtered water would discharge by gravity to the below grade clearwell. Backwash water would be provided by vertical pumps (one as a backup) in the clearwell. Backwash rates would be variable between 15 and 18 gpm per square foot.

- Disinfection Facilities

  The disinfection facilities would include gas chlorination, and ozonation. Both oxidants could be fed both pre and post treatment for maximum flexibility. During seasonal algae blooms, for example, pre chlorination may produce undesirable tastes and odors in the finished water, and/or produce high trihalomethanes (THM's).

- Clearwell Storage

  Below ground reinforced concrete clearwell storage is used as the design basis. Filter wash water storage is included in the clearwell. Vertical pumps on the clearwell would provide the wash water for the filters. The below grade concrete structure involves the highest capital cost, but also the longest service life and the lowest maintenance costs of the choices available.

- Sand Drying Beds

  Cost data for the sand drying beds is based on sizing the sand beds for eight applications of sludge per year, and applying liquid sludge to the beds with a solids content of 1.7 percent.

See Figure 2 for a typical layout of a 20 mgd conventional plant. A 40 mgd plant would be similar in layout.

5.0 Arsenic Removal Treatment

The Basalt Groundwater Aquifer, the current source of supply for the City of Fallon, the Naval Air Station, and Kennametal Industries, yields water with arsenic levels at average concentrations of 0.10 mg/L, which is *ten times* as high as the current MCL. Other than arsenic, the water supply from the aquifer is of reasonably good quality, with Total Dissolved Solids just below 500 mg/L. *An MCL of 10 ppb is used as the basis for producing cost data for this report.*

Nine wells in the Settlement area of Dixie Valley contain arsenic in concentrations from 3 to 25 ppb, with an average concentration of 15 ppb. In addition, water from another aquifer, the Intermediate Groundwater Aquifer, also contains arsenic, both with and without the presence of manganese. The Intermediate Groundwater Aquifer water supply, as determined by analyses of existing well water samples, has manganese concentrations from 0.24 up to 1.22 ppm, both with no arsenic and with arsenic from 0.10 ppm to 0.33 ppm. Removal of arsenic to *10 ppb*, and removal of manganese to the Secondary MCL of 0.10 ppm will be used as the basis of estimating costs for this report.

5.0.1 Arsenic Removal Treatment Technologies

The two principal forms of arsenic in water are the trivalent anion arsenite, and the pentavalent anion arsenate. Pentavalent arsenic can be removed from water by conventional chemical clarification with lime, or alum, or iron salts (ferric chloride or ferric sulfate) as coagulants. Trivalent arsenic is not effectively removed by chemical clarification, hence it must be oxidized to the pentavalent form with an oxidant such as chlorine, ozone, or potassium permanganate prior to clarification. After oxidation, filtration is required to remove the precipitated solids.

Arsenic may also be removed by anion exchange resins, or by activated alumina, which acts as an anion exchange media. Either must be periodically regenerated with caustic soda *or brine, both of* which present undesirable waste issues.

In addition to MCF discussed in the Introduction to this report, the EPA lists the following as Best Available Technologies (BAT) for arsenic removal: Modified Lime Softening, Anion Exchange, Oxidation Filtration, Activated Alumina, POU Reverse Osmosis, POU Activated Alumina, and Coagulation assisted microfiltration.

Data developed since 1999 indicates that up to almost 100% arsenic removal can be achieved with the MCF process. In this process, arsenite must first be oxidized to the arsenate state with chlorine, ozone, or other commonly used oxidant. Then, coagulation chemicals are added (alum, iron salts [ferric sulfate or ferric chloride], or polymers) to destabilize the suspended particles to produce filterable solids. Iron salts, especially ferric chloride, have usually been found to be more effective than alum, and are also effective over a wider pH range than alum. Polymers are usually employed in addition to iron salts to enhance the effectiveness of the coagulation process and to reduce the required dosage of iron salts.

Coagulants change the surface charge of the solids, allowing agglomeration into larger, more filterable solids. Arsenate is removed by adsorption to the precipitated ferric hydroxide resulting from oxidizing either the natural iron present in the raw water, or by adsorption to the ferric precipitates caused by injecting iron salts. If there is an insufficient amount of natural iron present in the water, iron salts must be added to create the ferric hydroxide floc. Adsorption is most effective at a pH of 7.0. The adsorption efficiency drops significantly at a pH above 8.5.

If the amount of precipitated solids is high, a settling step, or a clarification step may be necessary to reduce the amount of solids loading onto the filters. Treatment plants without settling or clarification are known as direct filtration plants.

The components of this system include chemical tanks and feed pumps, mixing/reaction tanks, and filters. Periodically, the filters require backwashing, which generates wastewater.

In the Modified Lime Softening process, lime (calcium hydroxide) is added to precipitate calcium carbonate, along with arsenic and other compounds. This process will generate a large amount of sludge, and also must be operated at high pH levels (approx. 10.5) to be effective in arsenic removal. Consequently, it would be necessary to lower the pH by feeding acid before sending

treated water to the system. The large amount and characteristics of the chemicals required for this process make it unattractive for use with small systems.

The anion exchange and activated alumina processes were discussed in the 1999 report, and no additional data has been produced on these processes since 1999.

The Oxidation Filtration process listed by the EPA is very similar to the Modified Coagulation Filtration process, and is applicable where the water source includes sufficient natural iron for the arsenic adsorption process to complete.

POU means point of use, or small treatment units installed in the home, which have not been accepted by the regulatory agencies for public water systems, and were not considered in this report.

Coagulation assisted microfiltration is the same as MCF, except that microfilters are used in place of conventional media filters. Microfilters have a smaller pore size than media filters and will remove a higher percentage of arsenic compared to media filters when the same ferric chloride dosage is used. However, because microfilters cost significantly more than media filters, the capital costs for the coagulation assisted microfiltration process are much higher as compared to the MCF process.

In addition to the above Best Available Technologies, the EPA also listed adsorbent technologies as viable for arsenic removal. One of these adsorbent technologies, granular ferric hydroxide, or GFH, was developed in Germany in response to that country's adoption of an arsenic MCL of 10 ppb in 1996. GFH is highly selective for arsenic, with phosphate, chromium, and uranium also competing for adsorption sites. It is currently non-regenerable in the field. Once exhausted, the media is removed and replaced with new media. Toxicity Characteristics Leaching Procedure (TCLP) tests have indicated that the exhausted media is non-hazardous, and can be disposed of in landfills. Depending on the pH, the amount of arsenic in the raw water, and other water characteristics, several months to several years of operation may be attained before replacement of the media is required.

GFH has demonstrated the ability to remove both arsenite and arsenate, without oxidation, at pH ranges less than 8.0. GFH is considered a viable process where influent water parameters are: arsenic < 50 ppb, combined iron and manganese < 0.3 ppm, and relatively free of particulate matter, which would foul the media. Due to the high cost of GFH, this technology is more applicable to very small systems where no skilled operators are available, where the simplicity of the process becomes more important. Because the raw water parameters do not fall into the acceptable range for a high percentage of the well water in the Lahontan and Dixie Valleys, the GFH process is not used as the basis of estimating costs in this report. Also, the cost of this process is higher than the MCF process for systems as large as those described in this report. The GFH process may be competitive with MCF for wellhead treatment where the water meets the above parameters.

Of the ion exchange methods, activated alumina is usually the best option, since it is more selective (conventional ion exchange will remove all of the anions present in the raw water supply) for arsenic than other ion exchange methods, and is less expensive both in terms of

capital and operating costs. Activated alumina will remove arsenic down to near non-detect levels, but will also remove sulfate and fluoride. Consequently, if the raw water supply contains significant levels of these other ions, the activated alumina will "load up" with these ions, which shortens the run time between regenerations, which in turn raises the operating costs and increases the amount of spent regenerant to be disposed of.

Reverse osmosis (RO) was not considered to be a viable process in the 1999 report, and no new data have been developed to change that conclusion. RO is not selective for the removal of arsenic, which means that arsenic would be removed along with the other ions present in the raw water, and this is not only expensive, but is undesirable. Also, the amount of reject water (wastewater) produced by an RO unit on this water supply would be substantial, probably 30% of the plant production or more. Disposal of this amount of water is problematical. Also, the high capital cost of RO, approximately $1.5 million for a 1000 gpm plant, is another reason why RO was not given consideration. These reasons also apply to the other groundwater treatment options discussed in the following sections.

The MCF process will be used as the basis of producing cost data for this report. The process is widely used in the water treatment industry for treatment of surface water, and for iron and manganese removal treatment of groundwater. Only minor modifications are required to the surface water treatment process to accomplish arsenic removal. The modifications include the use of greensand filter media instead of silica sand media, and the use of ferric chloride as a coagulant instead of alum. Arsenic removal with this process is primarily a function of the amount of ferric chloride used, and can reach nearly 100%. For the water sources described in this report, the MCF process has the lowest capital and operating cost of any of the arsenic removal processes for the size of plants considered.

5.1 1000 GPM Arsenic Removal Plants for Basalt Groundwater Aquifer

The *MCF* process has demonstrated the ability to reduce arsenic to below 5 ppb on water supplies with the levels of arsenic found in the Basalt Groundwater Aquifer. *However, pilot testing should be conducted to determine the operating parameters and refine the design criteria.*

The MCF process, although very similar to the Filtronics O-A-F process described in the 1999 report, does not include a gravity settler, and less chemical feed equipment is necessary. The MCF process is not proprietary to one manufacturer as was the case with the Filtronics process, which means that numerous equipment manufacturers can furnish the equipment. The equipment prices are substantially lower as a result. The MCF process for the 1000 gpm plant can also be housed in a much smaller building than the Filtronics O-A-F equipment.

These plants would include backwash water recovery systems to reduce the amount of wastewater. The recovery systems can recover up to 99% of the backwash water. The supernatant would be recycled back through the treatment process, with removed solids allowed to accumulate. Periodically, the solids would be transferred to vacuum trucks for disposal offsite.

5.1.1 DESCRIPTION OF COMPONENTS FOR 1000 GPM SYSTEM

- Chemical Storage and Feeding System

  The chemicals required for the *MCF* arsenic removal process are chlorine, ferric chloride, and a polymeric coagulant. As a basis of determining costs for this report, chemical solution tanks, mixers and feed pumps are included for sodium hypochlorite, a polymer, and ferric chloride.

- Chemical mixing

  Chemical mixing will be accomplished with *a static mixer. A detention tank is provided to allow the chemical reactions time to complete. Five minutes' detention time will be provided in pressure vessels prior to filtration. Five minutes at 1000 gpm, or 5000 gallons, can be achieved in an 8 foot diameter by 14 foot long horizontal tank. Interior baffling will be provided to prevent short circuiting of flow from the inlet to the outlet.*

- Filters

  At 5 gpm per square foot of filter area, a 200 square foot filter is required. A two cell, 8 foot diameter by 25 foot long horizontal filter is recommended. Dividing the filter into two cells will reduce the backwash flow requirement to one half the flow requirement for a single compartment filter. The backwash flow would be obtained from the distribution system. The filters would be equipped with automatic valves, piping, intemals, media, and controls. The filter tank would be lined with epoxy.

- Backwash Water Reclaim Facilities

  A grade level steel tank, sized to accommodate two backwash volumes (approximately 60,000 gallons) would be provided, along with a recycle pump to pump the supernatant back to the detention tank inlet. Recycling of the supernatant would start after an adjustable time period of approximately an hour had elapsed after the end of backwash. This delay period will allow the solids to settle out before recycling begins. Periodically, the accumulated solids will require removal. The solids can be discharged directly to a sanitary sewer if one is nearby, or the solids can be transferred to a vacuum truck for disposal offsite. Most wastewater treatment plants will accept these solids.

5.2 8.29 MGD Arsenic Removal Plant for Basalt Groundwater Aquifer

For the 8.29 and 17.36 MGD plants, the plant construction would be very similar as described for the conventional surface water treatment plant in Sections 4.1 and 4.1.1. *The arsenic removal plants would utilize anthracite and greensand filter media, and would use ferric chloride as the primary coagulant. In all other respects, the arsenic removal plant would be the same as the conventional surface water treatment plant described in Section 4.0.*

5.2.1 DESCRIPTION OF COMPONENTS

- Chemical Storage and Feeding System

  Provisions for ferric chloride and polymer in bulk shipments by truck and transfer to bulk storage tanks. Tanks would be located where convenient to truck access. Feeding systems would consist of flow paced metering pumps, with backup pumps for each chemical. Flow calibration chambers would be provided for each pump.

- Rapid Mixing

  Two mechanically mixed basins, with mechanical mixers, are included, one for each treatment train. Detention time in the basins is one minute, with mixers having a velocity gradient "G" of 700 sec^{-1}.

- Flocculation

  Two flocculation basins, one per treatment train, are included. Each basin would have two compartments, with a total of 30 minutes detention time for the two basins. Each compartment would have four vertical turbine flocculators. The first compartment turbine flocculators would have a velocity gradient "G" of 75 sec^{-1}, and the second a "G" value of 25 sec^{-1}.

- Sedimentation Basins

  Sedimentation basins would be horizontal flow type, rectangular or square in shape depending on the plant flow rate, with sludge removal scrapers. Rectangular basins are typically constructed with length to width ratios of 3:1 to 5:1, with depths of 8 to 10 feet. Sludge collectors for square basins are typically circular clarifiers with comer sweeps, with the basin bottoms sloped toward the center sludge discharge at slopes of 8 to 10%.

  The sedimentation basin design overflow rate would be 600 gallons per day per square foot, and the design weir overflow rate would be 20,000 gallons per day per linear foot.

- Filters

  Gravity filters would be constructed based on a 5 gpm square foot flow rate. Filtered water would discharge by gravity to the below grade clearwell. Backwash water would be provided by vertical pumps (one a backup) in the clearwell. Backwash rates would be variable between 12 and 18 gpm per square foot,

- Chlorination Facilities

  Gas chlorination facilities would be provided for prechlorination of the raw water. Gas scrubbers are included.

- Clearwell Storage

  Below ground reinforced concrete clearwell storage is used as the design basis. Filter wash water storage is included in the clearwell. Vertical pumps on the clearwell would provide the wash water for the filters. The below grade concrete structure involves the highest capital cost, but also the longest service life and the lowest maintenance costs of the choices available.

- Sand Drying Beds

  Cost data for the sand drying beds is based on sizing the sand beds for eight applications of sludge per year, and applying liquid sludge to the beds with a solids content of 1.7 percent.

5.3 17.36 MGD Arsenic Removal Plant for Basalt Groundwater Aquifer

5.3.1 DESCRIPTION OF COMPONENTS

The description of this capacity plant is the same as for the 8.29 MGD plant.

6.0 Fluoride and Arsenic Removal Treatment - Dixie Valley Groundwater

Groundwater from the Dixie Valley is a possible source of water. This groundwater typically contains fluoride at levels up to 9.12 ppm, compared to the MCL of 2.0 ppm. Excessive amounts of fluorides above the MCL have been established as the cause of dental fluorosis, which is a mottling, or disfiguring discoloration of the teeth. Treatment for fluoride removal to the MCL would be required on this water supply.

Also, all mineral analyses for the nine wells in the Settlement area indicated the presence of arsenic, at an average level of 15 ppb. Because this level is above the new MCL of 10 ppb, arsenic removal will also be required, unless groundwater sources can be found that contain no arsenic.

Fluoride removal is complicated by the presence of other ions in the water that compete with fluoride for removal. As stated previously, the most widely recognized method of fluoride removal is the ion exchange process using activated alumina. With this process, sulfate and arsenic will be removed along with fluoride. Consequently, the design of defluoridation systems requires laboratory and pilot scale work prior to the design of full scale treatment systems, in order to determine the design parameters.

Two forms of defluoridation have been used. One involves passage of water through defluoridation media such as bone meal, bone char, ion exchange resins, or activated alumina. All of the above are considered ion exchange treatment. The second involves the addition of chemicals such as lime or alumina prior to rapid mixing, flocculation, and sedimentation in a waterworks for the removal of fluoride only or the concurrent removal of fluoride and other ions such as calcium and magnesium. This method will be referred to as the Chemical Addition method. Given the relatively low levels of calcium and magnesium in the *nine* well water

samples from the Dixie Valley, the removal of these ions is not expected to be an issue with the Dixie Valley groundwater

6.1 Ion Exchange Method

The most widely used ion exchange method is the use of activated alumina as the exchange medium. One example of fluoride removal by this method is the plant at Gila Bend, Arizona, which has been in since 1978. This plant has a treatment capacity of 0.625 mgd, and has successfully reduced raw water fluoride levels of 3.0 ppm to as low as 0. 1 ppm. The plant consists of two 10 foot diameter rubber lined pressure vessels, each containing 5 feet, or 380 cubic feet of Alcoa F-1 activated alumina. Operation consists of adjusting the raw water pH to 5.5 with sulfuric acid prior to treatment, and after treatment, pH adjustment to 7.4 with sodium hydroxide. Careful raw water pH control is necessary since fluoride removal is not nearly as effective at higher pH values. The plant was designed for operation between 5 and 7.5 gpm per square foot. Treatment runs for each vessel are between 3.5 and 5 million gallons, and treated water is blended in a tank to produce a water with 1.0 ppm of fluoride for distribution. Regeneration consists of three steps: backwash, regeneration, and neutralization. Backwashing with raw water is performed to remove suspended solids that have been filtered from the water and to unpack the bed, thus preventing tendencies from channeling during the subsequent steps. Regeneration utilizes a 1 percent sodium hydroxide solution, which results in the activated alumina bed having a pH of 12 to 13. Since little fluoride removal occurs at pH values above 11, an optimum removal occurs at approximately pH 5 to 5.5, the bed is neutralized before placement back in service. During this step, the raw water pH is reduced to 2.5 and is fed downflow through the media bed until the bed is neutralized, ready for the next cycle. Wastewater is approximately 4% of the plant throughput, and is disposed of in a lined evaporation lagoon. Operating costs including labor, electricity, chemicals, media replacement, and miscellaneous costs, based on 1980 costs, averaged less than 12 cents per 1000 gallons treated. Chemical requirements are, for the above water, about 15.8 gallons of 66º B' sulfuric acid and 24.6 gallons of 50% sodium hydroxide per million gallons treated.

Note that with the activated alumina process, any iron or manganese present must be removed prior to the ion exchange step, since both iron and manganese would foul the media. Of the *nine* mineral analyses from Dixie Valley wells that were reviewed for this report, two had significant amounts of iron, up to almost 0.8 mg/L. Water with that much iron would require a two step treatment process, with the iron removed first. Since two stage treatment would not be viable from a cost and operational standpoint, it is assumed that well water without iron present would be used as the source of supply.

Arsenic also competes with the fluoride for removal sites in the activated alumina process, which will cause shorter run times between regenerations, thereby increasing the operating costs. Arsenic must be oxidized to the pentavalent form with an oxidant in order to be removed effectively with this process. Chlorine would be used as the oxidant.

Spent regenerant water would be captured in a lined evaporation pond. The pond would be sized to accommodate all of the spent regenerant plus the expected rainfall amounts. Evaporation losses during the year will prevent the pond from overflowing.

6.2 Chemical Addition Method

Lime and alum have been used successfully for fluoride removal. The defluoridation systems generally consist of lime or alum addition to a rapid mix chamber, followed by flocculation and sedimentation, then filtration. Lime treatment is only effective when significant quantities of magnesium are present in the raw water. Since the Dixie Valley groundwater is low in magnesium, this process is ruled out. Alum, when added to water, reacts with the natural alkalinity in the water to produce insoluble aluminum hydroxide. Fluoride is then removed by adsorption onto the aluminum hydroxide particles. However, alum dosages up to 400 ppm may be required to achieve adequate fluoride removal. At dosages this high, it would also be necessary to add alkalinity to the water by adding caustic soda or soda ash, since there is not enough natural alkalinity in the water to react with the alum. At these high dosages, the cost of chemicals would be very high, and the amount of sludge produced would be very high.

Of the two fluoride removal methods, ion exchange using activated alumina is the method that can be counted on to work effectively. The chemical addition method may work, but only a pilot study can determine its viability. Note that laboratory work and pilot studies must be completed for any alternative in order to obtain data for the design of the full scale plants, and to estimate the operation and maintenance costs for a full scale plant. The cost of laboratory work and pilot study costs are included in the cost estimate.

The activated alumina process will be used as the basis of determining costs, since it is the only process with any significant operating history that will remove both arsenic and fluoride.

6.2.1 DESCRIPTION OF COMPONENTS - 1500 gpm fluoride removal facility

- Sodium hypochlorite pretreatment
- Acid feed pumps to reduce the pH to approximately 5.5 prior to ion exchange
- Acid storage tank, epoxy lined steel
- Caustic feed pumps post treatment to raise pH to approximately 7.5
- Caustic storage tank, epoxy lined steel tank with immersion heater
- 4 each 10 foot diameter x 96 inch side shell pressure filters with face piping, control valves, controls, activated alumina media
- 100, 000 gallon clearwell
- Lined evaporation pond

6.2.2 DESCRIPTION OF COMPONENTS - 18.1 MGD Fluoride removal facility

- Gas chlorination pretreatment
- Acid feed pumps to reduce the pH to approximately 5.5 prior to ion exchange
- Acid storage tank, epoxy lined steel

- Caustic feed pumps post treatment to raise pH to approximately 7.5
- Caustic storage tank, epoxy lined steel tank with immersion heater
- 20 each 12 foot diameter x 96 inch side shell pressure filters with face piping, control valves, controls, activated alumina media
- 600,000 gallon clearwell
- Lined evaporation pond

6.2.3 DESCRIPTION OF COMPONENTS - 37.9 MGD Fluoride removal facility

- Gas chlorination pretreatment
- Acid feed pumps to reduce the pH to approximately 5.5 prior to ion exchange
- Acid storage tank, epoxy lined steel
- Caustic feed pumps post treatment to raise pH to approximately 7.5
- Caustic storage tank, epoxy lined steel tank with immersion heater
- 40 each 12 foot diameter x 96 inch side shell pressure filters with face piping, control valves, controls, activated alumina media
- 1,200,000 gallon clearwell
- Lined evaporation pond

7.0 Manganese Removal Treatment

Manganese is present in the Intermediate Groundwater Aquifer at levels up to 0.22 ppm. Water containing manganese is objectionable due to aesthetic reasons, since precipitation occurs at the point of use when atmospheric oxygen is brought into contact with the water. Precipitation of manganese causes brown to black stains in plumbing fixtures and objectionable tastes in drinking water and beverages, and stains clothing. Water containing less than about 0. 1 ppm manganese is not objectionable to the average consumer. The State of Nevada enforces the Secondary Standards for this constituent, which is an MCL of 0. 1 ppm. The AWWA has suggested a limit of 0.1 ppm for manganese for an "ideal" quality water for public use.

In addition to the above problems associated with manganese, another problem is the potential growth of microorganisms in distribution systems. Slime thickness of several centimeters have been observed in distribution pipes. These accumulations reduce pipeline capacity, require higher chlorine dosages, and deplete dissolved oxygen levels. Sloughing or resuspension of this material by high flows causes high turbidities, and complaints of discolored or black water. Discussions of bacteria associated with the presence of manganese can be found in *Standard Methods* [1] and *Water Quality and Treatment* [2].

There are many methods used for the removal of manganese from public water supplies. The primary method involves oxidation, precipitation, and filtration. Other methods include ion exchange, stabilization, and lime softening. A listing of the methods is:

- Chlorination, ozonation, or chlorine dioxide oxidation, precipitation, filtration
- Potassium permanganate oxidation, precipitation, and filtration
- Ion exchange softening
- Manganese greensand filtration
- Stabilization or sequestering
- Lime softening
- Proprietary "catalytic" filtration processes using proprietary filter media

Of the above methods, oxidation with chlorine is the preferred method due to the lower cost of chlorine compared to any other oxidant, the "operator friendliness" of the chlorination oxidation process compared to the other oxidants, and is the more widely used of any of the methods. Potassium permanganate is expensive and messy to use, and the ion exchange process requires the use of hazardous acid and caustic chemicals. Stabilization is not a preferred method since no manganese is removed, only sequestered, or held in solution, so that precipitation does not occur. Stabilization is also less effective on water with manganese levels as high as 1.2 ppm. Lime softening is only cost effective when lime treatment for hardness reduction is required. The proprietary processes are more expensive than the preferred method, both in terms of capital cost, and operational cost.

Dissolved manganese is normally present in the manganous manganese state. In the presence of an oxidizing agent these ions are oxidized to the manganic state, which forms insoluble precipitates that can be filtered out. Chlorination historically has been considered ineffective in oxidizing manganese, due to the relatively long time for the reaction to occur. For example, at a pH value of about 7.5, and a temperature of 25 degrees C, it requires more than six hours to oxidize manganese with chlorine, even with a dosage four times the stoichiometric amount. For this reason, stronger oxidants such as potassium permanganate or chlorine dioxide have been used in the past. Over the past 10 or so years, however, another oxidation-precipitation-filtration method has found widespread use, which is the use of oxide coated filter media.

7.1 Manganese Removal Using Oxide Coated Media

For several decades, water treatment plant operators have noticed that a black film or coating would frequently develop on filter media during water treatment operations. This black film or coating is manganic oxide where manganese is present. It has been discovered that this oxide coating allows for an adsorption/filtration process to be utilized for manganese removal, which takes advantage of the benefits of using chlorine as the oxidant instead of the more expensive or more objectionable oxidants. Manganese removal using oxide coated media is accomplished in two steps. Soluble manganous manganese is removed from the water by direct adsorption onto the oxide coated media surface. Subsequently, free chlorine oxidizes the adsorbed manganous

manganese to manganese oxide on the surface of the media. This method not only allows the use of the less expensive chlorine oxidant, but also does not involve the formation of colloidal manganese oxide solids, thereby minimizing filtering problems. This method also produces less sludge than a process using potassium permanganate, up to 40%, less.

The oxide coated media may be obtained by placing the plant into operation and allowing the oxide coating to form on silica sand filter media over a period of several days to several weeks, or it may be purchased in the form of manganese greensand**,** which is a proprietary media having the oxide coating, costing up to 10 times as much as the silica sand. The manganese greensand is also somewhat more effective at manganese removal of the two at higher filtration rates. Filters using manganese greensand also typically have a higher headloss and shorter run times than oxide coated silica sand filters. However, even given the significantly higher media cost, there are examples where, by using manganese greensand, the filter sizes can be reduced to the point where that option is less expensive than the silica sand option. For this reason, pilot studies are recommended using both silica sand and manganese greensand to determine the optimum media for this groundwater supply.

Backwash water recycling systems are typically used to reduce the amount of wastewater discharge. In most cases, up to 99% of the backwash water may be recycled. Solids are allowed to accumulate in the wastewater tank, and periodically are transferred to a vacuum truck and disposed of at a wastewater treatment plant. If the treatment plant is near a sanitary sewer, the solids may be discharged directly to the sewer.

The complete process consists of chlorine injection, detention vessels to provide time for the chemical reactions to complete, and filtration. The entire process can be completed under pressure, using the well pump discharge pressure to pump water through the treatment train, and into the distribution system. Filter rates of 5 gpm per square foot, and silica sand media will be used as the basis of estimating costs for this report, with 5 minutes detention time in the detention tanks.

7.1.1 DESCRIPTION OF COMPONENTS - 500 GPM FACILITY

- Chlorination Facility

  Due to the more stringent requirements of the applicable codes regarding the transportation, storage and use of chlorine gas, most municipal operators of treatment facilities of this size are switching to liquid sodium hypochlorite in lieu of chlorine gas. Although the liquid chlorine costs are twice the chlorine gas cost, the associated compliance costs and operator safety requirements for small facilities outweigh the potential cost savings of using gas. Sodium hypochlorite will be used as the basis of projected costs for this report for all treatment facilities up to and including 1500 gpm.

- Detention Tank

  Five minutes' detention time will be provided in pressure vessels prior to filtration. Five minutes at 500 gpm, or 2500 gallons, can be achieved in an 6 foot diameter by 12 foot long

horizontal tank. Interior baffling will be provided to prevent short circuiting of flow from the inlet to the outlet.

- Pressure Filter

  At 5 gpm per square foot of fitter area, a 100 square foot filter is required. A two cell, 6 foot diameter by 16 foot long horizontal filter is recommended. Dividing the filter into two cells will reduce the backwash flow requirement to one half of the flow requirement for a single compartment filter. The backwash flow could be obtained from the distribution system, at a flow rate of approximately 700 gpm. Backwash water would be directed to a wastewater reclaim tank for recycling through the filter.

- Backwash Water Reclaim Facilities

  A grade level steel tank, sized to accommodate two backwash volumes (approximately 30,000 gallons) would be provided, along with a recycle pump to pump the supernatant back to the detention tank inlet. Recycling of the supernatant would start after an adjustable time period of approximately an hour had elapsed after the end of backwash. This delay period will allow the solids to settle out before recycling begins. Periodically, the accumulated solids will require removal. The solids can be discharged directly to a sanitary sewer if one is nearby, or the solids can be transferred to a vacuum truck for disposal offsite. Most wastewater treatment plants will accept these solids.

7.1.2 DESCRIPTION OF COMPONENTS - 1000 GPM FACILITIES

The components for the 1,000 gpm facility would be the same as for the 500 gpm facility, with the exception that the recommended detention tank size is an 8 foot by 14 foot horizontal tank, the recommended filter size is 8 foot by 25 foot long four cell tank, and the backwash water reclaim tank should be 60,000 gallons minimum.

8.0 Manganese and Arsenic Removal Treatment from the Intermediate Groundwater Aquifer

The MCF process will effectively remove both manganese and arsenic.

Refer to Sections 5.0 and 5.1 for a detailed description of the process, and to Section 5.1.1 for a description of the components. The process is the same for only arsenic removal or for the removal arsenic and manganese.

8.1 Description of Components - 500 gpm Facility

The components for the 500 GPM facility would be same as described for the 1000 gpm arsenic removal facility in Section 5.1, except with smaller components.

8.2 Description of Components - 1000 gpm Facility

The components for the 1000 GPM facility would be identical to those described for the 1000 gpm arsenic removal facility in Section 5.1.

8.3 Description of Components - 40 mgd Facility

The components for the 40 MGD facility would be similar to the conventional surface water treatment plant described in Sections 4.1 and 4.1.1, but would not include the raw water intake/bar rack/traveling screen component. The components are as described below.

- Chemical Storage and Feeding System

  Provisions for ferric chloride and polymer in bulk shipments by truck and transfer to bulk storage tanks. Tanks would be located where convenient to truck access. Feeding systems would consist of flow paced metering pumps, with backup pumps for each chemical. Flow calibration chambers would be provided for each pump

- Rapid Mixing

  Two mechanically mixed basins, with mechanical mixers, are included, one for each treatment train. Detention time in the basins is 1 minute, with mixers having a velocity gradient "G" of 700 sec^{-1}.

- Flocculation

  Two flocculation basins, one per treatment train, are included. Each basin would have two compartments, with a total of 30 minutes detention time for the two basins. Each compartment would have four vertical turbine flocculators. The first compartment turbine flocculators would have a velocity gradient "G" of 75 sec^{-1}, and the second a " G" value of 25 sec^{-1}.

- Sedimentation Basins

  Sedimentation basins would be horizontal flow type, rectangular or square in shape depending on the plant flow rate, with sludge removal scrapers. Rectangular basins are typically constructed with length to width ratios of 3:1 to 5:1, with depths of 8 to 10 feet. Sludge collectors for square basins are typically circular clarifiers with comer sweeps, with the basin bottoms sloped toward the center sludge discharge at slopes of 8 to 10%.

  The sedimentation basin design overflow rate would be 600 gallons per day per square foot, and the design weir overflow rate would be 20,000 gallons per day per linear foot.

- Filters

  Gravity filters would be constructed based on a 5 gpm/square foot flow rate. Filter media would be *anthracite and manganese greensand.*. Filtered water would discharge by gravity

to the below grade clearwell. Backwash water would be provided by vertical pumps (one a backup) in the clearwell. Backwash rates would be variable between 10 and 12 gpm per square foot.

- Chlorination Facilities

  Gas chlorination facilities would be provided for prechlorination of the raw water. Gas scrubbers are included

- Clearwell Storage

  Below ground reinforced concrete clearwell storage is used as the design basis. Filter wash water storage is included in the clearwell. Vertical pumps on the clearwell would provide the wash water for the filters. The below grade concrete structure involves the highest capital cost, but also the longest service life and the lowest maintenance costs of the choices available.

- Sand Drying Beds

  Cost data for the sand drying beds is based on sizing the sand beds for eight applications of sludge per year, and applying liquid sludge to the beds with a solids content of 1.7 percent.

9.0 Cost Data

9.1 Surface Water Treatment Plant Costs

The cost data for surface water treatment plant construction, operation and maintenance was obtained from a U.S. EPA study developed originally by Culp/Wesner/Culp in 1978, and published in a four volume set of documents entitled *Estimating Water Treatment Costs* [3]. These cost data cover the capacity range up to 200 mgd. The construction cost data were developed using equipment cost data supplied by manufacturers, cost data from actual plant construction, unit cost take offs from actual and conceptual designs, and published cost data. Design criteria and other data used in the development of construction and operational costs are as follows:

• raw water pumping	100 feet TDH
• alum feed	50 mg/L design, 30 mg/L operating
• polymer feed	1 mg/L design, 0.2 mg/L operating
• rapid mix	60 sec detention, G = 700
• flocculation	G = 75 first stage, G = 25 second stage
• Clarifiers	600 gpd/sq ft
• gravity filtration	5 gpm/sq ft
• chlorine dosage	5 mg/L design, 2 mg/L operating

• ozone dosage	1.5 mg/L design, 0.8 mg/L operating
• product water pumping	300 feet TDH
• Electricity	11 cents per kWh
• Labor	$35/hr
• Diesel fuel	$1.50/gal
• Alum (liquid)	$0.08 per pound
• Polymer (liquid)	$1.25 per pound
• Chlorine gas	$0.15 per pound (2000 lb. cylinders)
• Sulfuric acid	$0.15 per pound (460 lb. drums)
• Caustic soda	$0.35 per pound (500 lb. drums)

The above costs from the 1999 report were checked against current 2002 prices, with changes as noted.

The following items were added to the construction cost data as separate line items to present a total project cost, not including land, legal and administrative costs:

- Engineering at 8%
- Sitework, interface piping, raw water piping - 15%
- General contractor overhead and profit - 10%
- *Construction management – 8%*

Cost additions must be made for the following items to determine total capital cost:

- Land
- Legal, fiscal, and administrative costs

The cost data for the 1999 report was determined as described below:

The costs referenced above were updated in January 1984, based on comparing costs from *Estimating Water Treatment Costs* to the actual construction cost of plants. The updated data was published in the *Handbook of Public Water Systems* [4]. The costs published in this 2002 report are based on the *Handbook of Public Water Systems* costs, *escalated* from January 1984 construction costs to October 1998 construction costs.

The escalation factor is based on a ratio of the 20 cities average Construction Cost Index (CCI) from the Engineering News Record for January 1984 (20 Cities Average) to the CCI for October 1998 (San Francisco). The ratio is:

$$\text{CCI October 1998/CCI January 1984} = \frac{6763}{4109} = 1.65$$

To adjust 1999 cost figures to September 2002 costs, an escalation factor of 1.10 was applied. (The 20 cities CCI for October 1998 was 5986, and for September 2002, 6589. This escalation factor is 6589 / 5986 = 1.10). This escalation factor was used as noted on each cost summary where applicable.

9.2 Arsenic, Fluoride, and Manganese Removal Costs

The cost data for the 1000 GPM arsenic plant only, plus the fluoride, and manganese removal plants were developed by obtaining budget cost estimates for the treatment equipment components and controls from several equipment manufacturers. In addition to the equipment components, the cost of a building or buildings, fencing, site improvements, wash water tanks, backwash water reclaim tanks, and electrical switchgear was added to make a complete plant. The cost data for the latter items are based on file data from other recent projects, and the 12th edition of R.S. Means Heavy Construction Cost Data handbook. Design criteria and other data used in the development of construction and operational costs are as follows:

- raw and product water pumping — 400 feet TDH total
- chlorine gas — $0.50 per pound in 150 lb. cylinders
- sodium hypochlorite — $1.25 per gallon in 53 gallon drums
- polymer — $1.25 per pound in 55 gallon drums
- ferric chloride — $0.35 per pound in 55 gallon drums
- caustic soda — $0.35 per pound (500 lb. drums)
- sulfuric acid — $0.15 per pound (460 lb. drums)
- electricity — 11 cents per kWh
- Labor — $35/hr

For the 8.29 MGD and 17.36 MGD arsenic removal plants, the costs were determined as described in Section 9.1 above for conventional surface water treatment plants, with adjustments as noted in the cost estimate for the differences between surface water treatment and arsenic removal. Ozone facilities are not required for arsenic, therefore these facilities were not included in the arsenic removal plants.

Engineering costs, sitework, interface piping, raw water piping, and general contractor overhead and profit were estimated at the following amounts for these larger arsenic removal plants, and the two larger capacity fluoride removal plants, due to the differences in scale from the smaller plants:

- Engineering at 8%
- Sitework, interface piping, raw water piping - 15%

- General contractor overhead and profit – 10 %
- *Construction management – 8%*

Cost additions must be made for the following items to determine total capital cost:

- Land
- Legal, fiscal, and administrative costs

9.3 Capital and O&M Cost Data, Surface Water Treatment

CAPITAL COSTS, 18.1 MGD (20) AND 37.9 MGD (40)[a]

Item	20 mgd Cost, $	40 mgd Cost, $
Raw water intake structure	550,000	660,000
Conventional treatment including rapid mix, chemical feed facilities, flocculation, sedimentation, gravity filtration, below grade clearwell, high lift pumps, backwash pumps, chlorine disinfection facilities, chemical building, administration building, pump building	13,673,000	25,476,000
Ozone facilities	1,650,000	2,090,000
Alum sludge drying beds	660,000	1,045,000
Subtotals	16,533,000	29,271,000
Sitework, interface piping, raw water piping - 15%	2,480,000	4,391,000
Subtotal – construction cost	19,013,000	34,112,000
General contractor overhead and profit – 10%	1,901,000	3,411,000
Engineering and CM – 16%	3,042,000	5,458,000
Total construction, engineering and construction management cost	23,956,000	42,981,000

O&M COSTS, 18.1 MGD (20) AND 37.9 MGD (40)

Item	20 mgd Cost, $	40 mgd Cost, $
All O&M costs except for ozone and alum sludge costs[b]	1,488,000	2,530,000
Ozone O&M costs[c]	110,000	220,000
Alum sludge disposal costs	28,000	39,000
Totals (based on operating at 95% capacity)	1,626,000	2,789,000
Cost per 1000 gallons treated	0.22	0.19

[a] Cost adjustment factor of 1.10 was applied to figures in both tables (see Section 9.1).
[b] Based on the actual cost of O&M for similar plants in Northern CA
[c] Based on $2.00 per pound, 0.8 mg/L ozone dosage

9.4 Capital and O&M Cost Data, Arsenic Removal Treatment

BASALT GROUNDWATER AQUIFER
CAPITAL COSTS, 1000 GPM PLANT

Item	Quantities and Units	Unit Price	Cost, $
Building	1500 SF	150	225,000
Treatment equipment including the chemical feed systems, detention tank, pressure filter, controls and accessories	LS	200,000	200,000
Installation labor on treatment components	LS	15,000	15,000
Washwater reclaim tank	LS	80,000	80,000
Reclaim pump	LS	5,000	5,000
Subtotal			525,000
Contingencies – 20%			105,000
Site work, interconnecting piping – 15%			79,000
Electrical and Instrumentation – 20%			105,000
Subtotal			814,000
General Contractor OH&P – 20%			163,000
Subtotal			977,000
Engineering and CM cost – 16%			156,000
Total construction, engineering and construction management cost[a]			1,133,000

O&M COSTS, 1000 GPM PLANT

Item	Quantities and Units	Unit Price	Cost/yr., $
Labor	2 hrs/day	$35/hr	25,500
Electricity – 1000 gpm @ 400 ft. TDH	2,552 kwh/day	0.11/kwh	101,000
Chemicals (chlorine, ferric chloride, polymer)[b]	LS	varies	50,000
Maintenance @ 5% of equipment cost/yr	LS	-	22,500
Total O&M Cost @ 95% capacity			199,700
Cost per 1000 gallons treated			0.40

[a] A three week pilot study is estimated to cost $25,000, including engineering oversight and independent testing. This cost is addition to the above total.
[b] Based on 91 lbs of ferric chloride, 35 gallons of sodium hypochlorite, and 11 lbs of polymer per day

9.5 Capital and O&M Cost Data, Arsenic Removal Treatment

BASALT GROUNDWATER AQUIFER
CAPITAL COSTS, 8.29 MGD and 17.36 MGD PLANTS[a]

Item	8.29 mgd Cost, $	17.36 mgd Cost, $
Conventional treatment including rapid mix, chemical feed facilities, flocculation, sedimentation, gravity filtration, below grade clearwell, high lift pumps, backwash pumps, chlorine disinfection facilities, chemical building, administration building, pump building	7,260,000	12,650,000
Sludge drying beds	440,000	660,000
Subtotals	7,700,000	13,310,000
Sitework, interface piping, raw water piping - 15%	1,155,000	1,997,000
Subtotal – construction cost	8,855,000	15,307,000
General contractor overhead and profit – 10%	886,000	1,531,000
Engineering and CM cost – 16%	1,417,000	2,449,000
Total construction, engineering, & construction management cost[b]	$11,158,000	$19,287,000

ANNUAL O&M COSTS, 8.29 MGD and 17.36 MGD PLANTS

Item	8.29 mgd Cost, $	17.36 mgd Cost, $
All O&M costs[c] (except additional chemicals required)	740,000	1,291,000
Chemicals (chlorine, ferric chloride, polymer)	220,000	458,000
Sludge disposal costs	28,000	44,000
Totals (based on operating at 95% capacity)	$988,000	$1,903,000
Cost per 1000 gallons treated	$0.34	$0.32

[a] Escalation factor of 1.10 was applied to figures in both tables (see Section 9.1)
[b] A three week pilot study is estimated to cost $25,000, including engineering oversight and independent testing. This cost is in addition to the above total.
[c] Based on the actual cost of O&M for similar plants in Northern CA
[d] Based on 552 lbs of ferric chloride, 210 gallons of sodium hypochlorite, and 69 lbs of polymer per day for the 8.29 MGD plant, and 2.1 times these amounts for the 17.36 MGD plant

9.6 Capital and O&M Cost Data, Fluoride and Arsenic Removal Treatment

DIXIE VALLEY GROUNDWATER
CAPITAL COSTS, 1500 GPM PLANT[a]

Item	Quantities and Units	Unit Price	Cost, $
Building	1600 SF	150	240,000
Treatment equipment including the chemical feed systems, chemical storage tanks, filters, controls and accessories	LS	968,000	968,000
Installation labor on treatment components	LS	110,000	110,000
Clearwell	LS	88,000	88,000
Lined evaporation pond	50,000 SF	2.20	110,000
Subtotal			1,516,000
Contingencies – 20%			303,000
Site work, interconnecting piping – 15%			227,000
Electrical and Instrumentation – 20%			170,000
Subtotal			2,216,000
General Contractor OH&P – 20%			443,000
Subtotal			2,659,000
Engineering & CM cost – 16%			425,000
Total construction, engineering, and construction management cost[b]			3,084,000

[a] Escalation factor of 1.10 was applied to figures in table (see Section 9.1)
[b] A three week pilot study is estimated to cost $25,000, including engineering oversight and independent testing. This cost is addition to the above total.

O&M COSTS, FLUORIDE REMOVAL SYSTEMS

The operating cost of a fluoride removal plant is largely dependent upon the mineral analysis of the well water, since sulfate and arsenic are removed along with the fluoride. The cost range for fluoride removal for this size of plant varies from 27 cents to 44 cents per thousand gallons, depending on the levels of the other constituents. A pilot study would be required before a more accurate figure could be calculated.

9.7 Capital and O&M Cost Data, Fluoride and Arsenic Removal Treatment – Dixie Valley Groundwater

CAPITAL COSTS, 18.1 MGD PLANT[a]

Item	Quantities and Units	Unit Price	Cost, $
Building	10,000 SF	125	1,250,000
Installation labor on treatment components	LS	400,000	400,000
Clearwell, 600,000 gallons	LS	330,000	330,000
Lined evaporation pond	450,000 SF	2.20	990,000
Subtotal			7,370,000
Contingencies – 20%			1,474,000
Site work, interconnecting piping – 15%			1,106,000
Electrical and Instrumentation – 15%			1,106,000
Subtotal			11,056,000
General Contractor OH&P – 10%			1,106,000
Subtotal			12,162,000
Engineering & CM cost – 16%			1,946,000
Total construction, engineering, and construction management cost[b]			14,108,000

[a] Escalation factor of 1.10 was applied to figures in table (see Section 9.1)
[b] A three week pilot study is estimated to cost $25,000, including engineering oversight and independent testing. This cost is in addition to the above total.

O&M COSTS, FLUORIDE REMOVAL SYSTEMS

The operating cost of a fluoride removal plant is largely dependent upon the mineral analysis of the well water, since sulfate and arsenic are removed along with the fluoride. The cost range for fluoride removal for this size of plant varies from 13 cents to 30 cents per thousand gallons, depending on the levels of the other constituents. A pilot study would be required before a more accurate figure could be calculated.

9.8 Capital and O&M Cost Data, Fluoride and Arsenic Removal Treatment Dixie Valley Groundwater

CAPITAL COSTS, 37.9 MGD PLANT[a]

Item	Quantities and Units	Unit Price	Cost, $
Building	20,000 SF	125	2,500,000
Treatment equipment including the chemical feed systems, chemical storage tanks, filters, controls and accessories	LS	8,800,000	8,800,000
Installation labor on treatment components	LS	800,000	800,000
Clearwell - 1,200,000 gallons	LS	660,000	660,000
Lined evaporation pond	900,000 SF	2.20	1,980,000
Subtotal			14,740,000
Contingencies – 20%			2,948,000
Site work, interconnecting piping – 15%			2,211,000
Electrical and Instrumentation – 15%			2,211,000
Subtotal			22,110,000
General Contractor OH&P – 10%			2,211,000
Subtotal			24,321,000
Engineering and CM cost – 16%			3,891,000
Total construction, engineering, and construction management cost[b]			28,212,000

[a] Escalation factor of 1.10 was applied to figures in table (see Section 9.1).
[b] A three week pilot study is estimated to cost $25,000, including engineering oversight and independent testing. This cost is in addition to the above total.

O&M COSTS, FLUORIDE REMOVAL SYSTEMS

The operating cost of a fluoride removal plant is largely dependent upon the mineral analysis of the well water, since sulfate and arsenic are removed along with the fluoride. The cost range for fluoride removal for this size of plant varies from 13 cents to 30 cents per thousand gallons, depending on the levels of the other constituents. A pilot study would be required before a more accurate figure could be calculated.

9.9 Capital and O&M Cost Data, Manganese Removal

CAPITAL COSTS, 500 GPM PLANT

Item	Quantities and Units	Unit Price, $	Cost, $
Building	1000 SF	150	150,000
Treatment equipment including the chlorination system, detention tank, pressure filter, controls and accessories	LS	110,000	110,000
Installation labor on treatment components	LS	10,000	10,000
Washwater reclaim tank	LS	48,000	48,000
Reclaim pump	LS	5,000	5,000
Subtotal			323,000
Contingencies – 20%			65,000
Site work, interconnecting piping – 15%			48,000
Electrical and Instrumentation – 20%			65,000
Subtotal			501,000
General Contractor OH&P – 20%			100,000
Subtotal			601,000
Engineering and CM cost – 16%			96,000
Total construction, engineering, & construction management cost			697,000

O&M COSTS, 500 GPM PLANT

Item	Quantities and Units	Unit Price, $	Cost/yr., $
Labor	2 hrs/day	$35/hr	25,500
Electricity – 500 gpm @ 400 ft. TDH	1,276 kwh/day	0.11/kwh	51,000
Chlorine	11.4 lbs/day	0.50	2,100
Maintenance @ 5% of equipment cost/yr	LS	-	8,500
Total O&M Cost @ 95% capacity			87,000
Cost per 1000 gallons treated			0.34

9.10 Capital and O&M Cost Data, Manganese Removal

CAPITAL COSTS, 1000 GPM PLANT

Item	Quantities and Units	Unit Price, $	Cost, $
Building	1500 SF	150	225,000
Treatment equipment including the chlorination system, detention tank, pressure filter, controls and accessories	LS	190,000	190,000
Installation labor on treatment components	LS	15,000	15,000
Washwater reclaim tank	LS	88,000	88,000
Reclaim pump	LS	5,000	5,000
Subtotal			523,000
Contingencies – 20%			105,000
Site work, interconnecting piping – 15%			78,000
Electrical and Instrumentation – 20%			105,000
Subtotal			811,000
General Contractor OH&P – 20%			162,000
Subtotal			973,000
Engineering & CM cost – 16%			156,000
Total construction, engineering, & construction management cost			1,129,000

O&M COSTS, 1000 GPM PLANT

Item	Quantities and Units	Unit Price, $	Cost/yr., $
Labor	2 hrs/day	$35/hr	25,500
Electricity – 1000 gpm @ 400 ft. TDH	2,552 kwh/day	0.11/kwh	102,000
Chlorine	22.8 lbs/day	0.50	4,200
Maintenance @ 5% of equipment cost/yr	LS	-	13,200
Total O&M Cost @ 95% capacity			145,000
Cost per 1000 gallons treated			0.29

9.11 Capital and O&M Cost Data, Manganese and Arsenic Removal Treatment

INTERMEDIATE GROUNDWATER AQUIFER
CAPITAL COSTS, 500 GPM PLANT

Item	Quantities and Units	Unit Price, $	Cost, $
Building	1000	150	150,000
Treatment equipment including the chemical feed systems, detention tank, pressure filter, controls and accessories	LS	125,000	125,000
Installation labor on treatment components	LS	10,000	10,000
Washwater reclaim tank	LS	48,000	48,000
Reclaim pump	LS	5,000	5,000
Subtotal			338,000
Contingencies – 20%			68,000
Site work, interconnecting piping – 15%			51,000
Electrical and Instrumentation – 20%			68,000
Subtotal			525,000
General Contractor OH&P – 20%			105,000
Subtotal			630,000
Engineering and CM cost – 16%			101,000
Total construction, engineering, and construction management cost			731,000

O&M COSTS, 500 GPM PLANT

Item	Quantities and Units	Unit Price, $	Cost/yr., $
Labor	2 hrs/day	$35/hr	25,500
Electricity – 500 gpm @ 400 ft. TDH	1,276 kwh/day	0.11/kwh	51,000
Chemicals (chlorine, ferric chloride, polymer)[a]	LS	Varies	18,300
Maintenance @ 5% of equipment cost/yr	LS	-	8,500
Total O&M Cost @ 95% capacity			103,000
Cost per 1000 gallons treated			0.41

[a] Based on 45 lbs of ferric chloride, 18 gallons of 12.5% hypochlorite, and 5.5 lbs of polymer per day.

9.12 Capital and O&M Cost Data, Manganese and Arsenic Removal Treatment Intermediate Groundwater Aquifer Capital Costs, 1000 gpm Plant

The capital and O&M costs for this type of plant are identical to the costs for the 1000 GPM arsenic removal plant per Section 9.4.

9.13 Capital and O&M Cost Data, Manganese and Arsenic Removal Treatment

INTERMEDIATE GROUNDWATER AQUIFER CAPITAL COSTS, 40 MGD[a]

Item	Cost, $
Conventional treatment including rapid mix, chemical feed facilities, flocculation, sedimentation, gravity filtration, below grade clearwell, high lift pumps, backwash pumps, chlorine disinfection facilities, chemical building, administration building, pump building	24,750,000
Sludge drying beds	1,045,000
Subtotals	25,795,000
Sitework, interface piping, raw water piping - 15%	3,869,000
Subtotal	29,664,000
General contractor overhead and profit – 10%	2,966,000
Engineering and CM – 16%	4,746,000
Total construction, engineering, & construction management cost	37,376,000

A three week pilot study is estimated to cost $25,000, including engineering oversight and independent testing. This cost is in addition to the above total.

ANNUAL O&M COSTS

Item	Cost, $
All O&M costs except chemicals[b]	2,750,000
Chemicals[c] (chlorine, ferric chloride, polymer)	1,310,000
Sludge disposal costs	55,000
Total (based on operating at 95% capacity)	4,115,000
Cost per 1000 gallons treated	0.30

[a] Cost adjustment factor of 1.10 was applied to figures in both tables (see Section 9.1).
[b] Based on the actual cost of O&M for similar plants in Northern CA
[c] Based on 650 lbs of ferric chloride, 1600 gallons of sodium hypochlorite, and 54 gallons of polymer per day

References

[1] APHA, AWWA, WPCF, *Standard Methods for the Examination of Water and Wastewater*, 14the ed., American Public Health Association, Washington, DC, 1976.

[2] AWWA, *Water Quality and Treatment*, 3rd ed. McGraw-Hill Book Co., New York, 1971.

[3] Gummerman, R.C., Culp, R.L., Hansen, S.P., and Lineck, T.S., *Estimating Water Treatment Costs*, Vols. 1-4, EPA-600/2-79-162A, 162b, 162c, and 162d, U.S. Environmental Protection Agency, Cincinnati, Ohio, 1979.

[4] Culp/Wesner/Culp, *Handbook of the Public Water Systems*, Von Nostrand Reinhold, New York, New York, 1986.

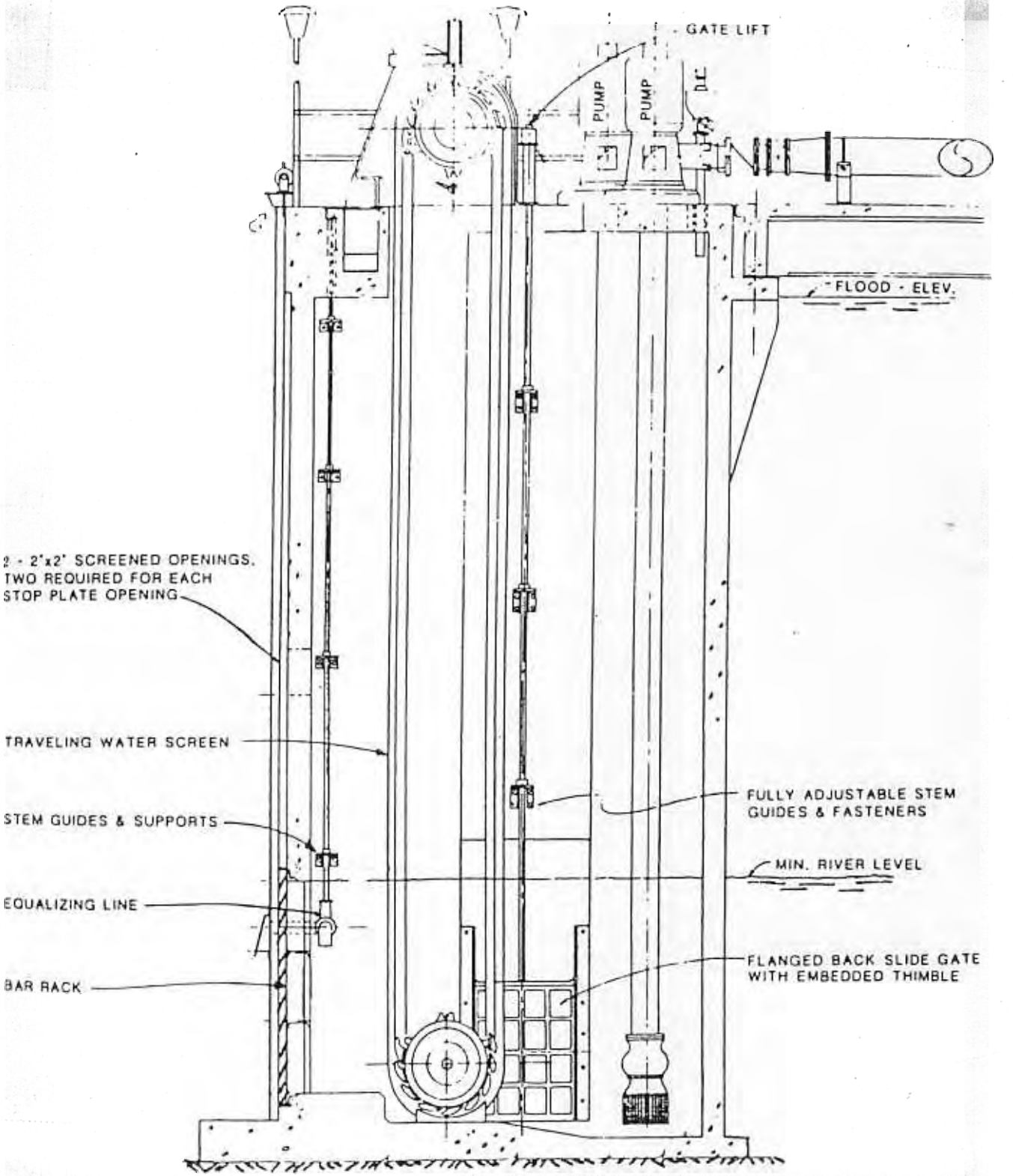


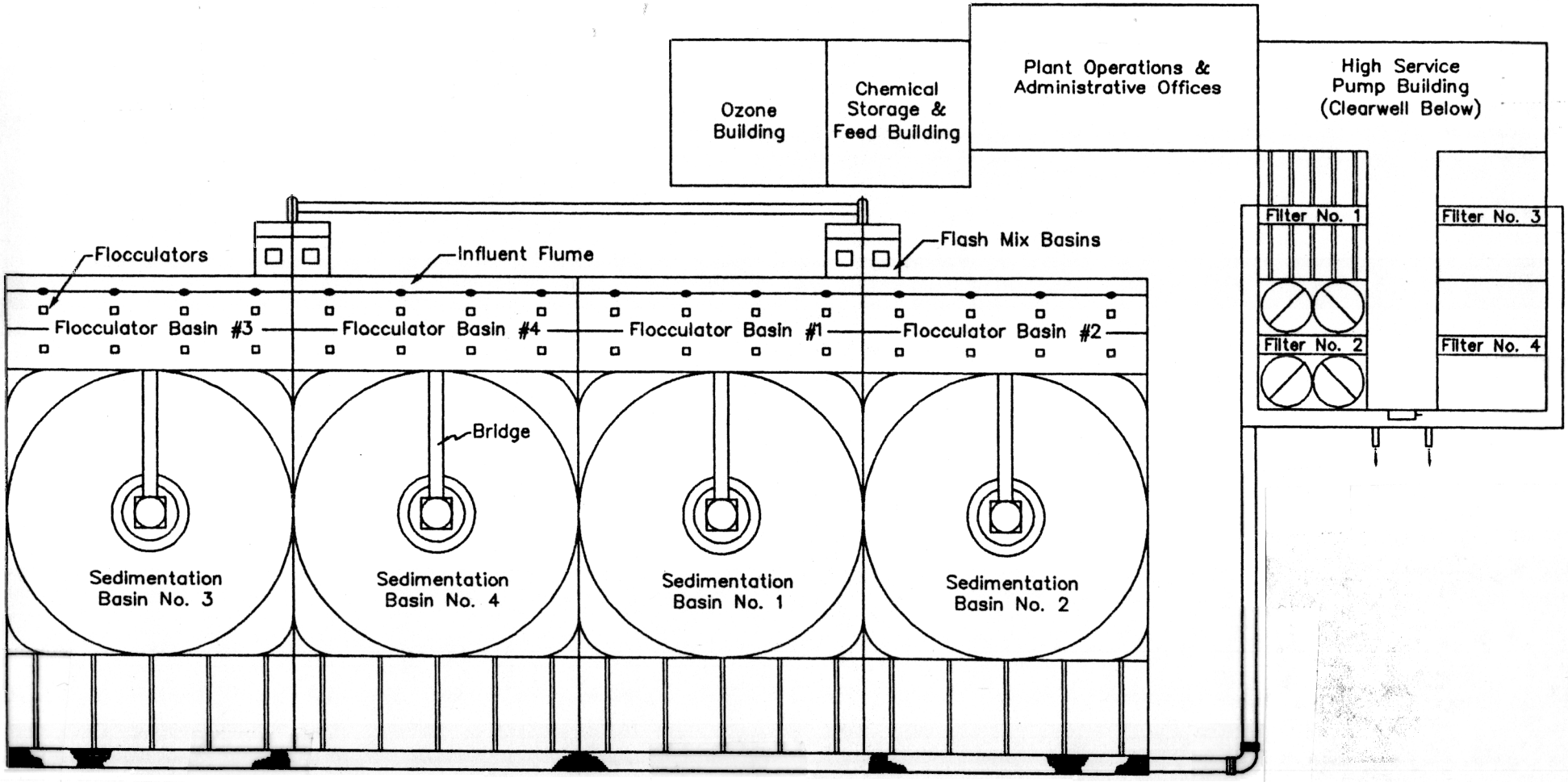
FIGURE 1

CHURCHILL COUNTY
WATER SUPPLY TREATMENT

INTAKE WITH VERTICAL PUMP AND TRAVELING WATER SCREEN

NOLTE
BEYOND ENGINEERING

N:\SA 57300\CI JRCI IL - .dwg KC.1 0/14/2002



Design Criteria

PLANT FLOW	20 MGD
FLASH MIX BASINS	
Number	4
Detention	1 min
Volume	3500 gal
Mixers	4
Hp	5
Velocity Gradient	700 sec
FLOCCULATION BASINS	
Number	8
Detention	30 min
Volume	210,000 gal
Flocculators	
Number	32
Type	Vertical Turbine
1st stage velocity gradient	75
2nd stage velocity gradient	25

SEDIMENTATION BASINS	
Number	4
Overflow rate	600 gpd/sq ft
Volume	800,000 gal
Weir length	250 ft/basin
FILTERS	
Number	8 (2 cell)
Filter rate	5 gpm/sq ft
Backwash rate	
Normal	15 gpm/sq ft
Maximum	18 gpm/sq ft

FIGURE 2

CHURCHILL COUNTY
WATER SUPPLY TREATMENT

FACILITY LAYOUT FOR 20 MGD WATER TREATMENT PLANT

NOLTE
BEYOND ENGINEERING

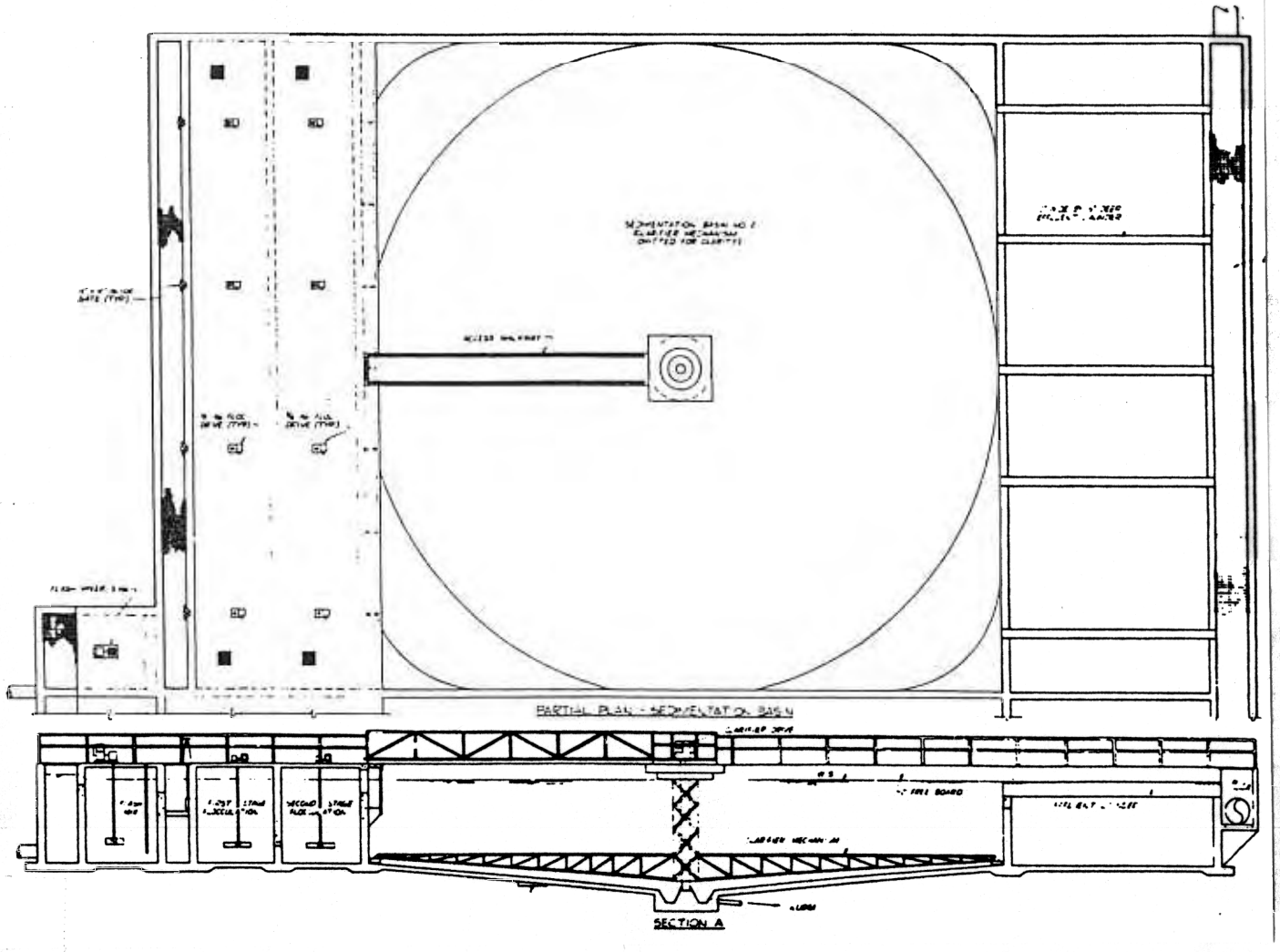
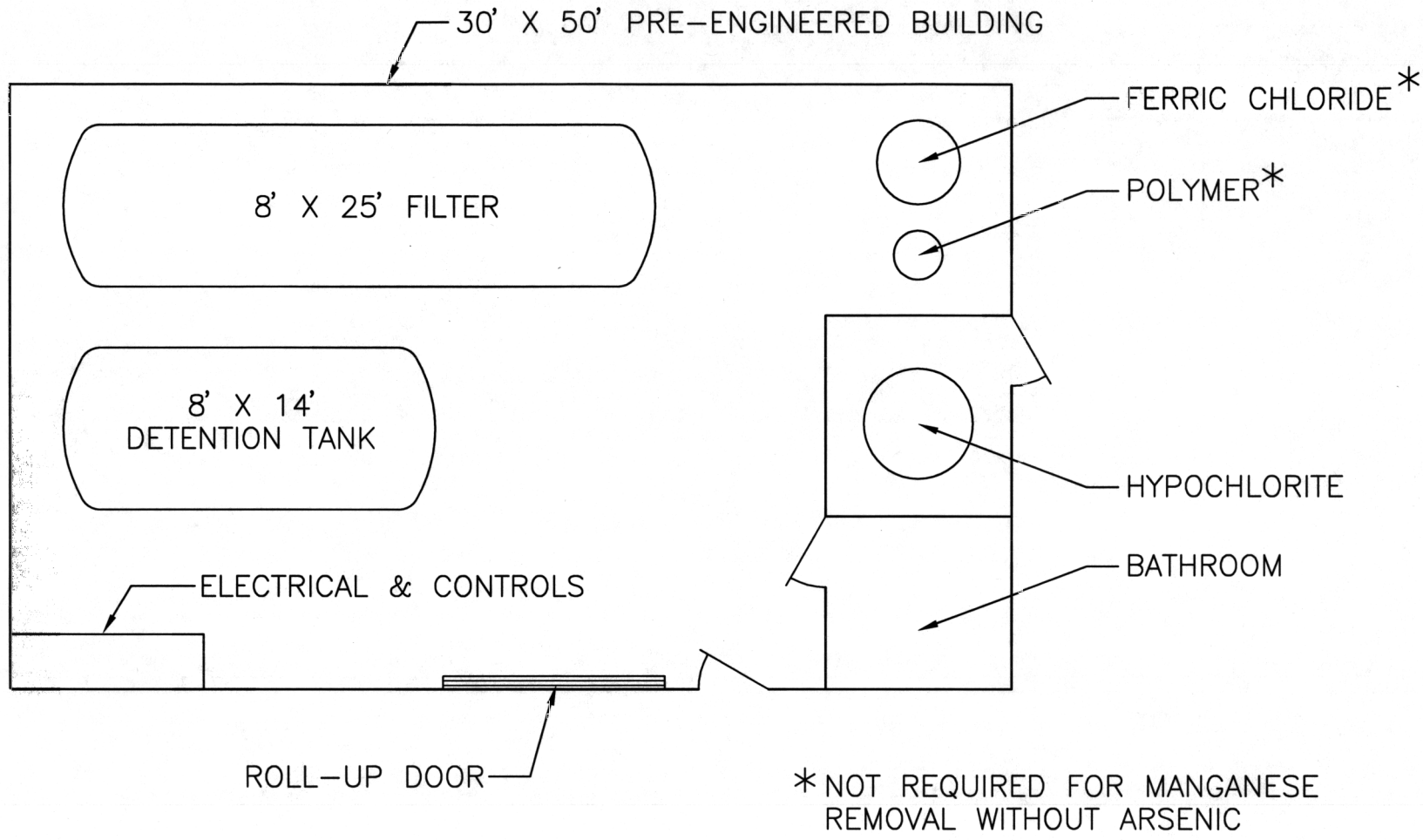


FIGURE 3

CHURCHILL COUNTY
WATER SUPPLY TREATMENT

PARTIAL PLAN FOR SEDIMENTATION BASIN

NOLTE
BEYOND ENGINEERING



NOTE:

THIS LAYOUT IS TYPICAL FOR 1000 GPM MANGANESE REMOVAL AND 1000 GPM MANGANESE AND ARSENIC REMOVAL PLANTS.

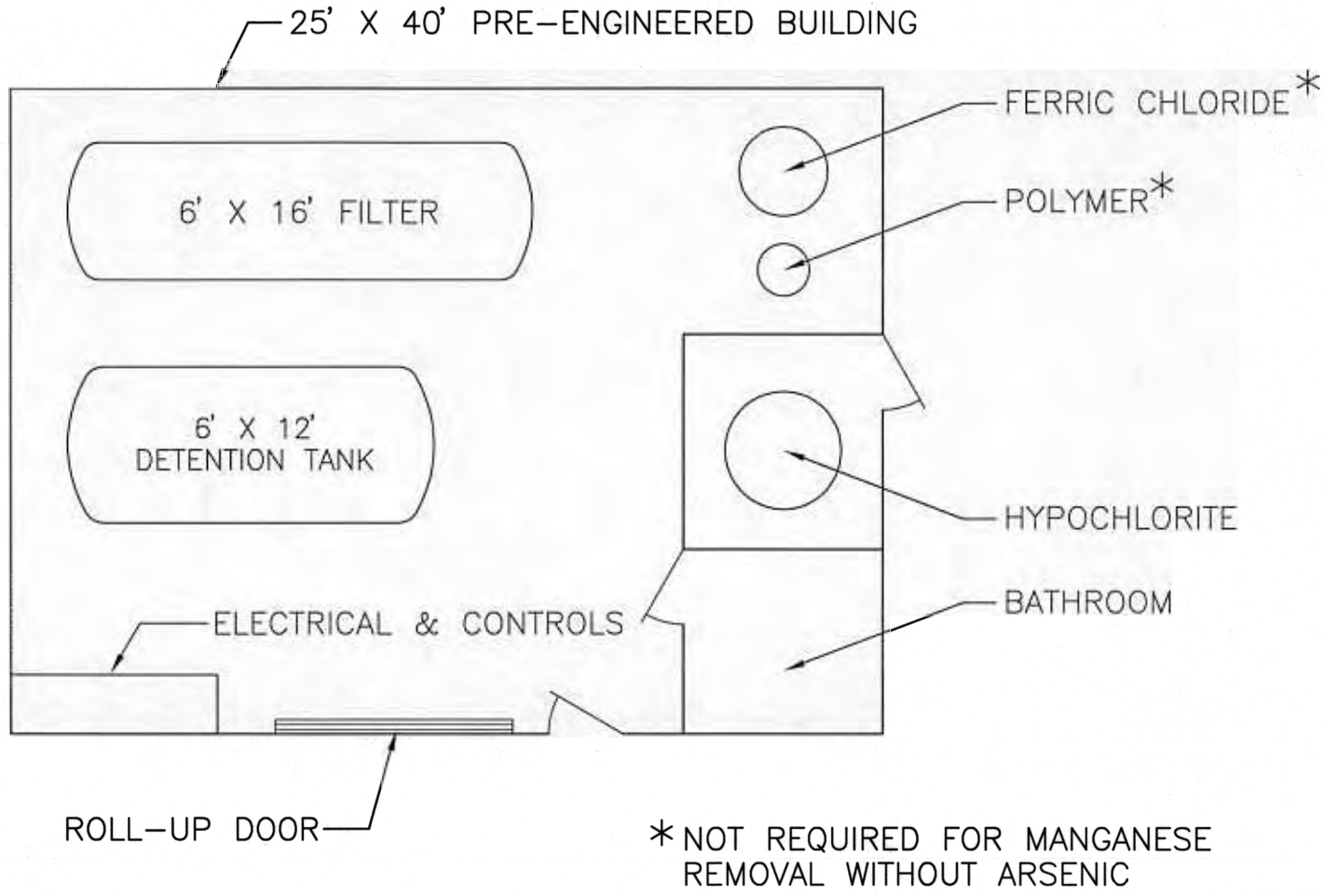
FIGURE 4

CHURCHILL COUNTY
WATER SUPPLY TREATMENT

TREATMENT BUILDING LAYOUT
1000 GPM ARSENIC REMOVAL PLANT

NOLTE
BEYOND ENGINEERING

N:\SA157300\CHURCHILL-4.dwg KCH 10/9/2002



NOTE:

THIS LAYOUT IS SIMILAR OR 500 GPM MANGANESE REMOVAL TREATMENT.

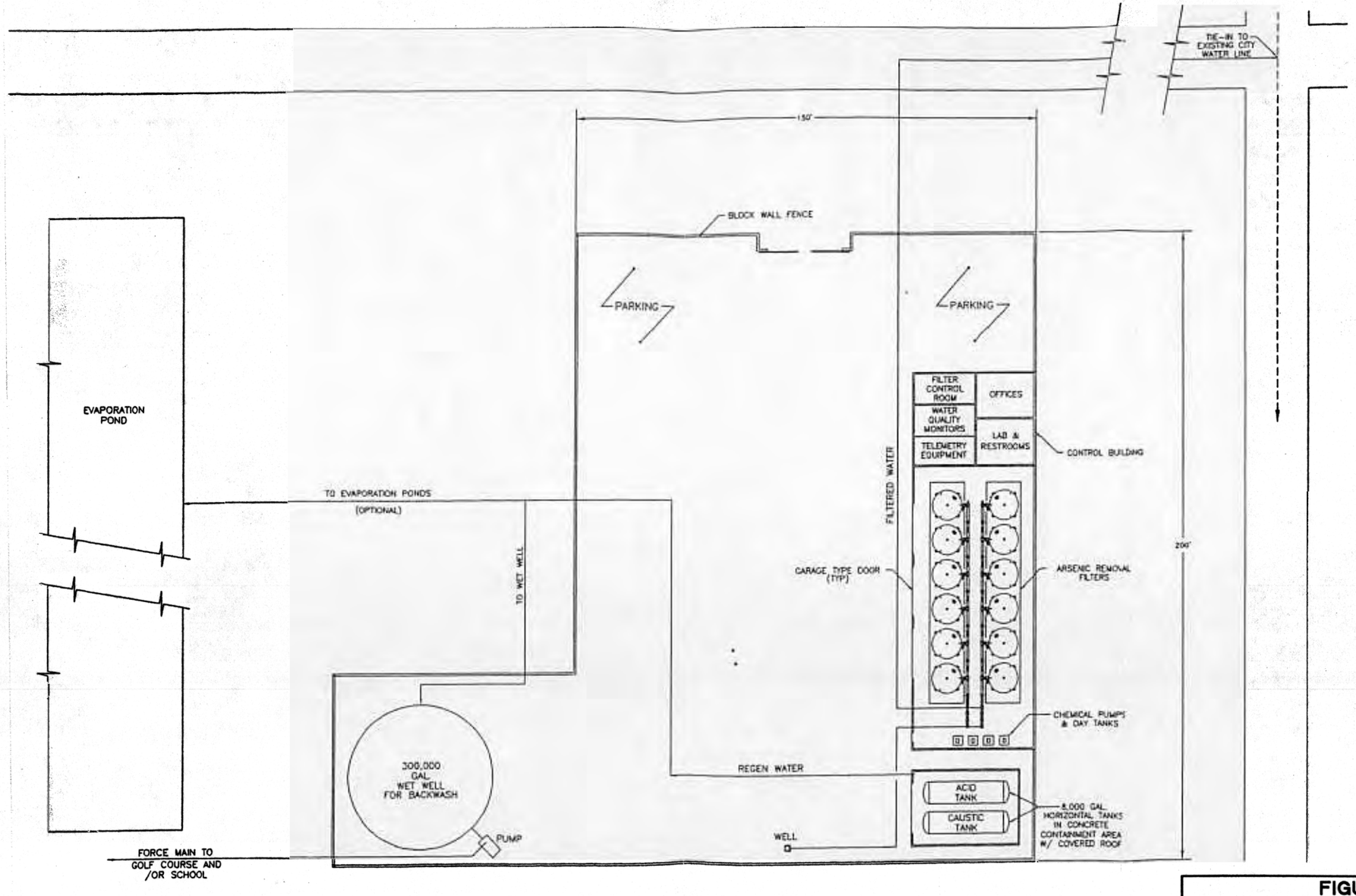
FIGURE 5

CHURCHILL COUNTY
WATER SUPPLY TREATMENT

TREATMENT BUILDING LAYOUT 500 GPM MANGANESE AND ARSENIC REMOVAL PLANT

NOLTE
BEYOND ENGINEERING

N:\SA157300\CHURCHILL-5.dwg KCH 10/9/2002



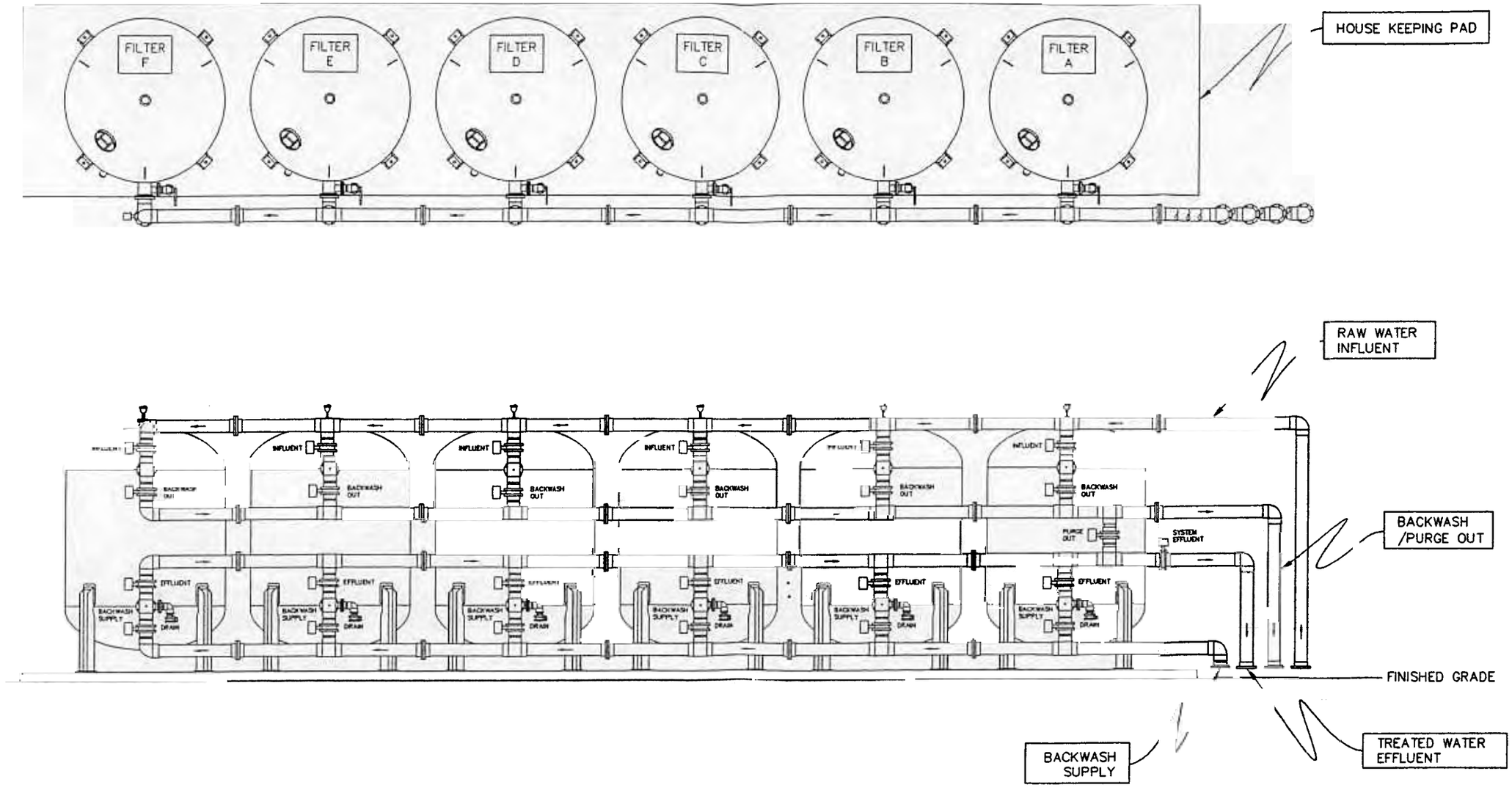
SAMPLE SYSTEM SITE PLAN

FIGURE 6

CHURCHILL COUNTY
WATER SUPPLY TREATMENT

SYSTEM SITE PLAN
8 MGD FLUORIDE REMOVAL PLANT

NOLTE
BEYOND ENGINEERING



CONCEPTUAL PLAN & ELEVATION

FIGURE 7

CHURCHILL COUNTY
WATER SUPPLY TREATMENT

CONCEPTUAL PLAN & ELEVATION
8 MGD FLUORIDE REMOVAL PLANT

NOLTE
BEYOND ENGINEERING

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION

WATER QUALITY RESULTS

PETER G. MORROS, Director
ALLEN BIAGGI, *Administrator*
(775) 687-4670
TDD 687-4678
Administration
Water Pollution Control
Facsimile 687-5856
Mining Regulation and Reclamation
Facsimile 684-5259

STATE OF NEVADA
KENNY C. GUINN
Governor

Waste Management
Corrective Actions
Federal Facilities
Air Quality
Water Quality Planning
Facsimile 687-6396

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL PROTECTION

333 W. Nye Lane, Room 138
Carson City, Nevada 89706-0851

March 15, 2000

RECEIVED
MAR 20 2000
County Manager

Bjorn P. Selinder
Churchill County Manager
155 N. Taylor Street, Suite 153
Fallon, NV 89406-2748

Dear Mr. Selinder,

Thank you for the opportunity to review the Final Draft version of the Churchill County Water Resources Plan. Comments from the Bureau of Water Quality, Nevada Division of Environmental Protection are outlined below.

1. Project Conjunctive Surface and Ground Water Development - It should be determined what elements may be leached by surface water percolating through the soil. **p. 1-7, Main Document**

2. All references to Water Quality in Lahontan Reservoir in the Main Document and Appendix 5.0 - Data more recent than 1972 and 1975 is available. NDEP monitors the water right below the outlet of the Reservoir and from the Truckee Canal. For your information, a summary of selected parameters has been provided.

Parameter	Reservoir Outlet	Truckee Canal
Turbidity, NTU		
average, Jan 91 - Nov 99		7
Jun 90 - Jan 95	range 2-65, ave = 13.6	
Mar 95 - Nov 99	range 5-90, ave = 31	
TDS, mg/L		
Jan 91 - Nov 99		200
Jun 90 - Jan 95	range 200 - 500, ave = 300	
Mar 95 - Nov 99	range 100 - 300, ave = 167	
Arsenic, ug/L		
average, Jan 91 - Nov 99		14
average, Jun 90 - Nov 99	17.3	

An in-house study conducted by NDEP in 1993, which sampled different depths of Lahontan Reservoir, may also be of interest to you and is available upon request.

3. Recharge, Storage and Recovery - Underground injection or discharging to infiltration basins for the purpose of recovering the water for use at a later date may require a permit from the Bureau of Water Pollution Control. **p. 7-39, Main Document**

If you have any questions or are interested in reviewing additional water quality data, please contact Jean Stone at 687-4670, extension 3090.

Sincerely,

Tom Porta, Chief
Bureau of Water Quality Planning

cc: Allen Biaggi

APPENDIX 6.0

DISTRIBUTION SYSTEM

2025 WATERCAD OUTPUT

Scenario: Base
Steady State Analysis
Pipe Cost Report

Label	Include in Cost Calculation?	Diameter (in)	Length (ft)	Construction Costs ($)	Total Cost ($)
P-1	true	16.0	8,648.00	604,982	604,982
P-2	true	16.0	6,447.00	443,554	443,554
P-3	true	12.0	5,395.00	298,382	298,382
P-4	true	12.0	5,552.00	286,483	286,483
P-5	true	16.0	5,854.00	402,755	402,755
P-6	true	12.0	3,841.00	198,196	198,196
P-7	true	12.0	5,999.00	329,548	329,548
P-8	true	12.0	3,336.00	202,138	202,138
P-9	true	12.0	6,551.00	348,032	348,032
P-10	true	12.0	5,342.00	285,647	285,647
P-11	true	12.0	5,355.00	276,318	276,318
P-12	true	24.0	5,366.00	643,920	643,920
P-13	true	16.0	8,552.00	588,378	588,378
P-14	true	12.0	12,307.00	645,041	645,041
P-15	true	12.0	9,293.00	479,519	479,519
P-16	true	12.0	3,984.00	215,574	215,574
P-17	true	12.0	6,609.00	361,024	361,024
P-18	true	16.0	5,054.00	377,715	377,715
P-19	true	12.0	6,857.00	363,821	363,821
P-20	true	12.0	6,556.00	338,290	338,290
P-21	true	24.0	5,319.00	638,280	638,280
P-22	true	16.0	7,831.00	538,773	538,773
P-23	true	12.0	5,619.00	299,940	299,940
P-24	true	16.0	8,306.00	571,453	571,453
P-25	true	16.0	7,955.00	557,304	557,304
P-26	true	24.0	2,984.00	378,080	378,080
P-27	true	16.0	2,289.00	187,483	187,483
P-28	true	16.0	5,968.00	420,598	420,598
P-29	true	24.0	5,616.00	673,920	673,920
P-30	true	16.0	9,471.00	651,605	651,605
P-31	true	16.0	5,351.00	368,149	368,149
P-32	true	36.0	5,427.00	1,114,546	1,114,546
P-33	true	16.0	3,323.00	228,622	228,622
P-34	true	16.0	5,315.00	375,672	375,672
P-35	true	24.0	3,981.00	537,720	537,720
P-36	true	24.0	6,641.00	796,920	796,920
P-37	true	12.0	7,907.00	408,001	408,001
P-38	true	24.0	2,108.00	252,960	252,960
P-39	true	16.0	5,300.00	394,640	394,640
P-40	true	42.0	5,327.00	1,230,537	1,230,537
P-41	true	16.0	5,327.00	366,498	366,498
P-42	true	12.0	5,300.00	273,480	273,480
P-43	true	12.0	5,351.00	286,112	286,112
P-44	true	16.0	5,545.00	421,496	421,496
P-45	true	24.0	3,925.00	501,000	501,000
P-46	true	24.0	4,038.00	484,560	484,560
P-47	true	16.0	2,631.00	181,013	181,013
P-48	true	12.0	5,341.00	285,596	285,596
P-49	true	12.0	11,187.00	607,249	607,249
P-50	true	42.0	5,245.00	1,211,595	1,211,595
P-51	true	16.0	5,271.00	362,645	362,645
P-52	true	12.0	5,271.00	271,984	271,984

Scenario: Base
Steady State Analysis
Pipe Cost Report

Label	Include in Cost Calculation?	Diameter (in)	Length (ft)	Construction Costs ($)	Total Cost ($)
P-53	true	24.0	1,474.00	176,880	176,880
P-54	true	16.0	5,262.00	362,026	362,026
P-55	true	12.0	5,288.00	282,861	282,861
P-56	true	12.0	9,795.00	505,422	505,422
P-57	false	16.0	8,486.00	593,837	593,837
P-58	false	16.0	2,728.00	187,686	187,686
P-59	true	42.0	5,751.00	1,338,481	1,338,481
P-60	true	16.0	5,319.00	365,947	365,947
P-61	false	16.0	21,170.00	1,466,496	1,466,496
P-62	false	8.0	27,667.00	794,676	794,676
P-63	true	12.0	928.00	47,885	47,885
P-64	true	24.0	468.00	56,160	56,160
P-65	true	16.0	706.00	48,573	48,573

Σ = 26,751,981 w/o P- 57, 58, 61 & 62

Σ = 29,794,667 inc P- 57, 58, 61 & 62

Scenario: Base
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Demand (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	4,027.00	Zone-1	Demand	231.00	Fixed	231.00	4,141.64	49.60
J-2	4,017.00	Zone-1	Demand	255.00	Fixed	255.00	4,142.00	54.08
J-3	4,012.00	Zone-1	Demand	190.00	Fixed	190.00	4,142.94	56.65
J-4	4,014.00	Zone-1	Demand	90.00	Fixed	90.00	4,143.01	55.81
J-5	4,020.00	Zone-1	Demand	110.00	Fixed	110.00	4,143.28	53.34
J-6	4,006.00	Zone-1	Demand	158.00	Fixed	158.00	4,143.59	59.53
J-7	4,003.00	Zone-1	Demand	206.00	Fixed	206.00	4,144.51	61.22
J-8	4,000.00	Zone-1	Demand	225.00	Fixed	225.00	4,144.52	62.53
J-9	3,996.00	Zone-1	Demand	118.00	Fixed	118.00	4,144.51	64.25
J-10	4,009.00	Zone-1	Demand	145.00	Fixed	145.00	4,143.44	58.16
J-11	3,992.00	Zone-1	Demand	156.00	Fixed	156.00	4,143.76	65.66
J-12	4,000.00	Zone-1	Demand	238.00	Fixed	238.00	4,144.99	62.73
J-13	3,986.00	Zone-1	Demand	286.00	Fixed	286.00	4,144.96	68.78
J-14	4,000.00	Zone-1	Demand	265.00	Fixed	265.00	4,143.64	62.15
J-15	3,990.00	Zone-1	Demand	488.00	Fixed	488.00	4,144.35	66.78
J-16	3,990.00	Zone-1	Demand	400.00	Fixed	400.00	4,145.61	67.33
J-17	3,980.00	Zone-1	Demand	143.00	Fixed	143.00	4,144.97	71.38
J-18	3,980.00	Zone-1	Demand	447.00	Fixed	447.00	4,146.57	72.07
J-19	3,980.00	Zone-1	Demand	177.00	Fixed	177.00	4,146.74	72.14
J-20	3,976.00	Zone-1	Demand	371.00	Fixed	371.00	4,146.07	73.58
J-21	3,976.00	Zone-1	Demand	195.00	Fixed	195.00	4,146.18	73.63
J-22	3,963.00	Zone-1	Demand	510.00	Fixed	510.00	4,145.17	78.82
J-23	3,966.00	Zone-1	Demand	425.00	Fixed	425.00	4,146.88	78.26
J-24	3,976.00	Zone-1	Demand	585.00	Fixed	585.00	4,147.32	74.12
J-25	3,970.00	Zone-1	Demand	334.00	Fixed	334.00	4,147.01	76.59
J-26	3,965.00	Zone-1	Demand	21.00	Fixed	21.00	4,147.04	78.76
J-27	3,963.00	Zone-1	Demand	480.00	Fixed	480.00	4,145.82	79.10
J-28	3,967.00	Zone-1	Demand	330.00	Fixed	330.00	4,147.01	77.88
J-29	3,967.00	Zone-1	Demand	543.00	Fixed	543.00	4,147.16	77.95
J-30	3,967.00	Zone-1	Demand	361.00	Fixed	361.00	4,148.07	78.34
J-31	3,963.00	Zone-1	Demand	340.00	Fixed	340.00	4,147.77	79.94
J-32	3,963.00	Zone-1	Demand	586.00	Fixed	586.00	4,147.19	79.69
J-33	3,962.00	Zone-1	Demand	80.00	Fixed	80.00	4,147.10	80.09
J-34	3,960.00	Zone-1	Demand	283.00	Fixed	283.00	4,149.68	82.07
J-35	3,960.00	Zone-1	Demand	297.00	Fixed	297.00	4,149.54	82.00
J-36	3,963.00	Zone-1	Demand	235.00	Fixed	235.00	4,147.50	79.82
J-37	3,955.00	Zone-1	Demand	58.00	Fixed	58.00	4,147.20	83.16
J-38	3,950.00	Zone-1	Demand	268.00	Fixed	268.00	4,146.05	84.82
J-39	3,960.00	Zone-1	Demand	139.00	Fixed	139.00	4,149.46	81.97
J-40	3,950.00	Zone-1	Demand	122.00	Fixed	122.00	4,147.43	85.42
J-41	3,921.00	Zone-1	Demand	163.00	Fixed	163.00	4,132.00	91.29
J-42	3,934.00	Zone-1	Demand	603.00	Fixed	603.00	4,142.25	90.10

Scenario: 2025PeakHour
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Demand (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	4,027.00	Zone-1	Demand	693.00	Fixed	693.00	4,137.47	47.80
J-2	4,017.00	Zone-1	Demand	765.00	Fixed	765.00	4,140.21	53.31
J-3	4,012.00	Zone-1	Demand	570.00	Fixed	570.00	4,127.06	49.78
J-4	4,014.00	Zone-1	Demand	270.00	Fixed	270.00	4,138.26	53.76
J-5	4,020.00	Zone-1	Demand	330.00	Fixed	330.00	4,125.28	45.55
J-6	4,006.00	Zone-1	Demand	474.00	Fixed	474.00	4,126.23	52.02
J-7	4,003.00	Zone-1	Demand	618.00	Fixed	618.00	4,139.25	58.95
J-8	4,000.00	Zone-1	Demand	675.00	Fixed	675.00	4,134.17	58.05
J-9	3,996.00	Zone-1	Demand	354.00	Fixed	354.00	4,132.50	59.06
J-10	4,009.00	Zone-1	Demand	435.00	Fixed	435.00	4,123.97	49.74
J-11	3,992.00	Zone-1	Demand	468.00	Fixed	468.00	4,125.76	57.87
J-12	4,000.00	Zone-1	Demand	714.00	Fixed	714.00	4,142.36	61.59
J-13	3,986.00	Zone-1	Demand	858.00	Fixed	858.00	4,134.45	64.23
J-14	4,000.00	Zone-1	Demand	795.00	Fixed	795.00	4,122.29	52.91
J-15	3,990.00	Zone-1	Demand	1,464.00	Fixed	1,464.00	4,124.03	57.99
J-16	3,990.00	Zone-1	Demand	1,200.00	Fixed	1,200.00	4,137.90	63.99
J-17	3,980.00	Zone-1	Demand	429.00	Fixed	429.00	4,132.70	66.07
J-18	3,980.00	Zone-1	Demand	1,341.00	Fixed	1,341.00	4,133.83	66.55
J-19	3,980.00	Zone-1	Demand	531.00	Fixed	531.00	4,135.80	67.41
J-20	3,976.00	Zone-1	Demand	1,113.00	Fixed	1,113.00	4,133.95	68.34
J-21	3,976.00	Zone-1	Demand	585.00	Fixed	585.00	4,133.46	68.13
J-22	3,963.00	Zone-1	Demand	1,530.00	Fixed	1,530.00	4,124.59	69.91
J-23	3,966.00	Zone-1	Demand	1,275.00	Fixed	1,275.00	4,133.64	72.53
J-24	3,976.00	Zone-1	Demand	1,755.00	Fixed	1,755.00	4,136.15	69.29
J-25	3,970.00	Zone-1	Demand	1,002.00	Fixed	1,002.00	4,133.96	70.94
J-26	3,965.00	Zone-1	Demand	63.00	Fixed	63.00	4,133.31	72.82
J-27	3,963.00	Zone-1	Demand	1,440.00	Fixed	1,440.00	4,124.83	70.02
J-28	3,967.00	Zone-1	Demand	990.00	Fixed	990.00	4,132.53	71.61
J-29	3,967.00	Zone-1	Demand	1,629.00	Fixed	1,629.00	4,133.54	72.06
J-30	3,967.00	Zone-1	Demand	1,083.00	Fixed	1,083.00	4,138.00	73.98
J-31	3,963.00	Zone-1	Demand	1,020.00	Fixed	1,020.00	4,136.25	74.96
J-32	3,963.00	Zone-1	Demand	1,758.00	Fixed	1,758.00	4,133.33	73.69
J-33	3,962.00	Zone-1	Demand	240.00	Fixed	240.00	4,133.00	73.98
J-34	3,960.00	Zone-1	Demand	849.00	Fixed	849.00	4,143.47	79.38
J-35	3,960.00	Zone-1	Demand	891.00	Fixed	891.00	4,142.70	79.04
J-36	3,963.00	Zone-1	Demand	705.00	Fixed	705.00	4,133.39	73.72
J-37	3,955.00	Zone-1	Demand	174.00	Fixed	174.00	4,132.99	77.01
J-38	3,950.00	Zone-1	Demand	804.00	Fixed	804.00	4,124.83	75.64
J-39	3,960.00	Zone-1	Demand	417.00	Fixed	417.00	4,141.10	78.35
J-40	3,950.00	Zone-1	Demand	366.00	Fixed	366.00	4,131.29	78.44
J-41	3,921.00	Zone-1	Demand	489.00	Fixed	489.00	4,131.62	91.13
J-42	3,934.00	Zone-1	Demand	1,809.00	Fixed	1,809.00	4,091.68	68.22

Scenario: 2025-PeakDay
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Demand (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	4,027.00	Zone-1	Demand	462.00	Fixed	462.00	4,140.15	48.96
J-2	4,017.00	Zone-1	Demand	510.00	Fixed	510.00	4,141.44	53.84
J-3	4,012.00	Zone-1	Demand	380.00	Fixed	380.00	4,137.01	54.09
J-4	4,014.00	Zone-1	Demand	180.00	Fixed	180.00	4,141.30	55.08
J-5	4,020.00	Zone-1	Demand	220.00	Fixed	220.00	4,136.57	50.43
J-6	4,006.00	Zone-1	Demand	316.00	Fixed	316.00	4,137.10	56.72
J-7	4,003.00	Zone-1	Demand	412.00	Fixed	412.00	4,142.52	60.36
J-8	4,000.00	Zone-1	Demand	450.00	Fixed	450.00	4,141.14	61.06
J-9	3,996.00	Zone-1	Demand	236.00	Fixed	236.00	4,140.58	62.55
J-10	4,009.00	Zone-1	Demand	290.00	Fixed	290.00	4,136.20	55.03
J-11	3,992.00	Zone-1	Demand	312.00	Fixed	312.00	4,137.04	62.75
J-12	4,000.00	Zone-1	Demand	476.00	Fixed	476.00	4,144.07	62.33
J-13	3,986.00	Zone-1	Demand	572.00	Fixed	572.00	4,141.50	67.28
J-14	4,000.00	Zone-1	Demand	530.00	Fixed	530.00	4,135.78	58.75
J-15	3,990.00	Zone-1	Demand	976.00	Fixed	976.00	4,136.80	63.52
J-16	3,990.00	Zone-1	Demand	800.00	Fixed	800.00	4,143.05	66.22
J-17	3,980.00	Zone-1	Demand	286.00	Fixed	286.00	4,140.84	69.59
J-18	3,980.00	Zone-1	Demand	894.00	Fixed	894.00	4,141.91	70.05
J-19	3,980.00	Zone-1	Demand	354.00	Fixed	354.00	4,142.78	70.43
J-20	3,976.00	Zone-1	Demand	742.00	Fixed	742.00	4,141.55	71.63
J-21	3,976.00	Zone-1	Demand	390.00	Fixed	390.00	4,141.50	71.60
J-22	3,963.00	Zone-1	Demand	1,020.00	Fixed	1,020.00	4,137.35	75.43
J-23	3,966.00	Zone-1	Demand	850.00	Fixed	850.00	4,141.91	76.11
J-24	3,976.00	Zone-1	Demand	1,170.00	Fixed	1,170.00	4,143.13	72.31
J-25	3,970.00	Zone-1	Demand	668.00	Fixed	668.00	4,142.04	74.43
J-26	3,965.00	Zone-1	Demand	42.00	Fixed	42.00	4,141.84	76.51
J-27	3,963.00	Zone-1	Demand	960.00	Fixed	960.00	4,137.67	75.57
J-28	3,967.00	Zone-1	Demand	660.00	Fixed	660.00	4,141.43	75.47
J-29	3,967.00	Zone-1	Demand	1,086.00	Fixed	1,086.00	4,141.92	75.68
J-30	3,967.00	Zone-1	Demand	722.00	Fixed	722.00	4,144.25	76.69
J-31	3,963.00	Zone-1	Demand	680.00	Fixed	680.00	4,143.40	78.05
J-32	3,963.00	Zone-1	Demand	1,172.00	Fixed	1,172.00	4,141.93	77.41
J-33	3,962.00	Zone-1	Demand	160.00	Fixed	160.00	4,141.76	77.78
J-34	3,960.00	Zone-1	Demand	566.00	Fixed	566.00	4,147.32	81.04
J-35	3,960.00	Zone-1	Demand	594.00	Fixed	594.00	4,146.92	80.87
J-36	3,963.00	Zone-1	Demand	470.00	Fixed	470.00	4,142.04	77.46
J-37	3,955.00	Zone-1	Demand	116.00	Fixed	116.00	4,141.76	80.80
J-38	3,950.00	Zone-1	Demand	536.00	Fixed	536.00	4,137.70	81.21
J-39	3,960.00	Zone-1	Demand	278.00	Fixed	278.00	4,146.14	80.54
J-40	3,950.00	Zone-1	Demand	244.00	Fixed	244.00	4,141.17	82.71
J-41	3,921.00	Zone-1	Demand	326.00	Fixed	326.00	4,131.90	91.25
J-42	3,934.00	Zone-1	Demand	1,206.00	Fixed	1,206.00	4,122.48	81.55

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-1	8,648.00	16.0	PVC	130.0	false	0.00	Open	-231.00	4,141.64	4,142.00	0.36	0.04	0.37
P-2	6,447.00	16.0	PVC	130.0	false	0.00	Open	-473.10	4,142.00	4,143.01	1.01	0.16	0.75
P-3	5,395.00	12.0	PVC	130.0	false	0.00	Open	-55.68	4,142.94	4,143.01	0.06	0.01	0.16
P-4	5,552.00	12.0	PVC	130.0	false	0.00	Open	134.32	4,143.28	4,142.94	0.34	0.06	0.38
P-5	5,854.00	16.0	PVC	130.0	false	0.00	Open	-618.78	4,143.01	4,144.51	1.50	0.26	0.99
P-6	3,841.00	12.0	PVC	130.0	false	0.00	Open	-155.54	4,143.28	4,143.59	0.31	0.08	0.44
P-7	5,999.00	12.0	PVC	130.0	false	0.00	Open	-219.28	4,143.59	4,144.51	0.92	0.15	0.62
P-8	3,336.00	12.0	PVC	130.0	false	0.00	Open	-21.93	4,144.51	4,144.52	0.01	2.2e-3	0.06
P-9	6,551.00	12.0	PVC	130.0	false	0.00	Open	14.96	4,144.52	4,144.51	0.01	1.12e-3	0.04
P-10	5,342.00	12.0	PVC	130.0	false	0.00	Open	88.77	4,143.44	4,143.28	0.15	0.03	0.25
P-11	5,355.00	12.0	PVC	130.0	false	0.00	Open	94.26	4,143.76	4,143.59	0.17	0.03	0.27
P-12	5,366.00	24.0	PVC	130.0	false	0.00	Open	1,022.14	4,144.99	4,144.51	0.48	0.09	0.72
P-13	8,552.00	16.0	PVC	130.0	false	0.00	Open	261.89	4,144.96	4,144.52	0.45	0.05	0.42
P-14	12,307.00	12.0	PVC	130.0	false	0.00	Open	103.04	4,144.97	4,144.51	0.46	0.04	0.29
P-15	9,293.00	12.0	PVC	130.0	false	0.00	Open	76.47	4,143.64	4,143.44	0.20	0.02	0.22
P-16	3,984.00	12.0	PVC	130.0	false	0.00	Open	-157.31	4,143.44	4,143.76	0.33	0.08	0.45
P-17	6,609.00	12.0	PVC	130.0	false	0.00	Open	-243.93	4,143.76	4,144.99	1.23	0.19	0.69
P-18	5,054.00	16.0	PVC	130.0	false	0.00	Open	81.57	4,144.99	4,144.96	0.03	0.01	0.13
P-19	6,857.00	12.0	PVC	130.0	false	0.00	Open	-18.04	4,144.96	4,144.97	0.01	1.5e-3	0.05
P-20	6,556.00	12.0	PVC	130.0	false	0.00	Open	163.64	4,144.35	4,143.76	0.58	0.09	0.46
P-21	5,319.00	24.0	PVC	130.0	false	0.00	Open	1,175.94	4,145.61	4,144.99	0.62	0.12	0.83
P-22	7,831.00	16.0	PVC	130.0	false	0.00	Open	448.28	4,146.07	4,144.96	1.11	0.14	0.72
P-23	5,619.00	12.0	PVC	130.0	false	0.00	Open	264.08	4,146.18	4,144.97	1.21	0.22	0.75
P-24	8,306.00	16.0	PVC	130.0	false	0.00	Open	-341.47	4,143.64	4,144.35	0.71	0.09	0.54
P-25	7,955.00	16.0	PVC	130.0	false	0.00	Open	-647.57	4,144.35	4,146.57	2.22	0.28	1.03
P-26	2,984.00	24.0	PVC	130.0	false	0.00	Open	-815.95	4,146.57	4,146.74	0.18	0.06	0.58
P-27	2,289.00	16.0	PVC	130.0	false	0.00	Open	667.39	4,146.74	4,146.07	0.68	0.30	1.06
P-28	5,968.00	16.0	PVC	130.0	false	0.00	Open	-151.89	4,146.07	4,146.18	0.11	0.02	0.24
P-29	5,616.00	24.0	PVC	130.0	false	0.00	Open	1,575.94	4,146.74	4,145.61	1.13	0.20	1.12
P-30	9,471.00	16.0	PVC	130.0	false	0.00	Open	345.54	4,145.17	4,144.35	0.83	0.09	0.55
P-31	5,351.00	16.0	PVC	130.0	false	0.00	Open	278.62	4,146.88	4,146.57	0.31	0.06	0.44
P-32	5,427.00	36.0	PVC	130.0	false	0.00	Open	3,236.28	4,147.32	4,146.74	0.57	0.11	1.02
P-33	3,323.00	16.0	PVC	130.0	false	0.00	Open	610.97	4,147.01	4,146.18	0.83	0.25	0.97
P-34	5,315.00	16.0	PVC	130.0	false	0.00	Open	-698.68	4,145.17	4,146.88	1.71	0.32	1.11
P-35	3,981.00	24.0	PVC	130.0	false	0.00	Open	-1,138.16	4,146.88	4,147.32	0.44	0.11	0.81
P-36	6,641.00	24.0	PVC	130.0	false	0.00	Open	707.88	4,147.32	4,147.01	0.30	0.05	0.50

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-37	7,907.00	12.0	PVC	130.0	false	0.00	Open	156.86	4,145.82	4,145.17	0.65	0.08	0.44
P-38	2,108.00	24.0	PVC	130.0	false	0.00	Open	-892.46	4,147.01	4,147.16	0.15	0.07	0.63
P-39	5,300.00	16.0	PVC	130.0	false	0.00	Open	264.13	4,147.16	4,146.88	0.28	0.05	0.42
P-40	5,327.00	42.0	PVC	130.0	false	0.00	Open	5,667.32	4,148.07	4,147.32	0.75	0.14	1.31
P-41	5,327.00	16.0	PVC	130.0	false	0.00	Open	202.99	4,147.19	4,147.01	0.17	0.03	0.32
P-42	5,300.00	12.0	PVC	130.0	false	0.00	Open	55.10	4,147.10	4,147.04	0.06	0.01	0.16
P-43	5,351.00	12.0	PVC	130.0	false	0.00	Open	-34.10	4,147.01	4,147.04	0.03	4.84e-3	0.10
P-44	5,545.00	16.0	PVC	130.0	false	0.00	Open	-562.46	4,145.82	4,147.01	1.19	0.22	0.90
P-45	3,925.00	24.0	PVC	130.0	false	0.00	Open	-1,699.59	4,147.16	4,148.07	0.91	0.23	1.21
P-46	4,038.00	24.0	PVC	130.0	false	0.00	Open	912.83	4,148.07	4,147.77	0.30	0.07	0.65
P-47	2,631.00	16.0	PVC	130.0	false	0.00	Open	572.83	4,147.77	4,147.19	0.58	0.22	0.91
P-48	5,341.00	12.0	PVC	130.0	false	0.00	Open	64.64	4,147.19	4,147.10	0.08	0.02	0.18
P-49	11,187.00	12.0	PVC	130.0	false	0.00	Open	74.40	4,146.05	4,145.82	0.23	0.02	0.21
P-50	5,245.00	42.0	PVC	130.0	false	0.00	Open	8,640.74	4,149.68	4,148.07	1.61	0.31	2.00
P-51	5,271.00	16.0	PVC	130.0	false	0.00	Open	280.80	4,147.50	4,147.19	0.31	0.06	0.45
P-52	5,271.00	12.0	PVC	130.0	false	0.00	Open	70.46	4,147.20	4,147.10	0.10	0.02	0.20
P-53	1,474.00	24.0	PVC	130.0	false	0.00	Open	1,069.66	4,149.68	4,149.54	0.14	0.10	0.76
P-54	5,262.00	16.0	PVC	130.0	false	0.00	Open	772.66	4,149.54	4,147.50	2.04	0.39	1.23
P-55	5,288.00	12.0	PVC	130.0	false	0.00	Open	128.46	4,147.50	4,147.20	0.30	0.06	0.36
P-56	9,795.00	12.0	PVC	130.0	false	0.00	Open	-342.40	4,146.05	4,149.46	3.41	0.35	0.97
P-57	8,486.00	16.0	PVC	130.0	false	0.00	Open	596.59	4,149.46	4,147.43	2.04	0.24	0.95
P-58	2,728.00	16.0	PVC	130.0	false	0.00	Open	-1,240.49	4,149.46	4,152.00	2.54	0.93	1.98
P-59	5,751.00	42.0	PVC	130.0	false	0.00	Open	9,993.40	4,152.00	4,149.68	2.32	0.40	2.31
P-60	5,319.00	16.0	PVC	130.0	false	0.00	Open	-128.41	4,147.43	4,147.50	0.07	0.01	0.20
P-61	21,170.00	16.0	PVC	130.0	false	0.00	Open	603.00	4,147.43	4,142.25	5.18	0.24	0.96
P-62	27,667.00	8.0	PVC	130.0	false	0.00	Open	162.50	4,149.46	4,132.00	17.46	0.63	1.04
P-63	928.00	12.0	PVC	130.0	false	0.00	Open	0.50	4,132.00	4,132.00	0.00	0.00	1.43e-3
P-64	468.00	24.0	PVC	130.0	false	0.00	Open	409.70	4,145.00	4,144.99	0.01	0.02	0.29
P-65	706.00	16.0	PVC	130.0	false	0.00	Open	12.90	4,142.00	4,142.00	0.00	0.00	0.02

Scenario: 2025PeakHour
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-1	8,648.00	16.0	PVC	130.0	false	0.00	Open	-693.00	4,137.47	4,140.21	2.74	0.32	1.11
P-2	6,447.00	16.0	PVC	130.0	false	0.00	Open	675.28	4,140.21	4,138.26	1.94	0.30	1.08
P-3	5,395.00	12.0	PVC	130.0	false	0.00	Open	-897.92	4,127.06	4,138.26	11.20	2.08	2.55
P-4	5,552.00	12.0	PVC	130.0	false	0.00	Open	-327.92	4,125.28	4,127.06	1.78	0.32	0.93
P-5	5,854.00	16.0	PVC	130.0	false	0.00	Open	-492.64	4,138.26	4,139.25	0.98	0.17	0.79
P-6	3,841.00	12.0	PVC	130.0	false	0.00	Open	-284.57	4,125.28	4,126.23	0.95	0.25	0.81
P-7	5,999.00	12.0	PVC	130.0	false	0.00	Open	-919.72	4,126.23	4,139.25	13.02	2.17	2.61
P-8	3,336.00	12.0	PVC	130.0	false	0.00	Open	759.67	4,139.25	4,134.17	5.08	1.52	2.16
P-9	6,551.00	12.0	PVC	130.0	false	0.00	Open	288.54	4,134.17	4,132.50	1.66	0.25	0.82
P-10	5,342.00	12.0	PVC	130.0	false	0.00	Open	-282.49	4,123.97	4,125.28	1.30	0.24	0.80
P-11	5,355.00	12.0	PVC	130.0	false	0.00	Open	-161.14	4,125.76	4,126.23	0.46	0.09	0.46
P-12	5,366.00	24.0	PVC	130.0	false	0.00	Open	2,790.03	4,142.36	4,139.25	3.11	0.58	1.98
P-13	8,552.00	16.0	PVC	130.0	false	0.00	Open	203.86	4,134.45	4,134.17	0.28	0.03	0.33
P-14	12,307.00	12.0	PVC	130.0	false	0.00	Open	65.46	4,132.70	4,132.50	0.20	0.02	0.19
P-15	9,293.00	12.0	PVC	130.0	false	0.00	Open	-240.47	4,122.29	4,123.97	1.68	0.18	0.68
P-16	3,984.00	12.0	PVC	130.0	false	0.00	Open	-392.98	4,123.97	4,125.76	1.79	0.45	1.11
P-17	6,609.00	12.0	PVC	130.0	false	0.00	Open	-994.86	4,125.76	4,142.36	16.59	2.51	2.82
P-18	5,054.00	16.0	PVC	130.0	false	0.00	Open	1,642.66	4,142.36	4,134.45	7.91	1.57	2.62
P-19	6,857.00	12.0	PVC	130.0	false	0.00	Open	288.81	4,134.45	4,132.70	1.74	0.25	0.82
P-20	6,556.00	12.0	PVC	130.0	false	0.00	Open	-295.02	4,124.03	4,125.76	1.73	0.26	0.84
P-21	5,319.00	24.0	PVC	130.0	false	0.00	Open	-3,403.38	4,137.90	4,142.36	4.45	0.84	2.41
P-22	7,831.00	16.0	PVC	130.0	false	0.00	Open	-291.99	4,133.95	4,134.45	0.50	0.06	0.47
P-23	5,619.00	12.0	PVC	130.0	false	0.00	Open	205.66	4,133.46	4,132.70	0.76	0.14	0.58
P-24	8,306.00	16.0	PVC	130.0	false	0.00	Open	-554.53	4,122.29	4,124.03	1.74	0.21	0.88
P-25	7,955.00	16.0	PVC	130.0	false	0.00	Open	-1,443.31	4,124.03	4,133.83	9.80	1.23	2.30
P-26	2,984.00	24.0	PVC	130.0	false	0.00	Open	-2,998.09	4,133.83	4,135.80	1.97	0.66	2.13
P-27	2,289.00	16.0	PVC	130.0	false	0.00	Open	1,152.08	4,135.80	4,133.95	1.86	0.81	1.84
P-28	5,968.00	16.0	PVC	130.0	false	0.00	Open	331.07	4,133.95	4,133.46	0.48	0.08	0.53
P-29	5,616.00	24.0	PVC	130.0	false	0.00	Open	-2,203.38	4,135.80	4,137.90	2.10	0.37	1.56
P-30	9,471.00	16.0	PVC	130.0	false	0.00	Open	280.20	4,124.59	4,124.03	0.56	0.06	0.45
P-31	5,351.00	16.0	PVC	130.0	false	0.00	Open	-213.78	4,133.64	4,133.83	0.19	0.04	0.34
P-32	5,427.00	36.0	PVC	130.0	false	0.00	Open	2,477.79	4,136.15	4,135.80	0.35	0.06	0.78
P-33	3,323.00	16.0	PVC	130.0	false	0.00	Open	459.59	4,133.96	4,133.46	0.49	0.15	0.73
P-34	5,315.00	16.0	PVC	130.0	false	0.00	Open	-1,718.67	4,124.59	4,133.64	9.04	1.70	2.74
P-35	3,981.00	24.0	PVC	130.0	false	0.00	Open	-2,924.91	4,133.64	4,136.15	2.52	0.63	2.07
P-36	6,641.00	24.0	PVC	130.0	false	0.00	Open	2,061.65	4,136.15	4,133.96	2.20	0.33	1.46

Scenario: 2025PeakHour
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-37	7,907.00	12.0	PVC	130.0	false	0.00	Open	91.53	4,124.83	4,124.59	0.24	0.03	0.26
P-38	2,108.00	24.0	PVC	130.0	false	0.00	Open	-2,529.41	4,132.53	4,133.54	1.02	0.48	1.79
P-39	5,300.00	16.0	PVC	130.0	false	0.00	Open	-145.02	4,133.54	4,133.64	0.09	0.02	0.23
P-40	5,327.00	42.0	PVC	130.0	false	0.00	Open	9,219.35	4,138.00	4,136.15	1.85	0.35	2.13
P-41	5,327.00	16.0	PVC	130.0	false	0.00	Open	-406.88	4,133.33	4,133.96	0.63	0.12	0.65
P-42	5,300.00	12.0	PVC	130.0	false	0.00	Open	-130.18	4,133.00	4,133.31	0.31	0.06	0.37
P-43	5,351.00	12.0	PVC	130.0	false	0.00	Open	193.18	4,133.96	4,133.31	0.65	0.12	0.55
P-44	5,545.00	16.0	PVC	130.0	false	0.00	Open	-1,539.41	4,124.83	4,132.53	7.69	1.39	2.46
P-45	3,925.00	24.0	PVC	130.0	false	0.00	Open	-4,013.39	4,133.54	4,138.00	4.46	1.14	2.85
P-46	4,038.00	24.0	PVC	130.0	false	0.00	Open	2,385.48	4,138.00	4,136.25	1.75	0.43	1.69
P-47	2,631.00	16.0	PVC	130.0	false	0.00	Open	1,365.48	4,136.25	4,133.33	2.92	1.11	2.18
P-48	5,341.00	12.0	PVC	130.0	false	0.00	Open	133.40	4,133.33	4,133.00	0.32	0.06	0.38
P-49	11,187.00	12.0	PVC	130.0	false	0.00	Open	-7.88	4,124.83	4,124.83	3.91e-3	3.49e-4	0.02
P-50	5,245.00	42.0	PVC	130.0	false	0.00	Open	16,701.21	4,143.47	4,138.00	5.47	1.04	3.87
P-51	5,271.00	16.0	PVC	130.0	false	0.00	Open	119.04	4,133.39	4,133.33	0.06	0.01	0.19
P-52	5,271.00	12.0	PVC	130.0	false	0.00	Open	-23.58	4,132.99	4,133.00	0.01	2.5e-3	0.07
P-53	1,474.00	24.0	PVC	130.0	false	0.00	Open	2,645.82	4,143.47	4,142.70	0.77	0.53	1.88
P-54	5,262.00	16.0	PVC	130.0	false	0.00	Open	1,754.82	4,142.70	4,133.39	9.31	1.77	2.80
P-55	5,288.00	12.0	PVC	130.0	false	0.00	Open	150.42	4,133.39	4,132.99	0.40	0.08	0.43
P-56	9,795.00	12.0	PVC	130.0	false	0.00	Open	-796.12	4,124.83	4,141.10	16.28	1.66	2.26
P-57	8,486.00	16.0	PVC	130.0	false	0.00	Open	1,394.64	4,141.10	4,131.29	9.81	1.16	2.23
P-58	2,728.00	16.0	PVC	130.0	false	0.00	Open	-2,724.60	4,141.10	4,152.00	10.90	3.99	4.35
P-59	5,751.00	42.0	PVC	130.0	false	0.00	Open	20,196.04	4,152.00	4,143.47	8.53	1.48	4.68
P-60	5,319.00	16.0	PVC	130.0	false	0.00	Open	-780.36	4,131.29	4,133.39	2.10	0.39	1.25
P-61	21,170.00	16.0	PVC	130.0	false	0.00	Open	1,809.00	4,131.29	4,091.68	39.61	1.87	2.89
P-62	27,667.00	8.0	PVC	130.0	false	0.00	Open	116.84	4,141.10	4,131.62	9.48	0.34	0.75
P-63	928.00	12.0	PVC	130.0	false	0.00	Open	372.16	4,132.00	4,131.62	0.38	0.41	1.06
P-64	468.00	24.0	PVC	130.0	false	0.00	Open	9,544.92	4,145.00	4,142.36	2.64	5.65	6.77
P-65	706.00	16.0	PVC	130.0	false	0.00	Open	2,133.28	4,142.00	4,140.21	1.79	2.54	3.40

Scenario: 2025-PeakDay
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-1	8,648.00	16.0	PVC	130.0	false	0.00	Open	-462.00	4,140.15	4,141.44	1.29	0.15	0.74
P-2	6,447.00	16.0	PVC	130.0	false	0.00	Open	162.57	4,141.44	4,141.30	0.14	0.02	0.26
P-3	5,395.00	12.0	PVC	130.0	false	0.00	Open	-534.83	4,137.01	4,141.30	4.29	0.80	1.52
P-4	5,552.00	12.0	PVC	130.0	false	0.00	Open	-154.83	4,136.57	4,137.01	0.44	0.08	0.44
P-5	5,854.00	16.0	PVC	130.0	false	0.00	Open	-552.26	4,141.30	4,142.52	1.22	0.21	0.88
P-6	3,841.00	12.0	PVC	130.0	false	0.00	Open	-207.44	4,136.57	4,137.10	0.53	0.14	0.59
P-7	5,999.00	12.0	PVC	130.0	false	0.00	Open	-573.14	4,137.10	4,142.52	5.42	0.90	1.63
P-8	3,336.00	12.0	PVC	130.0	false	0.00	Open	376.07	4,142.52	4,141.14	1.38	0.41	1.07
P-9	6,551.00	12.0	PVC	130.0	false	0.00	Open	160.35	4,141.14	4,140.58	0.56	0.09	0.45
P-10	5,342.00	12.0	PVC	130.0	false	0.00	Open	-142.27	4,136.20	4,136.57	0.37	0.07	0.40
P-11	5,355.00	12.0	PVC	130.0	false	0.00	Open	-49.70	4,137.04	4,137.10	0.05	0.01	0.14
P-12	5,366.00	24.0	PVC	130.0	false	0.00	Open	1,913.46	4,144.07	4,142.52	1.55	0.29	1.36
P-13	8,552.00	16.0	PVC	130.0	false	0.00	Open	234.28	4,141.50	4,141.14	0.36	0.04	0.37
P-14	12,307.00	12.0	PVC	130.0	false	0.00	Open	75.65	4,140.84	4,140.58	0.26	0.02	0.21
P-15	9,293.00	12.0	PVC	130.0	false	0.00	Open	-113.78	4,135.78	4,136.20	0.42	0.05	0.32
P-16	3,984.00	12.0	PVC	130.0	false	0.00	Open	-261.51	4,136.20	4,137.04	0.84	0.21	0.74
P-17	6,609.00	12.0	PVC	130.0	false	0.00	Open	-625.33	4,137.04	4,144.07	7.02	1.06	1.77
P-18	5,054.00	16.0	PVC	130.0	false	0.00	Open	894.22	4,144.07	4,141.50	2.56	0.51	1.43
P-19	6,857.00	12.0	PVC	130.0	false	0.00	Open	171.20	4,141.50	4,140.84	0.66	0.10	0.49
P-20	6,556.00	12.0	PVC	130.0	false	0.00	Open	-101.52	4,136.80	4,137.04	0.24	0.04	0.29
P-21	5,319.00	24.0	PVC	130.0	false	0.00	Open	-1,529.93	4,143.05	4,144.07	1.01	0.19	1.09
P-22	7,831.00	16.0	PVC	130.0	false	0.00	Open	83.27	4,141.55	4,141.50	0.05	0.01	0.13
P-23	5,619.00	12.0	PVC	130.0	false	0.00	Open	190.45	4,141.50	4,140.84	0.66	0.12	0.54
P-24	8,306.00	16.0	PVC	130.0	false	0.00	Open	-416.22	4,135.78	4,136.80	1.02	0.12	0.66
P-25	7,955.00	16.0	PVC	130.0	false	0.00	Open	-1,015.25	4,136.80	4,141.91	5.11	0.64	1.62
P-26	2,984.00	24.0	PVC	130.0	false	0.00	Open	-1,927.11	4,141.91	4,142.78	0.87	0.29	1.37
P-27	2,289.00	16.0	PVC	130.0	false	0.00	Open	922.95	4,142.78	4,141.55	1.23	0.54	1.47
P-28	5,968.00	16.0	PVC	130.0	false	0.00	Open	97.68	4,141.55	4,141.50	0.05	0.01	0.16
P-29	5,616.00	24.0	PVC	130.0	false	0.00	Open	-729.93	4,142.78	4,143.05	0.27	0.05	0.52
P-30	9,471.00	16.0	PVC	130.0	false	0.00	Open	275.45	4,137.35	4,136.80	0.54	0.06	0.44
P-31	5,351.00	16.0	PVC	130.0	false	0.00	Open	-17.85	4,141.91	4,141.91	1.95e-3	3.65e-4	0.03
P-32	5,427.00	36.0	PVC	130.0	false	0.00	Open	2,474.13	4,143.13	4,142.78	0.35	0.06	0.78
P-33	3,323.00	16.0	PVC	130.0	false	0.00	Open	482.76	4,142.04	4,141.50	0.54	0.16	0.77
P-34	5,315.00	16.0	PVC	130.0	false	0.00	Open	-1,187.65	4,137.35	4,141.91	4.56	0.86	1.90
P-35	3,981.00	24.0	PVC	130.0	false	0.00	Open	-1,980.27	4,141.91	4,143.13	1.22	0.31	1.40
P-36	6,641.00	24.0	PVC	130.0	false	0.00	Open	1,413.96	4,143.13	4,142.04	1.09	0.16	1.00

Scenario: 2025-PeakDay
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-37	7,907.00	12.0	PVC	130.0	false	0.00	Open	107.80	4,137.67	4,137.35	0.32	0.04	0.31
P-38	2,108.00	24.0	PVC	130.0	false	0.00	Open	-1,705.11	4,141.43	4,141.92	0.49	0.23	1.21
P-39	5,300.00	16.0	PVC	130.0	false	0.00	Open	39.52	4,141.92	4,141.91	0.01	1.57e-3	0.06
P-40	5,327.00	42.0	PVC	130.0	false	0.00	Open	7,038.35	4,144.25	4,143.13	1.12	0.21	1.63
P-41	5,327.00	16.0	PVC	130.0	false	0.00	Open	-160.35	4,141.93	4,142.04	0.11	0.02	0.26
P-42	5,300.00	12.0	PVC	130.0	false	0.00	Open	-60.85	4,141.76	4,141.84	0.08	0.01	0.17
P-43	5,351.00	12.0	PVC	130.0	false	0.00	Open	102.85	4,142.04	4,141.84	0.20	0.04	0.29
P-44	5,545.00	16.0	PVC	130.0	false	0.00	Open	-1,045.11	4,137.67	4,141.43	3.76	0.68	1.67
P-45	3,925.00	24.0	PVC	130.0	false	0.00	Open	-2,830.63	4,141.92	4,144.25	2.33	0.59	2.01
P-46	4,038.00	24.0	PVC	130.0	false	0.00	Open	1,621.78	4,144.25	4,143.40	0.86	0.21	1.15
P-47	2,631.00	16.0	PVC	130.0	false	0.00	Open	941.78	4,143.40	4,141.93	1.47	0.56	1.50
P-48	5,341.00	12.0	PVC	130.0	false	0.00	Open	92.28	4,141.93	4,141.76	0.16	0.03	0.26
P-49	11,187.00	12.0	PVC	130.0	false	0.00	Open	22.70	4,137.70	4,137.67	0.03	2.31e-3	0.06
P-50	5,245.00	42.0	PVC	130.0	false	0.00	Open	12,212.76	4,147.32	4,144.25	3.06	0.58	2.83
P-51	5,271.00	16.0	PVC	130.0	false	0.00	Open	162.16	4,142.04	4,141.93	0.11	0.02	0.26
P-52	5,271.00	12.0	PVC	130.0	false	0.00	Open	6.87	4,141.76	4,141.76	1.46e-3	2.78e-4	0.02
P-53	1,474.00	24.0	PVC	130.0	false	0.00	Open	1,832.96	4,147.32	4,146.92	0.39	0.27	1.30
P-54	5,262.00	16.0	PVC	130.0	false	0.00	Open	1,238.96	4,146.92	4,142.04	4.88	0.93	1.98
P-55	5,288.00	12.0	PVC	130.0	false	0.00	Open	122.87	4,142.04	4,141.76	0.28	0.05	0.35
P-56	9,795.00	12.0	PVC	130.0	false	0.00	Open	-558.70	4,137.70	4,146.14	8.45	0.86	1.58
P-57	8,486.00	16.0	PVC	130.0	false	0.00	Open	966.07	4,146.14	4,141.17	4.97	0.59	1.54
P-58	2,728.00	16.0	PVC	130.0	false	0.00	Open	-1,948.33	4,146.14	4,152.00	5.86	2.15	3.11
P-59	5,751.00	42.0	PVC	130.0	false	0.00	Open	14,611.72	4,152.00	4,147.32	4.68	0.81	3.38
P-60	5,319.00	16.0	PVC	130.0	false	0.00	Open	-483.93	4,141.17	4,142.04	0.87	0.16	0.77
P-61	21,170.00	16.0	PVC	130.0	false	0.00	Open	1,206.00	4,141.17	4,122.48	18.69	0.88	1.92
P-62	27,667.00	8.0	PVC	130.0	false	0.00	Open	145.56	4,146.14	4,131.90	14.24	0.51	0.93
P-63	928.00	12.0	PVC	130.0	false	0.00	Open	180.44	4,132.00	4,131.90	0.10	0.11	0.51
P-64	468.00	24.0	PVC	130.0	false	0.00	Open	5,438.95	4,145.00	4,144.07	0.93	1.99	3.86
P-65	706.00	16.0	PVC	130.0	false	0.00	Open	1,134.57	4,142.00	4,141.44	0.56	0.79	1.81

Scenario: 2025-PeakDay
Fire Flow Analysis
Fire Flow Report

Label	Zone	Fire Flow Iterations	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Minimum System Pressure (psi)	Calculated Minimum System Pressure (psi)
J-1	Zone-1	1	true	true	600.00	3,000.00	1,062.00	3,462.00	20.00	24.45	20.00	49.94	J-5	20.00	49.94
J-2	Zone-1	1	true	true	600.00	3,000.00	1,110.00	3,510.00	20.00	52.07	20.00	47.19	J-1	20.00	47.19
J-3	Zone-1	1	true	true	600.00	3,000.00	980.00	3,380.00	20.00	33.57	20.00	42.07	J-5	20.00	42.07
J-4	Zone-1	1	true	true	600.00	3,000.00	780.00	3,180.00	20.00	50.45	20.00	48.15	J-1	20.00	48.15
J-5	Zone-1	1	true	true	600.00	3,000.00	820.00	3,220.00	20.00	36.46	20.00	45.15	J-3	20.00	45.15
J-6	Zone-1	1	true	true	600.00	3,000.00	916.00	3,316.00	20.00	45.08	20.00	42.44	J-5	20.00	42.44
J-7	Zone-1	1	true	true	600.00	3,000.00	1,012.00	3,412.00	20.00	58.50	20.00	48.66	J-1	20.00	48.66
J-8	Zone-1	1	true	true	600.00	3,000.00	1,050.00	3,450.00	20.00	52.84	20.00	48.82	J-1	20.00	48.82
J-9	Zone-1	1	true	true	600.00	3,000.00	836.00	3,236.00	20.00	33.50	20.00	48.85	J-1	20.00	48.85
J-10	Zone-1	1	true	true	600.00	3,000.00	890.00	3,290.00	20.00	40.52	20.00	42.54	J-5	20.00	42.54
J-11	Zone-1	1	true	true	600.00	3,000.00	912.00	3,312.00	20.00	53.63	20.00	44.30	J-5	20.00	44.30
J-12	Zone-1	1	true	true	600.00	3,000.00	1,076.00	3,476.00	20.00	61.92	20.00	48.91	J-1	20.00	48.91
J-13	Zone-1	1	true	true	600.00	3,000.00	1,172.00	3,572.00	20.00	63.35	20.00	48.87	J-1	20.00	48.87
J-14	Zone-1	1	true	true	600.00	3,000.00	1,130.00	3,530.00	20.00	40.86	20.00	45.58	J-5	20.00	45.58
J-15	Zone-1	1	true	true	600.00	3,000.00	1,576.00	3,976.00	20.00	56.20	20.00	47.04	J-5	20.00	47.04
J-16	Zone-1	1	true	true	600.00	3,000.00	1,400.00	3,800.00	20.00	65.02	20.00	48.91	J-1	20.00	48.91
J-17	Zone-1	1	true	true	600.00	3,000.00	886.00	3,286.00	20.00	55.87	20.00	48.88	J-1	20.00	48.88
J-18	Zone-1	1	true	true	600.00	3,000.00	1,494.00	3,894.00	20.00	68.00	20.00	48.91	J-1	20.00	48.91
J-19	Zone-1	1	true	true	600.00	3,000.00	954.00	3,354.00	20.00	69.29	20.00	48.91	J-1	20.00	48.91
J-20	Zone-1	1	true	true	600.00	3,000.00	1,342.00	3,742.00	20.00	68.55	20.00	48.90	J-1	20.00	48.90
J-21	Zone-1	1	true	true	600.00	3,000.00	990.00	3,390.00	20.00	67.54	20.00	48.90	J-1	20.00	48.90
J-22	Zone-1	1	true	true	600.00	3,000.00	1,620.00	4,020.00	20.00	68.78	20.00	48.33	J-5	20.00	48.33
J-23	Zone-1	1	true	true	600.00	3,000.00	1,450.00	3,850.00	20.00	74.20	20.00	48.91	J-1	20.00	48.91
J-24	Zone-1	1	true	true	600.00	3,000.00	1,770.00	4,170.00	20.00	71.28	20.00	48.92	J-1	20.00	48.92
J-25	Zone-1	1	true	true	600.00	3,000.00	1,268.00	3,668.00	20.00	72.38	20.00	48.91	J-1	20.00	48.91
J-26	Zone-1	1	true	true	600.00	3,000.00	642.00	3,042.00	20.00	59.36	20.00	48.92	J-1	20.00	48.92
J-27	Zone-1	1	true	true	600.00	3,000.00	1,560.00	3,960.00	20.00	66.00	20.00	48.90	J-1	20.00	48.90
J-28	Zone-1	1	true	true	600.00	3,000.00	1,260.00	3,660.00	20.00	72.31	20.00	48.91	J-1	20.00	48.91
J-29	Zone-1	1	true	true	600.00	3,000.00	1,686.00	4,086.00	20.00	73.35	20.00	48.91	J-1	20.00	48.91
J-30	Zone-1	1	true	true	600.00	3,000.00	1,322.00	3,722.00	20.00	75.76	20.00	48.92	J-1	20.00	48.92
J-31	Zone-1	1	true	true	600.00	3,000.00	1,280.00	3,680.00	20.00	75.87	20.00	48.92	J-1	20.00	48.92
J-32	Zone-1	1	true	true	600.00	3,000.00	1,772.00	4,172.00	20.00	74.26	20.00	48.92	J-1	20.00	48.92
J-33	Zone-1	1	true	true	600.00	3,000.00	760.00	3,160.00	20.00	65.41	20.00	48.92	J-1	20.00	48.92
J-34	Zone-1	1	true	true	600.00	3,000.00	1,166.00	3,566.00	20.00	80.40	20.00	48.94	J-1	20.00	48.94
J-35	Zone-1	1	true	true	600.00	3,000.00	1,194.00	3,594.00	20.00	79.49	20.00	48.94	J-1	20.00	48.94

Scenario: 2025-PeakDay
Fire Flow Analysis
Fire Flow Report

Label	Zone	Fire Flow Iterations	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Minimum System Pressure (psi)	Calculated Minimum System Pressure (psi)
J-36	Zone-1	1	true	true	600.00	3,000.00	1,070.00	3,470.00	20.00	73.47	20.00	48.93	J-1	20.00	48.93
J-37	Zone-1	1	true	true	600.00	3,000.00	716.00	3,116.00	20.00	62.63	20.00	48.92	J-1	20.00	48.92
J-38	Zone-1	1	true	true	600.00	3,000.00	1,136.00	3,536.00	20.00	46.26	20.00	48.91	J-1	20.00	48.91
J-39	Zone-1	1	true	true	600.00	3,000.00	878.00	3,278.00	20.00	75.12	20.00	48.94	J-1	20.00	48.94
J-40	Zone-1	1	true	true	600.00	3,000.00	844.00	3,244.00	20.00	73.30	20.00	48.93	J-1	20.00	48.93
J-41	Zone-1	1	true	true	600.00	3,000.00	926.00	3,326.00	20.00	83.03	20.00	48.95	J-1	20.00	48.95
J-42	Zone-1	17	true	true	600.00	2,434.59	1,806.00	3,640.59	20.00	20.00	20.00	48.93	J-1	20.00	48.93

2050 WATERCAD OUTPUT

Scenario: Base
Steady State Analysis
Pipe Cost Report

Label	Include in Cost Calculation?	Diameter (in)	Length (ft)	Construction Costs ($)	Total Cost ($)
P-1	true	16	8,648.00	604,982	604,982
P-2	true	16	6,447.00	443,554	443,554
P-3	true	12	5,395.00	298,382	298,382
P-4	true	12	5,552.00	286,483	286,483
P-5	true	16	5,854.00	402,755	402,755
P-6	true	12	3,841.00	198,196	198,196
P-7	true	12	5,999.00	329,548	329,548
P-8	true	12	3,336.00	202,138	202,138
P-9	true	12	6,551.00	348,032	348,032
P-10	true	12	5,342.00	285,647	285,647
P-11	true	12	5,355.00	276,318	276,318
P-12	true	24	5,366.00	643,920	643,920
P-16	true	12	3,984.00	215,574	215,574
P-17	true	12	6,609.00	361,024	361,024
P-18	true	16	5,054.00	377,715	377,715
P-19	true	12	6,857.00	363,821	363,821
P-20	true	12	6,556.00	338,290	338,290
P-21	true	24	5,319.00	638,280	638,280
P-22	true	16	7,831.00	538,773	538,773
P-24	true	16	8,306.00	571,453	571,453
P-25	true	16	7,955.00	557,304	557,304
P-26	true	24	2,984.00	378,080	378,080
P-27	true	16	2,289.00	187,483	187,483
P-28	true	16	5,968.00	420,598	420,598
P-29	true	24	5,616.00	673,920	673,920
P-30	true	16	9,471.00	651,605	651,605
P-31	true	16	5,351.00	368,149	368,149
P-32	true	36	5,427.00	1,114,546	1,114,546
P-33	true	16	3,323.00	228,622	228,622
P-34	true	16	5,315.00	375,672	375,672
P-35	true	24	3,981.00	537,720	537,720
P-36	true	24	6,641.00	796,920	796,920
P-37	true	12	7,907.00	408,001	408,001
P-38	true	24	2,108.00	252,960	252,960
P-39	true	16	5,300.00	394,640	394,640
P-40	true	42	5,327.00	1,230,537	1,230,537
P-41	true	16	5,327.00	366,498	366,498
P-42	true	12	5,300.00	273,480	273,480
P-43	true	12	5,351.00	286,112	286,112
P-44	true	16	5,545.00	421,496	421,496
P-45	true	24	3,925.00	501,000	501,000
P-46	true	24	4,038.00	484,560	484,560
P-47	true	16	2,631.00	181,013	181,013
P-48	true	12	5,341.00	285,596	285,596
P-49	true	12	11,187.00	607,249	607,249
P-53	true	24	1,474.00	176,880	176,880
P-54	true	16	5,262.00	362,026	362,026
P-55	true	12	5,288.00	282,861	282,861
P-56	true	12	9,795.00	505,422	505,422
P-58	false	16	2,728.00	187,686	187,686
P-59	true	42	5,751.00	1,338,481	1,338,481
P-60	true	16	5,319.00	365,947	365,947

Scenario: Base
Steady State Analysis
Pipe Cost Report

Label	Include in Cost Calculation?	Diameter (in)	Length (ft)	Construction Costs ($)	Total Cost ($)
P-63	true	12	928.00	47,885	47,885
P-64	true	24	468.00	56,160	56,160
P-65	true	16	706.00	48,573	48,573
P-66	true	16	679.00	66,715	66,715
P-67	true	16	439.00	30,203	30,203
P-68	true	16	14,734.00	1,013,699	1,013,699
P-69	true	16	21,596.00	1,505,805	1,505,805
P-70	true	12	12,232.00	631,171	631,171
P-71	true	12	13,452.00	694,123	694,123
P-72	true	12	10,584.00	546,134	546,134
P-73	true	12	5,303.00	273,635	273,635
P-74	true	12	3,990.00	205,884	205,884
P-75	true	12	7,292.00	376,267	376,267
P-76	true	12	13,592.00	711,347	711,347
P-77	true	12	13,295.00	686,022	686,022
P-78	true	12	7,972.00	431,355	431,355
P-79	true	16	5,383.00	370,350	370,350
P-80	true	12	10,734.00	553,874	553,874
P-81	true	12	12,450.00	692,420	692,420
P-82	true	16	11,342.00	780,330	780,330
P-83	true	16	8,506.00	585,213	585,213
P-85	false	8	11,743.00	338,804	338,804
P-84	false	8	15,924.00	455,872	455,872
P-86	true	16	12,276.00	864,589	864,589
P-87	true	16	2,569.00	176,747	176,747
P-88	true	12	15,883.00	829,563	829,563
P-89	true	16	7,958.00	547,510	547,510
P-90	false	16	3,175.00	228,440	228,440
P-91	false	16	5,311.00	385,397	385,397
P-92	true	16	7,888.00	542,694	542,694
P-93	true	16	5,332.00	366,842	366,842
P-94	true	42	6,480.00	1,516,880	1,516,880
P-95	true	42	2,784.00	643,104	643,104
P-96	true	42	2,461.00	568,491	568,491
P-97	true	16	2,469.00	169,867	169,867
P-98	true	16	2,802.00	192,778	192,778
P-99	true	42	6,843.00	1,610,733	1,610,733
P-100	true	12	2,537.00	130,909	130,909
P-101	true	12	2,734.00	141,074	141,074
P-102	true	36	5,314.00	1,052,172	1,052,172
P-103	true	36	2,724.00	539,352	539,352
P-104	true	36	2,687.00	532,026	532,026
P-105	true	16	2,568.00	176,678	176,678
P-106	true	12	2,794.00	144,170	144,170
P-107	true	12	2,686.00	138,598	138,598
P-108	false	16	13,203.00	918,366	918,366
P-110	true	16	2,549.00	175,371	175,371
P-111	true	12	7,948.00	410,117	410,117
P-112	false	16	5,297.00	364,434	364,434
P-113	false	16	2,670.00	183,696	183,696
P-114	true	24	7,871.00	944,520	944,520
P-115	true	16	5,333.00	366,910	366,910

Scenario: Base
Steady State Analysis
Pipe Cost Report

Label	Include in Cost Calculation?	Diameter (in)	Length (ft)	Construction Costs ($)	Total Cost ($)
P-116	true	12	5,224.00	269,558	269,558
P-117	true	12	7,979.00	411,716	411,716
P-118	true	24	6,325.00	759,000	759,000
P-119	true	16	5,378.00	370,006	370,006
P-120	true	12	10,642.00	549,127	549,127
P-121	true	12	3,083.00	159,083	159,083
P-122	true	12	5,241.00	270,436	270,436
P-123	true	24	5,811.00	697,320	697,320
P-124	true	16	11,242.00	773,450	773,450
P-125	true	16	5,246.00	360,925	360,925
P-126	true	12	4,254.00	229,506	229,506
P-127	true	12	4,602.00	257,463	257,463
P-128	true	12	5,488.00	283,181	283,181
P-129	true	16	5,553.00	412,046	412,046
P-130	true	16	2,044.00	150,627	150,627
P-131	true	16	5,548.00	411,702	411,702
P-132	true	16	1,653.00	113,726	113,726
P-133	true	24	4,028.00	483,360	483,360
P-134	true	16	2,631.00	181,013	181,013
P-135	true	24	5,266.00	651,920	651,920
P-136	true	16	5,901.00	425,989	425,989
P-137	true	16	5,215.00	358,792	358,792
P-138	true	16	5,838.00	401,654	401,654
P-139	true	16	5,997.00	442,594	442,594
P-140	true	16	5,293.00	374,158	374,158
P-141	true	12	7,011.00	361,768	361,768
P-142	true	12	5,296.00	283,274	283,274
P-143	true	12	1,983.00	112,323	112,323
P-144	true	12	3,636.00	187,618	187,618
P-145	true	12	6,366.00	328,486	328,486
P-146	true	12	5,320.00	284,512	284,512
P-147	true	12	5,263.00	281,571	281,571
P-148	true	16	6,920.00	506,096	506,096
P-149	true	16	3,715.00	255,592	255,592
P-150	true	12	5,361.00	286,628	286,628
P-151	true	16	13,573.00	993,822	993,822
P-152	true	24	947.00	133,640	133,640
P-153	true	16	3,773.00	279,582	279,582
P-154	true	24	4,502.00	590,240	590,240
P-155	true	16	2,869.00	197,387	197,387
P-156	true	16	5,683.00	390,990	390,990
P-157	true	12	5,310.00	283,996	283,996

Σ = $61,385,003 W/O NAS & FPST EXISTING PIPES

Scenario: Base
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Demand (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	4,027.00	Zone-1	Demand	460	Fixed	460	4,132.00	45.43
J-2	4,017.00	Zone-1	Demand	412	Fixed	412	4,140.87	53.59
J-3	4,012.00	Zone-1	Demand	136	Fixed	136	4,136.41	53.83
J-4	4,014.00	Zone-1	Demand	153	Fixed	153	4,140.89	54.90
J-5	4,020.00	Zone-1	Demand	74	Fixed	74	4,138.08	51.09
J-6	4,006.00	Zone-1	Demand	242	Fixed	242	4,139.33	57.68
J-7	4,003.00	Zone-1	Demand	328	Fixed	328	4,143.09	60.61
J-8	4,000.00	Zone-1	Demand	288	Fixed	288	4,141.95	61.42
J-9	3,996.00	Zone-1	Demand	220	Fixed	220	4,140.68	62.60
J-10	4,009.00	Zone-1	Demand	78	Fixed	78	4,138.15	55.88
J-11	3,992.00	Zone-1	Demand	229	Fixed	229	4,139.52	63.82
J-12	4,000.00	Zone-1	Demand	395	Fixed	395	4,144.62	62.57
J-13	3,986.00	Zone-1	Demand	419	Fixed	419	4,142.62	67.76
J-14	4,000.00	Zone-1	Demand	372	Fixed	372	4,138.06	59.73
J-15	3,990.00	Zone-1	Demand	784	Fixed	784	4,139.98	64.89
J-16	3,990.00	Zone-1	Demand	672	Fixed	672	4,144.65	66.91
J-17	3,980.00	Zone-1	Demand	271	Fixed	271	4,141.20	69.74
J-18	3,980.00	Zone-1	Demand	761	Fixed	761	4,144.63	71.23
J-19	3,980.00	Zone-1	Demand	301	Fixed	301	4,145.07	71.42
J-20	3,976.00	Zone-1	Demand	582	Fixed	582	4,143.51	72.47
J-21	3,976.00	Zone-1	Demand	238	Fixed	238	4,143.49	72.46
J-22	3,963.00	Zone-1	Demand	468	Fixed	468	4,141.91	77.40
J-23	3,966.00	Zone-1	Demand	725	Fixed	725	4,145.26	77.56
J-24	3,976.00	Zone-1	Demand	786	Fixed	786	4,145.76	73.45
J-25	3,970.00	Zone-1	Demand	558	Fixed	558	4,144.77	75.62
J-26	3,965.00	Zone-1	Demand	171	Fixed	171	4,142.41	76.76
J-27	3,963.00	Zone-1	Demand	365	Fixed	365	4,141.91	77.41
J-28	3,967.00	Zone-1	Demand	401	Fixed	401	4,150.06	79.20
J-29	3,967.00	Zone-1	Demand	763	Fixed	763	4,148.05	78.33
J-30	3,967.00	Zone-1	Demand	455	Fixed	455	4,146.86	77.81
J-31	3,963.00	Zone-1	Demand	372	Fixed	372	4,146.39	79.34
J-32	3,963.00	Zone-1	Demand	757	Fixed	757	4,145.32	78.88
J-33	3,962.00	Zone-1	Demand	177	Fixed	177	4,143.90	78.70
J-34	3,960.00	Zone-1	Demand	273	Fixed	273	4,148.48	81.55
J-35	3,960.00	Zone-1	Demand	358	Fixed	358	4,147.99	81.33
J-36	3,963.00	Zone-1	Demand	318	Fixed	318	4,145.82	79.10
J-37	3,955.00	Zone-1	Demand	158	Fixed	158	4,144.31	81.91
J-38	3,950.00	Zone-1	Demand	406	Fixed	406	4,137.15	80.97
J-39	3,960.00	Zone-1	Demand	42	Fixed	42	4,147.01	80.91
J-40	3,950.00	Zone-1	Demand	225	Fixed	225	4,144.72	84.25
J-41	3,921.00	Zone-1	Demand	637	Fixed	637	4,131.59	91.11
J-42	3,934.00	Zone-1	Demand	905	Fixed	905	4,137.35	87.98
J-43	4,027.00	Zone-2	Demand	0	Fixed	0	4,254.63	98.49
J-44	4,040.00	Zone-2	Demand	271	Fixed	271	4,242.71	87.70
J-45	4,016.00	Zone-2	Demand	952	Fixed	952	4,230.40	92.76
J-46	4,110.00	Zone-2	Demand	251	Fixed	251	4,242.95	57.52
J-47	4,065.00	Zone-2	Demand	237	Fixed	237	4,241.09	76.18
J-48	4,018.00	Zone-1	Demand	191	Fixed	191	4,136.39	51.22
J-49	4,006.00	Zone-1	Demand	191	Fixed	191	4,137.63	56.95
J-50	3,980.00	Zone-1	Demand	313	Fixed	313	4,137.89	68.31
J-51	3,956.00	Zone-1	Demand	243	Fixed	243	4,139.51	79.40
J-52	3,944.00	Zone-1	Demand	150	Fixed	150	4,135.92	83.04

Scenario: Base
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Demand (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-53	3,942.00	Zone-1	Demand	320	Fixed	320	4,134.54	83.30
J-54	3,933.00	Zone-1	Demand	335	Fixed	335	4,133.34	86.68
J-55	3,934.00	Zone-1	Demand	365	Fixed	365	4,133.20	86.19
J-56	3,937.00	Zone-1	Demand	621	Fixed	621	4,133.24	84.90
J-57	3,940.00	Zone-1	Demand	339	Fixed	339	4,137.58	85.48
J-58	3,950.00	Zone-1	Demand	218	Fixed	218	4,145.23	84.47
J-59	3,967.00	Zone-1	Demand	0	Fixed	0	4,147.31	78.01
J-60	3,963.00	Zone-1	Demand	207	Fixed	207	4,146.08	79.21
J-61	3,963.00	Zone-1	Demand	93	Fixed	93	4,144.70	78.61
J-62	3,960.00	Zone-1	Demand	28	Fixed	28	4,144.14	79.67
J-63	3,957.00	Zone-1	Demand	66	Fixed	66	4,143.18	80.55
J-64	3,963.00	Zone-1	Demand	76	Fixed	76	4,143.75	78.20
J-65	3,953.00	Zone-1	Demand	207	Fixed	207	4,141.41	81.52
J-66	3,947.00	Zone-1	Demand	132	Fixed	132	4,140.59	83.76
J-67	3,953.00	Zone-1	Demand	206	Fixed	206	4,140.99	81.34
J-68	3,950.00	Zone-1	Demand	257	Fixed	257	4,139.80	82.12
J-69	3,939.00	Zone-1	Demand	33	Fixed	33	4,138.73	86.41
J-70	3,947.00	Zone-1	Demand	154	Fixed	154	4,139.53	83.30
J-71	3,947.00	Zone-1	Demand	231	Fixed	231	4,138.91	83.03
J-72	3,930.00	Zone-1	Demand	143	Fixed	143	4,135.89	89.08
J-73	3,940.00	Zone-1	Demand	347	Fixed	347	4,138.94	86.07
J-74	3,924.00	Zone-1	Demand	409	Fixed	409	4,135.43	91.47
J-75	3,924.00	Zone-1	Demand	443	Fixed	443	4,134.70	91.16
J-76	3,941.00	Zone-1	Demand	231	Fixed	231	4,138.20	85.32
J-77	3,950.00	Zone-1	Demand	377	Fixed	377	4,138.07	81.37
J-78	3,954.00	Zone-1	Demand	242	Fixed	242	4,139.44	80.23
J-79	3,951.00	Zone-1	Demand	90	Fixed	90	4,139.66	81.62
J-80	3,963.00	Zone-1	Demand	113	Fixed	113	4,141.01	77.02
J-81	3,967.00	Zone-1	Demand	113	Fixed	113	4,141.64	75.56
J-82	3,967.00	Zone-1	Demand	97	Fixed	97	4,142.44	75.90
J-83	3,965.00	Zone-1	Demand	342	Fixed	342	4,139.59	75.54
J-84	3,969.00	Zone-1	Demand	209	Fixed	209	4,139.81	73.90
J-85	3,973.00	Zone-1	Demand	430	Fixed	430	4,139.55	72.06
J-86	3,970.00	Zone-1	Demand	183	Fixed	183	4,141.41	74.16
J-87	3,980.00	Zone-1	Demand	209	Fixed	209	4,140.11	69.27
J-88	3,986.00	Zone-1	Demand	364	Fixed	364	4,139.78	66.53
J-89	3,990.00	Zone-1	Demand	255	Fixed	255	4,140.66	65.18
J-90	3,976.00	Zone-1	Demand	368	Fixed	368	4,141.52	71.61
J-91	3,989.00	Zone-1	Demand	0	Fixed	0	4,142.13	66.25

Scenario: 2050PeakHour
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Demand (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	4,027.00	Zone-1	Demand	1,380	Fixed	1,380	4,130.65	44.84
J-2	4,017.00	Zone-1	Demand	1,236	Fixed	1,236	4,137.39	52.09
J-3	4,012.00	Zone-1	Demand	408	Fixed	408	4,119.63	46.57
J-4	4,014.00	Zone-1	Demand	459	Fixed	459	4,131.83	50.98
J-5	4,020.00	Zone-1	Demand	222	Fixed	222	4,110.95	39.35
J-6	4,006.00	Zone-1	Demand	726	Fixed	726	4,110.97	45.42
J-7	4,003.00	Zone-1	Demand	984	Fixed	984	4,132.03	55.82
J-8	4,000.00	Zone-1	Demand	864	Fixed	864	4,108.62	46.99
J-9	3,996.00	Zone-1	Demand	660	Fixed	660	4,093.48	42.18
J-10	4,009.00	Zone-1	Demand	234	Fixed	234	4,105.91	41.93
J-11	3,992.00	Zone-1	Demand	687	Fixed	687	4,108.15	50.25
J-12	4,000.00	Zone-1	Demand	1,185	Fixed	1,185	4,138.42	59.89
J-13	3,986.00	Zone-1	Demand	1,257	Fixed	1,257	4,111.16	54.15
J-14	4,000.00	Zone-1	Demand	1,116	Fixed	1,116	4,094.61	40.93
J-15	3,990.00	Zone-1	Demand	2,352	Fixed	2,352	4,100.17	47.66
J-16	3,990.00	Zone-1	Demand	2,016	Fixed	2,016	4,126.75	59.16
J-17	3,980.00	Zone-1	Demand	813	Fixed	813	4,094.10	49.36
J-18	3,980.00	Zone-1	Demand	2,283	Fixed	2,283	4,118.23	59.81
J-19	3,980.00	Zone-1	Demand	903	Fixed	903	4,121.23	61.10
J-20	3,976.00	Zone-1	Demand	1,746	Fixed	1,746	4,111.51	58.63
J-21	3,976.00	Zone-1	Demand	714	Fixed	714	4,108.89	57.50
J-22	3,963.00	Zone-1	Demand	1,404	Fixed	1,404	4,103.29	60.70
J-23	3,966.00	Zone-1	Demand	2,175	Fixed	2,175	4,119.28	66.32
J-24	3,976.00	Zone-1	Demand	2,358	Fixed	2,358	4,121.98	63.16
J-25	3,970.00	Zone-1	Demand	1,674	Fixed	1,674	4,114.22	62.40
J-26	3,965.00	Zone-1	Demand	513	Fixed	513	4,093.82	55.74
J-27	3,963.00	Zone-1	Demand	1,095	Fixed	1,095	4,102.01	60.14
J-28	3,967.00	Zone-1	Demand	1,203	Fixed	1,203	4,141.78	75.62
J-29	3,967.00	Zone-1	Demand	2,289	Fixed	2,289	4,131.33	71.10
J-30	3,967.00	Zone-1	Demand	1,365	Fixed	1,365	4,125.60	68.62
J-31	3,963.00	Zone-1	Demand	1,116	Fixed	1,116	4,122.35	68.94
J-32	3,963.00	Zone-1	Demand	2,271	Fixed	2,271	4,115.18	65.84
J-33	3,962.00	Zone-1	Demand	531	Fixed	531	4,103.70	61.31
J-34	3,960.00	Zone-1	Demand	819	Fixed	819	4,133.25	74.96
J-35	3,960.00	Zone-1	Demand	1,074	Fixed	1,074	4,130.30	73.68
J-36	3,963.00	Zone-1	Demand	954	Fixed	954	4,116.82	66.55
J-37	3,955.00	Zone-1	Demand	474	Fixed	474	4,106.04	65.35
J-38	3,950.00	Zone-1	Demand	1,218	Fixed	1,218	4,078.13	55.43
J-39	3,960.00	Zone-1	Demand	126	Fixed	126	4,125.78	71.72
J-40	3,950.00	Zone-1	Demand	675	Fixed	675	4,110.24	69.33
J-41	3,921.00	Zone-1	Demand	1,911	Fixed	1,911	4,110.54	82.01
J-42	3,934.00	Zone-1	Demand	2,715	Fixed	2,715	4,053.84	51.85
J-43	4,027.00	Zone-2	Demand	0	Fixed	0	4,231.65	88.54
J-44	4,040.00	Zone-2	Demand	813	Fixed	813	4,196.83	67.85
J-45	4,016.00	Zone-2	Demand	2,856	Fixed	2,856	4,186.56	73.79
J-46	4,110.00	Zone-2	Demand	753	Fixed	753	4,191.77	35.38
J-47	4,065.00	Zone-2	Demand	711	Fixed	711	4,177.50	48.68
J-48	4,018.00	Zone-1	Demand	573	Fixed	573	4,103.98	37.20
J-49	4,006.00	Zone-1	Demand	573	Fixed	573	4,099.27	40.35
J-50	3,980.00	Zone-1	Demand	939	Fixed	939	4,085.72	45.74
J-51	3,956.00	Zone-1	Demand	729	Fixed	729	4,090.37	58.14
J-52	3,944.00	Zone-1	Demand	450	Fixed	450	4,073.40	55.98

Scenario: 2050PeakHour
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Demand (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-53	3,942.00	Zone-1	Demand	960	Fixed	960	4,069.46	55.14
J-54	3,933.00	Zone-1	Demand	1,005	Fixed	1,005	4,068.09	58.45
J-55	3,934.00	Zone-1	Demand	1,095	Fixed	1,095	4,070.41	59.02
J-56	3,937.00	Zone-1	Demand	1,863	Fixed	1,863	4,071.48	58.18
J-57	3,940.00	Zone-1	Demand	1,017	Fixed	1,017	4,084.55	62.54
J-58	3,950.00	Zone-1	Demand	654	Fixed	654	4,115.59	71.64
J-59	3,967.00	Zone-1	Demand	0	Fixed	0	4,127.29	69.35
J-60	3,963.00	Zone-1	Demand	621	Fixed	621	4,118.80	67.41
J-61	3,963.00	Zone-1	Demand	279	Fixed	279	4,109.06	63.19
J-62	3,960.00	Zone-1	Demand	84	Fixed	84	4,105.12	62.79
J-63	3,957.00	Zone-1	Demand	198	Fixed	198	4,097.89	60.96
J-64	3,963.00	Zone-1	Demand	228	Fixed	228	4,102.40	60.31
J-65	3,953.00	Zone-1	Demand	621	Fixed	621	4,084.69	56.97
J-66	3,947.00	Zone-1	Demand	396	Fixed	396	4,078.61	56.94
J-67	3,953.00	Zone-1	Demand	618	Fixed	618	4,082.17	55.89
J-68	3,950.00	Zone-1	Demand	771	Fixed	771	4,072.77	53.12
J-69	3,939.00	Zone-1	Demand	99	Fixed	99	4,064.44	54.27
J-70	3,947.00	Zone-1	Demand	462	Fixed	462	4,071.13	53.70
J-71	3,947.00	Zone-1	Demand	693	Fixed	693	4,066.24	51.59
J-72	3,930.00	Zone-1	Demand	429	Fixed	429	4,043.19	48.97
J-73	3,940.00	Zone-1	Demand	1,041	Fixed	1,041	4,066.57	54.76
J-74	3,924.00	Zone-1	Demand	1,227	Fixed	1,227	4,039.66	50.04
J-75	3,924.00	Zone-1	Demand	1,329	Fixed	1,329	4,034.11	47.64
J-76	3,941.00	Zone-1	Demand	693	Fixed	693	4,061.09	51.96
J-77	3,950.00	Zone-1	Demand	1,131	Fixed	1,131	4,060.07	47.62
J-78	3,954.00	Zone-1	Demand	726	Fixed	726	4,070.63	50.46
J-79	3,951.00	Zone-1	Demand	270	Fixed	270	4,072.52	52.58
J-80	3,963.00	Zone-1	Demand	339	Fixed	339	4,082.51	51.71
J-81	3,967.00	Zone-1	Demand	339	Fixed	339	4,087.67	52.21
J-82	3,967.00	Zone-1	Demand	291	Fixed	291	4,093.80	54.86
J-83	3,965.00	Zone-1	Demand	1,026	Fixed	1,026	4,072.24	46.40
J-84	3,969.00	Zone-1	Demand	627	Fixed	627	4,074.44	45.62
J-85	3,973.00	Zone-1	Demand	1,290	Fixed	1,290	4,073.20	43.35
J-86	3,970.00	Zone-1	Demand	549	Fixed	549	4,089.06	51.51
J-87	3,980.00	Zone-1	Demand	627	Fixed	627	4,080.24	43.37
J-88	3,986.00	Zone-1	Demand	1,092	Fixed	1,092	4,079.87	40.61
J-89	3,990.00	Zone-1	Demand	765	Fixed	765	4,092.12	44.18
J-90	3,976.00	Zone-1	Demand	1,104	Fixed	1,104	4,094.31	51.19
J-91	3,989.00	Zone-1	Demand	0	Fixed	0	4,108.65	51.77

Scenario: 2050-PeakDay
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Demand (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	4,027.00	Zone-1	Demand	920	Fixed	920	4,131.44	45.19
J-2	4,017.00	Zone-1	Demand	824	Fixed	824	4,139.32	52.92
J-3	4,012.00	Zone-1	Demand	272	Fixed	272	4,129.87	51.00
J-4	4,014.00	Zone-1	Demand	306	Fixed	306	4,137.76	53.55
J-5	4,020.00	Zone-1	Demand	148	Fixed	148	4,127.89	46.68
J-6	4,006.00	Zone-1	Demand	484	Fixed	484	4,128.13	52.84
J-7	4,003.00	Zone-1	Demand	656	Fixed	656	4,138.60	58.67
J-8	4,000.00	Zone-1	Demand	576	Fixed	576	4,129.22	55.91
J-9	3,996.00	Zone-1	Demand	440	Fixed	440	4,122.50	54.73
J-10	4,009.00	Zone-1	Demand	156	Fixed	156	4,126.13	50.68
J-11	3,992.00	Zone-1	Demand	458	Fixed	458	4,127.44	58.60
J-12	4,000.00	Zone-1	Demand	790	Fixed	790	4,142.11	61.49
J-13	3,986.00	Zone-1	Demand	838	Fixed	838	4,130.64	62.58
J-14	4,000.00	Zone-1	Demand	744	Fixed	744	4,122.02	52.79
J-15	3,990.00	Zone-1	Demand	1,568	Fixed	1,568	4,125.20	58.49
J-16	3,990.00	Zone-1	Demand	1,344	Fixed	1,344	4,137.92	64.00
J-17	3,980.00	Zone-1	Demand	542	Fixed	542	4,123.08	61.90
J-18	3,980.00	Zone-1	Demand	1,522	Fixed	1,522	4,134.79	66.97
J-19	3,980.00	Zone-1	Demand	602	Fixed	602	4,136.24	67.60
J-20	3,976.00	Zone-1	Demand	1,164	Fixed	1,164	4,131.23	67.16
J-21	3,976.00	Zone-1	Demand	476	Fixed	476	4,130.26	66.74
J-22	3,963.00	Zone-1	Demand	936	Fixed	936	4,127.28	71.07
J-23	3,966.00	Zone-1	Demand	1,450	Fixed	1,450	4,135.45	73.31
J-24	3,976.00	Zone-1	Demand	1,572	Fixed	1,572	4,136.79	69.57
J-25	3,970.00	Zone-1	Demand	1,116	Fixed	1,116	4,133.11	70.57
J-26	3,965.00	Zone-1	Demand	342	Fixed	342	4,123.61	68.62
J-27	3,963.00	Zone-1	Demand	730	Fixed	730	4,126.87	70.90
J-28	3,967.00	Zone-1	Demand	802	Fixed	802	4,146.90	77.83
J-29	3,967.00	Zone-1	Demand	1,526	Fixed	1,526	4,141.67	75.57
J-30	3,967.00	Zone-1	Demand	910	Fixed	910	4,138.76	74.31
J-31	3,963.00	Zone-1	Demand	744	Fixed	744	4,137.20	75.37
J-32	3,963.00	Zone-1	Demand	1,514	Fixed	1,514	4,133.74	73.87
J-33	3,962.00	Zone-1	Demand	354	Fixed	354	4,128.36	71.98
J-34	3,960.00	Zone-1	Demand	546	Fixed	546	4,142.65	79.02
J-35	3,960.00	Zone-1	Demand	716	Fixed	716	4,141.22	78.40
J-36	3,963.00	Zone-1	Demand	636	Fixed	636	4,134.66	74.27
J-37	3,955.00	Zone-1	Demand	316	Fixed	316	4,129.52	75.51
J-38	3,950.00	Zone-1	Demand	812	Fixed	812	4,115.02	71.40
J-39	3,960.00	Zone-1	Demand	84	Fixed	84	4,138.95	77.42
J-40	3,950.00	Zone-1	Demand	450	Fixed	450	4,131.47	78.51
J-41	3,921.00	Zone-1	Demand	1,274	Fixed	1,274	4,123.29	87.52
J-42	3,934.00	Zone-1	Demand	1,810	Fixed	1,810	4,104.83	73.91
J-43	4,027.00	Zone-2	Demand	0	Fixed	0	4,240.53	92.38
J-44	4,040.00	Zone-2	Demand	542	Fixed	542	4,212.70	74.72
J-45	4,016.00	Zone-2	Demand	1,904	Fixed	1,904	4,193.77	76.91
J-46	4,110.00	Zone-2	Demand	502	Fixed	502	4,212.44	44.32
J-47	4,065.00	Zone-2	Demand	474	Fixed	474	4,205.71	60.88
J-48	4,018.00	Zone-1	Demand	382	Fixed	382	4,124.21	45.95
J-49	4,006.00	Zone-1	Demand	382	Fixed	382	4,123.23	50.72
J-50	3,980.00	Zone-1	Demand	626	Fixed	626	4,118.45	59.90
J-51	3,956.00	Zone-1	Demand	486	Fixed	486	4,121.03	71.40
J-52	3,944.00	Zone-1	Demand	300	Fixed	300	4,112.54	72.92

Scenario: 2050-PeakDay
Fire Flow Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Demand (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-53	3,942.00	Zone-1	Demand	640	Fixed	640	4,110.42	72.87
J-54	3,933.00	Zone-1	Demand	670	Fixed	670	4,109.51	76.37
J-55	3,934.00	Zone-1	Demand	730	Fixed	730	4,110.26	76.26
J-56	3,937.00	Zone-1	Demand	1,242	Fixed	1,242	4,110.71	75.16
J-57	3,940.00	Zone-1	Demand	678	Fixed	678	4,117.85	76.95
J-58	3,950.00	Zone-1	Demand	436	Fixed	436	4,133.92	79.57
J-59	3,967.00	Zone-1	Demand	0	Fixed	0	4,139.66	74.70
J-60	3,963.00	Zone-1	Demand	414	Fixed	414	4,135.59	74.67
J-61	3,963.00	Zone-1	Demand	186	Fixed	186	4,130.94	72.66
J-62	3,960.00	Zone-1	Demand	56	Fixed	56	4,129.06	73.14
J-63	3,957.00	Zone-1	Demand	132	Fixed	132	4,125.65	72.97
J-64	3,963.00	Zone-1	Demand	152	Fixed	152	4,127.76	71.28
J-65	3,953.00	Zone-1	Demand	414	Fixed	414	4,119.39	71.99
J-66	3,947.00	Zone-1	Demand	264	Fixed	264	4,116.53	73.35
J-67	3,953.00	Zone-1	Demand	412	Fixed	412	4,118.16	71.46
J-68	3,950.00	Zone-1	Demand	514	Fixed	514	4,113.74	70.84
J-69	3,939.00	Zone-1	Demand	66	Fixed	66	4,109.83	73.91
J-70	3,947.00	Zone-1	Demand	308	Fixed	308	4,112.94	71.79
J-71	3,947.00	Zone-1	Demand	462	Fixed	462	4,110.64	70.80
J-72	3,930.00	Zone-1	Demand	286	Fixed	286	4,099.76	73.45
J-73	3,940.00	Zone-1	Demand	694	Fixed	694	4,110.79	73.89
J-74	3,924.00	Zone-1	Demand	818	Fixed	818	4,098.09	75.32
J-75	3,924.00	Zone-1	Demand	886	Fixed	886	4,095.47	74.19
J-76	3,941.00	Zone-1	Demand	462	Fixed	462	4,108.19	72.34
J-77	3,950.00	Zone-1	Demand	754	Fixed	754	4,107.71	68.23
J-78	3,954.00	Zone-1	Demand	484	Fixed	484	4,112.69	68.66
J-79	3,951.00	Zone-1	Demand	180	Fixed	180	4,113.57	70.33
J-80	3,963.00	Zone-1	Demand	226	Fixed	226	4,118.30	67.19
J-81	3,967.00	Zone-1	Demand	226	Fixed	226	4,120.71	66.50
J-82	3,967.00	Zone-1	Demand	194	Fixed	194	4,123.60	67.76
J-83	3,965.00	Zone-1	Demand	684	Fixed	684	4,113.42	64.22
J-84	3,969.00	Zone-1	Demand	418	Fixed	418	4,114.42	62.92
J-85	3,973.00	Zone-1	Demand	860	Fixed	860	4,113.80	60.92
J-86	3,970.00	Zone-1	Demand	366	Fixed	366	4,121.18	65.41
J-87	3,980.00	Zone-1	Demand	418	Fixed	418	4,116.92	59.24
J-88	3,986.00	Zone-1	Demand	728	Fixed	728	4,116.65	56.53
J-89	3,990.00	Zone-1	Demand	510	Fixed	510	4,121.98	57.10
J-90	3,976.00	Zone-1	Demand	736	Fixed	736	4,123.28	63.72
J-91	3,989.00	Zone-1	Demand	0	Fixed	0	4,129.31	60.70

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-1	8,648.00	16	PVC	130.0	false	0.00	Open	-1,308	4,132.00	4,140.87	8.88	1.03	2.09
P-2	6,447.00	16	PVC	130.0	false	0.00	Open	-60	4,140.87	4,140.89	0.02	3.33e-3	0.10
P-3	5,395.00	12	PVC	130.0	false	0.00	Open	-548	4,136.41	4,140.89	4.49	0.83	1.55
P-4	5,552.00	12	PVC	130.0	false	0.00	Open	316	4,138.08	4,136.41	1.67	0.30	0.90
P-5	5,854.00	16	PVC	130.0	false	0.00	Open	-760	4,140.89	4,143.09	2.20	0.38	1.21
P-6	3,841.00	12	PVC	130.0	false	0.00	Open	-330	4,138.08	4,139.33	1.25	0.33	0.94
P-7	5,999.00	12	PVC	130.0	false	0.00	Open	-471	4,139.33	4,143.09	3.77	0.63	1.34
P-8	3,336.00	12	PVC	130.0	false	0.00	Open	340	4,143.09	4,141.95	1.14	0.34	0.96
P-9	6,551.00	12	PVC	130.0	false	0.00	Open	250	4,141.95	4,140.68	1.27	0.19	0.71
P-10	5,342.00	12	PVC	130.0	false	0.00	Open	60	4,138.15	4,138.08	0.07	0.01	0.17
P-11	5,355.00	12	PVC	130.0	false	0.00	Open	101	4,139.52	4,139.33	0.19	0.04	0.29
P-12	5,366.00	24	PVC	130.0	false	0.00	Open	1,899	4,144.62	4,143.09	1.52	0.28	1.35
P-16	3,984.00	12	PVC	130.0	false	0.00	Open	-340	4,138.15	4,139.52	1.37	0.34	0.96
P-17	6,609.00	12	PVC	130.0	false	0.00	Open	-526	4,139.52	4,144.62	5.10	0.77	1.49
P-18	5,054.00	16	PVC	130.0	false	0.00	Open	781	4,144.62	4,142.62	1.99	0.39	1.25
P-19	6,857.00	12	PVC	130.0	false	0.00	Open	259	4,142.62	4,141.20	1.42	0.21	0.73
P-20	6,556.00	12	PVC	130.0	false	0.00	Open	144	4,139.98	4,139.52	0.46	0.07	0.41
P-21	5,319.00	24	PVC	130.0	false	0.00	Open	246	4,144.65	4,144.62	0.03	0.01	0.17
P-22	7,831.00	16	PVC	130.0	false	0.00	Open	398	4,143.51	4,142.62	0.89	0.11	0.63
P-24	8,306.00	16	PVC	130.0	false	0.00	Open	-585	4,138.06	4,139.98	1.92	0.23	0.93
P-25	7,955.00	16	PVC	130.0	false	0.00	Open	-966	4,139.98	4,144.63	4.66	0.59	1.54
P-26	2,984.00	24	PVC	130.0	false	0.00	Open	-1,322	4,144.63	4,145.07	0.43	0.15	0.94
P-27	2,289.00	16	PVC	130.0	false	0.00	Open	1,047	4,145.07	4,143.51	1.56	0.68	1.67
P-28	5,968.00	16	PVC	130.0	false	0.00	Open	67	4,143.51	4,143.49	0.02	4.17e-3	0.11
P-29	5,616.00	24	PVC	130.0	false	0.00	Open	918	4,145.07	4,144.65	0.42	0.07	0.65
P-30	9,471.00	16	PVC	130.0	false	0.00	Open	546	4,141.91	4,139.98	1.93	0.20	0.87
P-31	5,351.00	16	PVC	130.0	false	0.00	Open	405	4,145.26	4,144.63	0.63	0.12	0.65
P-32	5,427.00	36	PVC	130.0	false	0.00	Open	3,588	4,145.76	4,145.07	0.70	0.13	1.13
P-33	3,323.00	16	PVC	130.0	false	0.00	Open	772	4,144.77	4,143.49	1.29	0.39	1.23
P-34	5,315.00	16	PVC	130.0	false	0.00	Open	-1,006	4,141.91	4,145.26	3.36	0.63	1.61
P-35	3,981.00	24	PVC	130.0	false	0.00	Open	-1,224	4,145.26	4,145.76	0.50	0.13	0.87
P-36	6,641.00	24	PVC	130.0	false	0.00	Open	1,342	4,145.76	4,144.77	0.99	0.15	0.95
P-37	7,907.00	12	PVC	130.0	false	0.00	Open	8	4,141.91	4,141.91	2.93e-3	3.71e-4	0.02
P-38	2,108.00	24	PVC	130.0	false	0.00	Open	3,650	4,150.06	4,148.05	2.01	0.95	2.59
P-39	5,300.00	16	PVC	130.0	false	0.00	Open	912	4,148.05	4,145.26	2.79	0.53	1.46
P-40	5,327.00	42	PVC	130.0	false	0.00	Open	6,940	4,146.86	4,145.76	1.09	0.21	1.61

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-41	5,327.00	16	PVC	130.0	false	0.00	Open	378	4,145.32	4,144.77	0.55	0.10	0.60
P-42	5,300.00	12	PVC	130.0	false	0.00	Open	305	4,143.90	4,142.41	1.49	0.28	0.87
P-43	5,351.00	12	PVC	130.0	false	0.00	Open	389	4,144.77	4,142.41	2.36	0.44	1.10
P-44	5,545.00	16	PVC	130.0	false	0.00	Open	-1,588	4,141.91	4,150.06	8.15	1.47	2.53
P-45	3,925.00	24	PVC	130.0	false	0.00	Open	1,974	4,148.05	4,146.86	1.20	0.31	1.40
P-46	4,038.00	24	PVC	130.0	false	0.00	Open	1,166	4,146.86	4,146.39	0.46	0.11	0.83
P-47	2,631.00	16	PVC	130.0	false	0.00	Open	794	4,146.39	4,145.32	1.07	0.41	1.27
P-48	5,341.00	12	PVC	130.0	false	0.00	Open	296	4,145.32	4,143.90	1.42	0.27	0.84
P-49	11,187.00	12	PVC	130.0	false	0.00	Open	-382	4,137.15	4,141.91	4.76	0.43	1.08
P-53	1,474.00	24	PVC	130.0	false	0.00	Open	2,061	4,148.48	4,147.99	0.49	0.33	1.46
P-54	5,262.00	16	PVC	130.0	false	0.00	Open	799	4,147.99	4,145.82	2.17	0.41	1.27
P-55	5,288.00	12	PVC	130.0	false	0.00	Open	308	4,145.82	4,144.31	1.51	0.29	0.87
P-56	9,795.00	12	PVC	130.0	false	0.00	Open	-608	4,137.15	4,147.01	9.86	1.01	1.72
P-58	2,728.00	16	PVC	130.0	false	0.00	Open	-1,787	4,147.01	4,152.00	4.99	1.83	2.85
P-59	5,751.00	42	PVC	130.0	false	0.00	Open	12,529	4,152.00	4,148.48	3.52	0.61	2.90
P-60	5,319.00	16	PVC	130.0	false	0.00	Open	-551	4,144.72	4,145.82	1.10	0.21	0.88
P-63	928.00	12	PVC	130.0	false	0.00	Open	388	4,132.00	4,131.59	0.41	0.44	1.10
P-64	468.00	24	PVC	130.0	false	0.00	Open	3,355	4,145.00	4,144.62	0.38	0.81	2.38
P-65	706.00	16	PVC	130.0	false	0.00	Open	1,660	4,142.00	4,140.87	1.13	1.60	2.65
P-66	679.00	16	PVC	130.0	false	0.00	Open	1,711	4,132.00	4,130.85	1.15	1.69	2.73
P-67	439.00	16	PVC	130.0	false	0.00	Open	1,711	4,255.37	4,254.63	0.74	1.69	2.73
P-68	14,734.00	16	PVC	130.0	false	0.00	Open	1,150	4,254.63	4,242.71	11.92	0.81	1.84
P-69	21,596.00	16	PVC	130.0	false	0.00	Open	952	4,242.71	4,230.40	12.31	0.57	1.52
P-70	12,232.00	12	PVC	130.0	false	0.00	Open	-73	4,242.71	4,242.95	0.24	0.02	0.21
P-71	13,452.00	12	PVC	130.0	false	0.00	Open	561	4,254.63	4,242.95	11.68	0.87	1.59
P-72	10,584.00	12	PVC	130.0	false	0.00	Open	237	4,242.95	4,241.09	1.86	0.18	0.67
P-73	5,303.00	12	PVC	130.0	false	0.00	Open	156	4,138.06	4,137.63	0.43	0.08	0.44
P-74	3,990.00	12	PVC	130.0	false	0.00	Open	-202	4,137.63	4,138.15	0.52	0.13	0.57
P-75	7,292.00	12	PVC	130.0	false	0.00	Open	25	4,136.41	4,136.39	0.02	2.75e-3	0.07
P-76	13,592.00	12	PVC	130.0	false	0.00	Open	-166	4,136.39	4,137.63	1.24	0.09	0.47
P-77	13,295.00	12	PVC	130.0	false	0.00	Open	57	4,138.06	4,137.89	0.17	0.01	0.16
P-78	7,972.00	12	PVC	130.0	false	0.00	Open	-256	4,137.89	4,139.51	1.62	0.20	0.73
P-79	5,383.00	16	PVC	130.0	false	0.00	Open	834	4,141.91	4,139.51	2.40	0.45	1.33
P-80	10,734.00	12	PVC	130.0	false	0.00	Open	335	4,139.51	4,135.92	3.59	0.33	0.95
P-81	12,450.00	12	PVC	130.0	false	0.00	Open	185	4,135.92	4,134.54	1.38	0.11	0.52
P-82	11,342.00	16	PVC	130.0	false	0.00	Open	-583	4,134.54	4,137.15	2.61	0.23	0.93

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-83	8,506.00	16	PVC	130.0	false	0.00	Open	448	4,134.54	4,133.34	1.20	0.14	0.71
P-85	11,743.00	8	PVC	130.0	false	0.00	Open	71	4,133.20	4,131.59	1.61	0.14	0.45
P-84	15,924.00	8	PVC	130.0	false	0.00	Open	193	4,147.01	4,133.20	13.81	0.87	1.23
P-86	12,276.00	16	PVC	130.0	false	0.00	Open	113	4,133.34	4,133.20	0.13	0.01	0.18
P-87	2,569.00	16	PVC	130.0	false	0.00	Open	-130	4,133.20	4,133.24	0.04	0.01	0.21
P-88	15,883.00	12	PVC	130.0	false	0.00	Open	178	4,133.24	4,131.59	1.65	0.10	0.51
P-89	7,958.00	16	PVC	130.0	false	0.00	Open	-929	4,133.24	4,137.58	4.34	0.55	1.48
P-90	3,175.00	16	PVC	130.0	false	0.00	Open	944	4,147.01	4,145.23	1.78	0.56	1.51
P-91	5,311.00	16	PVC	130.0	false	0.00	Open	362	4,145.23	4,144.72	0.51	0.10	0.58
P-92	7,888.00	16	PVC	130.0	false	0.00	Open	-1,268	4,137.58	4,145.23	7.65	0.97	2.02
P-93	5,332.00	16	PVC	130.0	false	0.00	Open	-904	4,145.23	4,147.99	2.76	0.52	1.44
P-94	6,480.00	42	PVC	130.0	false	0.00	Open	8,509	4,152.00	4,150.06	1.94	0.30	1.97
P-95	2,784.00	42	PVC	130.0	false	0.00	Open	10,195	4,148.48	4,147.31	1.16	0.42	2.36
P-96	2,461.00	42	PVC	130.0	false	0.00	Open	6,587	4,147.31	4,146.86	0.46	0.19	1.53
P-97	2,469.00	16	PVC	130.0	false	0.00	Open	-379	4,145.82	4,146.08	0.25	0.10	0.60
P-98	2,802.00	16	PVC	130.0	false	0.00	Open	637	4,146.08	4,145.32	0.76	0.27	1.02
P-99	6,843.00	42	PVC	130.0	false	0.00	Open	6,478	4,147.31	4,146.08	1.24	0.18	1.50
P-100	2,537.00	12	PVC	130.0	false	0.00	Open	-220	4,144.31	4,144.70	0.39	0.15	0.62
P-101	2,734.00	12	PVC	130.0	false	0.00	Open	312	4,144.70	4,143.90	0.80	0.29	0.89
P-102	5,314.00	36	PVC	130.0	false	0.00	Open	5,255	4,146.08	4,144.70	1.38	0.26	1.66
P-103	2,724.00	36	PVC	130.0	false	0.00	Open	4,630	4,144.70	4,144.14	0.56	0.21	1.46
P-104	2,687.00	36	PVC	130.0	false	0.00	Open	3,845	4,144.14	4,143.75	0.39	0.15	1.21
P-105	2,568.00	16	PVC	130.0	false	0.00	Open	756	4,144.14	4,143.18	0.96	0.37	1.21
P-106	2,794.00	12	PVC	130.0	false	0.00	Open	-370	4,143.18	4,144.31	1.12	0.40	1.05
P-107	2,686.00	12	PVC	130.0	false	0.00	Open	-127	4,143.75	4,143.90	0.15	0.06	0.36
P-108	13,203.00	16	PVC	130.0	false	0.00	Open	688	4,144.72	4,140.59	4.13	0.31	1.10
P-110	2,549.00	16	PVC	130.0	false	0.00	Open	1,060	4,143.18	4,141.41	1.77	0.70	1.69
P-111	7,948.00	12	PVC	130.0	false	0.00	Open	177	4,141.41	4,140.59	0.82	0.10	0.50
P-112	5,297.00	16	PVC	130.0	false	0.00	Open	734	4,140.59	4,138.73	1.86	0.35	1.17
P-113	2,670.00	16	PVC	130.0	false	0.00	Open	905	4,138.73	4,137.35	1.39	0.52	1.44
P-114	7,871.00	24	PVC	130.0	false	0.00	Open	2,126	4,143.75	4,140.99	2.76	0.35	1.51
P-115	5,333.00	16	PVC	130.0	false	0.00	Open	676	4,141.41	4,139.80	1.61	0.30	1.08
P-116	5,224.00	12	PVC	130.0	false	0.00	Open	273	4,140.99	4,139.80	1.19	0.23	0.77
P-117	7,979.00	12	PVC	130.0	false	0.00	Open	204	4,139.80	4,138.73	1.07	0.13	0.58
P-118	6,325.00	24	PVC	130.0	false	0.00	Open	1,701	4,140.99	4,139.53	1.47	0.23	1.21
P-119	5,378.00	16	PVC	130.0	false	0.00	Open	488	4,139.80	4,138.91	0.89	0.17	0.78

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-120	10,642.00	12	PVC	130.0	false	0.00	Open	307	4,138.91	4,135.89	3.02	0.28	0.87
P-121	3,083.00	12	PVC	130.0	false	0.00	Open	-50	4,138.91	4,138.94	0.03	0.01	0.14
P-122	5,241.00	12	PVC	130.0	false	0.00	Open	164	4,135.89	4,135.43	0.46	0.09	0.46
P-123	5,811.00	24	PVC	130.0	false	0.00	Open	1,085	4,139.53	4,138.94	0.59	0.10	0.77
P-124	11,242.00	16	PVC	130.0	false	0.00	Open	688	4,138.94	4,135.43	3.51	0.31	1.10
P-125	5,246.00	16	PVC	130.0	false	0.00	Open	443	4,135.43	4,134.70	0.73	0.14	0.71
P-126	4,254.00	12	PVC	130.0	false	0.00	Open	322	4,139.53	4,138.20	1.32	0.31	0.91
P-127	4,602.00	12	PVC	130.0	false	0.00	Open	91	4,138.20	4,138.07	0.14	0.03	0.26
P-128	5,488.00	12	PVC	130.0	false	0.00	Open	-286	4,138.07	4,139.44	1.37	0.25	0.81
P-129	5,553.00	16	PVC	130.0	false	0.00	Open	140	4,139.53	4,139.44	0.09	0.02	0.22
P-130	2,044.00	16	PVC	130.0	false	0.00	Open	-388	4,139.44	4,139.66	0.22	0.11	0.62
P-131	5,548.00	16	PVC	130.0	false	0.00	Open	-601	4,139.66	4,141.01	1.35	0.24	0.96
P-132	1,653.00	16	PVC	130.0	false	0.00	Open	-768	4,141.01	4,141.64	0.63	0.38	1.23
P-133	4,028.00	24	PVC	130.0	false	0.00	Open	-1,561	4,141.64	4,142.44	0.80	0.20	1.11
P-134	2,631.00	16	PVC	130.0	false	0.00	Open	112	4,142.44	4,142.41	0.03	0.01	0.18
P-135	5,266.00	24	PVC	130.0	false	0.00	Open	1,770	4,143.75	4,142.44	1.31	0.25	1.25
P-136	5,901.00	16	PVC	130.0	false	0.00	Open	-53	4,140.99	4,141.01	0.02	2.73e-3	0.09
P-137	5,215.00	16	PVC	130.0	false	0.00	Open	123	4,139.66	4,139.59	0.07	0.01	0.20
P-138	5,838.00	16	PVC	130.0	false	0.00	Open	-219	4,139.59	4,139.81	0.22	0.04	0.35
P-139	5,997.00	16	PVC	130.0	false	0.00	Open	680	4,141.64	4,139.81	1.83	0.31	1.08
P-140	5,293.00	16	PVC	130.0	false	0.00	Open	252	4,139.81	4,139.55	0.26	0.05	0.40
P-141	7,011.00	12	PVC	130.0	false	0.00	Open	152	4,141.20	4,140.66	0.54	0.08	0.43
P-142	5,296.00	12	PVC	130.0	false	0.00	Open	-30	4,140.66	4,140.68	0.02	3.78e-3	0.08
P-143	1,983.00	12	PVC	130.0	false	0.00	Open	602	4,143.49	4,141.52	1.96	0.99	1.71
P-144	3,636.00	12	PVC	130.0	false	0.00	Open	164	4,141.52	4,141.20	0.32	0.09	0.46
P-145	6,366.00	12	PVC	130.0	false	0.00	Open	-70	4,141.41	4,141.52	0.12	0.02	0.20
P-146	5,320.00	12	PVC	130.0	false	0.00	Open	-229	4,139.78	4,140.66	0.88	0.17	0.65
P-147	5,263.00	12	PVC	130.0	false	0.00	Open	-135	4,139.78	4,140.11	0.33	0.06	0.38
P-148	6,920.00	16	PVC	130.0	false	0.00	Open	-522	4,140.11	4,141.41	1.30	0.19	0.83
P-149	3,715.00	16	PVC	130.0	false	0.00	Open	635	4,142.41	4,141.41	1.00	0.27	1.01
P-150	5,361.00	12	PVC	130.0	false	0.00	Open	-178	4,139.55	4,140.11	0.56	0.10	0.51
P-151	13,573.00	16	PVC	130.0	false	0.00	Open	703	4,136.41	4,132.00	4.41	0.33	1.12
P-152	947.00	24	PVC	130.0	false	0.00	Open	-160	4,132.00	4,132.00	2.93e-3	3.09e-3	0.11
P-153	3,773.00	16	PVC	130.0	false	0.00	Tempor	0	4,230.40	4,195.00	0.00	0.00	0.00
P-154	4,502.00	24	PVC	130.0	false	0.00	Open	-2,870	4,147.31	4,150.06	2.75	0.61	2.04
P-155	2,869.00	16	PVC	130.0	false	0.00	Open	500	4,142.62	4,142.13	0.50	0.17	0.80

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-156	5,683.00	16	PVC	130.0	false	0.00	Open	198	4,142.13	4,141.95	0.18	0.03	0.32
P-157	5,310.00	12	PVC	130.0	false	0.00	Open	-302	4,140.66	4,142.13	1.47	0.28	0.86

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Scenario: 2050PeakHour
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-1	8,648.00	16	PVC	130.0	false	0.00	Open	-1,127	4,130.65	4,137.39	6.74	0.78	1.80
P-2	6,447.00	16	PVC	130.0	false	0.00	Open	1,190	4,137.39	4,131.83	5.56	0.86	1.90
P-3	5,395.00	12	PVC	130.0	false	0.00	Open	-940	4,119.63	4,131.83	12.20	2.26	2.67
P-4	5,552.00	12	PVC	130.0	false	0.00	Open	-770	4,110.95	4,119.63	8.68	1.56	2.19
P-5	5,854.00	16	PVC	130.0	false	0.00	Open	-209	4,131.83	4,132.03	0.20	0.03	0.33
P-6	3,841.00	12	PVC	130.0	false	0.00	Open	-38	4,110.95	4,110.97	0.02	0.01	0.11
P-7	5,999.00	12	PVC	130.0	false	0.00	Open	-1,192	4,110.97	4,132.03	21.06	3.51	3.38
P-8	3,336.00	12	PVC	130.0	false	0.00	Open	1,733	4,132.03	4,108.62	23.41	7.02	4.92
P-9	6,551.00	12	PVC	130.0	false	0.00	Open	951	4,108.62	4,093.48	15.13	2.31	2.70
P-10	5,342.00	12	PVC	130.0	false	0.00	Open	-587	4,105.91	4,110.95	5.04	0.94	1.66
P-11	5,355.00	12	PVC	130.0	false	0.00	Open	-428	4,108.15	4,110.97	2.82	0.53	1.21
P-12	5,366.00	24	PVC	130.0	false	0.00	Open	4,118	4,138.42	4,132.03	6.39	1.19	2.92
P-16	3,984.00	12	PVC	130.0	false	0.00	Open	-444	4,105.91	4,108.15	2.24	0.56	1.26
P-17	6,609.00	12	PVC	130.0	false	0.00	Open	-1,376	4,108.15	4,138.42	30.27	4.58	3.90
P-18	5,054.00	16	PVC	130.0	false	0.00	Open	3,204	4,138.42	4,111.16	27.26	5.39	5.11
P-19	6,857.00	12	PVC	130.0	false	0.00	Open	990	4,111.16	4,094.10	17.06	2.49	2.81
P-20	6,556.00	12	PVC	130.0	false	0.00	Open	-673	4,100.17	4,108.15	7.99	1.22	1.91
P-21	5,319.00	24	PVC	130.0	false	0.00	Open	-5,728	4,126.75	4,138.42	11.68	2.20	4.06
P-22	7,831.00	16	PVC	130.0	false	0.00	Open	242	4,111.51	4,111.16	0.35	0.05	0.39
P-24	8,306.00	16	PVC	130.0	false	0.00	Open	-1,038	4,094.61	4,100.17	5.56	0.67	1.66
P-25	7,955.00	16	PVC	130.0	false	0.00	Open	-2,008	4,100.17	4,118.23	18.06	2.27	3.20
P-26	2,984.00	24	PVC	130.0	false	0.00	Open	-3,755	4,118.23	4,121.23	3.00	1.00	2.66
P-27	2,289.00	16	PVC	130.0	false	0.00	Open	2,815	4,121.23	4,111.51	9.71	4.24	4.49
P-28	5,968.00	16	PVC	130.0	false	0.00	Open	827	4,111.51	4,108.89	2.62	0.44	1.32
P-29	5,616.00	24	PVC	130.0	false	0.00	Open	-3,712	4,121.23	4,126.75	5.52	0.98	2.63
P-30	9,471.00	16	PVC	130.0	false	0.00	Open	708	4,103.29	4,100.17	3.12	0.33	1.13
P-31	5,351.00	16	PVC	130.0	false	0.00	Open	536	4,119.28	4,118.23	1.05	0.20	0.86
P-32	5,427.00	36	PVC	130.0	false	0.00	Open	3,761	4,121.98	4,121.23	0.76	0.14	1.19
P-33	3,323.00	16	PVC	130.0	false	0.00	Open	1,665	4,114.22	4,108.89	5.33	1.60	2.66
P-34	5,315.00	16	PVC	130.0	false	0.00	Open	-2,338	4,103.29	4,119.28	16.00	3.01	3.73
P-35	3,981.00	24	PVC	130.0	false	0.00	Open	-3,040	4,119.28	4,121.98	2.70	0.68	2.16
P-36	6,641.00	24	PVC	130.0	false	0.00	Open	4,076	4,121.98	4,114.22	7.76	1.17	2.89
P-37	7,907.00	12	PVC	130.0	false	0.00	Open	-226	4,102.01	4,103.29	1.27	0.16	0.64
P-38	2,108.00	24	PVC	130.0	false	0.00	Open	8,895	4,141.78	4,131.33	10.45	4.96	6.31
P-39	5,300.00	16	PVC	130.0	false	0.00	Open	2,009	4,131.33	4,119.28	12.05	2.27	3.21
P-40	5,327.00	42	PVC	130.0	false	0.00	Open	13,235	4,125.60	4,121.98	3.61	0.68	3.06

Scenario: 2050PeakHour
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-41	5,327.00	16	PVC	130.0	false	0.00	Open	510	4,115.18	4,114.22	0.96	0.18	0.81
P-42	5,300.00	12	PVC	130.0	false	0.00	Open	847	4,103.70	4,093.82	9.87	1.86	2.40
P-43	5,351.00	12	PVC	130.0	false	0.00	Open	1,247	4,114.22	4,093.82	20.40	3.81	3.54
P-44	5,545.00	16	PVC	130.0	false	0.00	Open	-3,737	4,102.01	4,141.78	39.77	7.17	5.96
P-45	3,925.00	24	PVC	130.0	false	0.00	Open	4,597	4,131.33	4,125.60	5.73	1.46	3.26
P-46	4,038.00	24	PVC	130.0	false	0.00	Open	3,332	4,125.60	4,122.35	3.25	0.80	2.36
P-47	2,631.00	16	PVC	130.0	false	0.00	Open	2,216	4,122.35	4,115.18	7.17	2.72	3.54
P-48	5,341.00	12	PVC	130.0	false	0.00	Open	915	4,115.18	4,103.70	11.48	2.15	2.60
P-49	11,187.00	12	PVC	130.0	false	0.00	Open	-912	4,078.13	4,102.01	23.89	2.14	2.59
P-53	1,474.00	24	PVC	130.0	false	0.00	Open	5,449	4,133.25	4,130.30	2.95	2.00	3.86
P-54	5,262.00	16	PVC	130.0	false	0.00	Open	2,144	4,130.30	4,116.82	13.49	2.56	3.42
P-55	5,288.00	12	PVC	130.0	false	0.00	Open	889	4,116.82	4,106.04	10.77	2.04	2.52
P-56	9,795.00	12	PVC	130.0	false	0.00	Open	-1,422	4,078.13	4,125.78	47.65	4.87	4.03
P-58	2,728.00	16	PVC	130.0	false	0.00	Open	-4,377	4,125.78	4,152.00	26.22	9.61	6.98
P-59	5,751.00	42	PVC	130.0	false	0.00	Open	30,902	4,152.00	4,133.25	18.75	3.26	7.16
P-60	5,319.00	16	PVC	130.0	false	0.00	Open	-1,447	4,110.24	4,116.82	6.58	1.24	2.31
P-63	928.00	12	PVC	130.0	false	0.00	Open	3,299	4,132.00	4,110.54	21.46	23.12	9.36
P-64	468.00	24	PVC	130.0	false	0.00	Open	15,612	4,145.00	4,138.42	6.58	14.06	11.07
P-65	706.00	16	PVC	130.0	false	0.00	Open	3,554	4,142.00	4,137.39	4.61	6.54	5.67
P-66	679.00	16	PVC	130.0	false	0.00	Open	3,140	4,130.65	4,127.12	3.53	5.20	5.01
P-67	439.00	16	PVC	130.0	false	0.00	Open	3,140	4,233.93	4,231.65	2.28	5.20	5.01
P-68	14,734.00	16	PVC	130.0	false	0.00	Open	2,052	4,231.65	4,196.83	34.82	2.36	3.27
P-69	21,596.00	16	PVC	130.0	false	0.00	Open	863	4,196.83	4,186.56	10.27	0.48	1.38
P-70	12,232.00	12	PVC	130.0	false	0.00	Open	376	4,196.83	4,191.77	5.06	0.41	1.07
P-71	13,452.00	12	PVC	130.0	false	0.00	Open	1,088	4,231.65	4,191.77	39.88	2.96	3.09
P-72	10,584.00	12	PVC	130.0	false	0.00	Open	711	4,191.77	4,177.50	14.26	1.35	2.02
P-73	5,303.00	12	PVC	130.0	false	0.00	Open	-565	4,094.61	4,099.27	4.67	0.88	1.60
P-74	3,990.00	12	PVC	130.0	false	0.00	Open	-797	4,099.27	4,105.91	6.64	1.66	2.26
P-75	7,292.00	12	PVC	130.0	false	0.00	Open	914	4,119.63	4,103.98	15.65	2.15	2.59
P-76	13,592.00	12	PVC	130.0	false	0.00	Open	341	4,103.98	4,099.27	4.70	0.35	0.97
P-77	13,295.00	12	PVC	130.0	false	0.00	Open	487	4,094.61	4,085.72	8.89	0.67	1.38
P-78	7,972.00	12	PVC	130.0	false	0.00	Open	-452	4,085.72	4,090.37	4.65	0.58	1.28
P-79	5,383.00	16	PVC	130.0	false	0.00	Open	1,956	4,102.01	4,090.37	11.64	2.16	3.12
P-80	10,734.00	12	PVC	130.0	false	0.00	Open	775	4,090.37	4,073.40	16.97	1.58	2.20
P-81	12,450.00	12	PVC	130.0	false	0.00	Open	325	4,073.40	4,069.46	3.94	0.32	0.92
P-82	11,342.00	16	PVC	130.0	false	0.00	Open	-1,116	4,069.46	4,078.13	8.67	0.76	1.78

Scenario: 2050PeakHour
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-83	8,506.00	16	PVC	130.0	false	0.00	Open	481	4,069.46	4,068.09	1.37	0.16	0.77
P-85	11,743.00	8	PVC	130.0	false	0.00	Open	-405	4,070.41	4,110.54	40.14	3.42	2.58
P-84	15,924.00	8	PVC	130.0	false	0.00	Open	408	4,125.78	4,070.41	55.37	3.48	2.61
P-86	12,276.00	16	PVC	130.0	false	0.00	Open	-524	4,068.09	4,070.41	2.32	0.19	0.84
P-87	2,569.00	16	PVC	130.0	false	0.00	Open	-806	4,070.41	4,071.48	1.08	0.42	1.29
P-88	15,883.00	12	PVC	130.0	false	0.00	Open	-984	4,071.48	4,110.54	39.06	2.46	2.79
P-89	7,958.00	16	PVC	130.0	false	0.00	Open	-1,686	4,071.48	4,084.55	13.06	1.64	2.69
P-90	3,175.00	16	PVC	130.0	false	0.00	Open	2,421	4,125.78	4,115.59	10.19	3.21	3.86
P-91	5,311.00	16	PVC	130.0	false	0.00	Open	1,295	4,115.59	4,110.24	5.35	1.01	2.07
P-92	7,888.00	16	PVC	130.0	false	0.00	Open	-2,703	4,084.55	4,115.59	31.04	3.94	4.31
P-93	5,332.00	16	PVC	130.0	false	0.00	Open	-2,231	4,115.59	4,130.30	14.71	2.76	3.56
P-94	6,480.00	42	PVC	130.0	false	0.00	Open	20,879	4,152.00	4,141.78	10.22	1.58	4.83
P-95	2,784.00	42	PVC	130.0	false	0.00	Open	24,634	4,133.25	4,127.29	5.96	2.14	5.70
P-96	2,461.00	42	PVC	130.0	false	0.00	Open	13,335	4,127.29	4,125.60	1.69	0.69	3.09
P-97	2,469.00	16	PVC	130.0	false	0.00	Open	-1,145	4,116.82	4,118.80	1.98	0.80	1.83
P-98	2,802.00	16	PVC	130.0	false	0.00	Open	1,480	4,118.80	4,115.18	3.62	1.29	2.36
P-99	6,843.00	42	PVC	130.0	false	0.00	Open	18,343	4,127.29	4,118.80	8.49	1.24	4.25
P-100	2,537.00	12	PVC	130.0	false	0.00	Open	-664	4,106.04	4,109.06	3.01	1.19	1.88
P-101	2,734.00	12	PVC	130.0	false	0.00	Open	871	4,109.06	4,103.70	5.36	1.96	2.47
P-102	5,314.00	36	PVC	130.0	false	0.00	Open	15,096	4,118.80	4,109.06	9.74	1.83	4.76
P-103	2,724.00	36	PVC	130.0	false	0.00	Open	13,282	4,109.06	4,105.12	3.94	1.45	4.19
P-104	2,687.00	36	PVC	130.0	false	0.00	Open	10,944	4,105.12	4,102.40	2.71	1.01	3.45
P-105	2,568.00	16	PVC	130.0	false	0.00	Open	2,255	4,105.12	4,097.89	7.22	2.81	3.60
P-106	2,794.00	12	PVC	130.0	false	0.00	Open	-1,079	4,097.89	4,106.04	8.15	2.92	3.06
P-107	2,686.00	12	PVC	130.0	false	0.00	Open	-408	4,102.40	4,103.70	1.29	0.48	1.16
P-108	13,203.00	16	PVC	130.0	false	0.00	Open	2,067	4,110.24	4,078.61	31.62	2.40	3.30
P-110	2,549.00	16	PVC	130.0	false	0.00	Open	3,135	4,097.89	4,084.69	13.21	5.18	5.00
P-111	7,948.00	12	PVC	130.0	false	0.00	Open	523	4,084.69	4,078.61	6.07	0.76	1.48
P-112	5,297.00	16	PVC	130.0	false	0.00	Open	2,194	4,078.61	4,064.44	14.17	2.68	3.50
P-113	2,670.00	16	PVC	130.0	false	0.00	Open	2,715	4,064.44	4,053.84	10.60	3.97	4.33
P-114	7,871.00	24	PVC	130.0	false	0.00	Open	6,238	4,102.40	4,082.17	20.23	2.57	4.42
P-115	5,333.00	16	PVC	130.0	false	0.00	Open	1,991	4,084.69	4,072.77	11.92	2.23	3.18
P-116	5,224.00	12	PVC	130.0	false	0.00	Open	831	4,082.17	4,072.77	9.40	1.80	2.36
P-117	7,979.00	12	PVC	130.0	false	0.00	Open	620	4,072.77	4,064.44	8.33	1.04	1.76
P-118	6,325.00	24	PVC	130.0	false	0.00	Open	5,063	4,082.17	4,071.13	11.04	1.75	3.59
P-119	5,378.00	16	PVC	130.0	false	0.00	Open	1,432	4,072.77	4,066.24	6.53	1.21	2.28

Scenario: 2050PeakHour
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-120	10,642.00	12	PVC	130.0	false	0.00	Open	919	4,066.24	4,043.19	23.05	2.17	2.61
P-121	3,083.00	12	PVC	130.0	false	0.00	Open	-180	4,066.24	4,066.57	0.33	0.11	0.51
P-122	5,241.00	12	PVC	130.0	false	0.00	Open	490	4,043.19	4,039.66	3.54	0.68	1.39
P-123	5,811.00	24	PVC	130.0	false	0.00	Open	3,287	4,071.13	4,066.57	4.56	0.78	2.33
P-124	11,242.00	16	PVC	130.0	false	0.00	Open	2,066	4,066.57	4,039.66	26.91	2.39	3.30
P-125	5,246.00	16	PVC	130.0	false	0.00	Open	1,329	4,039.66	4,034.11	5.55	1.06	2.12
P-126	4,254.00	12	PVC	130.0	false	0.00	Open	962	4,071.13	4,061.09	10.04	2.36	2.73
P-127	4,602.00	12	PVC	130.0	false	0.00	Open	269	4,061.09	4,060.07	1.03	0.22	0.76
P-128	5,488.00	12	PVC	130.0	false	0.00	Open	-862	4,060.07	4,070.63	10.56	1.92	2.45
P-129	5,553.00	16	PVC	130.0	false	0.00	Open	351	4,071.13	4,070.63	0.50	0.09	0.56
P-130	2,044.00	16	PVC	130.0	false	0.00	Open	-1,237	4,070.63	4,072.52	1.89	0.92	1.97
P-131	5,548.00	16	PVC	130.0	false	0.00	Open	-1,772	4,072.52	4,082.51	9.99	1.80	2.83
P-132	1,653.00	16	PVC	130.0	false	0.00	Open	-2,384	4,082.51	4,087.67	5.16	3.12	3.80
P-133	4,028.00	24	PVC	130.0	false	0.00	Open	-4,700	4,087.67	4,093.80	6.13	1.52	3.33
P-134	2,631.00	16	PVC	130.0	false	0.00	Open	-106	4,093.80	4,093.82	0.03	0.01	0.17
P-135	5,266.00	24	PVC	130.0	false	0.00	Open	4,886	4,102.40	4,093.80	8.61	1.63	3.46
P-136	5,901.00	16	PVC	130.0	false	0.00	Open	-274	4,082.17	4,082.51	0.33	0.06	0.44
P-137	5,215.00	16	PVC	130.0	false	0.00	Open	265	4,072.52	4,072.24	0.28	0.05	0.42
P-138	5,838.00	16	PVC	130.0	false	0.00	Open	-761	4,072.24	4,074.44	2.20	0.38	1.21
P-139	5,997.00	16	PVC	130.0	false	0.00	Open	1,977	4,087.67	4,074.44	13.23	2.21	3.15
P-140	5,293.00	16	PVC	130.0	false	0.00	Open	589	4,074.44	4,073.20	1.24	0.23	0.94
P-141	7,011.00	12	PVC	130.0	false	0.00	Open	306	4,094.10	4,092.12	1.98	0.28	0.87
P-142	5,296.00	12	PVC	130.0	false	0.00	Open	-291	4,092.12	4,093.48	1.37	0.26	0.83
P-143	1,983.00	12	PVC	130.0	false	0.00	Open	1,778	4,108.89	4,094.31	14.59	7.36	5.04
P-144	3,636.00	12	PVC	130.0	false	0.00	Open	129	4,094.31	4,094.10	0.21	0.06	0.37
P-145	6,366.00	12	PVC	130.0	false	0.00	Open	-545	4,089.06	4,094.31	5.24	0.82	1.55
P-146	5,320.00	12	PVC	130.0	false	0.00	Open	-949	4,079.87	4,092.12	12.25	2.30	2.69
P-147	5,263.00	12	PVC	130.0	false	0.00	Open	-143	4,079.87	4,080.24	0.36	0.07	0.40
P-148	6,920.00	16	PVC	130.0	false	0.00	Open	-1,471	4,080.24	4,089.06	8.82	1.28	2.35
P-149	3,715.00	16	PVC	130.0	false	0.00	Open	1,475	4,093.82	4,089.06	4.76	1.28	2.35
P-150	5,361.00	12	PVC	130.0	false	0.00	Open	-701	4,073.20	4,080.24	7.04	1.31	1.99
P-151	13,573.00	16	PVC	130.0	false	0.00	Open	-1,152	4,119.63	4,130.65	11.02	0.81	1.84
P-152	947.00	24	PVC	130.0	false	0.00	Open	-4,545	4,130.65	4,132.00	1.35	1.43	3.22
P-153	3,773.00	16	PVC	130.0	false	0.00	Open	-1,993	4,186.56	4,195.00	8.44	2.24	3.18
P-154	4,502.00	24	PVC	130.0	false	0.00	Open	-7,044	4,127.29	4,141.78	14.49	3.22	5.00
P-155	2,869.00	16	PVC	130.0	false	0.00	Open	1,199	4,111.16	4,108.65	2.51	0.87	1.91

Scenario: 2050PeakHour
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-156	5,683.00	16	PVC	130.0	false	0.00	Open	82	4,108.65	4,108.62	0.03	0.01	0.13
P-157	5,310.00	12	PVC	130.0	false	0.00	Open	-1,117	4,092.12	4,108.65	16.53	3.11	3.17

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Scenario: 2050-PeakDay
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-1	8,648.00	16	PVC	130.0	false	0.00	Open	-1,227	4,131.44	4,139.32	7.88	0.91	1.96
P-2	6,447.00	16	PVC	130.0	false	0.00	Open	599	4,139.32	4,137.76	1.56	0.24	0.96
P-3	5,395.00	12	PVC	130.0	false	0.00	Open	-743	4,129.87	4,137.76	7.90	1.46	2.11
P-4	5,552.00	12	PVC	130.0	false	0.00	Open	-346	4,127.89	4,129.87	1.98	0.36	0.98
P-5	5,854.00	16	PVC	130.0	false	0.00	Open	-451	4,137.76	4,138.60	0.83	0.14	0.72
P-6	3,841.00	12	PVC	130.0	false	0.00	Open	-134	4,127.89	4,128.13	0.24	0.06	0.38
P-7	5,999.00	12	PVC	130.0	false	0.00	Open	-818	4,128.13	4,138.60	10.47	1.75	2.32
P-8	3,336.00	12	PVC	130.0	false	0.00	Open	1,057	4,138.60	4,129.22	9.37	2.81	3.00
P-9	6,551.00	12	PVC	130.0	false	0.00	Open	614	4,129.22	4,122.50	6.72	1.03	1.74
P-10	5,342.00	12	PVC	130.0	false	0.00	Open	-333	4,126.13	4,127.89	1.76	0.33	0.94
P-11	5,355.00	12	PVC	130.0	false	0.00	Open	-199	4,127.44	4,128.13	0.69	0.13	0.57
P-12	5,366.00	24	PVC	130.0	false	0.00	Open	2,981	4,142.11	4,138.60	3.51	0.65	2.11
P-16	3,984.00	12	PVC	130.0	false	0.00	Open	-333	4,126.13	4,127.44	1.31	0.33	0.94
P-17	6,609.00	12	PVC	130.0	false	0.00	Open	-931	4,127.44	4,142.11	14.67	2.22	2.64
P-18	5,054.00	16	PVC	130.0	false	0.00	Open	2,008	4,142.11	4,130.64	11.47	2.27	3.20
P-19	6,857.00	12	PVC	130.0	false	0.00	Open	638	4,130.64	4,123.08	7.56	1.10	1.81
P-20	6,556.00	12	PVC	130.0	false	0.00	Open	-340	4,125.20	4,127.44	2.25	0.34	0.96
P-21	5,319.00	24	PVC	130.0	false	0.00	Open	-3,296	4,137.92	4,142.11	4.19	0.79	2.34
P-22	7,831.00	16	PVC	130.0	false	0.00	Open	320	4,131.23	4,130.64	0.59	0.08	0.51
P-24	8,306.00	16	PVC	130.0	false	0.00	Open	-768	4,122.02	4,125.20	3.18	0.38	1.23
P-25	7,955.00	16	PVC	130.0	false	0.00	Open	-1,427	4,125.20	4,134.79	9.60	1.21	2.28
P-26	2,984.00	24	PVC	130.0	false	0.00	Open	-2,536	4,134.79	4,136.24	1.45	0.49	1.80
P-27	2,289.00	16	PVC	130.0	false	0.00	Open	1,968	4,136.24	4,131.23	5.01	2.19	3.14
P-28	5,968.00	16	PVC	130.0	false	0.00	Open	484	4,131.23	4,130.26	0.97	0.16	0.77
P-29	5,616.00	24	PVC	130.0	false	0.00	Open	-1,952	4,136.24	4,137.92	1.68	0.30	1.38
P-30	9,471.00	16	PVC	130.0	false	0.00	Open	569	4,127.28	4,125.20	2.08	0.22	0.91
P-31	5,351.00	16	PVC	130.0	false	0.00	Open	414	4,135.45	4,134.79	0.65	0.12	0.66
P-32	5,427.00	36	PVC	130.0	false	0.00	Open	3,154	4,136.79	4,136.24	0.55	0.10	0.99
P-33	3,323.00	16	PVC	130.0	false	0.00	Open	1,187	4,133.11	4,130.26	2.85	0.86	1.89
P-34	5,315.00	16	PVC	130.0	false	0.00	Open	-1,627	4,127.28	4,135.45	8.17	1.54	2.60
P-35	3,981.00	24	PVC	130.0	false	0.00	Open	-2,084	4,135.45	4,136.79	1.34	0.34	1.48
P-36	6,641.00	24	PVC	130.0	false	0.00	Open	2,723	4,136.79	4,133.11	3.68	0.55	1.93
P-37	7,907.00	12	PVC	130.0	false	0.00	Open	-122	4,126.87	4,127.28	0.41	0.05	0.35
P-38	2,108.00	24	PVC	130.0	false	0.00	Open	6,121	4,146.90	4,141.67	5.23	2.48	4.34
P-39	5,300.00	16	PVC	130.0	false	0.00	Open	1,406	4,141.67	4,135.45	6.22	1.17	2.24
P-40	5,327.00	42	PVC	130.0	false	0.00	Open	9,533	4,138.76	4,136.79	1.97	0.37	2.21

Scenario: 2050-PeakDay
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-41	5,327.00	16	PVC	130.0	false	0.00	Open	406	4,133.74	4,133.11	0.63	0.12	0.65
P-42	5,300.00	12	PVC	130.0	false	0.00	Open	571	4,128.36	4,123.61	4.75	0.90	1.62
P-43	5,351.00	12	PVC	130.0	false	0.00	Open	825	4,133.11	4,123.61	9.51	1.78	2.34
P-44	5,545.00	16	PVC	130.0	false	0.00	Open	-2,580	4,126.87	4,146.90	20.03	3.61	4.12
P-45	3,925.00	24	PVC	130.0	false	0.00	Open	3,189	4,141.67	4,138.76	2.91	0.74	2.26
P-46	4,038.00	24	PVC	130.0	false	0.00	Open	2,240	4,138.76	4,137.20	1.56	0.39	1.59
P-47	2,631.00	16	PVC	130.0	false	0.00	Open	1,496	4,137.20	4,133.74	3.46	1.32	2.39
P-48	5,341.00	12	PVC	130.0	false	0.00	Open	607	4,133.74	4,128.36	5.38	1.01	1.72
P-49	11,187.00	12	PVC	130.0	false	0.00	Open	-624	4,115.02	4,126.87	11.85	1.06	1.77
P-53	1,474.00	24	PVC	130.0	false	0.00	Open	3,695	4,142.65	4,141.22	1.44	0.97	2.62
P-54	5,262.00	16	PVC	130.0	false	0.00	Open	1,452	4,141.22	4,134.66	6.55	1.25	2.32
P-55	5,288.00	12	PVC	130.0	false	0.00	Open	596	4,134.66	4,129.52	5.14	0.97	1.69
P-56	9,795.00	12	PVC	130.0	false	0.00	Open	-980	4,115.02	4,138.95	23.93	2.44	2.78
P-58	2,728.00	16	PVC	130.0	false	0.00	Open	-3,003	4,138.95	4,152.00	13.05	4.78	4.79
P-59	5,751.00	42	PVC	130.0	false	0.00	Open	21,222	4,152.00	4,142.65	9.35	1.63	4.91
P-60	5,319.00	16	PVC	130.0	false	0.00	Open	-979	4,131.47	4,134.66	3.19	0.60	1.56
P-63	928.00	12	PVC	130.0	false	0.00	Open	2,028	4,132.00	4,123.29	8.71	9.39	5.75
P-64	468.00	24	PVC	130.0	false	0.00	Open	10,006	4,145.00	4,142.11	2.89	6.17	7.10
P-65	706.00	16	PVC	130.0	false	0.00	Open	2,649	4,142.00	4,139.32	2.68	3.79	4.23
P-66	679.00	16	PVC	130.0	false	0.00	Open	2,719	4,131.44	4,128.74	2.70	3.98	4.34
P-67	439.00	16	PVC	130.0	false	0.00	Open	2,719	4,242.27	4,240.53	1.75	3.98	4.34
P-68	14,734.00	16	PVC	130.0	false	0.00	Open	1,818	4,240.53	4,212.70	27.83	1.89	2.90
P-69	21,596.00	16	PVC	130.0	false	0.00	Open	1,201	4,212.70	4,193.77	18.92	0.88	1.92
P-70	12,232.00	12	PVC	130.0	false	0.00	Open	75	4,212.70	4,212.44	0.26	0.02	0.21
P-71	13,452.00	12	PVC	130.0	false	0.00	Open	901	4,240.53	4,212.44	28.09	2.09	2.55
P-72	10,584.00	12	PVC	130.0	false	0.00	Open	474	4,212.44	4,205.71	6.73	0.64	1.34
P-73	5,303.00	12	PVC	130.0	false	0.00	Open	-273	4,122.02	4,123.23	1.22	0.23	0.77
P-74	3,990.00	12	PVC	130.0	false	0.00	Open	-509	4,123.23	4,126.13	2.90	0.73	1.44
P-75	7,292.00	12	PVC	130.0	false	0.00	Open	528	4,129.87	4,124.21	5.66	0.78	1.50
P-76	13,592.00	12	PVC	130.0	false	0.00	Open	146	4,124.21	4,123.23	0.98	0.07	0.41
P-77	13,295.00	12	PVC	130.0	false	0.00	Open	297	4,122.02	4,118.45	3.56	0.27	0.84
P-78	7,972.00	12	PVC	130.0	false	0.00	Open	-329	4,118.45	4,121.03	2.58	0.32	0.93
P-79	5,383.00	16	PVC	130.0	false	0.00	Open	1,348	4,126.87	4,121.03	5.84	1.09	2.15
P-80	10,734.00	12	PVC	130.0	false	0.00	Open	533	4,121.03	4,112.54	8.48	0.79	1.51
P-81	12,450.00	12	PVC	130.0	false	0.00	Open	233	4,112.54	4,110.42	2.13	0.17	0.66
P-82	11,342.00	16	PVC	130.0	false	0.00	Open	-793	4,110.42	4,115.02	4.60	0.41	1.26

Scenario: 2050-PeakDay
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-83	8,506.00	16	PVC	130.0	false	0.00	Open	386	4,110.42	4,109.51	0.91	0.11	0.62
P-85	11,743.00	8	PVC	130.0	false	0.00	Open	-220	4,110.26	4,123.29	13.03	1.11	1.41
P-84	15,924.00	8	PVC	130.0	false	0.00	Open	286	4,138.95	4,110.26	28.69	1.80	1.83
P-86	12,276.00	16	PVC	130.0	false	0.00	Open	-284	4,109.51	4,110.26	0.75	0.06	0.45
P-87	2,569.00	16	PVC	130.0	false	0.00	Open	-508	4,110.26	4,110.71	0.46	0.18	0.81
P-88	15,883.00	12	PVC	130.0	false	0.00	Open	-534	4,110.71	4,123.29	12.58	0.79	1.51
P-89	7,958.00	16	PVC	130.0	false	0.00	Open	-1,216	4,110.71	4,117.85	7.14	0.90	1.94
P-90	3,175.00	16	PVC	130.0	false	0.00	Open	1,653	4,138.95	4,133.92	5.03	1.58	2.64
P-91	5,311.00	16	PVC	130.0	false	0.00	Open	850	4,133.92	4,131.47	2.45	0.46	1.36
P-92	7,888.00	16	PVC	130.0	false	0.00	Open	-1,894	4,117.85	4,133.92	16.07	2.04	3.02
P-93	5,332.00	16	PVC	130.0	false	0.00	Open	-1,527	4,133.92	4,141.22	7.29	1.37	2.44
P-94	6,480.00	42	PVC	130.0	false	0.00	Open	14,347	4,152.00	4,146.90	5.10	0.79	3.32
P-95	2,784.00	42	PVC	130.0	false	0.00	Open	16,981	4,142.65	4,139.66	2.99	1.08	3.93
P-96	2,461.00	42	PVC	130.0	false	0.00	Open	9,494	4,139.66	4,138.76	0.90	0.37	2.20
P-97	2,469.00	16	PVC	130.0	false	0.00	Open	-759	4,134.66	4,135.59	0.93	0.37	1.21
P-98	2,802.00	16	PVC	130.0	false	0.00	Open	1,031	4,135.59	4,133.74	1.85	0.66	1.65
P-99	6,843.00	42	PVC	130.0	false	0.00	Open	12,330	4,139.66	4,135.59	4.07	0.59	2.86
P-100	2,537.00	12	PVC	130.0	false	0.00	Open	-442	4,129.52	4,130.94	1.42	0.56	1.25
P-101	2,734.00	12	PVC	130.0	false	0.00	Open	587	4,130.94	4,128.36	2.58	0.94	1.66
P-102	5,314.00	36	PVC	130.0	false	0.00	Open	10,126	4,135.59	4,130.94	4.65	0.87	3.19
P-103	2,724.00	36	PVC	130.0	false	0.00	Open	8,911	4,130.94	4,129.06	1.88	0.69	2.81
P-104	2,687.00	36	PVC	130.0	false	0.00	Open	7,351	4,129.06	4,127.76	1.30	0.48	2.32
P-105	2,568.00	16	PVC	130.0	false	0.00	Open	1,504	4,129.06	4,125.65	3.41	1.33	2.40
P-106	2,794.00	12	PVC	130.0	false	0.00	Open	-722	4,125.65	4,129.52	3.88	1.39	2.05
P-107	2,686.00	12	PVC	130.0	false	0.00	Open	-269	4,127.76	4,128.36	0.60	0.22	0.76
P-108	13,203.00	16	PVC	130.0	false	0.00	Open	1,379	4,131.47	4,116.53	14.94	1.13	2.20
P-110	2,549.00	16	PVC	130.0	false	0.00	Open	2,094	4,125.65	4,119.39	6.25	2.45	3.34
P-111	7,948.00	12	PVC	130.0	false	0.00	Open	349	4,119.39	4,116.53	2.87	0.36	0.99
P-112	5,297.00	16	PVC	130.0	false	0.00	Open	1,464	4,116.53	4,109.83	6.70	1.26	2.34
P-113	2,670.00	16	PVC	130.0	false	0.00	Open	1,810	4,109.83	4,104.83	5.00	1.87	2.89
P-114	7,871.00	24	PVC	130.0	false	0.00	Open	4,171	4,127.76	4,118.16	9.60	1.22	2.96
P-115	5,333.00	16	PVC	130.0	false	0.00	Open	1,331	4,119.39	4,113.74	5.65	1.06	2.12
P-116	5,224.00	12	PVC	130.0	false	0.00	Open	553	4,118.16	4,113.74	4.42	0.85	1.57
P-117	7,979.00	12	PVC	130.0	false	0.00	Open	412	4,113.74	4,109.83	3.91	0.49	1.17
P-118	6,325.00	24	PVC	130.0	false	0.00	Open	3,379	4,118.16	4,112.94	5.22	0.83	2.40
P-119	5,378.00	16	PVC	130.0	false	0.00	Open	958	4,113.74	4,110.64	3.10	0.58	1.53

Scenario: 2050-PeakDay
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-120	10,642.00	12	PVC	130.0	false	0.00	Open	613	4,110.64	4,099.76	10.88	1.02	1.74
P-121	3,083.00	12	PVC	130.0	false	0.00	Open	-117	4,110.64	4,110.79	0.15	0.05	0.33
P-122	5,241.00	12	PVC	130.0	false	0.00	Open	327	4,099.76	4,098.09	1.67	0.32	0.93
P-123	5,811.00	24	PVC	130.0	false	0.00	Open	2,188	4,112.94	4,110.79	2.15	0.37	1.55
P-124	11,242.00	16	PVC	130.0	false	0.00	Open	1,377	4,110.79	4,098.09	12.70	1.13	2.20
P-125	5,246.00	16	PVC	130.0	false	0.00	Open	886	4,098.09	4,095.47	2.62	0.50	1.41
P-126	4,254.00	12	PVC	130.0	false	0.00	Open	642	4,112.94	4,108.19	4.74	1.11	1.82
P-127	4,602.00	12	PVC	130.0	false	0.00	Open	180	4,108.19	4,107.71	0.49	0.11	0.51
P-128	5,488.00	12	PVC	130.0	false	0.00	Open	-574	4,107.71	4,112.69	4.98	0.91	1.63
P-129	5,553.00	16	PVC	130.0	false	0.00	Open	241	4,112.94	4,112.69	0.25	0.04	0.38
P-130	2,044.00	16	PVC	130.0	false	0.00	Open	-818	4,112.69	4,113.57	0.88	0.43	1.30
P-131	5,548.00	16	PVC	130.0	false	0.00	Open	-1,184	4,113.57	4,118.30	4.73	0.85	1.89
P-132	1,653.00	16	PVC	130.0	false	0.00	Open	-1,582	4,118.30	4,120.71	2.41	1.46	2.52
P-133	4,028.00	24	PVC	130.0	false	0.00	Open	-3,132	4,120.71	4,123.60	2.89	0.72	2.22
P-134	2,631.00	16	PVC	130.0	false	0.00	Open	-28	4,123.60	4,123.61	1.95e-3	7.42e-4	0.05
P-135	5,266.00	24	PVC	130.0	false	0.00	Open	3,297	4,127.76	4,123.60	4.16	0.79	2.34
P-136	5,901.00	16	PVC	130.0	false	0.00	Open	-172	4,118.16	4,118.30	0.14	0.02	0.27
P-137	5,215.00	16	PVC	130.0	false	0.00	Open	186	4,113.57	4,113.42	0.14	0.03	0.30
P-138	5,838.00	16	PVC	130.0	false	0.00	Open	-498	4,113.42	4,114.42	1.00	0.17	0.79
P-139	5,997.00	16	PVC	130.0	false	0.00	Open	1,324	4,120.71	4,114.42	6.29	1.05	2.11
P-140	5,293.00	16	PVC	130.0	false	0.00	Open	408	4,114.42	4,113.80	0.63	0.12	0.65
P-141	7,011.00	12	PVC	130.0	false	0.00	Open	222	4,123.08	4,121.98	1.10	0.16	0.63
P-142	5,296.00	12	PVC	130.0	false	0.00	Open	-174	4,121.98	4,122.50	0.52	0.10	0.49
P-143	1,983.00	12	PVC	130.0	false	0.00	Open	1,195	4,130.26	4,123.28	6.99	3.52	3.39
P-144	3,636.00	12	PVC	130.0	false	0.00	Open	126	4,123.28	4,123.08	0.20	0.05	0.36
P-145	6,366.00	12	PVC	130.0	false	0.00	Open	-333	4,121.18	4,123.28	2.10	0.33	0.94
P-146	5,320.00	12	PVC	130.0	false	0.00	Open	-606	4,116.65	4,121.98	5.33	1.00	1.72
P-147	5,263.00	12	PVC	130.0	false	0.00	Open	-122	4,116.65	4,116.92	0.27	0.05	0.35
P-148	6,920.00	16	PVC	130.0	false	0.00	Open	-992	4,116.92	4,121.18	4.26	0.62	1.58
P-149	3,715.00	16	PVC	130.0	false	0.00	Open	1,026	4,123.61	4,121.18	2.43	0.65	1.64
P-150	5,361.00	12	PVC	130.0	false	0.00	Open	-452	4,113.80	4,116.92	3.12	0.58	1.28
P-151	13,573.00	16	PVC	130.0	false	0.00	Open	-403	4,129.87	4,131.44	1.57	0.12	0.64
P-152	947.00	24	PVC	130.0	false	0.00	Open	-2,815	4,131.44	4,132.00	0.56	0.59	2.00
P-153	3,773.00	16	PVC	130.0	false	0.00	Open	-703	4,193.77	4,195.00	1.23	0.33	1.12
P-154	4,502.00	24	PVC	130.0	false	0.00	Open	-4,843	4,139.66	4,146.90	7.24	1.61	3.43
P-155	2,869.00	16	PVC	130.0	false	0.00	Open	852	4,130.64	4,129.31	1.33	0.46	1.36

Scenario: 2050-PeakDay
Fire Flow Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-156	5,683.00	16	PVC	130.0	false	0.00	Open	132	4,129.31	4,129.22	0.08	0.01	0.21
P-157	5,310.00	12	PVC	130.0	false	0.00	Open	-720	4,121.98	4,129.31	7.33	1.38	2.04

Scenario: 2050-PeakDay
Fire Flow Analysis
Fire Flow Report

Label	Zone	Fire Flow Iterations	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Minimum System Pressure (psi)	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-1	Zone-1	1	true	true	600	3,000	1,520	3,920	20.00	44.56	20.00	45.70	J-48	20.00	43.41	PMP-1
J-2	Zone-1	1	true	true	600	3,000	1,424	3,824	20.00	50.84	20.00	45.09	J-1	20.00	43.93	PMP-1
J-3	Zone-1	1	true	true	600	3,000	872	3,272	20.00	43.06	20.00	40.24	J-48	20.00	40.24	J-48
J-4	Zone-1	1	true	true	600	3,000	906	3,306	20.00	48.36	20.00	44.61	J-48	20.00	43.92	PMP-1
J-5	Zone-1	1	true	true	600	3,000	748	3,148	20.00	34.76	20.00	40.81	J-48	20.00	40.81	J-48
J-6	Zone-1	1	true	true	600	3,000	1,084	3,484	20.00	41.32	20.00	39.40	J-5	20.00	39.40	J-5
J-7	Zone-1	1	true	true	600	3,000	1,256	3,656	20.00	56.04	20.00	45.14	J-1	20.00	43.97	PMP-1
J-8	Zone-1	1	true	true	600	3,000	1,176	3,576	20.00	45.83	20.00	45.17	J-1	20.00	44.00	PMP-1
J-9	Zone-1	1	true	true	600	3,000	1,040	3,440	20.00	29.88	20.00	45.17	J-1	20.00	44.00	PMP-1
J-10	Zone-1	1	true	true	600	3,000	756	3,156	20.00	37.72	20.00	39.57	J-48	20.00	39.57	J-48
J-11	Zone-1	1	true	true	600	3,000	1,058	3,458	20.00	49.56	20.00	41.16	J-5	20.00	41.16	J-5
J-12	Zone-1	1	true	true	600	3,000	1,390	3,790	20.00	60.85	20.00	45.18	J-1	20.00	44.01	PMP-1
J-13	Zone-1	1	true	true	600	3,000	1,438	3,838	20.00	56.98	20.00	45.17	J-1	20.00	44.01	PMP-1
J-14	Zone-1	1	true	true	600	3,000	1,344	3,744	20.00	37.90	20.00	40.71	J-48	20.00	40.71	J-48
J-15	Zone-1	1	true	true	600	3,000	2,168	4,568	20.00	50.53	20.00	42.80	J-48	20.00	42.80	J-48
J-16	Zone-1	1	true	true	600	3,000	1,944	4,344	20.00	62.25	20.00	45.18	J-1	20.00	44.01	PMP-1
J-17	Zone-1	1	true	true	600	3,000	1,142	3,542	20.00	49.00	20.00	45.18	J-1	20.00	44.01	PMP-1
J-18	Zone-1	1	true	true	600	3,000	2,122	4,522	20.00	64.44	20.00	45.17	J-1	20.00	44.01	PMP-1
J-19	Zone-1	1	true	true	600	3,000	1,202	3,602	20.00	66.22	20.00	45.18	J-1	20.00	44.01	PMP-1
J-20	Zone-1	1	true	true	600	3,000	1,764	4,164	20.00	63.27	20.00	45.18	J-1	20.00	44.01	PMP-1
J-21	Zone-1	1	true	true	600	3,000	1,076	3,476	20.00	61.25	20.00	45.18	J-1	20.00	44.01	PMP-1
J-22	Zone-1	1	true	true	600	3,000	1,536	3,936	20.00	64.19	20.00	43.93	J-48	20.00	43.93	J-48
J-23	Zone-1	1	true	true	600	3,000	2,050	4,450	20.00	71.25	20.00	45.18	J-1	20.00	44.01	PMP-1
J-24	Zone-1	1	true	true	600	3,000	2,172	4,572	20.00	68.42	20.00	45.18	J-1	20.00	44.01	PMP-1
J-25	Zone-1	1	true	true	600	3,000	1,716	4,116	20.00	67.59	20.00	45.18	J-1	20.00	44.01	PMP-1
J-26	Zone-1	1	true	true	600	3,000	942	3,342	20.00	63.08	20.00	45.18	J-1	20.00	44.01	PMP-1
J-27	Zone-1	1	true	true	600	3,000	1,330	3,730	20.00	60.96	20.00	44.66	J-48	20.00	44.00	PMP-1
J-28	Zone-1	1	true	true	600	3,000	1,402	3,802	20.00	77.15	20.00	45.18	J-1	20.00	44.02	PMP-1
J-29	Zone-1	1	true	true	600	3,000	2,126	4,526	20.00	74.12	20.00	45.18	J-1	20.00	44.01	PMP-1
J-30	Zone-1	1	true	true	600	3,000	1,510	3,910	20.00	73.40	20.00	45.18	J-1	20.00	44.01	PMP-1
J-31	Zone-1	1	true	true	600	3,000	1,344	3,744	20.00	72.81	20.00	45.18	J-1	20.00	44.01	PMP-1
J-32	Zone-1	1	true	true	600	3,000	2,114	4,514	20.00	71.05	20.00	45.18	J-1	20.00	44.01	PMP-1
J-33	Zone-1	1	true	true	600	3,000	954	3,354	20.00	66.78	20.00	45.18	J-1	20.00	44.01	PMP-1
J-34	Zone-1	1	true	true	600	3,000	1,146	3,546	20.00	78.31	20.00	45.18	J-1	20.00	44.01	PMP-1
J-35	Zone-1	1	true	true	600	3,000	1,316	3,716	20.00	76.71	20.00	45.18	J-1	20.00	44.01	PMP-1

Scenario: 2050-PeakDay
Fire Flow Analysis
Fire Flow Report

Label	Zone	Fire Flow Iterations	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Minimum System Pressure (psi)	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-36	Zone-1	1	true	true	600	3,000	1,236	3,636	20.00	70.60	20.00	45.18	J-1	20.00	44.01	PMP-1
J-37	Zone-1	1	true	true	600	3,000	916	3,316	20.00	68.15	20.00	45.18	J-1	20.00	44.01	PMP-1
J-38	Zone-1	1	true	true	600	3,000	1,412	3,812	20.00	50.23	20.00	45.17	J-1	20.00	44.00	PMP-1
J-39	Zone-1	1	true	true	600	3,000	684	3,084	20.00	71.76	20.00	45.18	J-1	20.00	44.01	PMP-1
J-40	Zone-1	1	true	true	600	3,000	1,050	3,450	20.00	70.89	20.00	45.18	J-1	20.00	44.01	PMP-1
J-41	Zone-1	1	true	true	600	3,000	1,874	4,274	20.00	76.50	20.00	45.18	J-1	20.00	44.01	PMP-1
J-42	Zone-1	1	true	true	600	3,000	2,410	4,810	20.00	37.41	20.00	45.18	J-1	20.00	44.01	PMP-1
J-43	Zone-2	1	true	true	600	3,000	600	3,000	20.00	72.60	20.00	31.09	J-46	20.00	31.09	J-46
J-44	Zone-2	1	true	true	600	3,000	1,142	3,542	20.00	56.24	20.00	26.78	J-46	20.00	26.78	J-46
J-45	Zone-2	1	true	true	600	3,000	2,504	4,904	20.00	67.61	20.00	39.33	J-46	20.00	39.33	J-46
J-46	Zone-2	17	true	true	600	1,566	1,102	2,068	20.00	20.00	20.00	36.56	J-47	20.00	36.56	J-47
J-47	Zone-2	17	true	true	600	1,127	1,074	1,601	20.00	20.00	20.00	28.29	J-46	20.00	28.29	J-46
J-48	Zone-1	16	true	true	600	2,533	982	2,915	20.00	20.00	20.00	42.70	J-5	20.00	42.70	J-5
J-49	Zone-1	1	true	true	600	3,000	982	3,382	20.00	33.76	20.00	36.16	J-48	20.00	36.16	J-48
J-50	Zone-1	16	true	true	600	2,917	1,226	3,543	20.00	20.00	20.00	43.01	J-48	20.00	43.01	J-48
J-51	Zone-1	1	true	true	600	3,000	1,086	3,486	20.00	55.23	20.00	44.26	J-48	20.00	43.99	PMP-1
J-52	Zone-1	1	true	true	600	3,000	900	3,300	20.00	30.01	20.00	44.77	J-48	20.00	44.00	PMP-1
J-53	Zone-1	1	true	true	600	3,000	1,240	3,640	20.00	49.67	20.00	45.17	J-1	20.00	44.01	PMP-1
J-54	Zone-1	1	true	true	600	3,000	1,270	3,670	20.00	50.74	20.00	45.18	J-1	20.00	44.01	PMP-1
J-55	Zone-1	1	true	true	600	3,000	1,330	3,730	20.00	56.52	20.00	45.18	J-1	20.00	44.01	PMP-1
J-56	Zone-1	1	true	true	600	3,000	1,842	4,242	20.00	56.50	20.00	45.18	J-1	20.00	44.01	PMP-1
J-57	Zone-1	1	true	true	600	3,000	1,278	3,678	20.00	60.01	20.00	45.18	J-1	20.00	44.01	PMP-1
J-58	Zone-1	1	true	true	600	3,000	1,036	3,436	20.00	74.31	20.00	45.18	J-1	20.00	44.01	PMP-1
J-59	Zone-1	1	true	true	600	3,000	600	3,000	20.00	73.89	20.00	45.18	J-1	20.00	44.01	PMP-1
J-60	Zone-1	1	true	true	600	3,000	1,014	3,414	20.00	73.25	20.00	45.18	J-1	20.00	44.01	PMP-1
J-61	Zone-1	1	true	true	600	3,000	786	3,186	20.00	70.34	20.00	45.18	J-1	20.00	44.01	PMP-1
J-62	Zone-1	1	true	true	600	3,000	656	3,056	20.00	70.46	20.00	45.18	J-1	20.00	44.01	PMP-1
J-63	Zone-1	1	true	true	600	3,000	732	3,132	20.00	66.16	20.00	45.18	J-1	20.00	44.01	PMP-1
J-64	Zone-1	1	true	true	600	3,000	752	3,152	20.00	68.31	20.00	45.18	J-1	20.00	44.01	PMP-1
J-65	Zone-1	1	true	true	600	3,000	1,014	3,414	20.00	62.86	20.00	45.18	J-1	20.00	44.01	PMP-1
J-66	Zone-1	1	true	true	600	3,000	864	3,264	20.00	54.72	20.00	45.18	J-1	20.00	44.01	PMP-1
J-67	Zone-1	1	true	true	600	3,000	1,012	3,412	20.00	65.52	20.00	45.18	J-1	20.00	44.01	PMP-1
J-68	Zone-1	1	true	true	600	3,000	1,114	3,514	20.00	60.65	20.00	45.18	J-1	20.00	44.01	PMP-1
J-69	Zone-1	1	true	true	600	3,000	666	3,066	20.00	48.47	20.00	45.18	J-1	20.00	44.01	PMP-1
J-70	Zone-1	1	true	true	600	3,000	908	3,308	20.00	64.04	20.00	45.18	J-1	20.00	44.01	PMP-1

Scenario: 2050-PeakDay
Fire Flow Analysis
Fire Flow Report

Label	Zone	Fire Flow Iterations	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction	Minimum System Pressure (psi)	Calculated Minimum System Pressure (psi)	Minimum System Junction
J-71	Zone-1	1	true	true	600	3,000	1,062	3,462	20.00	56.93	20.00	45.18	J-1	20.00	44.01	PMP-1
J-72	Zone-1	1	true	true	600	3,000	886	3,286	20.00	32.27	20.00	45.10	J-75	20.00	44.01	PMP-1
J-73	Zone-1	1	true	true	600	3,000	1,294	3,694	20.00	64.12	20.00	45.18	J-1	20.00	44.01	PMP-1
J-74	Zone-1	1	true	true	600	3,000	1,418	3,818	20.00	40.09	20.00	38.96	J-75	20.00	38.96	J-75
J-75	Zone-1	1	true	true	600	3,000	1,486	3,886	20.00	22.59	20.00	40.09	J-74	20.00	40.09	J-74
J-76	Zone-1	1	true	true	600	3,000	1,062	3,462	20.00	43.05	20.00	44.66	J-77	20.00	44.01	PMP-1
J-77	Zone-1	1	true	true	600	3,000	1,354	3,754	20.00	35.55	20.00	45.18	J-1	20.00	44.01	PMP-1
J-78	Zone-1	1	true	true	600	3,000	1,084	3,484	20.00	58.55	20.00	45.18	J-1	20.00	44.01	PMP-1
J-79	Zone-1	1	true	true	600	3,000	780	3,180	20.00	61.25	20.00	45.18	J-1	20.00	44.01	PMP-1
J-80	Zone-1	1	true	true	600	3,000	826	3,226	20.00	60.48	20.00	45.18	J-1	20.00	44.01	PMP-1
J-81	Zone-1	1	true	true	600	3,000	826	3,226	20.00	60.86	20.00	45.18	J-1	20.00	44.01	PMP-1
J-82	Zone-1	1	true	true	600	3,000	794	3,194	20.00	63.24	20.00	45.18	J-1	20.00	44.01	PMP-1
J-83	Zone-1	1	true	true	600	3,000	1,284	3,684	20.00	51.91	20.00	45.18	J-1	20.00	44.01	PMP-1
J-84	Zone-1	1	true	true	600	3,000	1,018	3,418	20.00	52.49	20.00	45.18	J-1	20.00	44.01	PMP-1
J-85	Zone-1	1	true	true	600	3,000	1,460	3,860	20.00	44.67	20.00	45.18	J-1	20.00	44.01	PMP-1
J-86	Zone-1	1	true	true	600	3,000	966	3,366	20.00	56.83	20.00	45.18	J-1	20.00	44.01	PMP-1
J-87	Zone-1	1	true	true	600	3,000	1,018	3,418	20.00	46.89	20.00	45.18	J-1	20.00	44.01	PMP-1
J-88	Zone-1	1	true	true	600	3,000	1,328	3,728	20.00	31.07	20.00	45.18	J-1	20.00	44.01	PMP-1
J-89	Zone-1	1	true	true	600	3,000	1,110	3,510	20.00	43.50	20.00	43.90	J-9	20.00	43.90	J-9
J-90	Zone-1	1	true	true	600	3,000	1,336	3,736	20.00	54.42	20.00	45.18	J-1	20.00	44.01	PMP-1
J-91	Zone-1	1	true	true	600	3,000	600	3,000	20.00	52.58	20.00	45.17	J-1	20.00	44.00	PMP-1

APPENDIX 8.0

FINANCIAL PLANNING

INTRODUCTION

This appendix reviews the six water supply alternatives presented in Section 7.0 in order to determine the financial feasibility of each system. The development of a water system poses unique challenges for the residents of Lahontan Valley. Unlike most municipal water systems that serve urbanized areas, the proposed alternatives in Section 7.0 will have to be developed to serve relatively low density rural areas as well as more urbanized areas in the County. This situation is in response to the federal government's on-going efforts to purchase and reallocate much, if not all, of the surface water rights in the Lahontan Valley area and thereby eliminate a significant portion of groundwater recharge and historic uses of groundwater. The financial costs incurred by the residents of Lahontan Valley are the hidden cost of the federal government's water purchase and reallocation program. In other words the Churchill County residents must mitigate the significant adverse impacts imposed by the federal government and more specifically the U.S. Department of Interior.

The financial feasibility analysis focuses upon the ability of system's customer base to fund construction, maintain system operational requirements, and fund administrative costs associated with the various water supply alternatives needed to mitigate adverse impacts to the groundwater system. The analysis attempts to determine future revenues and a rate structure that would be needed to meet the various projected financial requirements of the alternatives presented in Section 7.0. The rate structure is made up of monthly service or user charges and system access fees.

In order to determine the potential number of customers to be served by the proposed system alternatives, two different service areas were identified. The service areas were determined by a review of the emerging patterns of development in the County, existing zoning, distribution of the current population, and the development suitability of lands in the proposed service areas. Potential service areas also include the Fallon Naval Air Station, the City of Fallon, and reservation lands of the Fallon Paiute/Shoshone Tribes (FPST) all of which are currently served by existing municipal water systems.

Population forecasts for the various service areas were then developed in order to determine not only the demand for water but also the estimated number of customers that may exist within the future service area boundaries. The population forecasts are used to determine future demand, infrastructure requirements, and operating costs as well as the level of revenues potentially available to meet financial obligations associated with the various system alternatives.

- **Organization**

The financial analysis is organized into two main parts. They include:

- Methodology and Project Approach
- Evaluation of Alternatives

Methodology and Project Approach

This is a preliminary feasibility analysis based upon initial costs estimates and preliminary designs for proposed water system alternatives presented in Section 7.0. The primary focus of this analysis is to determine which, if any, of the proposed water supply alternatives can be considered reasonably feasible for future development. Ideally, the financial evaluation of alternatives should be made on the basis of full cost pricing. Full cost pricing for public and private utilities occurs when user fees are set to recover all of the costs associated with providing services – capital, operations, maintenance, debt service, and replacement. Charging the full costs for environmental facilities and services helps to ensure that the demand for the facilities and services is proportionate with the cost of providing them, and that they are both environmentally and financially self-sustaining.

Cost estimates have been made for capital, operations, maintenance, and debt service requirements. Depreciation or replacement cost estimates for capital equipment were not included directly. The proposed system alternatives contemplate the development of mostly new water system treatment and delivery components with a relatively long usable life. Therefore, planning and programming for major system replacements initially should not be an important factor. Furthermore, the recognition of depreciation does not carry the same tax implications for a public entity as it does for private companies. If Churchill County were to initially collect revenues for replacement costs, system fees would be even higher and large ending fund balances would likely accumulate. One approach to dealing with the replacement cost issue to is examine system user fees to determine whether or not sufficient flexibility exists in order to increase revenues to cover future replacement costs.

Population Growth

The service area boundaries were established based upon a review of current development trends, existing zoning, and other policy goals that guide future development in Lahontan Valley. Population estimates were then calculated for each section/township/range contained within the proposed service area followed by an assessment for development and in-fill. Both the 2025 and 2050 service areas have a sufficient land base to accommodate the projected level of growth and development in Lahontan Valley through 2050.

Population growth for the service area is derived from the overall county 3 percent growth rate (See Section 4.0). Some minor adjustments have been made to the forecasts for certain subareas within the County. For example, population growth for Fallon NAS and the Fallon Tribes was set at 1.5 percent throughout the projection period. The City of Fallon's population remains at approximately 32 percent of the overall county population throughout the forecast period. The balance of the population growth occurs in the unincorporated areas of the County. Table 1 shows population projections for various areas.

Table 1
Population Projections
Churchill County: 2000-2050

Year	Churchill County	Fallon Naval Air Station	Fallon Tribes	City of Fallon	Unincorp. County	2025 * Service Area	2050* Service Area
2000	25,628	1,709	1,246	8,201	14,472	9,161	4,038
2005	29,710	1,841	1,342	9,507	17,020	10,773	4,748
2010	34,442	1,983	1,446	11,022	19,992	12,655	5,578
2015	39,928	2,137	1,558	12,777	23,457	14,848	6,544
2020	46,287	2,302	1,678	14,812	27,496	17,405	7,671
2025	53,660	2,480	1,808	17,171	32,201	20,384	8,984
2030	62,206	2,671	1,948	19,906	37,682	23,853	10,513
2035	72,114	2,878	2,098	23,077	44,062	27,891	12,293
2040	83,600	3,100	2,260	26,752	51,488	32,592	14,365
2045	96,915	3,340	2,435	31,013	60,129	38,061	16,776
2050	112,3510	3,598	2,623	35,953	70,179	44,423	19,580

(*) Unincorporated Areas Only

Population estimates in Table 1 were then converted to equivalent dwelling units (EDUs) in order to have a common unit for revenue estimates. The calculation of EDUs does not change the overall water demand for the entire service area or subunits within the service area. The conversion of population to EDUs is based upon the following information:

- Residential water use for Lahontan Valley is 140 gallons per capita/day. This includes the City, County, and Navy.
- County and City water use is 270 gallons per capita/day
- Navy water use is 350 gallons per capita/day
- FPST water use is 170 gallons per capita/day
- FPST residential water use is 120 gallons per capita/day
- FPST persons per household is 4
- Person per household for the Navy, City, and County is 2.6

Converting population to equivalent dwelling units uses the following formula:

$$\text{Equivalent Dwelling Units} = \frac{\text{Population * Total Water Use Per Capita/Day}}{\text{Persons Per Household * Residential Water Use/Day}}$$

Water use and persons per household figures are derived from the Census, local utility records (City, Navy, and FPST) and the State Water Plan. Residential water use includes water used normally for residential purposes, including household use, personal hygiene,

drinking, watering of domestic animals, and outside uses. The difference between residential water use and total water use per person is non-residential uses such as those associated with public facilities, and commercial and industrial applications. As reported in the State's Water Plan, residential water use for the City of Fallon is approximately 140 gallons per capita per day which is somewhat lower than Washoe County where domestic residential water use was reported to be 176 gallons per capita per day in 1995 (Division of Water Planning, 1999). Equivalent dwelling units were derived for each service area subunit. Table 2 shows the 2001 conversion to equivalent dwelling units for each of the subareas (NAS, City, Tribes and Unincorporated County).

Table 2
Equivalent Dwelling Units
By Service Area: 2000-2050

Year	Naval Air Station Fallon	Fallon Tribes	City of Fallon	2025 Service Area *	2050 Service Area *
2000	1,643	441	6,083	6,795	2,995
2005	1,770	475	7,052	7,991	3,522
2010	1,907	512	8,175	9,387	4,137
2015	2,054	552	9,477	11,014	4,854
2020	2,213	594	10,987	12,910	5,690
2025	2,384	640	12,737	15,120	6,664
2030	2,569	690	14,766	17,693	7,798
2035	2,767	743	17,117	20,689	9,119
2040	2,981	801	19,844	24,175	10,656
2045	3,211	862	23,004	28,232	12,444
2050	3,459	929	26,668	32,951	14,524

*** Unincorporated Areas Only, its does not include agricultural uses.**

In addition to equivalent dwelling units shown in Table 2, system design anticipates the need to provide water for agricultural use primarily for consumptive use by livestock. For purposes of this analysis all agricultural use is assumed to occur by 2025.

The EDU forecast was used to generate total system revenues. These revenue estimates are then matched against the annual system cost or expenditures estimates (Capital and O&M) for each of the alternatives. Water system fees were increased until revenues offset total system expenditures each year.

System Cost Estimates

Total system costs for each alternative includes capital cost, maintenance and operations, administrative costs (billing, management, etc). For the purposes of the analysis, all capital costs were inflated 3 percent annually until such time construction begins for Phase I or Phase II. Operations and maintenance costs are inflated 3 percent annually. It is important to note that each alternative has a range of cost associated with it depending primarily on the type of water treatment required. This analysis selects the most expensive treatment option for each alternative. (See Table 7.0.2). Annual operations

and maintenance costs estimates were also included for the treatment, distribution as well as project level infrastructure.

- **Adjustments to System Capital Costs**

Adjustments were made to each of the alternatives presented in Section 7.0. Project costs in Section 7.0 represent the total cost of the project to be incurred by the community. However, certain capital cost components are not expected to be funded through system user fees. Adjustments were made to costs associated with the acquisition of water rights and the installation of water meters. Meter costs will be incurred as customers come onto the system. Individual customers will pay for water meter installation. Also, developers and future homebuyers are expected to incur the costs associated with project level water infrastructure. Operating and maintenance costs associated with project level infrastructure is included as part of the annual expenditures.

Because the County has adopted a water right dedication ordinance, future water system customers will be responsible either directly or indirectly for the costs of water right acquisitions. However, in the event that the City of Fallon, the Navy, and FPST can no longer use their existing groundwater rights, additional water right acquisitions will be required to service them.

Dixie Valley is the only water supply alternative that would not require additional water right acquisitions. The County and Navy hold sufficient water rights to serve the population through 2050. If the Navy, City of Fallon, and FPST could no longer use groundwater resources, approximately 30 percent of the total water demand specified for the alternatives would have to be acquired.

Adjustments to the maintenance and operating costs include the addition of general administrative expenditures that are comprised of overall management, billing, and record keeping for the system. Because the County has other utility operations, a central billing process will be utilized in connection with Churchill County Telephone. Current estimates for billing services provided by Churchill County Telephone range from $3 to $4 dollars per customer per month. Other management and record keeping functions require approximately 3 more staff and a total operating budget of approximately $300,000 in 2001.

Development Scenario and Project Implementation

System alternatives are designed to accommodate a 2025 and a 2050 population in Lahontan Valley. Therefore, the costs represent an entire system fully built-out to serve the 2025 and 2050 populations under a consolidated utility. A consolidated utility operation assumes that all entities including Churchill County, the City of Fallon, the U.S. Navy, and the Fallon Tribes operate the system as one utility. The analysis also considers the feasibility of developing and operating a system that serves only the unincorporated areas of the county.

Phase I must be constructed and implemented before 2025 and Phase II must be constructed soon after 2025 because at that point the Phase I Alternatives are expected to be at capacity. The following scenarios describe a hypothetical simulated implementation schedule for Phase I and Phase II.

Phase I Development and Implementation

Phase I alternatives will be constructed and completed by the end of 2010. The system will manifold water to the City of Fallon, Fallon Navy Air Station and the Tribal Lands. These three areas will be the initial customer base for the system. It is assumed that there will be very few customers (commercial and residential) in the unincorporated county that will be able to connect to the system at the start of operations. However, this situation could change as the County implements policies that either require or provide incentives for new development to provide water system infrastructure and service connections for new residential dwelling units and commercial establishments.

Customers not served by an existing municipal water system will require a period of time to be brought onto the system. The analysis assumes a period of 10 years for all customers in the Phase I service areas to be connected to the system. As a result, nearly all customers not currently served by a municipal water system will be connected to the system by 2020 under Phase I. Development in the service area after the water systems are in place will be connected immediately including new growth within the City of Fallon, NAS, and Tribal lands.

The analysis assumes that existing customers of the City of Fallon, NAS, and the Fallon Tribes will not pay a system connection fee. Only new customers in these service areas will be required to pay the stated system connection fee.

Phase II Development and Implementation

Because Phase I is designed for a 2025 population and its associated demand, Phase II alternatives will have to be constructed soon after. Some amount of lag time is built into the Phase I system because it assumes that the entire existing population of Churchill County (53,660) will be on the system by 2025. However, there might be as many as 11,800 people living in the 2050 service area and in outerlying areas of the County not served by Phase I. Therefore, the system design and associated costs are somewhat conservative in that they are an overestimate both in terms of costs and number of persons served. The Phase I alternatives are capable of accommodating additional growth in the service area, perhaps through 2030. Therefore, Phase II alternatives will be constructed in a manner that it becomes available by 2030.

Evaluation of Alternatives

The feasibility analysis relies upon projecting the future total annual expenditures for debt, operating, and administrative costs for each alternative. A combination of average

monthly charges and system connection fees should provide sufficient revenues to cover the annual projected costs associated with each alternative.

In order to determine the reasonableness of future projected system charges and ultimately the financial feasibility of the proposed alternatives, the rate structure required to meet the financial obligations of each alternative is compared against "base rates". The base rate establishes monthly service charges and one-time service access fees for an EDU that could be implemented today if a system were in operation. The base rate monthly service and system connection fees are assumed to be at levels acceptable to a majority of current and future system users. The base rates are inflated three percent annually through 2050 creating a base rate curve for monthly service and system connection fee charges. For example, a total monthly service charge of $81 per month in 2010 is the same as $60 per month in 2001. A more conservative estimate of future base rates charges uses average annual increases to determine rates avoiding the exponential growth associated with compounding increases.

The base rates were established by reviewing the average monthly service charges and system access fees for various water systems throughout Nevada. Because water rate structures tend to vary among systems in Nevada and that many systems now have metered rates, it is difficult to make direct comparison on the rate structure itself. Instead, estimates of total average water charges per month were used as a direct comparison. For many of the smaller water systems in the State an average monthly charge for a residential customer is about $30 per month. Larger urban water systems have higher rates. For example, Washoe County currently has a residential flat rate of $60 per month. The newly formed Truckee Meadows Water Authority that provides service primarily to the metropolitan areas of Reno/Sparks has a flat rate of $49.19 per month. Washoe County utilities currently charges $4,200 for a residential system connection fee. Residential water connection fees charged by other communities include: Carson City $3,334, Douglas County $4,400, and Lyon County (Dayton) $5,330.

Metered rates for the two entities are set up on a tiered rate schedule with progressive increases in the rate for higher volumes of water use. The total billed to an individual residential unit would depend upon the volume of water used.

Results

The following sections provide the results of the financial feasibility for the two approaches identified above. The results are shown for a consolidated utility operation.

Conjunctive Surface, Induction Well, and Lahontan Reservoir Development

Four alternatives were combined in the financial analysis because they have very similar capital and operating costs. These alternatives include:

- Project Conjunctive Surface and Ground Water Development
- Project Induction Well Development
- Project Lahontan Reservoir Development
- Historic Groundwater Development

Of the four alternatives Project Induction Well Development and Historic Groundwater Develop are the least capital intensive and ultimately the most affordable options. Figure 1 shows the monthly base rates compared against the projected monthly users charges required to meet annual revenue requirements of the alternatives. The monthly base charge presented in terms of a residential dwelling equivalent. Larger commercial customers will be expected to pay more commensurate with their level of water use. In general, the projected rate for the four alternatives remains at or below the future base rate charge curve for most years through 2050 for the simulated development feasibility approach. In Figure 1 the base rate (average monthly charge per EDU) was initially set at $60 per month and is increased 3 percent annually through 2050 designated as the base rate curve. Also shown is the base rate in terms of an average annual percent increase designated as the alternate base rate.

Figure 2 shows the monthly base rate for system access fees compared against the projected rate required to meet annual expenditure requirements for the alternatives. In general, the projected rate for the three alternatives remain at or below the future base rate curve for most years through 2050. Again the base rate for a residential connection fee was initially set at $6,000 per month and increased at a 3 percent compounded annual rate as well as the application of an average annual percent increase.

As with each of the alternatives, there is a significant initial cash outlay that is needed to support system development and operation. In the first couple of years starting in 2010 there are not enough customers to support the system operating costs without exceeded the projected base rates due to the manner in which the systems are assumed to be developed and implemented. Initial deficits will exist under a simulated approach that assumes the entire system is implemented over a short period of time.

In reality, a majority of the water system will probably be implemented in phases over a period of time reducing somewhat the initial revenue requirements to fund the system. One of the critical elements to funding water system development for Lahontan Valley is the availability of an existing customer base, particularly at the time of development.

Over a 50-year period, the projected monthly service charges along with system access fees should provide sufficient revenues not only to cover annual system expenditures but also to provide periodic infrastructure replacement. As shown in Figure 1 and Figure 2, monthly charges and system access fees could be increased significantly to pay for water system expenditures. Starting in 2020, projected charges required to meet annual system costs remain well below the projected base rate curve for monthly service charges and

system access fees. It is also important to note that the analysis does not consider any grant funding opportunities or lower interest financing that may be available or other financial support that could be provided by state and federal resources. One potential shortcoming of trying to implement a centralized water system over a short period of time is the availability of financing and the debt capacity of those entities participating in the system.

In order to maintain monthly user fees and system access charges below projected base rates, supplemental funding of at least $50 million will be needed if the system has to be developed and implemented over a short period of time as might be the case where local entities must response to adverse impacts created by changing federal water management and use in the Newlands Project.

Recharge, Storage, and Recovery Alternative

The monthly charges reflect those for an equivalent residential dwelling unit. In general, the projected rate for the Recharge Alternative remains at or below the future base rate charge curve for most years through 2050. In Figure 1 the base rate (average monthly charge per EDU) was initially set at $60 per month and is increased 3 percent annually through 2050. An alternative straight-line function or an average annual percentage increase was also used to project future base rates.

In general, the projected rate for the alternative remains at or below the future base rate curve for most years through 2050. Again the base rate residential system access fee was initially set at $6,000 per month and compounded 3 percent annually and by an average annual percent increase.

The recharge, storage and recovery alternative may require a substantial amount of initial cash outlay, if the system were required to be developed and implemented over a short period of time. Deficits will exists during the first several years of operation. Deficits are due to the higher initial fixed costs associated with this alternative. Both the monthly service charge and system access fees would remain well above the base rates for some period of time, perhaps 10 or more years. These amounts could be reduced somewhat if the system were allowed to be implemented in phases overtime.

Dixie Valley Alternative

In general, the projected rates for the Dixie Valley alternatives remains somewhat above the future base rates during the initial years of operation. In Figure 8-5 the base charges (total average monthly charges) for a residential housing unit equivalent was set at $60 per month and appreciated 3 percent annually. System access fees will have to remain above the projected base charge for at least 10 years or more, if the system had to be developed and implemented over a short period of time.

In general, the projected charges for the Dixie Valley alternative remains above the projected base rate for monthly service fees and systems access charges until sometime

after 2020 timeframe. The implementation of the Dixie Valley alternative requires a larger initial service area population, and a greater number of connections. Land use and development policies could improve the feasibility of Dixie Valley as a stand alone alternative by encouraging future growth to be part of a municipal water system.

Unlike the other water system alternatives, a sizeable portion of the Dixie Valley Alternative cannot be phased in over time. The most expensive components of the project (transmission pipeline) must be implemented in its entirety. Dixie Valley is an alternative that will likely require the participation and support of all and jurisdictions in Churchill County and Lahontan Valley. It is not well suited for a County only operation until the population and number of customers increases substantially.

APPENDIX 9.0

WATER PLAN REVIEW & RESPONSE

APPENDIX 9.0

WATER PLAN REVIEW & RESPONSE

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X. SUMMARY OF SUBJECTIVE MATRIX EVALUATION OF WATER SUPPLY ALTERNATIVES.

I. INTRODUCTION

Copies of the Churchill County Water Resource Plan, Final Draft and Appendices were forwarded by the Churchill County Manager's Office in early 2000 to various governmental and nongovernmental entities, requesting their review and comments of this draft Plan. The following individuals representing those entities thought to be concerned with the water resources of Churchill County were forwarded copies of the Water Resource Plan, including supporting maps and appendices:

Mr. James Regan, Chairman, Board of Churchill County Commissioners
Ms. Gwen Washburn, Commissioner, Board of Churchill County Commissioners
Mr. Lynn Pearce, Commissioner, Board of Churchill County Commissioners
Mr. Richard Campbell, Legal Counsel, Churchill County Commissioners
Mr. Mert Mickelson, Chairman, Churchill County Planning Commission
Mr. Ronald Sims, Vice Chairman, Churchill County Planning Commission
Mr. Kenneth Catlin, Member, Churchill County Planning Commission
Mr. Tom Lammel, Member, Churchill County Planning Commission
Mr. Mario Peraldo, Member, Churchill County Planning Commission
Mr. Rick Sugg, Director, Churchill County Planning
Mr. Arthur Mallory, District Attorney, Churchill County District Attorney's Office
The Honorable Den Tedford, Mayor of the City of Fallon, City of Fallon
Mr. Mike Mackedon, Esq., City Attorney, City of Fallon
Mr. Steve King, Assistant City Attorney, City of Fallon
Mr. Larry White, City Engineer, City of Fallon
Mr. Lyman McConnell, District Manager, Truckee Carson Irrigation District
Mr. Dave Overvold, District Engineer, Truckee Carson Irrigation District
Ms. Marlene Caffrey, Administration Assistant, Truckee Carson Irrigation District
Mr. Michael VanZant, Esq., TCID Legal Counsel, McQuaid, Metzler, et al Law Offices
Mr. Craig Pridgen, TCID Legal Counsel, McQuaid, Metzler, et. al. Law Offices
Captain David Rogers, Base Commander, Fallon Naval Air Station
Mr. Del Pursel, Public Works Director, Fallon Naval Air Station
Mr. Alvin Moyle, Chairman, Fallon Paiute-Shoshone Tribe
Mr. William DuBois, Public Works Director, Fallon Paiute-Shoshone Tribe
Mr. Michael Turnipseed, State Engineer, Nevada Division of Water Resources
Ms. Naomi Duerr, State Water Planner, State of Nevada Water Planning
Mr. Allan Tinney, Chief, Division of Health and Protection Services
Mr. Allen Biaggi, Administrator, Nevada Department of Environmental Protection
Mr. Norman Harry, Chairman, Pyramid Lake Paiute Tribe
The Honorable Kenny Guinn, Governor, State of Nevada
The Honorable Lawrence Jacobsen, Senator, The Nevada State Senate
The Honorable Mike McGinness, Senator, The Nevada State Senate
The Honorable Marcia deBraga, Assemblywoman, The Nevada State Assembly
The Honorable Joseph Dini, Assemblyman, The Nevada State Assembly
The Honorable Harry Reid, Senator, United States Senate
The Honorable Richard Bryan, Senator, United States Senate
The Honorable James Gibbons, Representative, United States House of Representatives

The Honorable Shelley Berkley, Representative, United States House of Representatives
Ms. Elizabeth Reike, Area Manager, USDI Bureau of Reclamation, Carson City
Mr. Roger Le Sueur, Engineer, USDI Bureau of Reclamation. Fallon
Mr. Steve Alcorn, USDI Bureau of Reclamation, Carson City
Mr. Jon Nowlin, Nevada District Chief, USDI Geological Survey
Mr. John Singlaub, Area Manager, USDI Bureau of Land Management
Mr. David Roundtree, Public Works Director, Washoe County
Mr. William Henry, Wildlife Biologist, US Fish & Wildlife Service
Ms. Mary Elpers, Wildlife Biologist, US Fish & Wildlife Service
Mr. Edwin James, General Manager, Carson Water Subconservancy District
Mr. Rex Massey, RMA Research
Mr. Charlie Frey, Project Rancher
Mr. Norman Frey, Project Rancher
Mr. Rangesan Narayanan, Economist, University of Nevada
Ms. Rachel Dahl, Director, Lahontan Valley Environmental Alliance
Ms. Jamie Mills, Director, Newlands Water Protective Association
Mr. Mark Miller, Project Rancher
Mr. Robert Kofed, Manager, Sierra Pacific Power Company, Fallon Office
Mr. John Sprague, Lahontan Valley Environmental Alliance

Written responses to this draft document were received from the Churchill County Planning Commission, the Nevada Division of Water Resources, the Nevada Division of Water Planning, the Nevada Division of Environmental Protection, the Carson Water Subconservancy District, the USDI Bureau of Reclamation, the USDI Geological Survey, and the Washoe County Department of Water Resources. Additional communication and feedback in respect to this draft document was also sought and/or offered by members of the Churchill County Commission, the Churchill County Planning Commission, Mr. Richard Campbell, the Truckee Carson Irrigation District Staff, Sierra Pacific Power Company-Fallon Office, the Newlands Water Protective Association and individual irrigation and quasi municipal water users in Lahontan Valley. Additionally and most importantly, Mr. Bjorn P. Selinder, Churchill County Manager reviewed the draft Plan and provided critical editorial and subjective comments which adds considerable substance to the final Plan.

The following chapter index includes the comments made by each reviewer, followed by the authors response. In some cases the reviewer comments were paraphrased in an effort to shorten and make the comment section more concise. The complete original reviewer comments, including Subjective Matrix Evaluation of Water Supply Alternatives is included in the index immediately following the respective reviewer comment and response chapter.

In an effort to evaluate the seven water resource alternatives a subjective matrix evaluation form was forwarded to each reviewer to evaluate these alternatives. Subjective parameters included water quantity, water quality, environmental impact, permitting, legal/political/legislative issues, capital & operation and maintenance costs, physical system feasibility, and drought resistance for the proposed water supply. These

individual evaluations made by the four Churchill County Planning Commission members, the Nevada Division of Water Planning, the Nevada Division of Water Resources, and the Washoe County Department of Water Resources are included in each respective chapter. The average results of these eight evaluations are shown under the Subjective Matrix Evaluation Summary of Water Supply Alternatives under the chapter X of this appendix.

II. CARSON WATER SUBCONSERVANCY DISTRICT

Reference: Correspondence to Bjorn P Selinder, County Manager of April 11, 2000 from Edwin D. James, General Manager of the Carson Water Subconservancy District. (CWSD)

Item 1 Comment: Table 4.1.1: Regarding the projected Population & Water Demand: Is there enough undeveloped land in the City of Fallon service area for its population to increase almost five fold in the next 50 years?

Response: Pursuant to discussions with Larry White, City Engineer, the City has experienced a 2-3% annual growth and this trend is anticipated to continue. The undeveloped areas within the current city boundaries could potentially add 20% to the total demand if fully utilized. It is also anticipated that the City limits will expand into the unincorporated county as annexations occur. It was assumed that the current ratio of City population / overall county population would remain at 32%. See Section 6.2 for further description and methodology for population and demand distribution.

Comment: Is it true assumption that the Naval Air Station's population will continue to grow over the next fifty years at the same growth rate as the County?

Response: No, the annual growth rate for the NAS and the FPST has been reduced to 1.5% based upon discussions with their personnel. These modifications have been made to Table 4.1.1.

Comment: Is it necessary to provide M&I water supply for livestock or could livestock use local groundwater supplies? (Side note: Although the dairy industry may be increasing at a very fast rate now, my experience is that people and cows don't mix and in the future as the human population increases, the dairy industry will get squeezed.)

Response: In order to remain in compliance with Bureau of Health and Protection Services and local Health Department regulations, potable water is required for the wash down facilities associated with dairy operations. The major water demand for dairy is to meet wash down and sanitation needs. The projected dairy growth is based upon the Nevada Dairy Council 1998 estimates. The year 2000 livestock demand was distributed within the 2025 service area shown on Map 6.1.1 while the difference between the 2050 and 2000 livestock demand was distributed outside the of the 2025 service area but within the 2050 service area shown on Map 6.1.2. In all cases, the livestock demands were distributed in relatively rural

areas having a minimum zoning density parcel size of five acres (A-2) of ten acres (A-3).

Item 2 Comment: As the water demand increases in the future so will the amount of wastewater that is generated. The use of reclaimed water to irrigate parks or agricultural lands may reduce the M&I water demand or provide an alternative source of water you could exchange for surface water rights. You may want to look at the feasibility of drilling non-potable irrigation wells to provide irrigation water for parks and large other non-domestic uses. This may not reduce you need for water but it would reduce the need to treat all your water to drinking standards.

Response: In future planning it is advised that the reuse of wastewater to meet the irrigation demand of parks, golf courses and agricultural lands should be considered. Assuming State Engineer Order No. 1116 is modified to allow conditional or revocable permits for ground water use, potable as well as non potable needs may be developed to meet the short term water demand of the County.

Item 3 Comment: Although the Dixie Valley may be the water supply for Churchill County in the future, the cost of getting the water to the county now seems beyond the community's ability to pay. It may be more viable to develop your water system in multiple phases and begin building "satellite" systems which someday in the future could be tied together.

Response: A realistic course of action over the near terms is to recommend the continued use of ground water resources for the support of "satellite" developments in the County with associated infrastructures that may be tied together in the future**.**

Item 4 Comment: I would strongly recommend the county look at adopting some type of water right dedication ordinance to begin retaining some of the surface water rights for the future needs of the county.

Response: An ordinance was passed by the County on November 15, 2000 for the dedication of facilities and water rights, including agricultural surface water rights to the County for the development of a County wide water system.

Item 5 Comment: Although the Churchill County Water Resource Plan is a good report for looking at your county's future water needs, all the recommendations alternatives are your traditional engineering solutions. Due to the high cost to treat your water supply to meet current and future water quality standards, you may want to look at the feasibility of developing small individual non-potable water systems for parks, schools, and green belts to reduce the amount of water you will have to treat to meet your domestic water demands.

Response: See item 2 response. While the short term demand for non potable water may be met by further developing the groundwater, it must be recognized that in the long term as a result of the down sizing of the irrigation project, ground water supplies will be dramatically reduced in both quantity as well as quality.

III. CHURCHILL COUNTY PLANNING COMMISSION

Reference: Correspondence of May 22, 2000 from Mr. Mert Mickelson, Chairman, correspondence of May 12, 2000 from Mr. Ronald E. Simms, Vice Chairman, and correspondence of May 10, 2000 from Mario G. Peraldo, Member, all of the Churchill County Planning Commission to Mr. Bjorn P. Selinder, County Manager.

Mert Mickelson Comment: In paraphrase, the major recommendations were: Urges the County to adopt an ordinance for the dedication of water rights for support of development, and consider the development of a County wide sewer system to avoid the potential for pollution the underground aquifers. Rates the Dixie Valley alternative highest in the matrix evaluation and further indicates "We must have a NEW water supply in the Valley."

Response: The County has subsequently adopted an ordinance for the dedication of water rights and associated facilities to the County. A wastewater plan should be adopted and integrated with the Water Resource Plan. The Dixie Valley Alternative is recommended for the long term of final phase of the Water Resource Plan.

Ronald E. Simms Comment: In paraphrase, the major recommendations were: Placing the Dixie Valley alternative as the most favorable long term option, since it would "provide for a high degree of drought resistance", "appears to have quantity and quality superior to other alternatives", "would be least affected by the ever increasing demands for water resources in the northern Nevada area", and "least liable to be shackled by future highly restrictive federal regulations." As an alternative or secondary option, the recharge, storage and recovery alternative was recommended.

Response: The Final Water Resource Plan will recommend that the Dixie Valley alternative be chosen as the long term water supply for the Valley. The recharge, storage and recovery alternative is currently being investigated as supported by a grant from the Carson Water Subconservancy District.

Mr. Mario G. Peraldo Comment: In paraphrase, the following comments were made: "Diversions for irrigation in the Lahontan Valley must be maintained at or very near present levels to sustain the current amount of agriculture and municipal and industrial (M&I) use." "An additional new source of water is needed to sustain future growth of M&I use without sacrificing agricultural use." "The Dixie Valley importation alternative is the only one that can best meet both objectives." "The cost of the Dixie Valley alternative is a concern. But another concern is what would the cost be to not do it?" Lahontan Reservoir as a source could present more of a quality problem during drought, low levels and/or late in the summer when algae buildup and fish deaths might occur." "Although the Recharge, Storage, and Recovery option does not provide a new source of water, it seems to have more potential to capture some of the excess water during abundant

or flood years." Donner Lake rights should be considered. Wastewater treatment and reuse should also be considered.

Response: In respect to Dixie Valley and the Recharge, Storage, and Recovery recommendations, see responses to other Commission members. Donner Lake water (4500 acre feet) is owned by the Truckee Carson Irrigation District. Since this is a very reliable watershed (even during drought years Donner Lake fills completely), this source should be considered. The Water Resource Plan should be augmented with a wastewater plan.

III. NEVADA DIVISION OF ENVIRONMENTAL PROTECTION, DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

Reference: Correspondence of March 15, 2000 from Mr. Tom Porta, Chief Bureau of Water Quality Planning to Bjorn P. Selinder, County Manager.

Item 1 Comment: Leaching water quality: Project Conjunctive Surface and Ground Water Development – It should be determined what elements may be leached by surface water percolating through the soil.

Response: The water quality of the shallow aquifer (0 to 50') and the intermediate aquifer (50' to 500' - 1000') which are directly recharged by the Project's irrigation water reflects the summation of the Carson and Truckee River water quality and the percolating leachate quality. See Volume II, Appendix 5.2 for water quality analyses in Lahontan Valley.

Item 2 Comment: Lahontan Reservoir Water Quality: All references to Water Quality in Lahontan Reservoir in the main Document and Appendix 5.0 – Data more recent than 1972 and 1975 is available. NDEP monitors the water right below the outlet of the Reservoir and from the Truckee Canal. For your information, summary of selected parameters has been provided.

Response: This information will be included in Appendix 5.0 along with additional water quality data provided by the USGS.

Item 3 Comment: Water Quality at different Depths in Lahontan Reservoir: An in-house study conducted by NDEP in 1993, which sampled different depths of Lahontan Reservoir, may also be of interest to you and is available upon request.

Response: We appreciate the offer. The data will be included in Appendix 5.0.

Item 4 Comment: Recharge, Storage, & Recovery NDEP Permit: Underground injection or discharging to infiltration basins for the purpose of recovering the water for

use at a later date may require a permit from the Bureau of Water Pollution Control. P. 7-39, Main Document

Response: The County will be responsive to the possibility that a permit may be required from the Bureau of Water Pollution Control.

IV. NEVADA DIVISION OF WATER PLANNING, DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

Reference: Correspondence of March 31, 2000 from Ms. Naomi S. Duerr, Administrator – State Water Planner to Mr. Bjorn P. Selinder, County Manager.

Item 1 General Comment: It would be very useful if the Tab pages could be titled.

Response: Good suggestion, will add titles in Final Plan.

Item 2 Comment: Page 1-3 Population Growth: Using a constant (exponential) 3.0 percent population growth rate over the 25-year and 50-year planning horizon seem very ambitious. It is unclear whether the Chruchill County growth prospects, aside from the issue of water availability, can support such increases. Admittedly, recent growth has been in the 3-5 percent range, but some of this been due to the assimilation of the Navy Weapons School, the growth in Fernley, and other factors which may or may not continue to fuel population growth in the future. We would recommend the use of a non-exponential growth factor. If an exponential growth rate is used, we would suggest that a rationale for it use be provided in the document. It would be clearer if "Water Demand" were referred to as "Potable Water Demand" to differentiate it from irrigation demands.

Response: The estimates in population growth as shown in the Water Plan and that of the State Demographer are within 2% of each other, not a bad fit, considering the uncertainties of projecting population growth. It must be recognized that these estimates are only target amounts that are used for planning purposes. Final adjustments in water demand will be made as the population numbers materialize. The water demand is broken down into M&I and Livestock categories. See Table 4.1.1 Potable water is required for both uses.

Item 3 Comment: Page 1-13 Table 1.1.1 legend: NDWP: use of a legend on the graph would more clearly indicate which are capital costs and which are operations and maintenance costs, even though this evident from Table 1.1.1 on the preceding page.

Response: A legend will be added to Table 1.1.1.

Item 4 Comment: Page 1-15 "Subjective matrix": Enclosed is a completed "subjective matrix" evaluating the water supply alternatives. We note that this matrix truly is subjective. It is very difficult to provide an objective assessment of the water supply alternatives based on the detail provided in the draft plan, and in light of the other issues we raise in this letter. Overall, we ranked groundwater importation from Dixie Valley as

the highest prospect, followed by Lahontan Reservoir Development and Recharge, Storage and Recovery. The problem with most of the alternatives discussed is that they depend on acquisition of available water rights which as the text points out are in short supply.

Response: It is recognized that the matrix is subjective. It is interesting, however, that a planner is so concerned with subjectivity.

Item 5 Comment: Page 3-3 Sierra Pacific (now Truckee Meadows Water Authority-TMWA) diversion rights: Is the information in Table 3.1.1 the most current with respect to Sierra Pacific Power Company's diversion rights and their forecast needs, or have some of these figures been updated since the last regional water plan development? Also, on page 3-3 the number in the text on line 7 (43,019 AF) does not correspond to the number in Table 3.1.1 (43,029 AFA). Perhaps it is a typo?

Response: Typo in text and note that the total in Table 3.1.1 is rounded to the nearest 1,000 AFA (acre feet annually).

Item 6: Table 3.2.1, Page 3-16: 70,000 AFA recharge estimate error: The footnote for the 70,000 AFA figure suggests that this value may be in error by an order of magnitude or more. This is somewhat misleading. Maurer (1994) states some components of the water budget have uncertainties by an order of magnitude, but not all components have this level of uncertainty.

Response: True, some components of the water budget that Maurer (1994) are said to be have uncertainties of an order of magnitude. Footnote 2 will be deleted. In respect to annual recharge may vary from 50,000 AF to 100,000 AF. This range will be shown in the Final Plan.

Item 7 Comment: Table 3.3.2, Page 3-30: Cui-ui Recovery & Water Quality Settlement Agreement impact on Carson Desert (Basin 101) groundwater; Reliability of water supply, resulting from certain Federal actions; Maurer water budget time frame vs. historical: It appears that one purpose of this analysis is to estimate the overall impact various actions will have upon the ground water recharge in the Carson Desert (Basin 101). For the PL 101-618 Cui-ui Recovery and Water Quality Settlement Agreement actions, this table shows associated reductions in acreage and diversions for these actions. If these reductions occur along the Truckee Bench and the Truckee River, there would not be any impacts to groundwater recharge in the Carson Desert. Please clarify.

Response: The portions of the basin located in the vicinity of Hazen and Swingle Bench are located within Churchill County and Basin 101. The Cui-ui recovery does impact areas other that the Swingle Bench. The USFWS reserving 0.51 acre-feet of their Section 206 acquisitions in order to benefit Cui-ui will result in more water being purchased for the wetlands.

Comment: The table shows reductions in diversion due to: 1) Bench/Bottom Ruling; 2) 1985-88 Lack of perfection, etc.; and 3) NAS Conservation. Please address the possibility that reductions in demand could result in more reliable water supplies for the other water rights holders during drier period, resulting in less reductions in recharge that suggested by the table.

Response: During drier periods, the amount of water stored in Lahontan Reservoir will be limited to the reduced maximum storage amounts as set by the 1997 Adjusted OCAP. (e.g. 190,000 AF at end of June storage as versed to 317,000 AF) whereby the amount diverted to Lahontan Reservoir from the Truckee River will be controlling. During dry periods or droughts the Carson River cannot contribute enough to meet the Projects demand. Additionally by the Federal actions, less acreage will be irrigated and therefore, less recharge will occur. The remaining acreage will not receive a more reliable water supply. Additionally, the Navy water savings have been earmarked for Cui-ui recovery under the Settlement Act.

Comment: The table shows that the listed actions could reduce irrigated acreage by 87% (and, thus, recharge by 87%). A large part of this estimated reduction is due to changes from the 1967 OCAP to the 1997 OCAP. Inclusion of this impact to diversions would be appropriate if the water budget values developed by Maurer were for the period prior to 1967. However, it appears that Maurer's water budget was developed based upon data from 1975 to 1992.

Response: Out of the 18 year period (1975-1992) 11 of the years, releases were below the average of 370,000 acre feet, while the remaining 7 years were above the average. Upon considering the effect of PL 101-318 and other Federal actions may have in reducing the Project diversions, a below average release may be more meaningful in estimating the groundwater recharge in the future. An average release of 370,000 acre feet is well within the projected release amount allowed by the Bureau. The 1988 OCAP called for a diversion rate of 320,000 acre feet. A large part of the reductions are actions under the Settlement Act including authorization in the Act to have tighter OCAP.

Item 8 Comment: Page 3-32 Footnote 12: Footnote 12 should state that the purchase of 100,000 AF is associated with Alternative 2, not Alternative 3.

Response: Error has been corrected.

Item 9 Comment: Page 3-35: Estimated Recharge reduction resulting from "Threatened" actions: It is stated that recharge will be reduced to 10,000 AF as a result of the actions in Table 3.3.2. It is believed that there are large uncertainties with this number and the report should clearly state the uncertainties.

Response: These uncertainties will be based upon a range (50,000 AF to 100,000 AF) of estimated recharge amounts rather than one amount (70,000 AF).

Item 10 Comment: Page 4-1: Beginning on the third line you reference population forecasts made by the NDWP in 1998 for Churchill County. More recent forecasts have been produced in a February 1999 Churchill County Socioeconomic Overview which we are enclosing with these comments. These were the same population forecasts used in the April 1999 Nevada State Water Plan. The growth rate used in the more recent publication is an average of 2.16 percent in population growth over the 1998-2018 time period, broken out by 2.59 percent from 1998 to 2008 and 1.74 percent from 2008 to 2018. We suggest that the figures in this publication be incorporated into your final plan.

Response: The 1999 publication is cited in the final plan. See response to Item 2 above.

Item 11 Comment: Page 4-4 (Figure 4.1.1): As stated previously, we feel that a constant 3.0 percent (exponential) population growth is difficult to substantiate over this entire period.

Response: See Item 2 response.

Item 12 Comment: Page 7-1: For alternatives, it appears that the report assumes that none of the existing municipal wells and water rights are considered in meeting a portion of the Phase I and II demands. If this so, the report should state. Four of the alternatives involve the purchase of water rights associated with 15,300 acres of irrigated land. However, the report's analysis in Table 3.3.2 shows that 15,300 acres may not even be available as a result of action by others. This should be addressed in the report.

Response: Correct. The threatened actions will influence all groundwater in the Valley, including the existing groundwater rights. This will be clarified in the Final Plan. The County by ordinance is in the process of dedicating surface water rights for meeting these target amounts.

Item 13 Comment: Page 7-18: The report states that project canal losses for 1993 were estimated at 61,000 AF, with average canal losses assumed to be lower at about 23,000 AF. What percentage of total annual canal flows does this represent? In the report, it is assumed that the purchase of 25,204 AF of water rights and the subsequent conveyance of the associated water (21,531 AF) through the canal system will result in seepage of 21,531 AF. For this to be true, one must assume that 100% of the conveyed water is lost through seepage. We do not feel that this is reasonable assumption. Is it assumed that the proposed well would induce more seepage (in terms of percentage) than has occurred historically?

Response: 25,204 AF of agricultural irrigation water rights with a duty of 3.5 acre feet per acre must be purchased in order to obtain 21,531 AF at a duty of 2.99 acre feet per acre for M&I use. Note: A change of manner of use from irrigation to any other use the duty is reduced to 2.99 acre feet per acre. The BOR reported a

seepage loss from the canals at 61,000 AF in 1993 over a relatively short period of time in the spring and early summer just after the drought of the late 80s and early 90s and therefore indicate that these measurements are high and does not represent an average condition. BOR indicates that the seepage may vary from 23,000 AF to 79,000 AF. We chose the lower value of 23,000 AF to meet our demand of 21,531 AF.

Item 14 Comment: 7-19: The report should address any possible compliance issues related to the Surface Water Treatment Rule.

Response: The Surface Treatment Rule, as well as other Rules established by the EPA has been considered in all treatment processes.

Item 15 Comment: Page 7-33: The report states that the Lahontan Reservoir Development alternative may result in decreasing and degrading existing ground water resources in the Lahontan Valley resulting from removal of relatively large amounts of acreage and water from irrigation. This same type of impact would apply for the Conjunctive Surface and Groundwater Development alternative (Phase I and II) and should be stated in the report.

Response: Correct, this will be included for other alternatives that convert irrigation rights to M&I.

Item 16 Comment: Page 7-26: It appears that it is assumed that the conveyance of 21,531 AF of water down th Carson River will result in additional seepage of 21,531 AF (or 100% seepage losses). Please Explain.

Response: See response for Item 13.

Item 17 Comment: Page 7-33: The report states that the Lahontan Reservoir Development alternative may result in decreasing and degrading existing ground water resources in the Lahontan Valley due to removal of relatively large amounts of acreage and water from the irrigation. This same type of impact would apply for the Induction Well Development alternative (Phase I and II) and should be stated in the report.

Response: See response for Item 15.

Item 18 Comment: 4.0: The table and graphs are from a March 1998 copy of the Division's Churchill County Socioeconomic Overview. We would ask that the figures in the more recent February 199 version of this document be included instead, as these are the figures used in the April 1999 Nevada State Water Plan.

Response: The 1999 version will replace the 1998 version in the Final Plan.

V. NEVADA DIVISON OF WATER RESOURCES, DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

Reference: Correspondence of January 2, 2002 from Mr. Tim Wilson, P.E., Staff Engineer III to Mr. Bjorn P. Selinder, County Manager.

Item 1 Comment: USGS estimates of groundwater recharge: The executive summary estimates ground water recharge resulting from infiltration of Project irrigation water at 70,000 AFA. Referenced, is Maurer, et. al. USGS open file report 93-463, 1994. The report implies that the author has small confidence in the recharge number. …..

Response: Upon visiting with the USGS a range of estimated recharge of 50,000 AFA to 100,000 AFA is considered.

Item 2 Comment: Page 1-2 Carson Desert Ground Water Basin perennial yield: The Plan implies a perennial yield of 1300 acre-feet annually (AFA) for the Carson Desert Ground Water Basin. The Nevada Division of Water Resources (NDWR) currently uses a perennial yield of 2500 AFA as referenced in the USGS open file report 78-768.

Response: Since the only recharge that the USGS estimates for this Basin occurs from elevations above 5,000 feet, the recharge that is received by Lahontan Valley is from the Stillwater Range located on the northeastern portion of the Valley. This recharge reaches the highly saline areas of the Stillwater Wildlife area and other areas of groundwater discharge. Since the only potable groundwater well are located several miles to the west in the recharge portions of the Valley, this recharge amount does not contribute to the supply of the potable ground water wells of the Valley.

Item 3 Comment: Page 1-3 Dixie Valley perennial yield: The plan states that, "Dixie Valley … has an estimated perennial ground water yield on the order of 40,000 to 50,000 AFA (Durbin, 1996)." The NDWR currently uses perennial yield of 15,000 AFA as referenced in USGS open file report 78-768. The State Engineer may consider revising the estimated perennial yield of Dixie Valley if valid engineering studies are conducted supporting the revision.

Response: Additional engineering studies as well as considering other USGS studies will be conducted to ascertain the perennial yield of Dixie Valley.

Item 4 Comment: Population Growth Estimates: The estimated growth rate is 3.0% a year for the next 50 years. There does not appear to be any justification for choosing this particular growth rate. Given the critical nature of this data in regards to the planning effort, growth rate estimates from the State Demographer should be used.

Response: We considered the growth rate as based upon the State Demographer estimates. See page 4-1, where the State Demographer estimated the growth rate from 1998 to 2018 to be 2.91%. The 3.0% growth rate was also

recommended by the Churchill County Planning and Managers office. In a presentation of the Draft plan to the State Engineer staff on May 17, 2000, Mr. Turnipseed felt the 3% growth rate was reasonable.

Item 5 Comment: City of Fallon groundwater rights: The Plan indicates that the City of Fallon owns approximately 3,800 AFA of permitted and certificated ground water rights. Records on file in the Office of the State Engineer confirm that the City of Fallon holds about 3,886.2 AF of permitted and certificated ground water rights and approximately 2,280 AFA of water for year 2000.

Response: Thanks for the update.

Item 6 Comment: Six Alternatives for Development are "intriguing": The six alternatives for obtaining additional water resources are intriguing. The County may wish to combine alternatives or explore more than one alternative to increase the flexibility of the Plan. Most of the alternatives will require approval of the State Engineer to change existing water rights or obtain new appropriations of water. Projects for recharge, storage, and recovery of water, also require a separate permit. Nevada Division of Water Resources engineers are available for assistance with all necessary applications.

Response: This permitting is recognized and the County looks forward to working with the Division in respect to these matters.

VI. U. S. BUREAU OF RECLAMATION, LAHONTAN BASIN AREA OFFICE, U.S.D.I

Reference: Correspondence of April 21, 2000 to B.J. Selinder, County Manager, Churchill County from E.A. Rieke, Area Manager, Lahontan Basin Office, Bureau of Reclamation

Item 1 Comment: Page 1-1, Paragraph 1: "Historically during a 43 year period (1925-1967), the Truckee river, with large yearly fluctuations, furnished on an average 51% of the water stored in Lahontan Reservoir": Reclamation calculates 38%, not 51% of Lahontan Reservoir water in that time period was supplied by the Truckee River.

Response: See correspondence of 6/1/2001 from Roger C. Le Sueur, Manager, Fallon Field Office indicating that the BOR could not locate the documentation supporting the BOR argument. Mr. Dave Overvold, however, a former acting BOR Acting Manager of the Lahontan Basin Office provided data supporting the fact that the Truckee River did furnish about 51 % of the water stored in Lahontan Reservoir. For the period 1910 – 1998 the average flow at the gauge at Wadsworth was 214,065 acre feet.

Item 2 Comment: Page 1-1, paragraph 2: "In more recent times (1983-1996), … The Truckee River contribution to Lahontan Reservoir has been reduced to about 38%.": For the time period 1983 to 1996, the Truckee river contribution to Lahontan Reservoir was approximately 27%.

Response: Taking the ratio of the Truckee Canal Near Hazen to the total amount received by Lahontan Reservoir (Truckee Canal Near Hazen + Carson River at Fort Churchill) equals a mean 38.2 %. Raw data provided by Dave Overvold**.**

Item 3 Comment: Page 1-1, paragraph 1: "During drought years (1988, 1989, 1991, 1992, and 1994), however, the Truckee river contributed and average of 62% of the water received by Lahontan Reservoir.": 1989 was not a drought year, but it was an average water year. Did the author intend to use the drought year of 1990 instead of the average water year of 1989? If so, the 62% figure becomes 66% for 1990.

Response: The year 1989 was average. As indicated, this year should have been a drought year 1990. The average of these five years, however remains at 62%.

Item 4 Comment: Page 1-1, last paragraph: "Upon enforcement of the elements of P.L. 101-618 (OCAP …Efficiency increase ….": In regard to Newlands Project Efficiency, P.L. 101-618 required that a study be done to determine what measures would be required to raise the Project efficiency to 75%; there is no requirement to implement this increase. That study was completed in 1994. No actions have been proposed or are anticipated to effect such an efficiency increase.

Response: All of these actions (i.e. OCAP, Cui-Ui recovery, wetland acquisitions etc., including increased Project efficiency) are presented as "threatened actions" as shown in Table 3.3.2. While there may not be the funding at this time to affect such an efficiency increase, there is no guarantee that these actions will not take place at some point in the future. It is interesting to note that according to the TCID records of deliveries and releases, the conveyance efficiency of the Project in 2002 reached 70%. This efficiency was achieved without large capitol outlays and was attributable to more strict management of diversions and measuring devices at the individual farm head gates. In light of these improvements in conveyance efficiency, a 75% delivery efficiency may be reached rather easily.

Item 5 Comment: Page 1-2 paragraph 1: "The potential impacts of … granting the Pyramid Lake Paiute Tribe (PLPT) Truckee river unappropriated water …. Will further reduce the water supply of the Project and Lahontan Valley.": The Tribe's right to unappropriated water will be junior to the Truckee canal diversion right, so granting the Tribe rights to unappropriated Truckee River water will not reduce the supply to the Newlands Project and Lahontan Valley.

Response: In 1930 the Truckee Carson Irrigation District (TCID) made a filing under Application 9330 for the diversion of 100,000 acre feet from the Truckee River to augment the irrigation supply of Project. The TCID intended to raise the

control level of Lahontan Dam such that the capacity of this structure could be increased by 100,000 acre feet. Historically, a portion of the unappropriated has been diverted into the Truckee Canal to serve the Project. Upon the approval of the PLPT application for all of the unappropriated water the Project will receive less than the historical inflows and the denial of Application 9330.

It should also be noted that the PLPT has been granted about 25,000 AFY under Truckee River Decree Claims No.1 and No. 2 under Temporary Applications Nos. 67666T & 68157T for a change of use from irrigation to fish and wildlife use on the Lower Truckee River. Since these claims, having a 1859 priority, for water that has not historically been put to beneficial use, the diversion amounts for all other decreed water right holders, including TCID will be reduced.

Item 6 Comment: Page 2-2, paragraph 1: "Currently about 20,000 AF of water right permits and certificates have been granted in Basin 101.": Numbers obtained from the State Engineer's office as follows: 15,930 AF certificated, 10,670 AF permitted, for 26,600 total.

Response: It is believed that the higher BOR numbers includes a portion of the industrial rights which are primarily from the deep geothermal source. These amounts of water are returned to aquifer, thereby not influencing the upper aquifers from which QM and domestic wells use as a source. Industrial (geothermal) rights were not included in the Plan.

Item 7 Comment: Page 2-2, paragraph 1: "This order has essentially brought subdivision development in the Lahontan Valley to a standstill …": Churchill County Planning Department records show twenty subdivisions have begun construction since 1995. Of these twenty subdivisions, fifteen consist of twenty lots or more. Also, the Nevada State Engineer will approve domestic wells for lots larger than one acre. It appears subdivision development is moving forward as indicated by past population growth (more than 50% since 1990) and the State Demographer's projections for the future.

Response: Clarification will be provided in that the State Engineer by Order No. 1116 whereby well permits which deliver 4,000 gallon per day or more are denied, thereby prohibiting subdivisions that propose to use QM wells withdrawing more than 4,000 gallons per day to provide water for a number of dwellings and or businesses.

Item 8 Comment: Page 3-3, paragraph 1: "Additional SPPCo "drought" storage of about 39,000 AF is anticipated upon implementation of P.L. 101-618 and the Truckee River Operating Agreement (TROA). Although the 39,000 AF of additional storage is referred to as "drought" storage, this storage will apparently be used to support new population water demand with SPPCo's service area". Among the mechanisms for making "drought storage" available, P.L. 101-618 at Section 205(a)(7) authorizes "As provided in the Preliminary Settlement Agreement as modified by the Ratification Agreement, firm, and non-firm municipal and industrial credit water and the 7,500 acre-

feet of fishery credit water in Stampede Reservoir to be available under worse than critical drought conditions shall be used only to supply municipal and industrial needs when drought conditions or emergency or repair conditions exist, or as may be required to be converted to fishery credit water. None of these quantities of water shall be used to serve normal year municipal and industrial needs except when an emergency or repair conditions exists."

Response: Members of the Washoe County District Attorneys Office indicated that in reality the 39,000 AF so called "drought storage" will be used to support new growth in the SPPCo's service area. More recently, this type of action has been recommended by the Truckee Meadows Water Authority (TMWA) in the "Working Draft" Water Resource Plan whereby the assumed drought period for planning purposes be reduced from 10 years to 8 years. This proposal was made by TMWA planners to allow more growth in the service area during the next few years until TROA is implemented.

Item 9 Comment: Page 3-4, paragraph 2: "Methods used by the PLPT include: instituting Federal operating criteria (OCAP) under authority granted to the Secretary of Interior to protect endangered species and more recently Federal Legislation (P.L. 101-618) and the Truckee River Operating Agreement (TROA) which further reduce diversions to the Newlands Project and the continued invocation of the Endangered Species Act mandating high water demands on the low Truckee River (Derby Dam to the lake)." The OCAP, P.L. 101-618, ESA, and Truckee River Operating Agreement (TROA) are all Federal actions, not unilateral PLPT actions as characterized. Additionally, TROA continues to be negotiated. To characterize the agreement as existing is inappropriate. The TROA negotiators include five mandatory signatories as well as a number of voluntary, non-mandatory stakeholders.

Response: It must be recognized that the driving force behind these Federal actions are the efforts made by the PLPT legal representatives and the U.S. Fish and Wildlife Service. The legislative history of the Settlement Act was primarily, if not solely, was to settle disputes that were all occasioned by the Tribe's need for added water. While TROA has not been ratified, it is evident that the main purpose of TROA is to provide a better water supply for the upstream water users in the Truckee Meadows and Pyramid Lake, at the detriment of other water users downstream on the Truckee River. The non-mandatory stakeholders, which include the downstream users in Churchill and Lyon Counties essentially have no voice in the structuring of TROA.

Item 10 Comment: Page 3-5, paragraph 1: "… Derby Dam diverts a portion of the (Truckee) river's flow into the Truckee Canal, conveying water for delivery to the Truckee Division … of the Newlands Project to meet irrigation, municipal, industrial, and domestic water demands for about 5,900 acres of land … Within (Lahontan) reservoir, the Truckee River Carson River waters are commingled and stored for the irrigation of 67,820 acres within the Project below the dam and for municipal , industrial and domestic water purposes supported by the project in Churchill

County." Out of the 5,900 acres of water righted acres in the Truckee Division, approximately 4,000 acres of water righted land are irrigated. Approximately, 56,000 acres of water right land below Lahontan dam (Carson Division), are irrigated by the commingled supply each year. The water righted acreage in the Carson Division is 67,820 acres.

Diversions into the Truckee Canal at Derby Dam are currently used for irrigation purposes, domestic supply, wetlands supply, and stock water demands. Diversions are not used for municipal and industrial demands.

No water is stored in Lahontan Reservoir for municipal and industrial purposes in Churchill County, although Section 209(a) of P.L. 101-618 did expand the authorized purposes of Newlands Project to include municipal and industrial water supply in Lyon and Churchill counties; the counties have not obtained Project water rights for municipal and industrial use.

Response: According to the Bureau's "Newlands Project Efficiency Study" (1994), page 108, the Project supplies 5,700 AF of "Municipal and Industrial" water to 58 subdivisions in 1989. The language of Claim 3 does allow diversions for M&I purposes and groundwater recharge from irrigation was an intended result of how the project was built.

The County has purchased Project surface water rights for municipal and industrials uses in the future. At this time the County has not applied for a change in manner of use from irrigation to M&I use.

Item 11 Comment: Page 3-5, paragraph 1: "The communities of Hazen & Swingle Bench are located within Churchill county have an irrigation demand of about 1651 acres.": Approximately 1,500 acres of water righted acres of land in this area are irrigated each year. The percentage of eligible water righted land actually irrigated is much higher in the Hazen and Swingle Bench areas than in the Fernley area. Swingle Bench and Hazen are sparsely populated and consist mainly of large irrigated fields on family farms. The area in and around the Town of Fernley is more urbanized and much of the righted land is in subdivisions, under roads, or unused for other reasons.

Response: Irrigated acreage in the Hazen and Swingle Bench area according to that reported by the BOR in the "Newlands Project Efficiency Study (1994) is 1651 acres.

Item 12 Comment: Page 3-5, paragraph 1: "From Derby Dam the Truckee Canal continues generally to the southeast to augment the water supply to Lahontan Reservoir." This statement is not correct. The Canal is used to provide water to water rights in the Truckee Division and to supplement the water supply from the Carson River when the latter supply can not meet established targets.

Response: Correction made.

Item 13 Comment: Page 3-6, Table 3.1.2: This table is accurate because it counts unappropriated water and net evaporation at Pyramid Lake as demands on the Truckee River. The State Engineer has determined that unappropriated Truckee River will flow to Pyramid Lake. However, unappropriated water is available only after decreed rights have been served. If flow in the river is such that only decreed rights can be served, there is no unappropriated water. Similarly, evaporation at Pyramid Lake does not affect the ability of the river to meet decreed demands. Evaporation will occur regardless of the volume of Truckee River flow.

Response: It is recognized that unappropriated rights that have been granted to the PLPT are junior to decreed rights. These rights, however, are currently contested by the Truckee Carson District as per appeal of the State Engineer denial of Application 9330. The table is shown only to demonstrate the demand that is made against the Truckee River by all water users.

Item 14 Comment: Table 3.1.2: Newlands irrigation Project decreed irrigation & M&I rights as per the 1988 OCAP or the 1967 OCAP: There are no decreed M&I Newlands Project water rights in said OCAPS.

Response: Same as Item 10.

Item 15 Comment: Page 3-6, footnote 3: "The 1997 adjusted OCAP limits the storage capacity of Lahontan Reservoir to such an extent that the diversions for the Truckee River may approach zero during years when the Carson River is flowing above normal amounts." The storage capacity of Lahontan Reservoir is about 295,000, 317,000 acre-feet with flashboards, and not been changed by any OCAP. The 1997 Adjusted OCAP reduced storage targets for the Reservoir, but do not prohibit full use of Lahontan Reservoir available storage with Carson River water. Storage targets affect only the amount of water which can be diverted from the Truckee River to Lahontan Reservoir. During years when runoff in the Carson River (plus carry over storage) can meet the storage targets, no additional diversion from the Truckee River may be made.

Response: It is recognized that the storage limitations are targets.

Item 16 Comment: Page 3-9, paragraph 3: "Historically, the water diverted from the Truckee River into the Newlands Project has supplied municipal, industrial and domestic users in the rural and municipal communities by direct river or open

channel diversion and indirectly by infiltration or percolation from the Project's conveyance system to the ground water aquifers that supply ground water wells" The Newlands Project has never supplied water by direct river or open channel diversion for municipal or industrial users to the best of our knowledge. Prior to passage of P.L. 101-618 in 1990, municipal and industrial (M&I) use was not an authorized Newlands Project purpose. Section 209(a)(1)(B) of the law expanded the purpose of the project to include M&I use.

Response: Originally, the City of Fallon diverted water from the Carson River by a shallow type induction well to meet the City's M&I use. Later this structure was replaced by a ground water well constructed in the intermediate aquifer which in turn was replaced by wells constructed in the Basalt aquifer. (Bartlett personal comm.) Additionally, the community of Hazen diverted water directly from the Truckee Canal and thence in pond storage for delivery for the M&I and domestic use. The Bureau itself reports M&I deliveries of some 5,700 acre feet. (Newlands Project Efficiency Study, 1994) Claim 3 provides for M&I uses and the project anticipated groundwater recharge for domestic supplies.

Item 17 Comment: Page 3-9, paragraph 3: "Recognizing the (Churchill) County inhabitants dependency upon surface water diverted from the Truckee River, the County in an effort to further clarify the municipal, industrial and domestic right associated with the Newlands Project, petitioned the United States Bureau of Reclamation for 20,000 (acre-feet annually) of supplemental water under (Orr Ditch) Claim No. 3 in 1995 … Since the BOR has not responded to this petition, the County petitioned the Federal Court in February 1998, asking that the BOR's failure to act is a denial, and therefore, is seeking a reversal of that denial." BOR responded to the petition from Churchill County for 20,000 acre-feet annually of Truckee River water, in an August 30, 1996 letter to the law firm of Campbell, Campbell & Bancroft, representing Churchill County. A copy was also sent to Churchill County Manager, B.J. Selinder. The letter stated, "… Reclamation is without authority, absent specific action by Congress, to divest the United States of any of its water rights."

Response: In January of 2001 the BOR Commissioner denied the application made under Claim 3 alleging that any excess water was obligated to the Pyramid Tribe under the language of Tribe v. Morton and under PL 101-618. After denial of an appeal to the Department of Interior the County filed a petition for judicial review to the Federal District Court which is now being briefed by the parties.

Item 18 Comment: Page 3-18, paragraph 1: "Under the OCAP, the winter diversions for power generation at the Lahontan Dam were eliminated and set the total Newlands projected irrigated acreage at about 74,000 acres." The 1967 OCAP set the number of water righted acres at 74,000. The amount of water righted acreage is different from the amount of acres irrigated.

Response: Correction made.

Item 19 Comment: Page 3-19, paragraph 1: "Project conveyance efficiency was mandated to increase from 60% to 68.4% through Project implementation of some 22 water conservation measures." The 1988 OCAP did not mandate a 68.4% efficiency in all cases as is implied here. The 68.4% efficiency was required when 100% of the entitlement for water righted land that was irrigated was delivered. Historically, only about 90% of the entitlement was delivered and the 1988 OCAP required a lesser efficiency since the efficiency requirements were based upon a sliding scale.

Response: The 100% condition has been included in this statement.

Item 20 Comment: Page 3-19, paragraph 1: "The 1988 OCAP also reduced the maximum storage in Lahontan Reservoir …": The maximum storage in Lahontan Reservoir has not been reduced. A June end-of-month storage target of 215,000 acre-feet was established to determine whether Truckee River Diversions to the Carson Division would be allowed. The 1988 OCAP specifically allowed storage higher than 215,000 acre-feet using Carson River inflow.

Response: Clarification is made.

Item 21 Comment: Page 3-22, Paragraph 2: "It should be noted, in light of the enforcement of the 1997 adjusted OCAP, whereby Project target efficiency is set at 75% in 12 years …" The 1997 adjusted OCAP does not require a project efficiency of 75%. It actually lowers project efficiency requirements that were set out in the 1988 OCAP.

Response: As indicated earlier, the target Project efficiency has been set at 75%, presuming the financing becomes available to support improvements.

Item 22 Comment: Page 3-22, paragraph 3: "Approximately 10,000 AF of water rights is used to irrigate this buffer area surrounding the base." This states 10,000 acre-feet are used to irrigate a buffer area around the Naval Air Station Fallon. The actual irrigated acreage is approximately 1,900 acres for a water use of 6,650 acre-feet.

Response: NAS is entitled to irrigate 2934 acres (10,269 af). Under reductions required by the Settlement Act and under an agreement with USFWS, the irrigated acres are down to 398 acres (1,393 af)

Item 23 Comment: Page 3-22, paragraph 4: "Acquisition of Water rights for Pyramid Lake Fishery." While Section 207 authorizes the Secretary of the Interior to acquire water and water rights to assist in the recovery of Pyramid Lake fishery, no such actions are underway, nor are they currently anticipated. The U.S. Fish and Wildlife Service is currently embarked on an effort to review and revise the Lahontan cutthroat trout recovery plan. The results of that process are expected to determine what actions the Service believes will be necessary to recover the species.

Response: In the text we indicate: "water rights may be purchased for the support of the Lower Truckee river fishery." Underlining has been added. In the wetlands EIS the USFWS states that other actions under the Act may satisfy the 110,000 acre-foot/year requirement but that it was undetermined if acquisitions needed to be made under Section 207 to satisfy Cui-ui requirements.

Item 24 Comment: Page 3-22, paragraph 2: "It should be noted, in light of the enforcement of the 1997 adjusted OCAP, whereby Project target efficiency is set at 75% in 12 years and the storage of Lahontan (Reservoir) is reduced, the amount of drain and terminal spills will be significantly reduced." As mentioned previously, the 1997 Adjusted OCAP do not set the Project efficiency at 75%, but actually lower the efficiency requirements set in the 1988 OCAP, which were in the mid-60% range. Again, the 1997 Adjusted OCAP did not reduce Lahontan reservoir storage of Carson River water. However, they did further restrict the conditions under which water could be brought over from the Truckee River.

Response: See responses to Items 15, 19, 20 and 21.

Item 25 Comment: Page 3-23, paragraph 1: "..it does appear that the entire Truckee division (Fernley, Hazen & Swingle Bench) water right of about 5,900 acres or 26,550 AF is targeted for a buyout." There are 59,000 (5,900) acres of water righted acreage in the Truckee Division. Historically, only about 4,000 acres have been irrigated. Purchase of that acreage would equate to 18,000 acre-feet if the maximum head duty were applied. The amount in Churchill County is less that the 7,430 acre-feet suggested in this paragraph.

Response: The amount of water removed or purchased from the Truckee Division will be based upon the water righted acreage not that has been estimated to be irrigated in the past. This assumes the PLPT does not file a protest in respect to "lack of perfection, forfeiture or abandonment" issues. The recently completed EIS for the Water Quality Settlement Act now targets 6300 acre feet from the Truckee Division just by the Federal government. Purchases from the Washoe County interests currently underway are almost all on the Truckee Division and in Churchill County.

Item 26 Comment: Page 3-23, paragraph 2: The paragraph entitled "Water Quality Settlement Agreement (WQA)" contains erroneous information. The Water Quality Settlement Agreement was signed by Reno, Sparks, Washoe County, Nevada Division of Environmental Protection , Pyramid lake Paiute Tribe and the United States. Neither Washoe County Water Conservation District nor Sierra Pacific Power Company signed the Agreement. The agreement does not identify where Truckee River water rights will be acquired although it specifically prohibits acquisitions from the Carson Division. Water rights acquisitions totaling 12 million are to be made by Reno, Sparks and Washoe County; another $12 million, for water right acquisitions are to be made by the United States. The United States has contracted with the Pyramid Lake Paiute Tribe to make it's purchases. The latter will not commence until an EIS has been completed. Acquisitions are and will

be made in the Truckee Meadows, the Truckee River corridor from Vista downstream to the boundary of the Pyramid Lake Tribe's Reservation and the Truckee Division. Water associated with acquired water rights will be stored in Federal reservoirs and released during the summer months when flows in the river are normally low. The intent of the releases is to augment river flow to: meet water quality standards in the river from Vista gauge to Pyramid Lake; improve water quality in the river from Vista to Pyramid Lake; maintain aquatic and riparian habitat in the river downstream from Derby Dam; and promote aesthetic and recreational purposes through the Reno/Sparks area and continuing to Pyramid Lake.

Response: According to a copy of this Agreement dated March 28, 1994 Sierra Pacific Power Company (Walter M. Higgins) and Washoe County Water Conservation District (George Ball) were party to this Agreement. At this time the primary water purchased for diluting the Truckee River downstream of the Truckee Meadows has been from the Truckee Division of the Project. See also response to Item 25.

Item 27 Comment: Page 3-24, paragraph 3: "The proposed increase of the Project conveyance efficiency from 62.1 to 75% would be achieved primarily from the lining of about 54 miles of canals and piping of about 247 miles of laterals to reduce the seepage into the groundwater aquifers of the Project." The 1994 Newlands Project Efficiency Study identified the steps which would be necessary to raise the Project efficiency to 75% within 12 years of P.L. 101-618's passage in 1990. However, there is no requirement that such a program be implemented or that 75% Project efficiency be reached. Congress has not authorized such a program and Reclamation is not aware of any plans to do so.

Response: Same Item 4.

Item 28 Comment: Page 3-25, paragraph 4: The paragraph entitled "P.L. 101-618: Recoupment" includes incorrect information. Section 209 (h) of the law does not direct or authorize litigation. The section states that several preceding subsection (209(d),(e),(f), and (g) shall not become effective until the Truckee Carson Irrigation District has entered into a settlement agreement with the Secretary of Interior for claims concerning recoupment of water diverted in excess of permitted amount by applicable operating criteria and procedures. Also Section 209(h) very clearly states settlement must be made with the Secretary of the Interior, not the Pyramid Lake Tribe. Subsection 209 (j) (3) – directs the secretary to pursue, recoupment by litigation or settlement.

As noted in this paragraph of the report, a recoupment proposal was submitted for consideration by the court. The submission has not been adopted by the court, and could be modified by the court if it is adopted. The proposal submitted by DOI focused on recouping Truckee river water by reducing the volume of Truckee River water diverted to the Project.

Response: While litigation may not have been authorized under Section 209 (h) of P.L. 101-618, it was under (j) (3) of this same Subsection.

Item 29 Comment: Page 3-26, paragraph 2: "Under Section 210(a) Claims Settlement (B), the PLPT claim for unapproprited water of the Truckee River is mandated by this Act. The paragraph entitled, "P.L. 101-618: Pyramid Lake Paiute (PLPT) Claim for Truckee River Unappropriated Water" begins with an inaccurate sentence. Section 210(a) of the P.L. 101-618 does not order or authorize the Tribe's claim for unappropriated water. That matter was decided by the State Engineer and was not a federal action. Further, it erroneous to state: "… the PLPT is taking actions in both river systems that may influence the amount of unappropriated water in the Truckee River." Unapproprited water flowing to Pyramid Lake cannot affect decreed rights because unappropriated water exists only after all decreed right have been served.

Response: Under Section 210 (a)(1)(B) section 204 of this title, "the Preliminary Settlement Agreement as modified by the Ratification Agreement, and the Operating Agreement, shall not take effect until the Pyramid Lake Tribe's claim to the remaining water of the Truckee River which are not subject to vested of perfected rights has been finally resolved in manner satisfactory to the State of Nevada and the Pyramid Lake Tribe: …" This section clearly spells out the condition (granting of unappropriated water to the Tribe) that must be met before ratification of the Agreement.

The fact that the Tribe has been granted unappropriated waters of the Truckee River, allows the Tribe to argue and litigate the target storage amounts for Lahontan Reservoir as influenced by releases from the Truckee River via the Truckee Canal. Other issues that relate to the commingling of Truckee and Carson River waters can be raised by the PLPT.

Item 30 Comment: Page 3-27, paragraph 1: "…within the text of the adjusted 1997 OCAP, Project acreage of about 52,000 to 55,000 is considered" The actual language in the adjusted OCAP is: As the adjustment are made, the District will provide updated information to the Bureau for review and approval. The District must adjust anticipated water allocations to individual water users accordingly. The allocation will at all times be based on a maximum annual entitlement of 3.5 acre-feet (AF) per acre of bottom land, 4.5 AF per acre of bench land 1.5 AF per acre of pasture land that is anticipated to be irrigated and not on the number of water-righted acres. No mention is made of a targeted range from 52,000 to 55,000 acres. In the table entitled "Expected Project Distribution System Efficiency" the range of project acreage considered is from 52,000 to 64,850 acres.

Response: According to the Adjusted 1997 OCAP, Table A, the acreage base for modeling the Project was 59,075 acres (55,075 acres for the Carson Division and 4,000 acres for the Truckee Division.)

Item 31 Comment: Page 3-27, paragraph 1: "Projected Project acreage of 64,850 under the 1988 OCAP has been reduced to about 60,000 acres, with lower average water duty per acre due to Bench/Bottom changes. Further, within the text of the adjusted 1997 OCAP, Project acreage of 52,000 to 55,000 acres is considered." The acreage base adjustments were made to reflect observed conditions. When the 1997 Adjusted OCAP was written, approximately 60,000 acres were being irrigated on the Newlands Project. The 64,850 acres anticipated to be irrigated under the 1988 OCAP never materialized. The 1997 Adjusted OCAP actually considers a range of irrigated acreage from 52,000 acres to 64,850 acres, to allow calculation of a target efficiency for a wide range of conditions.

Response: Same as for Item 30.

Item 32 Comment: Page 3-27, paragraph 2: "the 1997 Adjusted OCAP reduces future storage to only 174,000 AF during the maximum runoff period of January through May and 190,000 AF for June … the target storage end-of-month amounts are those storage quantities that re attributable to diversion made from the Truckee River … Actual Storage amounts (in Lahontan Reservoir) exceeding the target amount may occur during periods of high Carson River runoff, however, during drought periods, these amounts or less, would represent the maximum storage allowed during these periods. This change in operation of the Truckee River significantly reduces the amount of water historically allowed to be stored in Lahontan Reservoir for year-to-year carryover." As previously mentioned, the 1997 Adjusted OCAP reduced storage targets but do not prohibit full use of Lahontan Reservoir available storage for Carson River water. Storage targets affect only the amount of water that can be diverted from the Truckee River to Lahontan Reservoir, not the storage in the reservoir itself. The 1997 Adjusted OCAP do not limit storage to 174,000 acre-feet during the January to May period; they only prohibit diversion from the Truckee River to Lahontan Reservoir if it appears the 174,000 acre-foot storage level will be reached at the end of May or June without such diversions. Except for the reservoir's physical capacity limitation and possible precautionary drawdown when floods threaten, there is not limit on the amount of Carson River water which can be stored in Lahontan Reservoir at any time, including drought periods. The storage target reduction will reduce year-to-year Lahontan Reservoir carryover of the Truckee River water in some years. This reduced level of carry over is based on reduced Project demand due to the reduction of Project acreage from 64,850 acres to 59,075 acres.

Response: During low runoff years, including droughts, when the Carson River inflow to Lahontan Reservoir is low, thereby requiring the Truckee River for augmentation, the target storage limitation will apply.

Item 33 Comment: Page 3-28, Table 3.3.1 1997 Adjusted OCAP Lahontan Storage Assumptions and Limits: The title should be "1997 Adjusted OCAP Lahontan Reservoir Target Storage"; there are no limits on storage.

Response: There certainly is a "limitation" in storage when considering Truckee River diversions to Lahontan Reservoir.

Item 34 Comment: Page 3-29, paragraph 2: "In contrast, the Newlands Project will lose the ability to utilize the full storage capacity of Lahontan Reservoir by reducing the Truckee River diversions to Lahontan Reservoir, restricted by the end-of-month storage amounts set out by the 1997 Adjusted OCAP." See previous comment for Page 3-27, paragraph 2. The Newland Project will not lose the ability to utilize the full storage capacity of Lahontan Reservor and storage of Carson River water is not restricted by the 'end-of-month' storage amounts in the 1997 Adjusted OCAP.

Response: Same as Item 32.

Item 35 Comment: Page 3-28, paragraph 2: "No consideration was given to maintaining or improving the water supply for irrigators who hold water rights on the Truckee River (River), including the Newlands Project." P.L. 101-618, sec. 205(a)(2) states: The operating agreement shall provide for the operation of the Truckee river reservoirs and shall ensure that the reservoirs will be operated to: (A) satisfy all applicable dam safety and flood control requirements; (B) provide for the enhancement of spawning flows available in the Lower Truckee River for the Pyramid Lake fishery in a manner consistent with the Secretary's responsibilities under the Endangered Species Act, as amended; (C) carry out the terms, conditions, and contingencies of the Preliminary Settlement agreement as modified by the Ratification Agreement. Mitigation necessary to reduce or avoid significant adverse environmental effects, if any, of the implementation of the Preliminary Settlement Agreement as modified by the Ratification Agreement, including instream beneficial uses of water within the Truckee River basin, shall be provided through one of more mitigation agreements which shall be negotiated and executed by the parties to the Preliminary Settlement Agreement as modified by Ratification agreement and appropriate agencies of the State of Nevada and California; (D) ensure that water is stored in and released from Truckee River reservoirs to satisfy the exercise of water rights in conformance with the Orr Ditch decree and Truckee River general Electric decree, except for those rights are voluntarily relinquished by the parties to the Preliminary Settlement Agreement as modified by the Ratification Agreement, or by any other person or entities, or which are transferred pursuant to State law; and (E) minimize the Secretary's cost associated with operation and maintenance of Stampede Reservoir.

Response: While the Orr Ditch Decree is acknowledged, it difficult to envision it's implementation when considering all of the other components of the Preliminary Settlement Agreement and associated terms. The motivation for P.L. 101-618 is to expand the water supply for the Truckee Meadows and the Pyramid Lake fishery and Lake at the expense (reduction) of downstream water users, excluding Pyramid Lake Reservation. There has also been no final EIS completed.

Item 36 Comment: Page 3-28, Paragraph 2: "No other water right holders on the River, including the Newlands Project, were included in this decision making

process." TROA negotiations are ongoing and the agreement is not complete. It is inappropriate to draw conclusions about the final agreement. In addition to the five mandatory signatories, at least five other stakeholders have voluntarily participated, either directly or through a representative signatory. TCID participated in the negotiations for many years; they voluntarily ceased attending.

Response: Only the five mandatory signatories make the decisions.

Item 37 Comment: Page 3-29, paragraph 1: "At this time no environmental impact statement has been prepared to address all of the impacts that these (previously presented modifications … will have…": Once the TROA negotiated agreement has been reached, full environmental analysis and disclosure under both the NEPA and CEQA processes is required by Federal and California State law, respectively. A draft EIS/EIR has been released but a new draft will be prepared due to expected changes in the draft agreement.

Response: The statement that no environmental impact statement has been prepared stands as a true statement.

Item 38 Comment: Page 3-29, paragraph 2: "The TROA, combined with OCAP, …significantly reduces that amount available for the Project." Since TROA negotiations are ongoing and the agreement is not complete. It is inappropriate to draw conclusions about the final agreement. The NEPA and CEQA process will analyze any such impacts. It is important to note that P.L. 101-618 clearly mandates protection of existing water rights.

Response: The 1997 adjusted OCAP certainly reduces that water available for Project needs through setting target storage limitations at Lahanton Reservoir, among other actions. TROA, being bound to the preliminary settlement agreement, which further limits that water supply to the Project from the Truckee River.

Item 39 Comment: Page 3-30, Table 3.3.2: The column heading Maximum Lahontan Storage is a misnomer. As discussed previously, the Lahontan Reservoir levels referred to in the OCAP are target levels to determine whether Truckee river diversions are allowed, not maximum reservoir storage. Comment for action 1988 OCAP "Interim OCAP" – the 1988 OCAP were not interim. Comment for action 1997 Adjusted OCAP "Interim OCAP" – 1997 OCAP were not interim.

Comment for action P.L. 101-618 Wetlands Acquisition – Under the Project Diversion column Project Diversion is listed a reduction of 100,000 to 147,000 acre-feet per year in Project Diversion; this is incorrect. The wetlands acquisitions program is transferring most acquired water rights to another area of the Project, not abandoning them. Diversion will still be required to meet the demands of the wetlands.

The reduction in diversion attributable to the retirement of 6,500 acres in AB380 is not correct. It is expected that most of the 6,500 acres will be acres that have not been irrigated for many years. Thus the retirement of these acres will have little actual effect in the volume of water diverted. With full implementation of AB 380, protests and petitions alleging forfeiture and abandonment will be dropped, allowing the activation of additional acres that have not been irrigated for many years.

NAS conservation cannot result in a 16,000 acre-feet reduction in diversions since their historical water use only on about 1,900 acres of water rights and not on all of their water rights.

P.L. 101-618 efficiency improvements. The stated diversion reduction of 66,000 acre-feet is not correct. A 75% efficiency is not mandated nor are there plans to implement a 75% efficiency.

Response: Maximum Lahontan Storage is footnoted to the target levels allowed from the Truckee River. "Interim" for both the 1988 OCAP and the adjusted 1997 OCAP has been deleted.

The table did not indicate that these rights were abandoned. These water rights, however, are being transferred by a change in place of use away from the irrigated area of the Project to the lower lying wetland areas. In effect this irrigation water and the associated recharge to the potable ground water resource is being removed from the Project. The USFWS is reserving 0.51 acre foot of each water right purchased to ultimately benefit the Cui-ui.

Based upon my observations, as representing applicants who were subject to the PLPT protests, most of the alleged forfeiture and abandonment and lack of perfection involved irrigated areas that were challenged which been changed to another portion of the land and were therefore put to benefical use. While the exact number of acres removed from irrigation is not known, the total amount will approach the 6,500 acres.

While the BOR representative indicates that enforcement of the 75% efficiency level is not contemplated at this time does not guarantee that this will not come about in the future, should funding become available to support the improvements (canal lining, pipeline, etc.)

Item 40 Comment: Page 3-30, Table 3.3.2, footnote 6: "1997 Adjusted OCAP revised 1988 OCAP, including target storage maximum amounts in Lahontan Reservoir." Since there is not maximum storage amount imposed by the 1997 Adjusted OCAP, the word "maximum" should be deleted.

Response: This the maximum amount of storage that is allowed as governed by Truckee River diversions.

Item 41 Comment: Page 3-31, footnote number 8: "Based upon agreement associated with AB380 (1999 Nevada Legislature) where 6,500 acres will be purchased and retired on the Project. Assuming an average head duty of 3.7 AF/Ac and project delivery efficiency of 62%, this retirement should reduce the Project delivery for irrigation by approximately 38,790 AF." As noted above, full implementation of AB380 will reduce the size of the Project by 6,500 acres. It is, however, misleading to state that retirement of those acres will result in a reduction in Project deliveries by 38,790 acre-feet, because most of the acreage expected to be purchased has not been irrigated for many years.

Response: Based upon my experience, most of this acreage has been irrigated in recent years. This position is only an argument of the tribe and the Justice department, the TCID farmers take the opposite position in the transfer litigation.

Item 42 Comment: Page 3-32, footnote 13: "As mandated by P.L. 101-518, the Project target delivery efficiency is to increased from 62.1 to 75% over a certain time frame, thereby decreasing the Project releases for irrigation by estimated 66,060 AF (USDOI, 1994)." P.L. 101-618 does not require the project efficiency to be increased to 75%. P.L. 101-618 requires a study to determine the feasibility of increasing the efficiency to 75%. The committee report that accompanies the legislation states, "This section does not require the Newlands Project to be operate at 75% efficiency, but is intended to provide the Secretary and congress with a comprehensive, workable plan for significantly improving the efficiency of water use on the project." There are not plans to go to a 75% efficiency.

Response: See Item 4 and 38 responses.

Item 43 Comment: Page 3-33 through 3-34, Reduced Project Diversion for Irrigation: "…these reductions represent 87% to 101% reduction in Project diversion. If these reduction were compared to the Project diversions set forth in the 1988 OCAP of 320,000 AF, the reductions would vary from 111% to 128%." It is not possible to reduce Project diversion by more than 100%.

Response: Correct! The calculation was made to demonstrate that the Federal, PLPT, and State Actions that are threatened and treated cumulatively exceed the project water supply.

Item 44 Comment: Page 3-34, last paragraph: "Recently, the Unites States … has proposed reducing this (Lahontan Reservoir) capacity (end of June target storage) to 139,000 AF in their arguments presented in the recoupment litigation. This represents a 56% storage reduction in Lahontan Reservoir." As discussed previously, any change in Lahontan Reservoir storage targets affects only diversion from the Truckee River; it does not limit the amount of water which can be stored in Lahontan Reservoir, which receives most of it water from the Carson River.

Response: Wording will be modified to show that the limitation is related to the Truckee River diversions to Lahontan Reservoir. Historically, Lahontan Reservoir has received about half of its supply from the Truckee River and the remaining half from the Carson River.

Item 45 Comment: Page 3-34, paragraph 2: "Among those apparent conflicting actions are the wetlands acquisitions program and proposed Project delivery efficiency increase from 62.1% to 75%. As stated above, there are no requirements or plans to improve project efficiency to 75%.

Response: Same as Item 38.

Item 46 Comment: Page 3-34, paragraph 2: "Additionally, the purchase of water rights for wetlands from willing sellers, will in all probability, result in scattered retirement of parcels within the Project are rather than the block retirement of larger areas or an entire area served by one lateral or canal. As a result, achieving improved efficiency will be difficult, if not impossible to attain when most canals and laterals must be operated to serve fewer and scattered water users." The impact on project delivery efficiency of wetlands purchases will be affected by the location of the purchases and changes in operations. Delivery efficiency could increase due to the fact that the wetlands will take its water in large blocks. Current users take the water in small blocks.

Response: While some wetlands purchases have been rather large in the Stillwater area, others have been much smaller (individual farms) scattered throughout the Project. Efficiencies only increase if one assumes all the water in a particular canal is earmarked for the wetlands. That is untrue if there are a few farmers left at the end of a lateral where most of the other water rights have been acquired.

Item 47 Comment: Page 3-35, paragraph 3: It is not correct to state that the recoupment proposal submitted to the court by the United States will reduce the storage capacity of Lahontan Reservoir. If implemented by the court, the proposal would reduce storage targets for the reservoir, but storage targets are used only to determine when Truckee River water can be diverted to the reservoir. The volume of Carson River runoff that can be stored in Lahontan Reservoir is not limited by storage targets and would be constrained only by the capacity if the reservoir itself.

Response: Same as Item 32.

Item 48 Comment: Page 3-35, paragraph 2: "Since the (ground water) recharge is directly related to diversions made into the Project for irrigation, the estimated reduction in recharge will be in the order of 61,000 AF…" The wetland water acquisition program will not result in a complete elimination of ground water recharge. The water must still be transported to the wetlands via the existing delivery system and

seepage will occur. Existing studies show that the project canals are the largest source of groundwater recharge.

Response: While some recharge may occur as a result of the wetlands acquisition though existing canal, the conveyance will be more direct, thereby reducing the amount of seepage and recharge. Currently, the wetlands acquisition program is considering the rerouting and improvement of the conveyance of water to the wetland via lined canals etc, to reduce seepage and subsequent recharge of the ground water (Cal Poly, 2001). In Seiler's 1999 USGS report, he confirms that lateral abandonment and less irrigation will result in less recharge. Ms. Reike, the current Area Manager for the LBAO, has stated that BOR now realizes that the Cumulative effect of all Federal actions will mean that no viable agricultural community will remain in the Newlands Project. (Rieke, 2000).

Item 49 Comment: Page 4-8, paragraph 3, numbers 3 and 4, Irrigation Scheduling Service and Education. These two items (irrigation scheduling service and education) are already being addressed through Reclamation's Water Conservation Field Service's Program in partnership with the Lahontan Conservation District, Natural resources Conservation Service, and the Truckee Carson Irrigation District. We would welcome Churchill County as a partner in these activities.

Response: Thank you and I'm sure the County would appreciate the opportunity to cooperate with Reclamation and others in respect to these endeavors**.**

Item 50 Comment: Page 7-11, paragraph 2: "Projected environmental and permitting expenditures for gaining easements for power line extensions & upgrades and conveyance structures through the Project, many regulated by the BOR, are expected to be substantial and are estimated to approach 25% of the capital cost of improvements (SPPCo, 1999)" While it is true that many easements required for this project would be on land administered by Reclamation, Reclamation is willing to work cooperatively with Churchill County to obtain the easements. The estimate of the cost to obtain easements of 25% of the capital cost of improvements seems excessive. SPPCo's estimate of 25% of the capital cost of improvements is unfounded and grossly exaggerated.

Response: As indicated in the Plan, this is the information that was provided by SPPCo as per their experience working within the Project area. Upon relaying the Bureau's comments to SPPCo representatives, they maintain that the 25% estimate is reliable for planning purposes.

Item 51 Comment: Page 7-18: "Other seepage data reported earlier by the BOR in 1989, indicated that the seasonal or annual seepage rate for the Project was on the order of 79,000 AF." This is the estimated seepage for only the Carson Division of the Newlands Project.

Response: This has been clarified in the text.

Item 52 Comment: Page 7-20, paragraph 1: Same comments as on the easements above.

Response: Same as Item 49.

Item 53 Comment: Page 7-70, paragraph 2: Recharge and Treatment of Basalt Aquifer. The USGS has proposed to study the potential for recharging the basalt aquifer with surface water. This phase of the multi-phase USGS study proposal has not been funded and will be conducted only if funding is available.

Response: Thanks for the update.

Item 54 Comment: Page 7-70, paragraph 3: Basalt Aquifer for meeting peak demands. The USGS is currently studying the potential for in-situ remediation of groundwater in the basalt aquifer for its elevated concentrations of arsenic.

Response: This USGS study reference will be added to this paragraph.

VII. U.S. GEOLOGCIAL SURVEY, WATER RESOURCES DIVISION, U.S.D.I.

Reference: Correspondence of March 20, 2000 to B.J. Selinder, County Manager, Churchill County from Jon O. Nowlin, Nevada District Chief, USGS

Item 1 Comment: Page 1-2, Lahontan Valley Ground Water, Paragraphs 1. The reference to annual recharge from precipitation should read Glancey and Katzer, 1975, rather than Glancy, 1975. Here and elsewhere in the report, the estimate of 70,000 acre-ft/yr for recharge from the surface-water distribution system is based on estimates of outflow from irrigated land during 10 year with below average releases from Lahontan Reservoir. As stated in the Resource Plan, the value is implied to be fairly precise; however, Maurer (1994, p.28) cautions that values calculated using estimates of streamflow having uncertain accuracy should not be considered exact. Recharge from the distribution system is quite uncertain as shown by the reported range of 50,000 to 100,000 acre-ft/yr presented in Maurer (1994, p.71 and 72). Use of this range for recharge from the surface-water distribution system would provide reasonable bounds for planning purposes.

Response: Out of the 18 year period (1975-1992) 11 year releases were below the average of 370,000 acre feet, while the remaining 7 years were above the average. Upon considering the effect of P.L. 101-618 and other Federal actions may have in reducing the Project diversions, a below average release may be more meaningful in estimating the groundwater recharge. An average release of 370,000 acre feet is well within the projected release amount allowed by the Bureau of Reclamation. The 1988 OCAP called for a diversion rate of 320,000 acre feet. A range of groundwater recharge from 50,000 to 100,000 acre feet will be incorporated in the text.

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Item 2 Comment: Page 1-2, Lahontan Valley Ground Water, Paragraph 2. On page 3-21, the table shows full implementation of P.L. 101-618 reducing water–right acreage by 10.7 -78.6 percent, not 87 percent, as stated. The value of 87 percent is probably the result of all pending actions on the system as described in Table 3.3.2. Using the quite inexact value of 70,000 acre-ft/yr for recharge in calculations of overdraft is potentially misleading. The amount of permitted ground water rights in Lahontan Valley is correctly reported as "committed". However, the actual amount of water pumped under the permits is not known, and, as in most basins along the Carson River is probably much less than the total amount permitted. The amount not currently being used may represent a large part of the 2025 water demand of 21,531 acre-ft/yr, described on page 1-3, if permits could be obtained by or transferred to Churchill County.

Response: In response to the first three sentences, the reviewer is apparently referring to the statement made whereby as a result of enforcement of the elements of P.L 101-618 (OCAP, Cu-Ui Recovery, Wetlands Acquisition of water rights, Naval Air Station Conservation, Project Delivery Efficiency increase, etc) and all of the other actions being taken to reduce diversions to the Project, the diversion reduction would vary from 354,000 to 411,000 acre feet which equates to a 87 to 101 percent reduction as based upon a diversion rate of 406,000 acre feet.

In respect to the committed water rights, whether they are being fully utilized or not at this time will be impacted by the threatened reductions in diversion to the Project since these rights are dependent upon the recharge of the ground water by the irrigation Project. The State Engineer recognized this fact in the curtailment Order No. 1116 where no further quasi-municipal wells are allowed excepting wells pumping 4,000 gallon or less per day.

Item 3 Comment: Pages 1-6 to 1-8, 7.0, Alternative Water Resources and Treatment: USGS: For alternatives 7.1, 7.2, and 7.3, it seems the order by the State Engineer no. 1116 would need to be rescinded, as described in the detailed description of alternative 7.1 on page 7-1. This is not discussed or mentioned in the Executive Summary, or in the detailed descriptions of alternatives 7.2 and 7.3.

Response: A good comment. A discussion of State Engineer Order 1116 will be included in the Executive Summary under the discussion of alternative 7.1, 7.2, and 7.3. In respect to alternatives 7.2 and 7.3, the surface water rights are proposed to be diverted by wells supplied from either the seepage and recharge from the Projects conveyance system (7.2) or the River (7.3). Conceptually, from the State Engineer's standpoint, this change in delivery may only involve a change in manner of use from irrigation to quasi municipal. The State Engineer will ultimately determine the necessity of modifying the Order in the event alternatives 7.2 or 7.3 are pursued.

Item 4 Comment: Page 1-7, 7.2, Project Conjunctive Surface & Ground Water Development, Paragraph 2: Statement that the "alternative could benefit TCID through improving the conveyance efficiency of the Project" is not supported or mentioned in the detailed section 7.2, pages 7-18 to 7-25. It seems that pumping adjacent to the canals would increase seepage and decrease Project efficiency.

Response: From Project's standpoint seepage that occurs from the conveyance system is essentially lost and is not available to serve other irrigation surface water rights. Seepage, on the other hand that can be harvested from earthen conveyance systems by wells can be delivered at high degree if efficiency for quasi municipal use if diverted by wells located near the conveyance structures. It is expected that the greatest seepage loss occurs during the first few weeks that the canals and laterals are charged with water in the spring. Later in the season these conveyance structures tend to seal, thereby limiting the seepage rates and allowing the conveyance efficiency to increase. If this is the case, the pumping of wells nearby would have less influence on the induced seepage rate of the conveyance structure over the balance of the irrigation season. The primary water supply for the proposed wells would presumably be supplied annually by seepage from the conveyance system at the time of first charging the canal in the spring. Since the effect of the wells is felt only during a short period in the spring, the overall conveyance efficiency for the entire season may not be adversely affected. Field studies must be undertaken to verify these presumptions. Interestingly, the

Bureau of Reclamation's (BOR) review of the Water Resource Plan did not include comments on this issue one way or the other. In the BOR's efficiency study (Ref. Newlands Project Efficiency Study, 1994, p. 139) consideration was given to the use of pumped wells to service remotely located irrigation farm head gates in lieu of surface delivery laterals.

Item 5 Comment: Page 2-2 Paragraph 1: Last sentence stating that subdivision development in Lahontan Valley has been brought to standstill by Order No. 1116 of the State Engineer, Is not true. Check with Rick Sugg, Director, Churchill County Planning; several subdivisions are currently planned and actively in development using individual domestic wells as a water source.

Response: True, subdivisions supplied by individual single dwelling ground water wells are allowed in the County. Subdivisions, however, that requires a centralized quasi municipal well (i.e. well pumping more than 4,000 gallons per day or 2.78 gpm pumped continuously for 24 hours) is prohibited as per Order No. 1116.

Item 6 Comment: Page 3-5 Newlands Irrigation Project, Paragraph 1: Discussions with BOR personnel indicate that direct water delivery to the Truckee Division for M&I and domestic water use does not take place, only indirectly through infiltration from the conveyance system as discussed on page 3-9.

Response: The BOR personnel are apparently unaware that six or seven 6" redwood banded pipelines with control gate valves at the Canal deliver water from the Truckee Canal to the farmsteads and communities (Fernley & Hazen) domestic, municipal, and stock water. The discharge rates of these pipelines were measured and documented in 1971 by the University of Nevada. (Ref. Guitjens and Mahannah, 1971) This component of the Project was constructed to supply these water users since relatively shallow groundwater was not yet present within the Project and the technology of pumped ground water wells had not yet been developed. Additionally, rural electrical power source was not yet available in the early portion of 1900s. Water from the pipelines was stored in cisterns to meet the domestic and municipal uses of that day. Although the original pipelines still supply water to farmsteads to meet stock water demands, the M&I demand of these communities as well as individual domestic demands are now met by the use of groundwater wells and submersible pumps.

Item 7 Comment: Page 3-9 Churchill County Claim, Paragraph 1: Statement that water diverted from Truckee has historically been used to directly supply M&I and domestic water needs does not appear to be correct.

Response: As discussed above under Item 6, the Project was constructed to supply not only irrigation water but also M&I, stock water and domestic water. The Truckee River Decree recognized this need as shown in Claim No.3 whereby the uses included: "supplying the inhabitants of cities and towns on the project and

for domestic and other purposes," Additionally, the BOR has indicated (BOR, 1994, p. 108) that approximately 5,900 acre feet of M&I water was supplied to individuals and subdivisions in 1989. According to this reference, the BOR considers the TCID an M&I supplier.

Item 8 Comment: Page 3-12, Estimated Natural Ground-Water Recharge, Paragraph 1: Reference to Glancy (1975) should be Glancey and Katzer.

Response: Correction made.

Item 9 Comment: Page 3-12, Estimated Natural Ground-Water Recharge, Paragraph 3: The shallow aquifer extends from near land surface to a depth of 50 feet (Glancy, 1981, p.6) not from 50 to 150 feet, as stated. Statement that Maurer (1994) estimates that shallow aquifer receives 120,000 acre-ft/yr from the irrigation distribution system is incorrect. Maurer (1994, p. 71 and elsewhere) states this volume is 50,000-100,000 acre-ft/yr. Thus subtracting an estimate of 50,000 acre-ft/yr of crop consumptive use to obtain a net recharge of 70,000 acre-ft/yr on 3-13 is inaccurate.

Response: The definition of the shallow aquifer as reported by the USGS will be shown as well as reporting the recharge ranging between 50,000 acre feet per year to 100,000 acre feet per year as estimated by Maurer (1994).

Item 10 Comment: Page 3-13, Paragraph 2: The intermediate aquifer extends from 50 feet to 500-1,000 feet Glancy, 1981, p. 6, not from 150 to 350-400, as stated. Statement that Maurer (1994) estimates recharge to the intermediate aquifer is 25,000 is incorrect. Maurer (1994, p. 71) states inflow to the intermediate aquifer is about 33,000 acre-ft/yr.

Response: The definition by the USGS of the intermediate aquifer will be shown and the recharge from the shallow to the intermediate will be corrected.

Item 11 Comment: Page 3-13, Paragraph 3: The deep aquifer is generally below depths of 500-1000 feet (Glancy, 1981, P.6), not 350-400 feet as stated.

Response: This USGS definition will be included in the Plan.

Item 12 Comment: Page 3-14 Permitted, Certificated Ground Water Rights: The number of domestic wells in use was estimated by Maurer (1994, P.72 and 74) to total about 4,500 from the shallow aquifer and 1,000 from the intermediate aquifer. The stated depth ranges for the shallow and intermediate aquifers are incorrect.

Response: These estimates will be included in the Plan.

Item 13 Comment: 3-16, Table 3.2.1: The best estimate for recharge to the shallow aquifer is the range of 50,000-100,000 acre-ft/yr, and to the intermediate aquifer, 33,000 acre-ft/yr, as discussed above.

Response: The range is included in the Plan.

Item 14 Comment: Page 3-35, Project Diversion Reduction, Paragraph 1: See discussion on use of 70,000 acre-ft/yr for recharge, above.

Response: The range is included in the Plan.

Item 15 Comment: Page 4-7 Paragraph 2: The number of domestic wells estimated in 1994 by Maurer (1994, not 1993) totaled bout 5,500, as described above.

Response: This change has been incorporated in the Plan.

Item 16 Comment: Page 4-8, Paragraph 2: Statement that ground-water quality will degrade with reductions in Project diversions is speculative. In fact, preliminary data collected under a cooperative program with Churchill County suggests water quality improved at two sites after irrigation was stopped.

Response: Upon visiting with the USGS, the author was not sure whether the two sites were irrigated or not. Generally, after irrigation is terminated and the cultivated vegetation disappears or becomes less dense and native or invasive vegetation becomes established, the ground water quality degrades. Without the application of irrigation water the ground water becomes more saline or alkaline due to the evapotranspiration and lack of irrigation which tends to concentrate salts in the ground water table. To make the statement that curtailment of irrigation will result in improved water quality is "highly" speculative.

Item 17 Comment: Page 5-3: Lahontan Reservoir Surface Water, and Appendix 5.0, Table 5-1: It would be worthwhile to determine and include the number of samples and dates of sampling used to determine the concentration of arsenic in water from Lahontan Reservoir. In Table 5-1, the concentrations of most other constituents are presented as a range of values while arsenic and nitrate are single values. It is not clear if these values are averaged or are from single samples. Data collected by USGS and presented in Water Resources Investigations Report 89-4105, p. 99, and Open-File Report 91-185, p. 104, show arsenic concentrations in the Carson River below Lahontan Reservoir ranging from 0.07 to 0.45 ppm, with highest values in the month of March from 1986 to 1989. This may affect the optimal timing for use of water from Lahontan Reservoir, and the analysis of treatment costs discussed in section 5.3. Also nitrate concentrations are listed as 0.00 in Table 5-1, while Table 5-3 and Figure 5-2 indicate higher concentrations.

Response: These references will be included in the tables and appendix.

Item 18 Comment: Page 5-4, Shallow and Intermediate Aquifer Ground Water, Table 5.2, and Appendix 5.2: Cursory examination of Appendix 5.2 reveals that, based on listed township and range locations for the samples some wells are not located in Lahontan or Dixie Valleys. If not typographical error, data from these wells should be

excluded from the statistical analysis of ground water in Lahontan and Dixie Valleys in Table 5.2.

Response: The few values that were included in the table outside the subject Valleys were excluded from the statistical analysis.

Item 19 Comment: Section 5.3 Water Treatment. Some section headings seem to be repeated, or are incorrect. On page 5-7, the headings reads "Treatment of Manganese Removal … Intermediate Aquifer"; on page 5-8, the heading reads "Treatment of Arsenic removal … Deep or Intermediate Aquifers" on page 5-9 the heading reads "Treatment of Arsenic and Manganese Removal … Intermediate Aquifer". I think some of the confusion comes from use of the term "deep" aquifer for the basalt aquifer as stated in the report by Gilmore engineering, Appendix 5.0. This report states that the aquifer supplying Fallon, the Navy, and Kennametal is deep aquifer. This at odds with the aquifer descriptions of Glancy (1981) and in previous section of the Resource Plan on pages 3-12 to 3-14.

Response: The water Treatment section has been rewritten by Nolte Engineering (Nolte, 2003) to reflect the current technology and costing of these various water treatment processes. A clarification has been made to differentiate the deep aquifer and the basalt aquifer as defined by Glancey (1981).

Item 20 Comment: Page 5-10, Treatment of Lahontan Reservoir Surface Water: Although arsenic was reported to exceed the projected MCL, there is no discussion or cost estimate for treatment of arsenic.

Response: The conventional water treatment that was described to treat Lahontan Reservoir water does remove arsenic down to the MCL set for arsenic. A statement to that effect will be added to this section. See Nolte (2003)

VII. WASHOE COUNTY DEPARTMENT OF WATER RESOURCES, WASHOE COUNTY

Reference: Correspondence of March 20, 2000 from Mr. Steve Walker, Washoe County Water Management Planner to Mr. Bjorn P. Selinder, Churchill County Manager

Item 1 Comment: Wastewater reuse: "Before getting into specifics, my general comment is that by not including wastewater treatment and its very useable recycled water supply a major issue or component of the water budget is not being addressed".

Response: Wastewater reuse and the integration of a wastewater treatment facility County wide will be discussed and recommended in the Final Plan. It is interesting, however, to note that the Truckee Meadows Water Authority's (TMWA) 2005-2025 Water Resource Plan, Working Draft v02 (2002) does not include a discussion of wastewater reuse in the Truckee Meadows, nor is recycled reuse water included in the water supply vs. demand projections.

Item 2 Comment: Conjunctive use of groundwater and surface water: "My second major concern is that a conjunctive use system of treated surface water providing base demand and groundwater providing peaking was not analyzed."

Response: In 1977 (Watersource Consulting Engineers) considered using surface water treated at Lahontan Reservoir conjunctively with Basalt aquifer groundwater wells to meet peaking demands. This alternative was considered when the MCL for arsenic was set at 50 ppb. With the Basalt water quality was about 100 ppb arsenic, the mix ratio was a 2 to 1. Now with the MCL mandated at 10 ppb, it not believed practical to blend and mix Basalt water at 100 ppb with treated surface water (arsenic removed) at 10 to 1 ratio. On the other hand if groundwater wells can be developed that have relatively low concentrations of regulated constituents, they may be used to blend and meet peaking needs in conjunction with a surface water treatment base supply.

Item 3 Comment: Acquire Surface water rights: "Not considering a surface water resource because of the threat that all surface water rights are vulnerable to buy-out, payback and/or increasing project efficiency standards is operating in a reactive posture. As the report points out, your water resource is surface water. At least you should consider the pro-active approach of requiring surface water right dedication for any type of land division other than land division maps – with water rights held until a trigger point requires construction of a surface water treatment plant. In the meantime groundwater could be used to serve development."

Response: The County is acting in a pro-active manner in that a dedication ordinance is in place whereby developers must provide or dedicate surface water rights to the County in an amount equal to the water demand of the development. This dedication is either in the form of dedicated surface or ground water rights or payment equaling the value of the water rights. The proposed short term development is to be met with the existing or historical groundwater supply as long as it can be sustained and the long term supply is to be met by the Dixie Valley alternative or some combination of the other alternatives that depend upon surface water rights from the Project.

Item 4 Comment: Growth, demand and water supply loss: "My final comment is that the entire report takes the maximum values for growth, per capita consumption and water right loss. I believe that once a refined alternative or two are recommended, then the analysis should re-work the numbers under low moderate demands to more reflect reality."

Response: Growth projections are considered reasonable. The State Demographer projections support this projection. We believe that the water demand expressed on per capita basis of 270 gallons per capita per day is conservative, considering that the majority of use will include the rural irrigation of small pastures, lawns, gardens and livestock use. In the Truckee Meadows the Truckee Meadows Water Authority currently calculates that the per capita use in

the more urban area is 280 gallon per capita per day and is projected to level out at about 250 gallons per capita per day beginning in 2012 and continuing through 2024. The loss of groundwater recharge, resulting from the combination of the threatened actions being taken by the Federal and upstream interests is very real.

X. SUMMARY OF SUBJECTIVE MATRIX EVALUATION OF WATER SUPPLY ALTERNATIVES

Upon reviewing the Subjective Matrix Evaluation Summary of Water Supply Alternatives, the Dixie Valley Ground Water Importation alternative received the highest average rating of 4.0. Major reasons for supporting this alternative includes the supply would provide for a high degree of drought resistance, water quality and quantity appears to be superior to other alternatives, this source would be least affected by the ever increasing demands for water sources in northern Nevada, and the source would least liable to be shackled by future Federal regulations. The down side of this alternative is the cost. The Lahontan Reservoir alternative follows the Dixie Valley in preference as per these evaluations while the historic Lahontan Valley Ground Water alternative is rated as the lowest. The primary reason that this alternative is rated low is due to the threatened Federal, Tribal and State actions which will reduce the recharge of the existing Lahontan ground water supply. In conclusion, it is suggested by the reviewers that several of these alternatives should be studied and perhaps pursued and then developed together to meet the future demands of the County quasi municipal development.

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Memo.cwpreviewer comments.doc

VOLUME II
APPENDIX 5.2

CHURCHILL COUNTY UNDERGROUND WATER QUALITY DATA SUMMARY

(LAHONTAN VALLEY)
(DIXIE VALLEY)

October 9, 2003

WATER
RESEARCH &
DEVELOPMENT, INC.
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The enclosed underground water quality data was summarized from water quality reports analyzed by the Nevada State Health Laboratory. The reports were produced from the records of the State of Nevada Bureau of Health and Protection Services and the data was entered into a Microsoft Access relational database. The records are sorted in ascending order by township, range, section and date of analysis. The majority of the samples are located in the Lahontan Valley, while a few are located in Dixie Valley located in Churchill County.

All of the parameters are reported in ppm except: Color, Turbidity and pH. Each of the parameters was compared against the maximum contaminant levels (MCL's) which the Bureau of Health Protective Services regulates. The new Arsenic standard of 0.01 ppm was used. If the MCL is exceeded, the value is shaded which allows for a quick scan of the data to determine which parameters are exceeded.

TABLE 5.2 HISTORICAL LAHONTAN VALLEY UNDERGROUND WATER QUALITY & MCL EXCEEDENCE[1]

CONSTITUENT	MCL (ppm)	NO. OF RECORDS WHICH EXCEED MCL'S[2]	% OF RECORDS WHICH EXCEED MCL's
TDS	500	1103	40%
MAGNESIUM	150	30	1%
SULFATE	250	368	13%
CHLORIDE	400	117	4%
NITRATE	10	590	21%
FLOURIDE	2	203	7%
ARSENIC:			
Current Standard	0.05	955	34%
2006 EPA Standard	0.01	1898	68%
Detection Level	0.002	2656	95%
IRON	0.6	188	7%
MANGANESE	0.1	810	29%
COPPER	1	2	0%
ZINC	5	1	0%
BARIUM	2	0	0%
COLOR	15	342	12%
pH	6.5-8.5	506	18%

[1] See Appendix 5.2 which is a tabulation of the water quality records sorted by Township, Range & Section.

[2] There are a total of 2792 records in the data base, however some of them are duplicate wells sampled at different dates.

Churchill County Water Quality Data

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
111111					Dom			No									
1					CL'S			No	500			150			250	400	10
76837	8/24/87				Dom			No									
68854	10/25/85		30	8	Dom	30	8	No	241	73	21	5	48	4	38	13	0.1
70057	11/20/85	12	29	31	dom	20	5	No	338	83	25	5	84	4	50	12	4
56992	7/7/81	15	34	10	Dom	505	16	No	1050	143	49	5	266	14	340	193	0.6
69800	10/14/85	17	24	34	Dom	100		No	324	157	43	12	39	5	80	13	0.4
61263	12/20/82	17	28	1	Dom	22		No	558	183	52	13	117	8	95	45	0.7
63347	9/20/83	17	28	1	Dom	28	6	No	1150	489	151	27	186	8	261	130	81.7
82163	2/23/89	17	28	1	Dom			No	1633	71	22	4	536	11	485	155	0.2
68944	7/29/85	17	28	2	Dom	25	8	No	1124	103	33	5	364	5	322	110	0.1
88653	7/3/90	17	28	2	Dom	20	8	No	1016	192	52	15	289	12	256	92	0.6
127181	5/9/96	17	28	2	Dom	23		No	1313	267	77	18	357	10	342	247	0
93803	8/15/91	17	28	3	Dom	20	6	No	806	164	46	12	215	10	189	61	1.9
97143	5/27/92	17	28	8	Dom	30	6	No	561	313	74	31	60	30	62	18	21.7
60607	9/9/82	17	28	12	Dom	20	8	No	1149	118	39	5	355	6	360	106	0.4
111673	4/6/94	17	28	12	Dom	20	6	No	345	96	22	10	89	8	58	25	0
99777	9/28/92	17	28	19	Dom	123	6	No	73	5	2	0	27	0	1	3	0.6
139609	7/13/98	17	28	27	Dom			No	333	5	2	0	117	5	29	6	0.1
96653	4/27/92	17	29	3	Dom		6	No	3047	13	2	2	1169	17	7	1000	0.7
98468	8/17/92	17	29	3	Dom	127	6	No	2489	7	1	1	977	13	14	750	0.3
100151	10/29/92	17	29	3	Dom	31	8	No	23953	1600	72	345	7721	148	3860	10300	0.3
58545	2/8/82	17	29	5	Dom			No	1061	3	1	0	417	4	36	170	0.3
59409	5/13/82	17	29	6	Dom	12	8	No	1098	92	22	9	351	10	344	124	4.4
62614	6/20/83	17	29	6	Dom	10	8	No	1568	204	57	15	454	10	460	237	5
64797	2/29/84	17	29	6	Dom	12	8	No	2445	562	126	60	614	17	765	505	0.5
72988	8/14/86	17	29	6	Dom	18	20	No	9202	1556	372	152	2406	34	3584	1875	32.8
58394	1/14/82	17	29	8	Dom	30	8	No	752	68	119	5	246	9	107	114	3
68447	5/28/85	17	29	8	Dom	18	8	No	347	169	51	10	49	8	47	15	12.3
58756	4/14/82	17	29	9	Dom			No	3947	5	2	0	1517	25	13	1250	0.6
81442	10/10/88	17	29	14	Dom	28		No	474	3	1	0	159	7	62	24	21
68786	7/8/85	17	29	18	Dom	45		No	29650	2059	137	417	10110	126	5125	12600	0.2

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
			2	0.01	0.6	0.1	1	5	2			15		8.5		
				0.12												
126	154	0	0.45	0.007	0.5	0.41	0	1.24	0.03	0.4	43	12	1.9	7.86		
200	244	0	0.69	0.058	0	0	0.01	0	0.01	0.5	45	5	0.4	8.19		
126	154	0	2.6	0.03	0.04	0.01	0.02	0.59	0.02			5	0.3	7.81		
150	183	0	0.21	0.003	1.54	0.02	0	0.38	0.04	0.2	43	35	9.1	7.8		
292	356	0	0.56	0.045	0.07	1.98	0	0.02	0.09	0.8	41	10	0.8	7.6		
394	481	0	0.31	0.03	0	1.95	0.03	0.07	0.06	1	43	17	0.5	7.58		
538	603	26	1.06	0.16	0.04	0.1	0	0	0.1	2.1	44	3	0.5	8.21	2453	
402	490	0	1.09	0.23	0.04	0.44	0	0.03	0.02	1.4	41	10	0.3	7.87		
438	534	0	0.99	0.03	0.3	0.53	0	0.01	0.06	1.4	45	10	0.6	7.52	1541	
390	476	0	0.94	0.03	0.01	0.65	0.01	0.06	0.05	1.5	38	10	0.3	7.69	2068	0.55
364	444	0	0.89	0.13	0	0.45	0.17	0.03	0.04	1	44	3	0.1	8.01	1244	
384	468	0	0.31	0.03	0.01	0	0.04	0.08	0.08	0.5	56	3	0.1	7.95	845	
322	393	0	2.06	0.35	0.04	0.52	0	0.04	0.01	2.6	45	12	0.7	7.64		
192	234	0	0.44	0.02	0.29	0.779	0	0	0.05	0.5	38	17	1.4	7.96	553	0.03
58	46	12	0.22	0.1	0.01	0	0	0.01	0.01	0.8	18	3	0.2	8.32	124	
218	222	22	0.98	0.17	0.36	0.03	0.03	0.02	0.02	0.6	40	25	1.4	8.67	527	-0.24
1206	1320	74	3.74	0.39	0.12	0	0	0	0.06	13.2	37	70	1.6	8.65	5039	
1020	1108	67	3.38	0.52	0.47	0.02	0.01	0.04	0.04	9.6	37	70	0.2	8.84	4057	
1138	1388	0	1.22	0.53	0.57	0.14	0.01	3.29	0.02	65.1	36	30	4.1	7.87	30995	
608	644	40	3.08	0.42	0.37	0.02	0	0.04	0.01	3.3	41	70	1.7	8.94		
332	405	0	0.85	0.13	0.28	0.17	0	0.01	0.02			25	4.9	7.82		
420	512	0	0.9	0.06	0.02	0.26	0.28	0.05	0.07	2.5	34	20	0.3	7.61		
432	527	0	0.63	0.05	0.02	3.27	0.14	0.01	0.1	3.3	34	7	0.2	7.54		
664	810	0	1.11	0.2	0.43	1.98	0.03	0.22	0.06	18.5	41	55	1.8	7.63	11528	
312	351	12	1.04	0.24	0	0	0	0.01	0.03	1.5	39	5	0.3	8.24		
202	246	0	0.46	0.04	0	0	0	0.03	0.06	0.5	36	5	0.1	7.72		
1540	1659	90	4.12	0.27	0.04	0	0	0	0.06	19.7	41	70	0.4	8.6		
254	310	0	0.43	0.05	0	0	0.05	0.01				3	0.4	7.94	716	
774	944	0	1.28	0.07	0.15	0.33	0.1	0.83	0.02	40.5	39	25	0.8	7.71		

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
70294	12/23/85	17	29	18	Dom	12		No	1166	206	48	21	328	9	177	160	1.3
92409	5/22/91	17	29	18	Dom	30	12	No	922	136	20	21	268	16	137	154	0.3
78391	1/28/88	17	29	26	Dom	14	8	No	1563	131	31	13	486	9	468	310	7.9
71612	4/21/86	17	29	28	Dom	40	8	No	2202	329	56	46	644	19	545	430	20.5
71611	4/21/86	17	29	28	Dom	30	8	No	2189	329	56	46	639	19	531	415	21.9
82166	2/23/89	17	29	29	Dom	117	22	No	11260	1461	308	168	3116	22	4220	2250	2.8
110834	2/23/94	17	33	24	Dom	540	8	No	600	7	1	1	221	8	91	106	0.7
76701	8/5/87	17	35	32	Dom		6	No	552	148	51	5	117	5	180	37	0
84398	10/12/89	17	36	25	Dom	206	6	No	288	109	32	7	48	5	39	20	3.4
129605	9/18/96	17	36	31	Dom	80	6	No	591	185	59	9	112	12	118	67	5.3
62523	6/29/83	18	2	30	Dom	35	8	No	1257	267	79	17	308	17	457	122	9
73825	10/22/86	18	2	30	Dom	35	8	No	161	0	0	0	61	1	11	14	0
131736	2/5/97	18	18	29	Dom	170	6	No	528	3	1	0	175	5	38	8	0.3
68307	5/3/85	18	21	21	Dom		8	No	936	434	126	29	137	15	270	93	0
68308	5/3/85	18	21	21	Dom			No	930	430	126	28	125	7	266	95	2.5
71364	4/8/86	18	25	35	Dom		8	No	205	71	20	5	30	5	37	18	0
49480	4/6/79	18	26	5	Dom			No	820	119	31	10	237	9	225	115	3.8
73492	9/24/86	18	26	5	Dom	165	10	No	2366	783	208	64	424	20	400	900	8.9
81737	1/10/89	18	27	6	Dom	26	8	No	1041	115	36	6	290	43	393	114	0.2
97858	7/6/92	18	27	24	Dom	36	6	No	250	56	16	4	61	3	38	13	0.7
59908	7/20/82	18	28	1	Dom			No	2007	84	27	4	649	27	656	183	10.7
60070	7/23/82	18	28	1	Dom	25	12	No	1138	61	21	2	361	14	169	49	9.3
64430	2/3/84	18	28	1	Dom	32	6	No	324	153	40	13	49	6	44	12	8.1
64782	3/19/84	18	28	1	Dom	110	6	No	476	8	3	0	156	5	93	25	0.7
66971	12/12/84	18	28	1	Dom	25	8	No	565	227	61	18	90	19	142	46	0
68414	5/21/85	18	28	1	Dom	35	8	No	529	233	62	19	95	7	74	18	10.5
71369	4/7/86	18	28	1	Dom	110	8	No	423	5	2	0	137	6	109	28	0
59282	5/3/86	18	28	1	Dom			No	450	42	12	3	132	18	84	24	0.2
73298	9/3/86	18	28	1	Dom	30	6	No	889	152	41	12	238	31	259	60	2.1
73294	9/4/86	18	28	1	Dom	30	6	Yes	611	79	20	7	181	20	110	23	0
73798	10/20/86	18	28	1	Dom			No	440	166	50	10	79	9	88	29	8.6
75079	3/9/87	18	28	1	Dom	28	8	No	1093	158	40	14	322	15	293	90	5.8
75636	4/20/87	18	28	1	Dom	28	8	No	867	111	28	10	255	13	213	65	5.3
76776	8/17/87	18	28	1	Dom			No	919	400	119	25	142	14	274	89	17.6

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
70294	546	666	0	0.84	0.07	0.38	1.07	0	0.04	0.04	2.3	60	45	1.6	7.74		
92409	390	476	0	0.58	0.07	0.02	1	0.01	0.14	0.04	1.6	47	7	0.2	7.68	1496	
78391	310	378	0	0.62	0.16	0.07	0.37	0.05	0.03	0.06	2.3	35	25	4.4	7.45	2472	
71612	620	756	0	0.64	0.15	0	1.78	0	0	0.09	3.5	41	10	0.2	7.87		
71611	638	778	0	0.64	0.13	0.02	2.12	0	0.01	0.11	3.7	41	15	0.1	7.7		
82166	740	903	0	0.72	0.09	0.07	3.5	0.16	1.36	0.04	24	33	17	1	7.4	13526	
110834	246	212	43	0.73	0.1	0.02	0	0	0	0	1.2	27	5	0.4	9.26	995	0.07
76701	164	200	0	2.82	0.05	0.08	0.01	0.02	0.15	0.03	0.3	52	3	0.4	7.53	849	
84398	152	185	0	0.45	0.01	0.79	0.15	0.01	0.54	0.02	0.2	53	12	3.7	7.6	441	
129605	198	242	0	1.68	0.01	0.01	0	0	0.06	0.03	0.4	68	3	0.1	7.96	857	0.45
62523	326	398	0	0.76	0.05	0.03	2.8	0	0.02	0.12	1.7	28	20	0.7	7.66		
73825	104	127	0	0.45	0.01	0	0	0	0.01	0.06	1.2	9	3	0.4	7.28	276	
131736	328	400	0	2.02	0.26	0.31	0.03	0.01	0.01	0.02	1.3	43	55	3.2	7.58	759	-1.48
68307	350	427	0	0.47	0.05	0	4	0	0.01	0.32	0.8	43	5	0.4	7.61		
68308	318	388	0	0.42	0.04	0	5.95	0	0.01	0.14	0.9	43	5	0.2	7.54		
71364	82	100	0	0.26	0.02	0.03	0.09	0	0.81	0.03		49	5	0.3	7.95		
49480	224	273	0	0.56	0.2	0.05	0	0	0.02	0.2			3	0.4	7.91		
73492	92	112	0	0.27	0.024	1.2	0.11	0	0.01	0.05	0.8	63	25	5.1	7.61	3618	
81737	260	264	26	0.3	0.02	0.12	0.1	0.01	0	0.03	0.6	41	7	0.5	8.3	1618	
97858	130	159	0	1.19	0.08	0.03	0.01	0	0.08	0.02	0.3	41	3	0.3	8.05	365	
59908	564	649	16	1.3	0.21	0	0.04	0	0.02	0.01	3.2	41	12	0.4	8.2		
60070	654	725	30	1.6	0.36	0	0.04	0	0.02	0	2.2	39	20	0.4	8.36		
64430	196	239	0	0.34	0.02	0.02	0.04	0	0.05	0.04	0.3	39	3	0.4	8.02		
64782	214	144	58	0.76	0.225	0.46	0.07	0.08	0.04	0.03	0.5	43	35	17	9.47		
66971	240	293	0	0.42	0.05	0.09	0.47	0	0.01	0.06	0.4	34	5	0.5	7.98		
68414	346	422	0	0.51	0.02	0.02	0.23	0.05	0.03	0.03	0.6	45	5	0.2	7.93		
71369	172	176	17	0.53	0.07	0.29	0.02	0	0	0.01		41	17	0.8	8.82		
59282	210	256	0	1.76	0.31	0.17	0.02	0.01	0.06	0			3	0.4	8.04		
73298	346	422	0	0.6	0.003	0.08	0.22	0	0.01	0.05	1.3	40	7	0.4	8.17	1370	
73294	362	427	7	1.23	0.09	0	0.05	0.03	0.01	0.02	1.5	42	3	0.2	8.24	974	
73798	216	264	0	0.36	0.03	0	0	0.04	0.08	0.04	0.6	32	3	0.3	7.63	697	
75079	436	532	0	1	0.25	0	0.26	0	0	0.03	1.6	49	7	0.4	8.08	1683	
75636	358	432	2	0.97	0.24	0	0.16	0	0.02	0.02	1.3	49	7	0.4	8.26	1336	
76776	294	359	0	0.28	0.02	0.01	0.03	0.01	0.48	0.07	0.9	33	5	0.4	7.46	1388	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
84914	12/4/89	18	28	1	Dom	94	6	No	291	3	1	0	96	2	58	13	0.2
87055	4/17/90	18	28	1	Dom	35	6	No	923	257	65	23	183	14	274	5	6.5
88707	7/17/90	18	28	1	Dom	28	6	No	3970	349	100	24	1128	96	1660	410	30.7
89000	8/2/90	18	28	1	Dom	30	6	No	519	41	10	4	163	18	68	18	4.8
96363	4/2/92	18	28	1	Dom	90	6	No	177	103	33	5	14	2	19	6	2.1
126873	4/16/96	18	28	1	Dom	110	6	No	431	3	1	0	140	7	132	30	0
132998	5/15/97	18	28	1	Dom			No	546	124	33	10	138	14	155	43	0
137244	3/9/98	18	28	1	Dom			No	699	370	102	28	106	12	133	45	0
65175	5/7/84	18	28	2	Dom	14		No	580	302	91	18	47	17	75	72	58.2
65654	7/23/84	18	28	2	Dom	30	8	No	731	305	81	25	144	6	129	34	10.6
65684	7/23/84	18	28	2	Dom	28	8	No	430	183	52	13	77	3	85	14	13.7
67659	3/4/85	18	28	2	Dom		6	No	274	131	36	10	37	7	48	12	2.5
74094	11/17/86	18	28	2	Dom	33	6	No	299	31	9	2	92	3	39	11	2.3
90678	12/28/90	18	28	2	Dom	23	6	No	328	173	51	11	40	4	63	14	4.8
99991	10/16/92	18	28	2	Dom	50	6	No	298	49	13	4	87	5	42	13	0.3
100604	11/23/92	18	28	2	Dom		8	No									8
61145	12/8/82	18	28	3	Dom	30	8	No	387	205	59	14	44	14	44	12	25.2
70254	12/17/85	18	28	3	Dom	34		No	306	161	48	10	38	5	44	14	15.6
72987	8/14/86	18	28	3	Dom	30	8	No	384	164	41	15	60	16	53	13	0
83288	6/19/89	18	28	3	Dom	45	8	No	517	172	49	12	119	7	74	25	13.5
86954	4/25/90	18	28	3	Dom			No	763	312	92	20	144	8	133	32	16.7
86956	4/25/90	18	28	3	Dom			No	246	81	24	5	31	18	47	10	0.6
94192	9/27/91	18	28	3	Dom	30	8	No	999	341	102	21	212	9	224	91	18.2
94191	9/27/91	18	28	3	Dom	30	8	No	1225	615	180	40	192	14	219	124	8.3
59676	5/27/82	18	28	4	Dom	26	8	No	479	264	71	21	55	15	52	16	21.9
73510	9/26/86	18	28	4	Dom	30	8	No	467	244	63	21	48	11	61	20	47.1
73796	10/20/86	18	28	4	Dom			No	277	134	37	10	34	7	41	10	2.8
74292	12/2/86	18	28	4	Dom	30	6	No	438	173	48	13	70	17	48	14	22.9
75638	4/21/87	18	28	4	Dom			No	435	179	52	12	72	15	48	13	32
78390	1/27/88	18	28	4	Dom	18	8	No	321	139	36	12	47	15	39	10	0
79416	5/3/88	18	28	4	Dom	60	7	No	295	125	35	9	30	17	73	17	0
79381	5/6/88	18	28	4	Dom		8	No	520	214	61	15	89	11	78	20	27.9
79903	6/24/88	18	28	4	Dom			No	217	104	30	7	24	9	32	8	3.7
91559	3/7/91	18	28	4	Dom		6	No	528	235	66	17	89	11	73	35	25.4

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
84914	138	129	19	0.31	0.05	0.06	0.03	0.02	0	0.01	0.1	37	3	0	8.76	453	
87055	354	432	0	0.83	0.04	0.01	0.12	0	0.04	0.03	1.2	45	3	0.02	8.12	1309	
88707	636	776	0	0.53	0.06	0	0.09	0.01	0.09	0.04	3.4	37	17	0.4	8.13	5437	
89000	328	390	5	0.74	0.1	0	0	0	0.01	0.01	0.4	36	3	0.4	8.22	829	
96363	106	129	0	0.18	0.003	0.01	0	0	0	0.02	0.1	41	5	0.4	7.92	258	
126873	150	154	14	0.25	0.03	0.13	0.04	0	0.01	0.01	0.2	38	8	0.2	8.71	668	-0.68
132998	208	239	7	0.79	0.2	0.08	0.23	0.01	0.01	0.04	0.9	44	3	0.5	8.4	857	0.66
137244	398	486	0	0.28	0.03	0.02	0.19	0.01	0.76	0.03	0.7	55	3	0.4	7.74	1099	0.76
65175	200	244	0	0.29	0.01	0	1.64	0	0.21	0.19	0.3	36	7	0.3	7.58		
65654	426	520	0	0.6	0.01	0.01	0.4	0	0.1	0.05	0.8	47	5	0.3	7.92		
65684	222	271	0	0.5	0.02	0	0	0.02	0.01	0.04	0.5	49	3	0.2	7.81		
67659	152	185	0	0.33	0.04	0	0	0	0.04	0.03	0.1	39	5	0.2	8.14		
74094	178	207	5	0.1	0.16	0.15	0.01	0	0.02	0.01	0.5	43	5	0.9	8.34	461	
90678	178	217	0	0.4	0.02	0.11	0.34	0	0.01	0.09	0.4	39	3	0.4	7.77	525	
99991	172	200	5	0.77	0.08	0.01	0.04	0	0	0.01	0.4	43	3	0.1	8.34	438	
100604																	
61145	238	290	0	0.29	0.01	0.01	0.02	0.03	0.54	0.05	0.3	47	7	0.8	7.59		
70254	176	215	0	0.33	0.007	0	0.19	0	0.01	0.02	0.3	36	5	0.6	7.7		
72987	248	303	0	0.31	0.01	0.2	0.02	0	0.72	0.03	0.4	42	3	0.6	7.79	612	
83288	320	390	0	0.67	0.02	0.01	0.78	0	0.01	0.04	0.6	34	3	0.3	7.99	832	
86954	466	569	0	0.35	0.01	0	0.01	0	0.14	0.05	0.7	45	3	0.4	7.8	1124	
86956	112	137	0	0.29	0.01	0.14	0.26	0	0.01	0.07	0	47	3	0.5	8.16	366	
94192	454	554	0	0.31	0.02	0	0.05	0.02	0.16	0.13	1.3	38	3	0.4	7.73	1525	
94191	662	808	0	0.34	0.01	0	0.07	0.13	0.02	0.32	1.2	32	20	0.5	7.43	1856	
59676	290	354	0	0.25	0.01	0.52	0.01	0.02	0.47	0.06	0.4	49	3	0.8	7.56		
73510	240	293	0	0.37	0.04	0.46	0.09	0	0	0.05	0.4	51	17	2.2	7.84	710	
73796	158	193	0	0.34	0.03	0	0.01	0	0	0.03	0.3	45	3	0.2	8.02	433	
74292	176	337	0	0.39	0.02	0	0.06	0.06	0.06	0.06	0.5	46	7	0.4	7.83	689	
75638	266	325	0	0.42	0.02	0	0.06	0	0.02	0.06	0.4	44	3	0.2	7.77	698	
78390	218	266	0	0.45	0.02	0.29	0.01	0.03	0.29	0.06	0.3	47	5	2.7	7.41	518	
79416	116	142	0	0.27	0.01	0.28	0.45	0	0	0.09	0.2	50	3	1.1	7.78	450	
79381	298	364	0	0.33	0.01	0	0.14	0	0	0.06	0.6	47	3	0.2	7.67	820	
79903	120	146	0	0.28	0.03	0.01	0	0	0	0.01	0.2	38	3	0.2	8	343	
91559	300	366	0	0.34	0.01	0	0.31	0.01	0.04	0.07	0.6	44	3	0.4	7.55	845	

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
94950	11/27/91	18	28	4	Dom	60	6	No	315	134	37	10	29	17	72	19	0
106370	8/11/93	18	28	4	Dom	35	8	No	570	286	78	22	86	15	77	46	6.4
121306	6/9/95	18	28	4	Dom			No	445	35	9	3	136	8	67	24	0.8
127844	6/24/96	18	28	4	Dom	80	8	No	350	127	36	9	54	24	76	26	0
62610	6/28/83	18	28	5	Dom	29	6	No	245	107	28	9	33	13	35	12	0
65948	8/20/84	18	28	5	Dom	28	8	No	496	275	87	14	57	11	62	40	45.9
68314	4/29/85	18	28	5	Dom	30	6	No	750	420	122	28	70	8	185	75	7.8
69403	9/10/85	18	28	5	Dom	25	6	No	423	193	54	14	64	0	68	17	18.5
74563	1/13/87	18	28	5	Dom			No	431	95	33	3	113	7	68	15	5.9
76257	6/15/87	18	28	5	Dom	30	8	No	901	214	56	18	214	21	176	87	114.8
76471	7/14/87	18	28	5	Dom			No	333	181	56	10	31	10	43	10	14.3
76902	8/31/87	18	28	5	Dom	35	6	No	387	199	60	12	40	11	48	13	38.5
82164	2/23/89	18	28	5	Dom	25	6	No	730	258	77	16	151	10	177	34	4
83274	6/22/89	18	28	5	Dom			No	430	222	69	12	54	11	54	17	9.5
83458	6/30/89	18	28	5	Dom	109	6	No	308	0	0	0	106	1	41	7	0.9
86434	3/25/90	18	28	5	Dom			No	354	118	29	11	50	27	71	21	0
86955	4/25/90	18	28	5	Dom			No	379	120	30	11	64	23	64	18	4.7
90296	12/4/90	18	28	5	Dom			Yes	793	132	33	12	215	19	174	73	39.4
94435	10/16/91	18	28	5	Dom	35	6	No	553	261	73	19	80	14	99	27	25.7
95361	1/7/92	18	28	5	Dom	30		No	994	486	145	30	159	13	198	94	21
97384	6/15/92	18	28	5	Dom	65	6	No	452	47	14	3	123	14	123	32	0.9
99992	10/16/92	18	28	5	Dom		6	No	468	123	41	5	109	9	75	34	5.6
107498	9/15/93	18	28	5	Dom			No	291	125	37	8	45	8	60	25	1.2
71068	3/11/86	18	28	6	Dom	27	8	No	206	106	31	7	26	5	34	10	0
71751	5/2/86	18	28	6	Dom	160	10	No	1281	429	124	29	226	9	418	230	0
74446	1/5/87	18	28	6	Dom	40	8	No	636	352	93	29	64	6	163	40	12
77405	10/13/87	18	28	6	Dom	30	8	No	660	178	50	13	167	4	113	33	14.2
83180	6/9/89	18	28	6	Dom			Yes	2538	23	9	0	908	5	492	750	3.9
83331	6/26/89	18	28	6	Dom	21	5	No	680	205	59	14	150	9	184	62	5.6
84945	12/11/89	18	28	6	Dom	265	10	No	1137	390	110	28	193	20	379	200	2.9
95885	2/11/90	18	28	6	Dom	65	8	No	241	75	20	6	39	12	40	7	0
86718	4/17/90	18	28	6	Dom			No	382	187	50	15	48	3	65	28	9.1
88353	6/13/90	18	28	6	Dom	65	8	No	246	84	22	7	37	12	45	8	0.1
97783	7/15/92	18	28	6	Dom			No	25	0	0	0	9	0	1	0	0

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
94950	120	146	0	0.3	0.02	0.26	0.48	0	0	0.1	0.2	49	7	0.9	7.41	452	
106370	332	405	0	0.41	0.01	0.06	0.08	0.04	0.02	0.07	0.5	49	5	0.6	7.83	893	0.83
121306	248	264	19	1.07	0.19	1.09	0.12	0.08	0.05	0.02	0.8	42	25	8.4	8.34	666	0.12
127844	164	200	0	0.34	0.01	0.05	0.8	0	0	0.14	0.3	46	10	0.2	7.82	550	0.03
62610	130	159	0	0.27	0.03	0.02	0	0	0.02	0.06	0.2	41	5	0.2	8.19		
65948	234	285	0	0.36	0.03	0.04	0.01	0.01	0.01				5	0.3	8		
68314	274	334	0	0.27	0.01	0.04	0.02	0	1.15	0.13	0.5	43	3	0.3	7.85		
69403	230	281	0	0.5	0.04	0	0.2	0	0.11	0.04	0.5	43	5	0.2	7.94		
74563	256	312	0	0.44	0.04	0	0	0.01	0.05	0.05	0.5	30	3	0.2	8.07	677	
76257	308	376	0	0.36	0.05	0	0	0	0	0.06	0.9	43	3	0.2	7.9	1436	
76471	198	242	0	0.32	0.01	0.08	0.01	0.01	0.28	0.03	0.3	40	3	0.4	7.74	531	
76902	204	249	0	0.65	0.02	0	0	0.01	0.02	0.05	0.3	45	3	0.2	7.91	608	
82164	366	447	0	0.72	0.01	0	0.81	0.01	0.05	0.03	1	42	3	0.5	7.61	1133	
83274	272	332	0	0.44	0.03	0.12	0	0.05	0.03	0.05	0.4	40	3	0.3	7.66	679	
83458	188	171	29	0.77	0.224	0.82	0.03	0.04	0.03	0.01	0.4	39	25	3.3	9.16	475	
86434	160	195	0	0.35	0.06	0.29	0.56	0	0.01	0.08	0.2	51	3	1	8	554	
86955	212	259	0	0.46	0.04	0.16	0.32	0	0	0.06	0.2	49	3	0.9	7.97	600	
90296	330	403	0	0.12	0.003	0	0	0	0	0.01	0.9	27	3	0	7.95	1260	
94435	294	359	0	0.48	0.04	0.05	0.46	0.05	0.03	0.07	0.7	42	3	0.5	7.76	871	
95361	496	605	0	0.3	0.01	0.02	0.03	0.04	0	0.25	1	30	15	0.4	7.47	1512	
97384	170	193	7	0.42	0.03	2.54	0.22	0	0	0.07	0.4	69	12	9.3	8.37	642	
99992	226	276	0	0.57	0.05	0.01	0	0.01	0.02	0.06	0.6	38	3	0.1	8.17	695	
107498	130	159	0	0.28	0.01	0	0	0	0.02	0.08	0.4	33	3	0.5	7.53	454	-0.2
71068	126	154	0	0.23	0.01	0.21	0.51	0	0.73	0.05		28	12	1.8	7.6		
71751	202	246	0	0.5	0.02	0.2	0.12	0	0.11	0.07	1	43	10	0.5	7.67		
74446	276	337	0	0.26	0.01	0.01	0.01	0	0.02	0.03	0.6	52	3	0.3	7.72	946	
77405	368	449	0	0.79	0.04	0	0.02	0.01	0.01	0.03	0.8	39	7	0.4	8.11	1014	
83180	448	547	0	0.74	0.02	0	0	0.12	0	0	2	39	3	0.4	7.77	4097	
83331	262	320	0	0.46	0.02	0.03	0.1	0	0	0.04	1	40	3	0.5	7.72	1049	
84945	180	220	0	0.41	0.01	0.05	0.27	0.05	0.01	0.1	0.9	52	3	0	7.61	1622	
95885	126	154	0	0.32	0.023	0.29	0.22	0	0	0.04	0.2	51	12	1.9	7.89	356	
86718	184	224	0	0.45	0.01	0.28	0.04	0	0.03	0.12	0.2	48	7	1.6	7.1	589	
88353	118	144	0	0.31	0.02	0.22	0.22	0.01	0	0.04	0.1	53	3	1.2	8.1	361	
97783	24	5	12	0.07	0.005	0.01	0	0	0	0	1.3	3	3	0.4	9.08	41	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
104833	6/21/93	18	28	6	Dom	120	6	Yes	45	12	3	1	13	0	5	0	0.4
68309	4/8/85	18	28	7	Dom	23	8	No	1361	419	123	27	312	10	394	190	0.2
68542	6/6/85	18	28	7	Dom	30	6	No	1373	383	112	25	338	9	370	156	0
68544	6/6/85	18	28	7	Dom	23	8	No	1318	390	115	25	311	9	376	182	0
71468	4/15/86	18	28	7	Dom	33	8	No	1431	383	112	25	287	19	541	200	2.1
71996	5/27/86	18	28	7	Dom	33	8	Yes	511						90		
73429	9/8/86	18	28	7	Dom	54	8	No	1565	591	154	50	249	34	464	410	3.2
73967	11/5/86	18	28	7	Dom	55	8	No	1660	648	172	53	259	33	483	440	6.8
74897	2/18/87	18	28	7	Dom	87	8	No	258	64	19	4	54	8	55	13	0.1
75278	3/18/87	18	28	7	Dom	23	8	No	1315	665	187	48	141	10	500	142	7.8
81808	12/14/88	18	28	7	Dom	100	8	No	274	9	2	1	90	4	54	13	0.6
82983	5/18/89	18	28	7	Dom	38	6	No	1901	577	142	54	345	22	850	212	1.1
88911	8/1/90	18	28	7	Dom	32	6	No	1322	337	79	34	303	12	366	297	0.8
93126	7/1/91	18	28	7	Dom	69	6	No	415	135	36	11	68	18	108	65	0.5
93805	8/20/91	18	28	7	Dom	73	6	No	253	26	7	2	64	8	44	9	0.5
96898	5/5/92	18	28	7	Dom		8	No	594	305	81	25	88	6	111	35	10.3
99990	10/16/92	18	28	7	Dom		6	No	971	32	8	3	341	15	164	60	8.2
59022	4/2/82	18	28	8	Dom	78	8	No	237	38	12	2	53	9	45	9	0
59284	5/3/82	18	28	8	Dom	28	8	No	1567	462	132	32	321	29	598	217	9.2
62877	8/10/83	18	28	8	Dom	62	8	No	249	71	20	5	44	13	45	11	0
68915	7/17/85	18	28	8	Dom	30	6	No	1081	298	88	19	230	15	424	148	1.5
72037	5/29/86	18	28	8	Dom	65	8	No	263	33	10	2	63	9	41	12	0
73952	11/3/86	18	28	8	Dom			No	973	174	50	12	263	24	262	92	6.7
74896	2/19/87	18	28	8	Dom	40	8	No	264	73	21	5	52	12	50	12	0.3
76312	6/24/87	18	28	8	Dom	52	6	No	262	56	16	4	53	12	47	12	0
77979	12/21/87	18	28	8	Dom	30	8	No	837	150	45	9	228	10	234	84	4.5
79764	6/13/88	18	28	8	Dom	60	6	No	257	24	8	1	66	9	47	10	0
80511	8/23/88	18	28	8	Dom	32	8	No	387	175	55	9	60	10	55	16	15.9
82825	5/9/89	18	28	8	Dom	60	8	No	255	59	17	4	45	13	48	14	0.4
88331	5/31/90	18	28	8	Dom	64	6	No	444	144	38	12	69	18	113	71	0
89483	9/13/90	18	28	8	Dom			No	255	66	18	5	50	12	49	12	0
92799	6/12/91	18	28	8	Dom	78	8	No	240	45	13	3	53	8	42	8	0
94028	9/18/91	18	28	8	Dom			No	423	157	43	12	63	19	117	35	0
94741	11/13/91	18	28	8	Dom			No	257	63	17	5	52	13	51	12	0.2

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
104833	36	24	10	0.07	0.04	0	0	0	0	0	0.5	10	5	0.3	8.62	77	-0.59
68309	438	534	0	0.41	0.01	0.01	0.04	0	0.01	0.02	1.7	41	5	0.2	7.74		
68542	552	673	0	1.15	0.01	0.36	0.39	0	0.13	0.04	1.6	34	15	0.6	7.8		
68544	440	537	0	0.47	0.01	0.02	0.1	0.01	0.03	0.01	1.7	39	5	0.2	7.81		
71468	244	298	0	0.43	0.01	0	0.04	0	0.12	0.02	1.4	47	5	0	7.78		
71996																	
73429	136	166	0	0.24	0.01	1.34	2.49	0	0.01	0.16	0.3	49	7	2.6	7.72	2374	
73967	146	178	0	0.26	0.01	0.03	2.61	0	0	0.1	0.2	50	3	0.4	7.55	2530	
74897	114	139	0	0.35	0.02	0.95	0.13	0	0.04	0.02	0.3	46	25	15	8.14	402	
75278	270	329	0	0.3	0.01	0.02	0	0	0.01	0.11	1.2	43	3	0.3	7.59	1823	
81808	134	139	12	0.27	0.03	0.17	0.03	0	0.02	0.02	0.2	42	7	2.6	8.58	427	
82983	184	224	0	0.66	0.01	0.68	0.08	0	0	0.05	1.5	57	7	3.1	8.03	2518	
88911	236	288	0	1.22	0.015	0.08	0.05	0	0	0.02	1.1	51	3	0.3	8.1	2036	
93126	106	110	10	0.25	0.02	0.03	0.72	0	0	0.1	0.3	51	3	0.1	8.22	671	
93805	122	129	10	0.56	0.07	0.22	0.04	0	0.02	0.01	0.3	50	3	0.4	8.49	378	
96898	326	398	0	0.29	0.01	0	0	0	0.03	0.04	0.6	52	3	0	7.89	875	
99990	486	529	31	2.38	0.91	0.05	0.01	0	0	0.01	4.1	38	5	0.4	8.7	1482	
59022	110	124	4	0.41	0.03	0.15	0.12	0	0.01	0.02			5	0.8	8.2		
59284	284	346	0	0.4	0.01	0.02	0.01	0	0.01	0.01			3	0.3	7.83		
62877	116	142	0	0.34	0.02	0.03	0.26	0	0	0.06	0.2	49	5	0.6	7.8		
68915	188	229	0	0.37	0.01	0	0	0	0.03	0.03	1	36	3	0.2	7.8		
72037	126	144	5	0.37	0.05	0.04	0.11	0	0	0.02	0.3	49	3	0	8.25		
73952	368	449	0	0.62	0.03	0	0	0	0.01	0.07	1.1	46	5	0.3	7.91	1507	
74896	132	161	0	0.36	0.02	0.04	0.31	0	0.01	0.05	0.3	49	3	0.5	8.13	415	
76312	122	139	5	0.35	0.03	0.53	0.24	0	0.04	0.04	0.3	49	7	1.6	8.2	399	
77979	306	373	0	0.6	0.022	0.02	0	0	0	0.02	1.5	49	3	0.4	7.87	1285	
79764	120	132	7	0.4	0.06	0.13	0.08	0	0	0.01	0.3	51	3	0.4	8.35	383	
80511	230	281	0	0.49	0.01	0	0	0.01	0.01	0.05	0.4	46	3	0.1	7.7	617	
82825	114	139	0	0.32	0.02	0.17	0.2	0	0	0.04	0.3	47	3	0.4	8.1	378	
88331	108	117	7	0.25	0.02	0	0.7	0	0	0.15	0.1	52	3	0.2	8.3	706	
89483	126	154	0	0.36	0.03	0.05	0.23	0	0.01	0.04	0.1	50	3	0.4	8.14	397	
92799	116	127	7	0.38	0.04	0.02	0.1	0.08	0	0.01	0.3	49	3	0.3	8.24	354	
94028	146	178	0	0.25	0.03	0.06	0.75	0	0.01	0.1	0.3	51	3	0.3	7.86	651	
94741	124	151	0	0.35	0.011	0.29	0.23	0	0.12	0.03	0.3	48	5	2.1	7.96	400	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
103872	5/18/93	18	28	8	Dom			No	328	49	13	4	79	13	76	28	0
103871	5/18/93	18	28	8	Dom	100	6	No	295	38	12	2	70	10	63	23	0
114494	7/26/94	18	28	8	Dom	69		No									
132480	4/1/97	18	28	8	Dom	65	8	No	322	76	22	5	70	15	74	21	0
59964	7/19/82	18	28	9	Dom	30	6	No	377	199	60	12	44	9	56	18	9.1
60658	9/22/82	18	28	9	Dom			No	528	164	49	10	123	13	62	16	23.2
62878	8/15/83	18	28	9	Dom	32	7	No	344	89	24	7	74	13	59	27	5.4
68648	6/17/85	18	28	9	Dom	25	6	No	923	432	125	29	144	13	243	68	3.2
70037	11/18/85	18	28	9	Dom			No	284	158	50	8	30	8	31	9	4
70105	11/22/85	18	28	9	Dom			No	491	170	45	14	100	16	57	21	19.7
70891	2/24/86	18	28	9	Dom	24	2	No	812	190	53	14	222	8	155	60	34.3
71622	4/28/86	18	28	9	Dom	24	2	No	641	150	42	11	180	10	90	23	20.1
75203	3/16/87	18	28	9	Dom	175	9	No	235	10	4	0	69	9	45	8	0
76076	5/31/87	18	28	9	Dom			No	263	132	43	6	30	7	33	8	0
78515	2/18/88	18	28	9	Dom	30	6	No	655	194	66	7	147	10	89	24	9.9
93289	6/19/89	18	28	9	Dom	25	6	No	529	123	31	11	129	17	70	41	18
84397	10/13/89	18	28	9	Dom	25		No	649	234	69	15	124	17	126	42	10.8
86582	4/2/90	18	28	9	Dom			No	472	160	41	14	98	17	67	17	14.9
88820	7/24/90	18	28	9	Dom	28	8	No	216	107	33	6	27	6	34	17	2.4
98354	8/11/92	18	28	9	Dom	30	8	No	562	283	92	13	77	12	85	34	2.5
114481	7/27/94	18	28	9	Dom			No	259	129	40	7	33	6	54	20	2.5
67655	2/22/85	18	28	10	Dom	32	6	No	1008	233	67	16	254	11	270	108	40.5
82491	3/30/89	18	28	10	Dom	30	6	No	318	98	26	8	62	12	51	14	16.1
82828	5/3/89	18	28	10	Dom	28	6	No	662	306	88	21	104	12	128	47	0.7
84328	10/3/89	18	28	10	Dom	109	6	No	351	31	9	2	62	15	33	7	0.9
89847	10/11/90	18	28	10	Dom	27		No	412	206	56	16	45	16	63	25	12.4
67577	2/12/85	18	28	11	Dom	41	9	No	412	222	64	15	49	9	83	22	20.5
75398	3/31/87	18	28	11	Dom	30	6	No	463	218	61	16	77	8	78	21	5.4
78774	3/7/88	18	28	11	Dom	30	6	No	321	134	34	12	47	13	47	10	9.9
79137	4/11/88	18	28	11	Dom	30	6	No	541	258	77	16	78	8	98	28	22.1
79138	4/11/88	18	28	11	Dom	30	6	No	696	306	96	16	109	8	161	50	23.9
83365	6/30/89	18	28	11	Dom	52	6	No	326	163	44	13	45	13	66	21	17.1
84850	12/4/89	18	28	11	Dom	117		No	243	3	1	0	87	3	36	6	0.4
93352	7/19/91	18	28	11	Dom	38	6	No	400	246	82	10	36	5	72	27	12.9

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
103872	110	124	5	0.31	0.04	0.12	0.2	0.01	0.01	0.03	0.3	51	3	0.7	8.25	477	
103871	112	127	5	0.38	0.05	0.02	0.13	0	0	0.02	0.3	49	3	0.2	8.31	433	
114494					0.15												
132480	132	161	0	0.18	0.04	0.18	0.37	0	0	0.06	0.3	49	3	0.3	8.1	474	0.01
59964	206	251	0	0.29	0.015	0	0	0	0.01	0.04	0.4	39	3	0.4	8.02		
60658	330	403	0	0.78	0.03	0.01	0	0.01	0.04	0.03	0.6	45	10	0.4	7.89		
62878	162	198	0	0.53	0.01	0.02	0	0	0.02	0.03	0.4	36	5	0.4	7.86		
68648	438	534	0	0.41	0.02	0	4.08	0	0.01	0.1	1.2	30	10	0	7.71		
70037	186	227	0	0.38	0.03	0.01	0	0	0.03	0.02	0.2	41	5	0.2	8.02		
70105	312	381	0	0.63	0.06	0	0	0	0.01	0.04	0.7	43	3	0.5	7.91		
70891	398	486	0	0.99	0.01	0.04	0.01	0	0.01	0.04	1.1	49	5	1	8.13		
71622	408	498	0	0.91	0.02	0.05	0.01	0	0.01	0.03	1	47	10	1.5	7.96		
75203	116	127	7	0.38	0.05	0.05	0.05	0	0.01	0.02	0.3	43	3	0.4	8.46	366	
76076	166	203	0	0.29	0.04	0.01	0	0	0.25	0.02	0.2	30	3	1	7.47	424	
78515	422	515	0	0.71	0.05	0	0	0	0.07	0.05	0.7	42	3	0.2	7.55	1021	
93289	288	307	22	0.6	0.1	0.08	0	0.03	0.08	0.03	0.6	40	3	1.8	8.2	838	
84397	332	405	0	0.5	0.03	0.02	0.01	0.01	0.03	0.11	0.9	48	3	0.3	7.64	991	
86582	292	356	0	0.52	0.04	0.12	0	0.02	0.04	0.04	0.5	46	3	0.5	8.07	755	
88820	114	139	0	0.3	0.02	0	0	0.01	0.13	0.02	0.1	29	3	0.1	7.76	357	
98354	328	400	0	0.44	0.01	0	0	0	0	0.06	0.5	43	3	0.1	7.57	847	
114481	118	144	0	0.31	0.02	0	0	0.02	0	0.03	0.3	31	3	0.1	7.62	408	-0.25
67655	344	420	0	1.06	0.01	0.08	0	0	0.07	0.04	1	47	5	0.4	7.88		
82491	168	205	0	0.37	0.004	0	0	0.01	0.24	0.02	0.3	37	3	0.4	7.84	501	
82828	366	447	0	0.35	0.03	0.45	3.28	0.01	0	0.08	0.8	35	5	1.7	7.69	1043	
84328	148	146	17	0.48	0.003	0.03	0.01	0.03	0.01	0.03	0.3	46	25	0.5	8.58	384	
89847	218	266	0	0.51	0.015	0.02	0.01	0.03	0.01	0.03	0.2	51	3	0.2	7.85	645	
67577	210	256	0	0.23	0.01	0	0.01	0	0.02	0.06	0.2	32	3	0.2	8.01		
75398	282	344	0	0.26	0.01	0.04	0.07	0	0.02	0.07	0.6	40	3	0.6	8	754	
78774	184	224	0	0.44	0.02	0	0.01	0	0.44	0.04	0.4	40	3	0.3	7.91	498	
79137	294	359	0	0.38	0.03	0	0.02	0	0.02	0.06	0.6	43	3	0.1	7.6	851	
79138	298	364	0	0.41	0.02	0	0.45	0.02	0.04	0.06	0.8	44	7	0.2	7.61	1072	
83365	180	190	14	0.38	0.02	0.03	0.23	0	0.01	0.04	0.3	31	5	0.4	8.27	539	
84850	142	139	17	0.63	0.108	0.73	0.05	0	0.02	0	0.1	39	17	0.2	8.86	380	
93352	200	244	0	0.32	0.02	0.01	0.01	0	0.14	0.03	0.3	37	3	0.2	7.76	638	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
133287	5/30/97	18	28	11	Dom			No									0.1
62359	6/6/83	18	28	12	Dom	30	6	No	209	91	28	5	22	9	32	8	1.6
62849	8/8/83	18	28	12	Dom	31	5	No	526	263	74	19	66	7	100	41	48.8
68805	7/10/85	18	28	12	Dom	14	6	No	265	32	8	3	72	12	39	10	2.5
71776	5/7/86	18	28	12	Dom	28	6	No	243	95	28	6	34	16	34	10	3.8
75082	3/10/87	18	28	12	Dom		8	No	416	59	17	4	114	13	75	18	0.1
77475	10/19/87	18	28	12	Dom	25	6	No	440	120	33	9	102	4	123	22	2.7
79581	5/19/88	18	28	12	Dom			No	756	3	1	0	268	1	198	57	10.7
84396	10/16/89	18	28	12	Dom		8	No	418	56	16	4	115	13	73	19	0.3
98472	8/18/92	18	28	12	Dom	115	8	No	324	42	12	3	86	13	53	13	0
84673	11/8/89	18	28	13	dom	102	6	No	3189	5	2	0	1247	12	48	1238	0.8
91769	3/25/91	18	28	13	Dom	26	8	No	1101	143	39	11	325	26	209	72	22.4
92726	6/19/91	18	28	13	Dom			No	354	146	47	7	65	5	51	21	2.8
100592	11/20/92	18	28	13	Dom	155	8	No	393	0	0	0	138	3	36	7	0.3
108061	10/6/93	18	28	13	Dom	37	6	No	391	95	23	9	90	13	105	28	0.7
62879	8/14/83	18	28	15	Dom	72	6	No	305	10	4	0	91	9	38	8	0.1
70709	2/4/86	18	28	15	Dom			No	262	96	27	7	43	12	42	10	5.7
70722	2/10/86	18	28	15	Dom	22	8	No	203	115	36	6	23	3	33	10	2.1
70998	3/10/86	18	28	15	Dom	30	8	No	254	117	32	9	35	8	39	12	6.4
71849	5/14/86	18	28	15	Dom	30	8	No	217	91	25	7	27	12	32	7	4.6
73514	9/30/86	18	28	15	Dom			No	376	107	33	6	79	11	54	10	13.1
86171	3/5/90	18	28	15	Dom	64	8	No	329	10	4	0	99	8	41	11	0.2
91264	2/8/91	18	28	15	Dom	30	8	No	310	139	39	10	42	12	47	18	11.4
98556	8/20/92	18	28	15	Dom	66	6	No	294	17	5	1	88	8	39	7	0.1
101166	12/28/92	18	28	15	Dom	66	6	No	302	17	5	1	89	8	59	8	0.2
59734	6/16/82	18	28	16	Dom	30	8	No	405	76	22	5	97	6	85	36	0.4
59963	6/18/82	18	28	16	Dom	30		No	2619	907	259	63	459	16	932	445	68.4
62840	8/2/83	18	28	16	Dom	28	8	No	471	43	14	2	135	8	123	45	0.2
63320	9/6/83	18	28	16	Dom	30	6	No	277	90	26	6	53	6	55	19	0.1
64287	1/24/84	18	28	16	Dom	31	8	No	308	138	42	8	42	11	56	22	0.6
72081	5/30/86	18	28	16	Dom	40	6	No	1565	332	95	23	383	12	525	253	4.6
72639	7/16/86	18	28	16	Dom	30	8	No	673	136	38	10	153	23	173	77	12
73764	10/20/86	18	28	16	Dom	40	6	Yes	418						104		
78389	2/1/88	18	28	16	Dom	26	8	No	674	111	33	7	184	15	190	85	1.2

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
133287																	
62359	104	127	0	0.33	0.02	0.03	0	0.06	0.02	0.03	0.1	28	5	0.8	8.04		
62849	212	259	0	0.42	0.02	0	0.09	0	0.02	0.05	0.5	41	5	0.4	7.93		
68805	144	151	12	0.72	0.12	0.01	0	0.01	0	0.01	0.3	41	3	0.2	8.42		
71776	134	163	0	0.39	0.02	0.02	0.01	0.01	0.04	0.03	0.3	36	7	0.1	8.12		
75082	234	271	7	0.51	0.05	0.09	0.11	0.01	0.02	0.03	0.4	41	3	0.4	8.31	665	
77475	184	210	7	0.28	0.16	0.37	0.06	0	0.02	0.03	0.5	40	5	2.1	8.37	690	
79581	288	351	0	0.63	0.12	0	0.14	0	0.54	0	0.9	36	3	0.2	7.82	1191	
84396	232	259	12	0.52	0.09	0.18	0.09	0	0.14	0.03	0.3	39	5	1.1	8.27	654	
98472	178	193	12	0.5	0.07	0.07	0.09	0	0	0.02	0.4	39	5	0.4	8.62	481	
84673	968	1030	74	1.9	0.39	0.98	0.02	0.12	0	0.06	11.2	35	25	2.8	8.58	5342	
91769	558	622	29	1.02	0.14	0	0.13	0.01	0.04	0.03	1.8	39	17	0.6	8.21	1685	
92726	208	254	0	0.52	0.09	0	0.02	0	0.02	0.04	0.4	34	3	0.1	7.92	578	
100592	256	234	38	1.33	0.24	0.35	0.02	0.02	0	0.02	0.8	42	55	0.4	9.28	571	
108061	156	181	5	0.47	0.06	0.02	0.02	0	0.01	0.02	0.4	43	5	0.4	8.3	601	0.51
62879	164	176	12	0.6	0.09	0.08	0.04	0.03	0.01	0.03	0.4	47	15	0.4	8.48		
70709	154	188	0	0.4	0.01	0	0	0	0.08	0.03	0.3	39	5	0.1	7.65		
70722	122	149	0	0.3	0.01	0.01	0	0	0.18	0.02	0.2	28	3	0.1	7.61		
70998	142	173	0	0.25	0.01	0	0	0.23	0.01	0.02		39	5	0.2	7.52		
71849	120	146	0	0.31	0.004	0.01	0	0.18	0.01	0.02	0.2	39	3	0.1	7.7		
73514	216	264	0	0.87	0.04	0.01	0.01	0	0.03	0.02	0.5	43	3	0.3	7.82	581	
86171	176	215	0	0.55	0.17	0.27	0.04	0	0.07	0	0.3	48	25	3.2	7.23	475	
91264	164	200	0	0.32	0.01	0	0	0.02	0.05	0.04	0.3	40	3	0.1	7.71	499	
98556	164	181	10	0.6	0.12	0.1	0.05	0.01	0.04	0.02	0.4	46	15	0.3	8.63	417	
101166	164	181	10	0.59	0.12	1.07	0.06	0	0.06	0.02	0.4	56	25	3.6	8.62	412	
59734	156	190	0	0.43	0.02	0.06	0	0	0.04	0.02	0.5	39	3	1	8.12		
59963	310	344	14	0.36	0.03	0.03	0.01	0.04	0.04	0.05	1.8	51	7	0.4	8.2		
62840	160	181	7	1.21	0.23	0.02	0.01	0.01	0	0.03	0.6	41	5	0.3	8.25		
63320	130	159	0	0.4	0.025	0.07	0	0.01	0.04	0.04	0.4	32	7	0.7	7.73		
64287	160	195	0	0.29	0.01	0.27	0.02	0.01	0.01	0.04	0.3	36	5	2.7	7.97		
72081	306	364	5	1	0.02	0.03	0.07	0	0.01	0.04	1.6	41	3	0.1	8.34		
72639	224	273	0	0.27	0.02	0.01	0.01	0.01	0.04	0.04	0.9	43	3	0.1	8.04	1041	
73764																	
78389	230	281	0	0.88	0.06	0.01	0	0	0.02	0.04	0.9	41	3	0.2	8.04	1083	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
82480	4/4/89	18	28	16	Dom	30		No	512	126	37	8	121	9	133	56	1.2
83748	8/11/89	18	28	16	Dom	30	6	No	278	125	35	9	44	7	56	24	4.3
84805	11/9/89	18	28	16	Dom	51	6	No	326	10	4	0	103	7	62	16	0.4
84804	11/13/89	18	28	16	Dom	28	8	No	305	76	22	5	63	16	46	16	1.1
86216	3/19/90	18	28	16	Dom	30	8	No	955	181	56	10	252	11	328	106	5.2
86583	4/3/90	18	28	16	Dom	59	6	No	329	5	2	0	106	7	64	15	0.6
87780	5/16/90	18	28	16	Dom	29	8	No	631	268	81	16	96	14	114	75	17.1
88334	6/8/90	18	28	16	Dom	30	8	No	835	126	39	7	231	10	260	114	3
90487	12/17/90	18	28	16	Dom	30	6	No	221	71	20	5	42	8	36	20	0.4
91249	2/6/91	18	28	16	Dom	68	8	No	279	3	1	0	97	7	48	8	0.2
91361	2/20/91	18	28	16	Dom	75	6	No	302	17	5	1	84	8	60	14	0
92327	5/7/91	18	28	16	Dom	20	6	No	332	71	20	5	84	6	60	27	0
96443	4/13/92	18	28	16	Dom	27	8	No	438	148	41	11	83	13	90	41	12.2
96575	4/27/92	18	28	16	Dom		6	No	777	110	31	8	218	18	220	77	12.1
97862	7/7/92	18	28	16	Dom	52	6	No	330	14	4	1	101	7	66	18	0
104488	6/1/93	18	28	16	Dom	43	6	No	575	14	4	1	184	11	182	56	0
110996	3/8/94	18	28	16	Dom			No	570	236	68	16	73	14	104	39	4.3
123426	9/11/95	18	28	16	Dom	57		No	419	14	4	1	132	10	106	35	0.1
125855	2/9/96	18	28	16	Dom	68		No	343	17	5	1	103	7	81	21	0
126287	3/6/96	18	28	16	Dom			No									
133659	6/19/97	18	28	16	Dom	34	8	No	574	268	84	14	95	13	93	27	5.3
64778	3/31/84	18	28	17	Dom	36	8	No	2620	13	5	0	901	23	503	138	23.8
77039	9/14/87	18	28	17	Dom			No	254	36	11	2	63	10	51	14	0
74753	2/2/87	18	28	20	Dom	38	8	No	623	124	33	10	171	4	143	28	6.5
107806	9/28/83	18	28	21	Dom		6	No	412	92	27	6	93	18	112	32	0.7
76311	6/23/87	18	28	21	Dom	81	8	No	314	19	6	1	91	8	62	16	2.3
100596	11/2/92	18	28	21	Dom		6	No	387	209	49	21	37	21	68	28	1.2
107811	9/20/93	18	28	21	Dom	38	6	No	634	115	33	8	167	13	176	75	0.5
108879	11/15/93	18	28	21	Dom		6	No		3	1	0	10	1	1		0.4
65314	5/23/84	18	28	22	Dom	23	6	No	429	82	23	6	114	11	85	41	7.5
66333	9/18/84	18	28	22	Dom	37	6	No	512	201	54	16	99	12	80	35	21.2
72007	5/13/86	18	28	22	Dom	45	6	No	299	3	1	0	93	9	33	9	0
72837	7/29/86	18	28	22	Dom	30	8	No	830	315	88	23	164	11	165	55	14.2
74488	1/6/87	18	28	22	Dom	30	8	No	434	73	21	5	115	10	120	30	1.2

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
82480	192	234	0	0.48	0.02	0.04	0	0	0	0.03	0.7	38	3	0.3	8.11	817	
83748	130	149	5	0.34	0.02	0.08	0.02	0	0.25	0.03	0.4	27	3	0.4	8.23	457	
84805	150	168	7	0.4	0.1	0.1	0.07	0	0	0.01	0.3	50	3	0.2	8.37	484	
84804	164	171	14	0.46	0.04	0.1	0.01	0.01	0	0.02	0.4	44	3	0.7	8.41	468	
86216	262	320	0	0.56	0.12	0.02	0	0.02	0.01	0.07	1.4	43	3	0.1	8.08	1428	
86583	156	156	17	0.47	0.1	0.2	0.01	0	0	0.01	0.2	47	10	0.8	8.67	501	
87780	274	334	0	0.35	0.025	0	0.02	0.01	0.01	0.21	0.4	37	5	0.1	7.69	999	
88334	218	246	10	0.71	0.13	0.01	0	0	0	0.06	0.9	40	3	0.2	8.35	1309	
90487	110	134	0	0.4	0.01	1.38	0.02	0	0	0.02	0.3	29	12	6.6	8.17	367	
91249	162	198	0	0.16	0.01	0.04	0	0	0	0	0.5	25	3	0.1	8.1	465	
91361	134	139	12	0.41	0.09	0.19	0.05	0	0	0.02	0.3	49	3	0.2	8.57	454	
92327	162	188	5	0.45	0.03	0.01	0	0	0.02	0	0	38	3	0	8.4	529	
96443	192	234	0	0.43	0.02	0	0.28	0.01	0.03	0.06	0.5	37	3	0.4	7.69	669	
96575	260	317	0	0.39	0.04	0.01	0.01	0.01	0.01	0.13	0.9	41	3	0.3	7.68	1213	
97862	148	132	24	0.34	0.102	0.07	0.06	0	0	0.01	0.3	49	7	0.3	8.45	472	
104488	176	190	12	0.34	0.07	1	0.08	0	0	0.02	0.4	44	12	2.2	8.46	880	-0.12
110996	234	285	0	0.44	0.007	0	0	0	0.02	0.09	0.6	45	7	0.3	8.18	857	0.8
123426	156	166	12	0.28	0.06	0.3	0.07	0	0	0.01	0.3	47	15	0.6	8.3	655	-0.47
125855	144	146	14	0.4	0.05	0.15	0.07	0	0	0.03	0.3	47	12	0.3	8.58	515	-0.12
126287					0.068												
133659	306	373	0	0.46	0.008	0.42	0.02	0	0.02	0.08	0.6	46	5	2.1	7.96	849	0.79
64778	1264	1371	84	1.71	0.81	0	0.01	0.01	0.02	0.07	3.5	24	25	0.4	8.71		
77039	114	129	5	0.37	0.04	0.06	0.14	0	0	0.02	0.3	51	3	0.3	8.32	397	
74753	306	373	0	0.92	0.09	0.01	0.71	0	0.03	0.07	1.3	50	3	0.2	7.46	964	
107806	158	168	12	0.26	0.05	0.01	0	0	0.01	0.04	0.4	43	3	0.4	8.33	634	0.53
76311	138	149	10	0.39	0.07	0.6	0.05	0.01	0	0.02	0.3	47	7	1.6	8.53	475	
100596	194	227	5	0.21	0.01	0.01	0	0	0	0.06	0.4	42	3	0.2	8.25	582	
107811	210	232	12	0.84	0.06	0	0	0	0	0.04	0.7	41	3	0.4	8.25	985	0.65
108879				0.06	0.006	0	0.01	0	0	0	0.6	4					
65314	194	207	14	0.39	0.06	0.03	0	0	0.01	0.02	0.5	39	3	0.3	8.44		
66333	288	351	0	0.23	0.01	0	0	0	0.13	0.03	0.4	36	7	0.3	8.17		
72007	170	188	10	0.61	0.21	0.2	0.02	0.01	0	0.01	0.5	47	15	0.3	8.34		
72837	442	539	0	0.69	0.03	0.03	2.07	0	0.01	0.04	1	39	7	0.5	7.72	1294	
74488	182	222	0	0.56	0.07	0.01	0	0.01	0.03	0.02	0.8	40	3	0.4	8.07	686	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
75492	4/13/87	18	28	22	Dom	33	8	Yes	46	13	2	2	10	1	0	2	0
77294	10/1/87	18	28	22	Dom	45	6	No	298	3	1	0	95	10	38	9	0
78255	1/19/88	18	28	22	Dom	120	6	No	533	28	8	2	180	8	102	32	0
83432	7/10/89	18	28	22	Dom	28.5	6	No	887	115	31	9	267	15	260	116	3.3
83699	8/10/89	18	28	22	Dom	27	8	No	1599	436	130	27	378	23	468	156	3.1
88652	7/7/90	18	28	22	Dom	37	8	No	615	142	42	9	159	12	125	55	2.8
89004	8/9/90	18	28	22	Dom	68	6	No	300	8	3	0	99	8	40	8	0.3
90906	1/17/91	18	28	22	Dom	120	6	No	330	5	2	0	113	7	35	7	0
92319	5/15/91	18	28	22	Dom			Yes	24	10	4	0	6	0	0	5	0
93824	8/26/91	18	28	22	Dom	137	6	No	332	5	2	0	113	6	32	7	0.1
95798	2/11/92	18	28	22	Dom	111	8	No	354	3	1	0	128	4	30	7	0
97639	6/22/92	18	28	22	Dom			Yes	452	14	4	1	154	5	82	28	6.8
98358	8/5/92	18	28	22	Dom	69	6	No	552	236	60	21	53	38	185	54	0
97334	9/16/92	18	28	22	Dom			No	264	135	39	9	29	7	53	25	2
103088	4/20/93	18	28	22	Dom	30	6	No	281	78	23	5	64	6	60	25	0
104057	5/22/93	18	28	22	Dom	75	6	No	339	12	3	1	106	8	68	19	0.2
106373	8/19/93	18	28	22	Dom	32	6	No	929	385	108	28	162	8	253	89	0.2
107232	9/8/93	18	28	22	Dom	45	6	No	306	9	2	1	99	10	42	11	0.5
111869	4/11/94	18	28	22	Dom		6	No	346	9	2	1	118	7	32	6	0.9
119125	12/31/94	18	28	22	Dom	150	6	No	918	105	27	9	258	23	295	128	0.3
131310	1/10/97	18	28	22	Dom	73	6	No	332	19	6	1	105	9	76	19	0
133647	6/19/97	18	28	22	Dom	60		No	308	5	2	0	95	8	40	9	0
134172	7/16/97	18	28	22	Dom	73		No									
134173	7/17/97	18	28	22	Dom		6	No									
61125	12/8/82	18	28	23	Dom	20	8	No	278	119	36	7	38	8	44	18	0
67955	3/20/85	18	28	23	Dom	28	8	No	294	166	50	10	35	3	43	14	3.1
69214	8/20/85	18	28	23	Dom	33	8	No	941	264	89	10	211	15	195	50	56.5
70541	1/22/86	18	28	23	Dom	32	8	No	431	227	48	26	38	30	78	26	34.7
73795	10/17/86	18	28	23	Dom	26	8	No	1094	491	147	30	151	8	313	118	2.7
75457	4/3/87	18	28	23	Dom	116	6	No	391	0	0	0	144	4	25	4	0.5
75458	4/3/87	18	28	23	Dom	30	6	No	325	130	39	8	49	9	79	21	0
78869	3/21/88	18	28	23	Dom	35	6	No	337	5	2	0	115	5	53	12	0
78868	3/21/88	18	28	23	Dom	30	6	No	660	97	29	6	196	12	159	62	2.1
81004	9/14/88	18	28	23	Dom	30	6	No	441	220	60	17	53	11	98	36	17.5

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
75492	26	32	0	0.05	0.004	0	0	0	0	0	0.5	7	3	0.2	7.77	83	
77294	174	173	19	0.63	0.203	0.21	0.02	0	0	0	0.5	48	17	0.3	8.6	457	
78255	278	310	14	1.23	0.08	0.44	0.01	0	0	0.01	0.8	38	12	1.7	8.5	856	
83432	300	366	0	0.47	0.01	0.52	0.03	0	0.23	0.02	1.2	31	3	2.9	8	1436	
83699	580	708	0	0.07	0.03	0.02	0.13	0	0	0.24	2.4	44	15	0.2	7.97	2326	
88652	298	344	10	0.58	0.05	0.19	0.01	0	0.03	0.03	0.1	40	10	1.8	8.22	980	
89004	172	176	17	0.54	0.15	0.06	0.03	0	0	0.02	0.2	49	7	0.3	8.86	460	
90906	210	222	17	0.8	0.15	0.2	0.02	0.01	0.01	0.02	0.5	47	17	1.2	8.91	507	
92319	18	12	5	0.08	0.004	0	0	0	0	0.01	0.2	3	3	0	8.79	59	
93824	218	246	10	0.86	0.22	0.23	0.02	0.01	0	0.02	0.6	45	25	0.4	8.68	516	
95798	232	244	19	0.89	0.26	0.34	0.04	0.02	0	0.02	0.6	48	55	0.3	8.78	545	
97639	218	237	14	0.91	0.2	0.02	0	0.01	0	0.01	1.6	18	3	0.3	8.46	701	
98358	156	181	5	0.17	0.02	0.17	0.97	0	0	0.22	0.2	46	3	0.4	8.22	788	
97334	124	151	0	0.21	0.01	0.02	0	0.01	0	0.04	0.3	30	3	0.1	8.16	408	
103088	132	161	0	0.36	0.03	0.51	0.06	0.01	0.03	0.02	0.3	34	7	3.1	7.79	437	
104057	158	173	10	0.47	0.11	0.04	0.03	0.01	0	0.02	0.4	46	5	0.3	8.64	506	
106373	386	471	0	0.35	0.01	0	0	0.03	0	0.09	1.2	47	3	0.2	7.39	1408	0.57
107232	172	190	10	0.59	0.19	0.2	0.03	0.01	0	0.01	0.5	47	17	0.5	8.48	447	-0.27
111869	228	234	22	0.9	0.23	0.26	0.05	0.02	0	0.02	0.6	44	55	0.4	8.86	511	-0.04
119125	218	242	12	1.08	0.09	0.03	0.01	0	0	0.02	1.1	44	5	0.3	8.43	1456	0.6
131310	140	151	10	0.38	0.09	0.14	0.04	0	0.01	0.03	0.4	47	3	0.4	8.29	507	-0.34
133647	166	173	14	0.67	0.14	0.36	0.02	0.01	0.01	0.01	0.5	46	17	2.8	8.49	441	-0.54
134172					0.074												
134173					0.082												
61125	146	178	0	0.26	0.005	0.28	0.49	0	0.07	0	0.3	34	7	1.7	7.62		
67955	174	212	0	0.23	0.02	0	0.38	0	0.34	0.05	0.2	34	5	0.4	7.66		
69214	422	515	0	0.4	0.17	0.01	0	0.13	0.22	0.04	2.6	41	7	0.3	7.68		
70541	216	264	0	0.19	0.01	0.08	0	0	0.01	0.03	0.4	45	7	0.1	8.06		
73795	342	417	0	0.45	0.04	0.01	6.46	0.01	0.01	0.16	1.1	43	7	0.3	7.4	1566	
75457	280	273	34	1.04	0.215	0.3	0.03	0.04	0	0.02	0.7	44	65	0.5	9.08	608	
75458	146	178	0	0.29	0.01	0.29	0.45	0	0.01	0.01	0.4	32	3	1.9	7.92	526	
78869	188	181	24	0.46	0.26	0.22	0.09	0	0.06	0	0.3	39	25	0.5	8.98	523	
78868	260	317	0	0.48	0.04	0.04	1.04	0.03	0.02	0.09	0.6	35	12	0.9	8.17	1085	
81004	178	217	0	0.19	0.01	0.03	0.01	0.01	0.02	0.04			5	0.3	8.03	677	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
83178	6/12/89	18	28	23	Dom			No	395	3	1	0	150	4	24	6	1.3
83684	8/9/89	18	28	23	Dom	126	6	No	404	0	0	0	150	2	27	6	1.6
91564	3/5/91	18	28	23	Dom	30	8	No	655	120	33	9	183	11	90	28	0.1
91859	4/10/91	18	28	23	Dom	30	6	No	535	127	36	9	136	12	117	48	0
92140	5/7/91	18	28	23	Dom			No	902	414	121	27	133	7	276	82	2.5
104402	5/25/93	18	28	23	Dom	30	8	Yes	62	12	3	1	20	2	6	10	0.4
59660	6/21/82	18	28	24	Dom	22	6	No	920	385	116	23	148	11	278	60	13.7
66748	11/14/84	18	28	24	Dom	29	8	No	1141	296	84	21	259	24	171	120	90.8
66747	11/14/84	18	28	24	Dom	29	8	No	791	247	71	17	172	16	143	41	19.6
68651	6/18/85	18	28	24	Dom	20		No	620	3	1	0	238	5	63	16	11.9
71176	3/18/86	18	28	24	Dom	30	6	No	784	177	51	12	212	13	122	33	2.2
84771	11/20/89	18	28	24	Dom	20	6	No	733	301	89	19	135	9	134	34	57.5
95881	2/20/92	18	28	24	Dom			No	394	77	21	6	100	8	76	38	0
97860	7/6/92	18	28	24	Dom	33	6	No	744	51	12	5	246	20	118	29	0
97861	7/28/92	18	28	24	Dom	114	6	No	294	3	1	0	99	3	56	12	0
106372	8/19/93	18	28	24	Dom	37	6	No	210	92	27	6	33	4	49	18	0
70169	12/9/85	18	28	25	Dom		6	No	746	86	26	5	224	5	228	96	0.9
70280	12/23/85	18	28	25	Dom			No									
78153	1/7/88	18	28	25	Dom	25	8	No	523	163	44	13	122	5	101	51	0
91779	3/25/91	18	28	25	Dom	28		No	217	101	29	7	31	4	40	17	0
99095	9/16/92	18	28	25	Dom		6	No	393	99	28	7	93	4	82	25	1.9
126468	3/19/96	18	28	25	Dom			No	432	0	0	0	157	5	54	17	0.2
129497	9/16/96	18	28	25	Dom			No	182	78	23	5	35	5	30	8	0.4
59286	4/22/82	18	28	26	Dom	27	4	No	683	350	102	23	96	10	126	31	7.6
67579	2/18/85	18	28	26	Dom	30	6	No	311	140	43	8	52	4	57	21	4.6
70167	12/9/85	18	28	26	Dom	30	8	No	926	257	73	18	241	15	82	25	3.3
70383	1/3/86	18	28	26	Dom	31	6	No	738	253	70	19	152	10	131	44	16.2
71069	3/13/86	18	28	26	Dom	127	6	No	663	3	1	0	256	6	47	18	0
78254	1/25/87	18	28	26	Dom	111	6	No	527	5	2	0	202	4	34	11	0
76255	6/17/87	18	28	26	Dom	30	10	No	977	455	144	23	169	7	164	42	5.7
78856	3/22/88	18	28	26	Dom	70	6	No	364	148	38	13	35	22	99	21	0
80812	9/20/88	18	28	26	Dom	36	6	Yes	425	201	59	13	63	7	85	24	0
94575	10/21/91	18	28	26	Dom	50	6	No	1082	225	52	23	268	24	280	104	52.6
97589	7/1/92	18	28	26	Dom	33	6	Yes									

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
83178	284	293	26	1.07	0.21	0.25	0.04	0.02	0.01	0.03	0.6	44	70	0.4	9.03	609	
83684	286	295	26	1.55	0.15	0.37	0.03	0.01	0	0.01	0.7	43	45	0.8	8.97	620	
91564	418	510	0	1.14	0.18	0.3	0.35	0	0.02	0.03	1	36	7	0.9	8.16	1014	
91859	248	303	0	0.36	0.03	0	0.84	0.01	0.08	0.05	0.6	36	12	0.4	8.16	859	
92140	326	398	0	0.53	0.04	0	5.09	0	0	0.14	0.9	42	3	0	7.56	1303	
104402	40	49	0	0.05	0	0	0.09	0	0	0.16	0.8	2	3	0.3	6.84	124	-2.34
59660	346	422	0	0.64	0.01	0	2.27	0	0.09	0.05	1.2	41	3	0.3	8.03		
66748	470	573	0	0.76	0.09	0	1.29	0	0.07	0.09	0.9	41	25	0.2	7.58		
66747	410	500	0	0.7	0.04	0	0.98	0	0.02	0.04	0.8	39	7	0.2	7.53		
68651	416	264	120	2.3	1.1	0.18	0.01	0	0	0	1.7	30	7	0	9.65		
71176	512	625	0	0.85	0.1	0	0.49	0	0.06	0.03		34	15	0.2	7.92		
84771	362	442	0	0.78	0.02	0.07	1.14	0.01	0.01	0.15	0.8	42	3	0.3	7.4	1092	
95881	184	210	7	0.7	0.04	0.17	0.39	0	0.02	0.02	0.5	36	3	1.2	8.25	635	
97860	428	429	46	0.84	0.24	0.13	0.02	0	0	0.01	1.2	42	7	0.3	8.58	1135	
97861	152	156	14	0.37	0.09	0.1	0.02	0	0	0.01	0.3	42	3	0.3	8.87	433	
106372	98	120	0	0.33	0.04	0.1	0	0.01	0.01	0.05	0.3	23	3	0.4	8.06	341	0.08
70169	220	249	10	1.49	0.565	0.02	0.86	0	0.01	0.06	0.8	34	5	0.6	8.35		
70280					0.011		0										
78153	270	329	0	0.69	0.08	0.06	0.46	0.02	0.67	0.04	0.6	26	7	0.7	7.92	865	
91779	112	137	0	0.32	0.03	0.07	0	0.01	0.15	0.04	0.3	24	5	0.6	7.45	364	
99095	178	198	10	0.62	0.24	0.01	0.16	0	0	0.03	0.5	41	3	0.2	8.44	583	
126468	280	224	58	1.36	0.35	0.02	0	0	0	0	0.7	36	12	0.2	9.43	702	0.01
129497	110	120	7	0.36	0.04	0.02	0	0	0	0	0.3	29	3	0.1	8.3	310	0.18
59286	390	476	0	0.77	0.04	0	2.72	0	0.05	0.05			3	0.5	7.75		
67579	168	205	0	0.35	0.03	0	0.04	0	0.08	0.01	0.2	34	5	0.2	8.02		
70167	698	852	0	1.04	0.03	0.09	0.42	0	0.13	0.03	1.3	41	17	1.1	7.84		
70383	414	505	0	0.76	0.03	0	1.74	0.05	0.05	0.07	1	43	7	0.1	7.86		
71069	502	427	91	2.58	0.03	0.15	0.01	0.07	0	0.01		39	17	1.2	9.22		
78254	392	386	46	2.16	0.15	0.2	0.02	0.01	0.01	0.01	1.1	41	45	0.9	9.03	843	
76255	612	747	0	0.55	0.05	0.03	3.2	0.01	0.05	0.03	1.4	47	3	0.4	7.54	1506	
78856	120	146	0	0.26	0.01	0.56	0.8	0	0.72	0.07	0.2	49	3	3.2	7.5	538	
80812	228	278	0	0.6	0.02	0.37	0.9	0.01	0.12	0.02	0.5	46	7	7	7.75	668	
94575	382	466	0	0.89	0.07	0	0.6	0.01	0.05	0.02	1.3	44	5	0.7	7.93	1631	
97589					0.11								3		8.61		

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
99787	8/26/92	18	28	26	Dom			Yes	1245	562	169	34	187	10	398	100	0.1
101182	12/31/92	18	28	26	Dom	30	6	No	754	292	87	18	143	7	194	68	0.6
61849	4/5/83	18	28	27	Dom	40	8	No	240	138	37	11	25	3	32	12	0.8
64225	1/13/84	18	28	27	Dom	28	8	No	980	315	80	28	208	21	260	81	19.8
66035	8/23/84	18	28	27	Dom	30	6	No	298	121	32	10	45	11	52	19	0
66966	12/18/84	18	28	27	Dom	25	6	No	850	42	12	3	270	19	275	75	0
75397	3/31/87	18	28	27	Dom		6	Yes	1329	216	60	16	368	18	388	143	7.6
76282	6/24/87	18	28	27	Dom			No					52				
86355	3/26/90	18	28	27	Dom			No	212	79	25	4	26	9	45	7	0.1
90995	1/29/91	18	28	27	Dom			No	385	188	49	16	55	14	69	22	2
101173	12/30/92	18	28	27	Dom	54	6	No	1352	189	51	15	389	15	390	166	4.4
64432	2/14/84	18	28	28	Dom	35	8	No	316	176	54	10	38	4	36	8	6.8
64433	2/14/84	18	28	28	Dom	35		No	446	167	47	12	91	8	66	20	18.7
68461	5/31/85	18	28	28	Dom	32	8	No	262	144	38	12	30	9	31	6	0
83457	7/10/89	18	28	28	Dom	112	6	No	233	0	0	0	77	2	40	5	0.7
62616	6/23/83	18	28	29	Dom	28	8	No	350	92	27	6	82	4	59	19	7.1
70457	1/9/86	18	28	29	Dom	25	6	No	354	144	41	10	63	3	59	20	18.3
73442	9/12/86	18	28	30	Dom	25	2	Yes	333	27	9	1	97	11	57	20	0
101895	2/16/93	18	28	30	Dom			No									
63888	11/16/83	18	28	31	Dom	32	8	No	1474	569	155	44	218	10	557	203	0.1
71609	4/20/86	18	28	31	Dom	100	8	No	1029	3	1	0	390	5	21	96	0
73513	9/29/86	18	28	31	Dom			No	291	121	32	10	35	8	71	15	0
79194	4/22/88	18	28	31	Dom	150		No	194	60	19	3	32	7	39	4	0
82045	2/14/89	18	28	31	Dom	43	6	Yes	226	5	2	0	72	3	17	75	0.1
58752	3/1/82	18	28	32	Dom	30	6	No	221	107	33	6	26	2	35	11	0.3
85253	1/9/90	18	28	32	Dom	65	6	No	296	5	2	0	87	6	48	10	0.1
60609	9/17/82	18	28	33	Dom			No	271	143	44	8	34	4	42	15	10
61149	12/6/82	18	28	33	Dom	28	8	No	410	199	60	12	65	4	57	17	3.9
66424	10/8/84	18	28	33	Dom	36	10	No	279	135	39	9	36	3	39	11	3.1
113964	7/1/94	18	28	33	Dom			No	249	117	32	9	27	11	64	12	0.6
60044	8/3/82	18	28	34	Dom	30	8	No	924	163	47	11	233	11	273	53	7.9
62615	7/1/83	18	28	34	Dom	25	6	No	489	113	32	8	122	6	69	22	8.3
63442	9/23/83	18	28	34	Dom	30	6	No	341	170	45	14	35	16	85	15	0.1
61043	11/16/83	18	28	34	Dom	30	6	No	332	158	42	13	33	15	84	14	0.2

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
99787	444	542	0	0.56	0.01	0	6.3	0	0.13	0.1	1	30	3	0.3	7.66	1744	
101182	316	386	0	0.48	0.03	0.13	1.57	0.02	0.02	0.07	1	42	10	0.4	7.77	1138	
61849	146	178	0	0.27	0.015	0.03	0.04	0	0.09	0.02	0.3	36	5	0.7	7.68		
64225	418	510	0	0.56	0.03	0	1.04	0.01	0.13	0.05	1.2	43	5	0.3	7.88		
66035	154	188	0	0.34	0.02	0.07	0.09	0	0.02	0.01	0.3	45	5	0.2	7.94		
66966	276	298	19	0.59	0.01	0.08	0.04	0	0.04	0.04	0.4	32	12	2.1	8.5		
75397	454	554	0	0.88	0.08	0	1.87	0.08	0.01	0.04	1.6	43	7	0.5	8.14	2059	
76282																	
86355	92	102	5	0.23	0.01	0.46	0.2	0	0	0.06	0.1	50	3	1.3	8.31	306	
90995	222	271	0	0.33	0.02	0.03	0.41	0	0.03	0.04	0.4	46	3	0.4	7.03	624	
101173	414	505	0	1.06	0.12	0	1.5	0.01	0	0.05	1.5	43	7	0.3	8.04	2041	
64432	204	249	0	0.35	0.02	0	0	0.01	0.06	0.03	0.3	41	3	0.5	7.69		
64433	264	322	0	0.66	0.08	0.03	0	0	0.09	0.04	0.6	43	3	0.5	7.74		
68461	178	217	0	0.32	0.01	0.02	0	0	0.01	0.05	0.3	41	5	0.2	8.07		
83457	124	102	24	0.73	0.25	0.93	0.03	0.02	0	0.01	0.3	40	35	3.2	8.95	352	
62616	186	227	0	1.31	0.005	0.02	0.21	0.03	0.07	0.04	0.4	26	5	0.1	7.9		
70457	188	229	0	0.26	0.03	0	0.03	0	0.02	0.05	0.4	36	5	0.4	7.83		
73442	170	188	10	0.43	0.113	0	0	0	0	0.01	0.5	42	5	0.3	8.41	523	
101895					0.01												
63888	240	293	0	0.61	0.02	0.57	0.03	0.03	0.07	0.04	0.9	45	3	1.7	8.04		
71609	736	830	34	3.54	0.37	0.06	0.01	0	0.03	0.02	3.2	39	55	0.5	8.72		
73513	112	137	0	0.27	0.01	0.04	0.47	0	0	0.05	0.2	53	3	0.4	7.97	433	
79194	96	98	10	0.25	0.02	0.33	0.29	0	0	0.07	0.2	40	5	0.9	8.21	292	
82045	42	51	0	0.13	0.004	0.01	0	0.02	0.02	0.09	2.3	24	3	0.2	7.26	392	
58752	112	137	0	0.6	0.005	0.05	0.12	0.01	0.06	0.02	0.2	41	3	0.3	7.89		
85253	154	149	19	0.46	0.09	0.22	0.02	0.02	0.01	0.01	0.3	46	7	1.2	8.93	442	
60609	140	171	0	0.36	0.01	1.04	0.06	0	0.01	0.02	0.3	36	12	2.4	8.18		
61149	276	337	0	0.43	0.01	0.01	1.28	0.03	0.02	0.1	0.5	39	5	0.6	7.67		
66424	158	193	0	0.45	0.005	0.49	0	0	0.03	0.02	0.1	34	3	0.5	7.81		
113964	106	129	0	0.24	0.01	0.69	0.59	0	0	0.1	0.2	45	15	2.5	8.14	377	0.13
60044	342	417	0	0.94	0.05	0.01	0.47	0	0.15	0.04	1.6	41	7	0.7	7.86		
62615	276	337	0	0.81	0.02	0.03	0.04	0	0.01	0.03	0.5	45	5	0.3	7.75		
63442	150	183	0	0.32	0	0.4	0.43	0.02	0.02	0.06	0.2	45	7	1.4	7.91		
61043	148	181	0	0.27	0	0.44	0.42	0.04	0.02	0.04	0.1	47	5	1.9	7.83		

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
81006	9/13/88	18	28	34	Dom	125	6	No	1002	9	2	1	379	11	3	150	6.3
81005	9/13/88	18	28	34	Dom	30	6	No	6020	9	2	1	2076	29	1680	1213	1.4
81678	11/4/88	18	28	34	Dom	10	12	No	2415	30	12	0	883	13	495	325	2.8
88607	6/15/90	18	28	34	Dom	80	6	No	819	5	2	0	292	7	19	19	4.6
97574	7/2/92	18	28	34	Dom		6	No	368	178	48	14	57	8	60	26	0.3
99779	9/28/92	18	28	34	Dom		8	Yes	72	12	3	1	25	1	5	9	1
104945	7/2/93	18	28	34	Dom	30	6	No	566	31	9	2	180	9	122	45	0
59406	5/20/82	18	28	35	Dom	20	7	No	2613	110	29	9	865	28	847	297	0.1
59735	6/25/82	18	28	35	Dom	30	8	No	1851	287	85	18	532	13	493	208	73.9
60763	10/9/82	18	28	35	Dom	25	6	No	1570	38	12	2	498	16	356	108	26.8
64288	1/16/84	18	28	35	Dom	28	10	No	541	237	67	17	91	4	100	35	9.3
65443	6/25/84	18	28	35	Dom	128	6	No	3301	15	6	0	1161	20	1324	350	1.3
809	12/3/84	18	28	35	Dom	36	8	No	440	199	55	15	71	7	57	19	17.7
69651	9/24/85	18	28	35	Dom	32	8	No	426	216	60	16	63	9	60	18	15.1
69803	10/14/85	18	28	35	Dom		8	Yes	421	10	4	0	141	5	62	24	0.4
70562	1/20/86	18	28	35	Dom	27	6	No	958	27	9	1	321	9	222	71	0.3
73864	10/24/86	18	28	35	Dom			No	2104	66	23	2	701	25	638	210	0.3
76079	6/2/87	18	28	35	Dom			Yes	327	53	18	2	65	1	0	26	0
76158	6/3/87	18	28	35	Dom	75	6	No	772	5	2	0	287	7	15	22	4.4
76258	6/15/87	18	28	35	Dom	45	6	No	653	8	3	0	236	10	92	26	0.2
76767	8/10/87	18	28	35	Dom	48	6	No	547	3	1	0	185	7	130	25	0.2
81904	1/23/89	18	28	35	Dom	22	6	No	1393	254	59	26	358	37	537	145	0.6
82741	4/26/89	18	28	35	Dom	42	8	No	627	3	1	0	227	7	78	48	1.3
84516	10/26/89	18	28	35	Dom	112	6	Yes	487	3	1	0	162	3	58	12	61.7
89960	10/8/90	18	28	35	Dom			Yes	502	13	2	2	184	2	31	167	0
97342	6/9/92	18	28	35	Dom	28	6	No	384	198	58	13	48	7	85	33	5.2
100597	11/5/92	18	28	35	Dom	35	6	Yes	280	0	0	0	94	2	63	15	0
100949	12/10/92	18	28	35	Dom	35	6	No	236	58	15	5	44	15	52	10	0
128172	7/15/96	18	28	35	Dom	36	6	No	661	12	3	1	232	10	157	45	0.3
98214	7/28/92	18	28	36	Dom	125	6	Yes	43	0	0	0	9	1	0	0	0
80210	7/13/88	18	29	1	Dom	23	6	No	1168	60	14	6	402	13	199	156	3.7
83879	9/6/89	18	29	1	Dom	108	6	Yes	1321	3	1	0	498	8	102	148	0.2
84330	10/11/89	18	29	1	Dom	108	6	Yes	127								
84490	10/25/89	18	29	1	Dom			Yes									

ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
578	676	14	2.28	0.08	2.58	0.09	0.04	0.13	0.07			70	1.9	8.34	1566	
1248	1196	161	7.25	3.74	0.08	0.06	0.03	0.05	0.03			65	9.6	8.96	8718	
1018	1022	108	3.4	2.12	0.13	0.02	0.01	0.01	0.02	6.4	37	25	1	8.94	3723	
602	647	43	2.32	0.18	0.4	0.09	0	0	0.02	1.9	50	70	0.3	8.89	1202	
216	264	0	0.36	0.03	0.02	0	0.02	0	0.04	0.4	42	3	0.2	8.08	566	
42	51	0	0.06	0.003	0	0	0	0.08	0.01	0.9	7	3	0.2	7.61	134	
258	276	19	0.73	0.103	2.61	0.12	0.07	0.03	0.04	0.6	47	70	28	8.73	842	0.65
712	869	0	1.36	0.1	0.04	0.14	0.01	0.02	0.07			17	0.6	8.06		
570	695	0	1.01	0.32	0	0.2	0.03	0.13	0.04	2.3	49	45	0.7	7.67		
658	739	31	5.08	0.75	0.04	0.09	0.35	0.03	0.01	3.6	34	20	0.7	8.48		
290	354	0	0.41	0.04	0	0.7	0.01	0.7	0.06	0.5	47	3	0.4	7.77		
672	712	53	5.56	3.16	0.27	0.03	0	0	0.02	5.4	41	25	10	8.66		
264	322	0	0.46	0.03	0	0	0	0.01	0.03	0.3	36	5	0.3	7.85		
264	322	0	0.31	0.03	0	0	0	0	0.04	0.5	43	5	0.1	8.12		
232	283	0	0.57	0.03	0	0.01	0	0.01	0.07	0.6	45	5	0.2	7.92		
408	454	22	0.88	0.27	0.18	0.03	0.01	0.02	0.02	1.5	41	35	8.7	8.59		
668	815	0	1.88	0.13	0.04	0.09	0.01	0.02	0.03	4.1	41	25	0.6	8.13	3043	
84	102	0	0.07	0.01	1.05	0.03	0.08	0.86	0.03	0.9	17	3	0.1	7.52	296	
566	520	84	2.24	0.14	0.3	0.08	0.01	0.01	0.03	1.9	45	70	0.5	9.18	1196	
388	376	48	1.45	0.18	0.32	0.02	0	0.04	0.03	1.1	62	45	3.9	9.02	1027	
244	229	34	0.74	0.09	1.31	0.04	0.01	0.03	0.01	0.5	46	55	6.3	8.93	857	
290	354	0	0.6	0.03	0.01	0.08	0	0	0.23			3	0.3	8.11	2035	
344	317	50	1.05	0.15	0.25	0.02	0.01	0.02	0	0.8	45	70	0.6	9.34	988	
248	303	0	1.22	0.09	0.18	0.01	0	0.01	0	0.1	42	17	2.8	7.57	725	
168	205	0	0.54	0.04	0	0	0.01	0.03	0.07	1.7	21	3	1.2	8.09	931	
176	215	0	0.28	0.02	0.01	0	0.01	0.09	0.04	0.5	33	3	0.2	7.75	588	
114	127	5	0.24	0.01	0	0	0	0	0	0.2	45	3	0.2	8.21	402	
106	127	0	0.26	0.01	0.38	0.47	0	0	0.06	0.2	44	12	2.8	8.19	340	
294	276	41	0.64	0.117	0.22	0.05	0	0	0.01	0.7	41	45	0.4	8.87	1052	0.23
20	24	0	0.04	0.12	0	0	0	0.01	0	0.4	22	3	0	7.63	'45	
530	598	24	0.78	0.23	0.02	0.01	0	0.01	0.04	3.1	41	12	0.6	8.44	1829	
780	893	29	3.78	0.71	0.21	0.02	0	0	0.01	7.5	32	25	0.4	8.5	2050	
			0.23	0.106								3				
				0.03												

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
61974	4/12/83	18	29	2	Dom	33	6	No	859	5	2	0	317	12	137	27	0.3
76904	8/28/87	18	29	2	Dom	85	6	No	966	5	2	0	362	8	63	34	0
79093	4/6/88	18	29	2	Dom	112	6	No	1198	5	2	0	447	8	94	95	0.4
79774	6/1/88	18	29	2	Dom	108	6	No	1479	5	2	0	550	8	95	205	1.8
81930	1/17/89	18	29	2	Dom	106	6	No	1474	7	1	1	537	12	114	193	1.2
81901	1/17/89	18	29	2	Dom	106	6	No	1308	5	1	1	478	10	100	143	0.5
83205	6/6/89	18	29	2	Dom	15	8	No	300	117	32	9	62	5	0	35	1.1
92731	6/19/91	18	29	2	Dom	37		No	877	9	2	1	310	14	165	32	0.9
97344	6/10/92	18	29	2	Dom	110	6	No	1016	9	2	1	386	8	58	60	0
66229	9/21/84	18	29	3	Dom	29	8	No	590	56	14	5	177	16	178	34	1.9
101172	12/30/92	18	29	3	Dom	28		No	715	102	21	12	192	22	240	49	0.5
66420	10/9/84	18	29	4	Dom	137	8	No	442	3	1	0	163	3	45	17	0.7
76832	8/19/87	18	29	4	Dom	30	6	No	289	47	14	3	75	5	39	12	8.9
77914	11/30/87	18	29	4	Dom	38	6	No	443	144	41	10	87	13	114	33	0
82723	4/21/89	18	29	4	Dom			No	932	20	8	0	360	6	22	287	1.4
82694	4/24/89	18	29	4	Dom			No	480	52	16	3	146	11	100	29	0.5
95987	2/26/92	18	29	4	Dom	190	8	No	525	3	1	0	193	3	44	9	1.4
59289	4/22/82	18	29	5	Dom	27		No	1635	926	308	38	148	7	43	650	38.9
60007	7/29/82	18	29	5	Dom	150	6	No	432	0	0	0	155	2	46	9	0.4
60208	8/18/82	18	29	5	Dom	28	8	No	2387	15	6	0	626	20	525	154	3.6
61971	4/19/83	18	29	5	Dom	120	8	No	349	0	0	0	132	2	40	9	0.1
65764	8/2/84	18	29	5	Dom	24	8	No	1868	40	16	0	635	30	514	175	4.9
65763	8/2/84	18	29	5	Dom	28	8	No	632	198	61	11	138	8	142	34	3.7
69079	7/30/85	18	29	5	Dom	29	6	Yes	1575	256	76	16	442	13	523	138	0
72240	6/16/86	18	29	5	Dom	18	12	No	1871	132	38	9	593	21	480	165	32.9
74899	2/18/87	18	29	5	Dom	90	6	Yes	11	7	1	1	1	0	0	0	0
74898	2/18/87	18	29	5	Dom	90	6	No	250	0	0	0	84	0	57	8	0
75359	4/1/87	18	29	5	Dom	28	8	No	1513	30	12	0	549	12	344	106	0.3
75639	4/21/87	18	29	5	Dom	30	4	No	1271	22	7	1	465	15	167	66	11
76035	5/26/87	18	29	5	Dom	30	4	Yes	70	0	0	0	27	1	1	4	1.7
76627	8/4/87	18	29	5	Dom			No	1533	15	6	0	551	17	290	105	13.7
78250	1/27/88	18	29	5	Dom	108	6	No	355	239	53	26	34	6	46	32	3.9
79140	3/29/88	18	29	5	Dom	27	8	No	641	208	57	16	130	17	105	31	20.1
79860	6/15/88	18	29	5	Dom	32	6	No	321	162	45	12	34	6	56	19	15.7

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
61974	512	512	55	6.92	0.76	0.55	0.02	0.01	0.14	0.01	3.3	28	45	4.6	9.19		
76904	688	742	48	3.74	0.33	0.11	0.01	0	0	0	5.1	45	35	1.2	8.79	1511	
79093	768	864	36	3.68	0.53	0.25	0.03	0	0.03	0.01	7.1	32	25	0.8	8.64	1884	
79774	810	905	41	3.64	0.73	4.6	0.05	0	0	0.01	8	27	70	5.8	8.6	2287	
81930	806	861	60	3.56	0.93	0.3	0.02	0.05	0.01	0.05			25	1.6	8.51	2235	
81901	774	861	41	3.58	0.57	0.76	0.02	0	0	0.22			45	1.5	8.54	1944	
83205	228	278	0	1.08	0.02	28.7	1.25	0	0.09	0.13	0.6	44	70	20	7.02	548	
92731	486	500	46	5.68	0.64	0.82	0.04	0.01	0	0.01	3.2	31	55	1.8	9.05	1378	
97344	710	798	34	3.8	0.33	0.51	0.03	0.01	0	0.02	5.1	42	45	1.3	8.5	1582	
66229	228	244	17	1.35	0.18	0.15	0.06	0	0.01	0.02	1.3	39	12	1.4	8.4		
101172	242	271	12	0.98	0.14	0.16	0.06	0	0.01	0.03	1.4	34	3	0.7	8.43	1109	
66420	280	259	41	1.37	0.43	0.95	0.04	0	1.26	0.01	0.7	32	45	4.1	9.23		
76832	148	166	7	0.3	0.17	0.01	0.01	0	0.01	0.01	0.4	46	3	0.2	8.26	451	
77914	184	224	0	0.45	0.03	0.15	0.06	0.01	0.05	0.04	0.4	40	3	0.7	7.95	707	
82723	358	417	10	0.72	0.05	2.06	0.18	0.01	0	0.03	2	38	35	5.2	8.25	1605	
82694	242	251	22	0.92	0.18	0.16	0.06	0.01	0	0.06	0.5	35	7	0.9	8.61	746	
95987	372	415	19	2.1	0.51	0.31	0.03	0.01	0	0.02	1.5	40	25	0.4	8.96	824	
59289	280	342	0	0.37	0	0.28	0.03	0.01	2.86	0.24			3	2.1	7.57		
60007	268	249	32	1.48	0.5	0.41	0.03	0.02	0	0.01	1	36	30	0.3	9.2		
60208	658	632	70	4.2	1.69	0.02	0.03	0	0	0	4.1	36	5	0.6	9.04		
61971	228	220	29	0.99	0.24	0.18	0.02	0.1	0.01	0.01	0.6	32	25	2.3	9.19		
65764	676	649	86	4.6	1.95	0.01	0.06	0	0	0.02	4.5	36	10	0.2	9.04		
65763	312	381	0	0.4	0.05	0.01	0.29	0	0.01	0.06	0.7	41	7	0.1	7.74		
69079	530	647	0	1.23	0.04	0.01	2.94	0.02	0.19	0.12	2.2	39	7	0.3	7.93		
72240	716	844	14	1.1	0.42	0.37	0.39	0.04	0.07	0.09	2.2	36	35	5.3	8.2	2650	
74899	6	7	0	0.04	0.003	0	0	0	0	0	0.2	4	3	0.2	7.84	22	
74898	110	129	2	0.23	0.01	0.14	0	0	0	0	0.2	47	3	1.9	8.26	374	
75359	716	683	94	5.52	2.26	0.17	0.12	0	0	0.02	5.8	32	17	2.3	9.13	2346	
75639	778	910	19	2.04	0.54	0	0.1	0	0.01	0.01	2	39	7	0.4	8.44	1965	
76035	46	56	0	0.13	0.01	0	0	0	0.03	0.01	2.3	6	3	0.2	7.67	126	
76627	764	869	31	2.12	0.68	0	0.18	0	0.02	0	2.5	40	7	0.3	8.4	2248	
78250	238	290	0	0.09	0.003	0.02	0	0	0.29	0.1	0.2	37	3	0.6	7.69	631	
79140	360	439	0	0.71	0.07	0	0	0	0.03	0.03	0.8	48	5	0.2	7.95	991	
79860	152	185	0	0.43	0.01	0	0	0	0	0.02	0.3	43	3	0.2	7.99	505	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
80813	9/20/88	18	29	5	Dom			No	312	132	38	9	47	4	67	27	4.4
82234	11/16/88	18	29	5	Dom	450	12	No		5	2	0	195	7			
82097	2/21/89	18	29	5	Dom		6	No	344	136	38	10	58	8	54	14	5.4
83182	6/6/89	18	29	5	Dom	20	6	No	877	41	10	4	293	11	215	47	3.2
83880	9/6/89	18	29	5	Dom		6	Yes	1208	8	3	1	422	2	332	99	4.8
84266	10/4/89	18	29	5	Dom		6	Yes	289								
86719	3/30/90	18	29	5	Dom	100	8	No	349	0	0	0	121	2	39	8	0.2
88706	7/20/90	18	29	5	Dom	127	6	No	347	0	0	0	122	2	40	7	1.7
90486	12/10/90	18	29	5	Dom	35	6	No	287	66	18	5	67	6	43	17	7
95327	12/23/91	18	29	5	Dom	138	6	No	437	7	1	1	157	4	48	8	0.3
97641	6/26/92	18	29	5	Dom	22	6	No	263	82	23	6	49	14	42	16	0
104404	5/25/93	18	29	5	Dom	60	6	Yes	61	0	0	0	21	1	0	8	3.3
58891	3/15/82	18	29	6	Dom	20	6	No	401	203	63	11	45	8	47	15	8.6
60084	8/5/82	18	29	6	Dom	60		No									
62227	5/19/83	18	29	6	Dom			No									
62357	6/6/83	18	29	6	Dom		7	No	672	222	51	23	127	33	99	20	12.9
62465	6/21/83	18	29	6	Dom	24	8	No		85	24	6	256	11			
62748	7/27/83	18	29	6	Dom	30	12	No	849	346	94	27	162	7	104	20	19.4
62858	8/8/83	18	29	6	Dom			No			26	6	276	16			
62814	8/9/83	18	29	6	Dom	31	8	No	1006	119	36	7	265	46	339	102	0
63637	10/4/83	18	29	6	Dom	25	8	No	333	127	36	9	47	18	58	23	0.5
64434	2/10/84	18	29	6	Dom	28	6	No	1093	112	35	6	306	41	387	120	0.1
64796	3/30/84	18	29	6	Dom	23	6	No	492	234	69	15	77	10	98	38	18.4
65006	4/23/84	18	29	6	Dom	28	6	No	533	92	22	9	148	20	97	26	3
65603	7/3/84	18	29	6	Dom	25	6	No	315	125	35	9	51	20	60	20	0.1
65681	7/30/84	18	29	6	Dom	31	6	No	985	131	41	7	264	46	323	102	0.3
66421	10/2/84	18	29	6	Dom	29	8	No	1062	67	22	3	315	33	321	114	0.1
66894	12/10/84	18	29	6	Dom	25	8	No	508	192	57	12	103	11	95	30	1.1
67238	1/14/85	18	29	6	Dom	25	6	No	546	194	58	12	117	12	101	28	0.5
67237	1/14/85	18	29	6	Dom	28	6	No	1109	53	18	2	368	28	312	110	2.7
67234	1/21/85	18	29	6	Dom	27	8	No	692	253	70	19	129	16	109	28	60.4
67669	3/4/85	18	29	6	Dom	25	6	No									
67911	3/27/85	18	29	6	Dom	28	6	No	536	159	47	10	120	13	101	31	1.9
67931	4/1/85	18	29	6	Dom	25	6	No	484	212	60	15	70	22	88	28	2.1

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
80813	132	161	0	0.43	0.005	0.72	0.15	0.02	0.08	0.07	0.5	29	7	7	7.35	496	
82234																	
82097	196	239	0	0.82	0.04	0	0.16	0	0	0.04	0.4	47	3	0.2	7.9	552	
83182	410	451	24	1.41	0.13	0.06	0.01	0	0.01	0.02	1.6	37	3	0.4	8.56	1358	
83880	462	564	0	0.74	0.06	0.06	0.01	0.01	0.06	0	1.5	44	3	0.5	7.86	1852	
84266					0.03												
86719	224	205	34	0.98	0.28	0.18	0.01	0.07	0	0	0.4	36	12	0.5	9.21	545	
88706	220	195	36	0.93	0.25	0.21	0.02	0.01	0.01	0.01	0.4	36	17	0.4	9.2	543	
90486	146	168	5	0.24	0.09	0.04	0.01	0	0	0.01	0.3	47	3	0.1	8.36	451	
95327	290	290	31	1.74	0.41	2.41	0.05	0.02	0.04	0.03	1	51	45	10	9.09	677	
97641	140	156	7	0.5	0.03	0.01	0.01	0	0.09	0.01	0.4	40	3	0.2	8.25	397	
104404	28	34	0	0.06	0.003	0	0	0.01	0.04	0	1	4	3	0.2	6.93	107	
58891	224	273	0	0.28	0.02	0.01	0.43	1.03	0.1	0.09	0.4	49	3	0.6	7.59		
60084					0.03												
62227							0.02										
62357	414	505	0	0.6	0.01	0.01	0.06	0	0.05	0.05	0.7	45	5	0.8	7.88		
62465						0.03	0.02	0.01	0.04	0.02	1.1	43					
62748	586	715	0	0.52	0.04	0	0.1	0	0.34	0.06	1	49	7	0.4	7.61		
62858						0.02	0.22				1.4	43			8.01		
62814	256	312	0	0.25	0.02	0.11	0.05	0	0.04	0.03	0.6	36	10	2.4	8.04		
63637	166	183	10	0.23	0.01	0.02	0.14	0.01	0.11	0.03	0.4	36	5	0.3	8.32		
64434	232	259	12	0.29	0.02	0.21	0.05	0	0	0.03	0.4	39	10	4.3	8.24		
64796	246	300	0	0.18	0.01	0	0.04	0.01	0.06	0.09	0.5	39	3	0.1	7.92		
65006	296	317	22	1.1	0.08	0.06	0.05	0.01	0.01	0.02	0.9	41	3	0.8	8.27		
65603	162	198	0	0.3	0.02	0.03	0.11	0	0.04	0.02	0.3	39	5	0.3	8.06		
65681	268	283	22	0.41	0.05	0.08	0.12	0	0.08	0.05	0.8	39	7	1.1	8.51		
66421	308	317	29	1.06	0.28	0.17	0.02	0	0.01	0.02	1.1	30	7	0.4	8.78		
66894	288	351	0	0.35	0.02	0.4	1.41	0	0.38	0.08	0.2	28	17	3.3	7.57		
67238	324	395	0	0.33	0.03	0.42	1.42	0	0.28	0.08	0.4	32	10	2.7	7.74		
67237	374	368	43	1.73	0.56	0.09	0.01	0	0.01	0.02	1.5	34	10	0.5	8.85		
67234	350	427	0	0.7	0.04	0.01	0.07	0	0.38	0.04	0.6	47	7	0.4	7.75		
67669							0.96										
67911	282	344	0	0.34	0.04	0.32	1.04	0	0.11	0.07	0.5	34	30	1.6	7.76		
67931	268	327	0	0.28	0.02	0.15	0.61	0	0.01	0.04	0.5	36	10	1.2	7.58		

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
68104	4/17/85	18	29	6	Dom	28	6	No	1075	75	20	6	337	29	317	66	0.3
68462	5/23/85	18	29	6	Dom	30	10	No	568	61	18	4	158	29	131	32	0
68450	5/28/85	18	29	6	Dom	28	6	No									
69215	8/20/85	18	29	6	Dom	120	8	No	189	77	21	6	29	3	32	8	1.7
70256	12/17/85	18	29	6	Dom	25	6	No	393	125	37	8	82	13	63	20	1.4
71606	4/24/86	18	29	6	Dom			No	536	247	69	18	90	10	78	23	0
71621	4/28/86	18	29	6	Dom	30	8	No	1884	150	45	9	548	55	715	225	0
72111	6/6/86	18	29	6	Dom	30	8	Yes	77						18		
73628	9/30/86	18	29	6	Dom			No	383	181	51	13	40	21	45	15	20.4
75081	2/19/87	18	29	6	Dom	29.5	8	No	459	238	64	19	62	6	96	36	14.2
75400	3/31/87	18	29	6	Dom	27	6	No	641	234	64	18	127	18	118	34	20.1
75883	5/6/87	18	29	6	Dom	150	6	No	478	5	2	0	185	3	45	10	0.1
76400	7/6/87	18	29	6	Dom	30	8	No	667	249	57	26	123	35	99	19	12
76771	8/11/87	18	29	6	Dom	95	8	No	307	3	1	0	107	1	36	8	0
76835	8/19/87	18	29	6	Dom	28	8	No	996	56	19	2	326	27	266	92	0
77130	9/21/87	18	29	6	Dom			No	402	184	49	15	59	3	46	25	13.1
77293	10/6/87	18	29	6	Dom	28	8	No	1031	56	19	2	337	29	281	100	0
77292	10/6/87	18	29	6	Dom	29	8	No	931	105	32	6	254	44	304	88	0
77401	10/7/87	18	29	6	Dom	28	7	No	865	79	25	4	242	32	263	84	2.3
77766	11/30/87	18	29	6	Dom			Yes	87	3	1	0	28	3	17	17	0
78256	1/20/88	18	29	6	Dom	25	8	No	444	224	70	12	60	8	61	18	12
78387	2/9/88	18	29	6	Dom	29	8	No	815	84	22	7	239	31	225	58	0
79417	4/26/88	18	29	6	Dom	46.5	6	No	1346	170	58	6	250	52	493	154	0
80311	7/25/88	18	29	6	Dom	98	6	No	354	5	2	0	126	3	47	9	0.6
80924	9/9/88	18	29	6	Dom	40		No	1436	117	32	9	414	47	570	180	0.5
80775	9/13/88	18	29	6	Dom	40	6	No	1763	200	57	14	472	59	710	233	0
80964	10/4/88	18	29	6	Dom		6	No	400	186	53	13	45	24	50	17	14.6
81582	10/5/88	18	29	6	Dom	26	8	No	1108	124	38	7	292	43	410	112	4.4
82251	3/7/89	18	29	6	Dom	37	6	No	881	187	50	15	214	28	262	60	1.8
82582	4/4/89	18	29	6	Dom	27	8	No	324	133	40	8	48	10	55	21	10
83747	8/15/89	18	29	6	Dom	30		No	784	323	88	25	163	7	90	20	8.9
83882	9/6/89	18	29	6	Dom			No	401	189	51	15	54	3	68	30	16.2
84944	12/11/89	18	29	6	Dom		6	No	781	267	74	20	171	7	221	53	3.9
85153	12/22/89	18	29	6	Dom	35	8	No	881	75	25	3	252	33	290	81	0.3

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
68104	420	512	0	0.7	0.17	0.01	0.04	0	0	0.02	1.5	36	5	0.6	8.11		
68462	270	300	14	0.49	0.04	0.24	0.09	0	0.02	0.02	0.9	36	10	1.4	8.46		
68450							0.96										
69215	96	117	0	0.3	0.01	0.29	0.01	0	0.06	0.05	0.2	32	7	1.1	7.37		
70256	232	283	0	0.4	0.05	0.37	0.47	0	0.08	0.04	0.5	24	15	1.5	7.87		
71606	354	432	0	0.38	0.03	0.02	0.08	0.01	0.38	0.02	0.6	51	5	0.1	7.89		
71621	420	473	19	0.5	0.21	0.22	0.18	0	0.01	0.04	2.6	36	10	0.4	8.23		
72111					0.003		0										
73628	218	266	0	0.34	0.03	0	0.75	0	0.05	0.02	0.4	46	3	0.3	7.8	584	
75081	220	268	0	0.29	0.01	0.02	0.01	0.01	0.33	0.04	0.6	43	3	0.4	7.96	752	
75400	350	427	0	0.6	0.05	0.01	0.05	0	0.06	0.03	0.8	48	3	0.4	7.91	1021	
75883	338	320	46	1.84	0.29	0.26	0.01	0	0.01	0.01	1.7	44	10	1.6	8.21	770	
76400	416	508	0	0.55	0.02	0	0.09	0	0.13	0.06	0.9	47	3	0.3	7.8	1076	
76771	184	151	36	0.64	0.17	0.13	0.03	0	0.03	0	0.4	39	12	0.7	9.11	485	
76835	372	371	41	1.23	0.37	0.02	0.05	0	0	0.02	1.4	38	3	0.5	8.81	1585	
77130	232	283	0	0.48	0.02	0	0.04	0	0	0.12	0.4	50	3	0.4	7.1	632	
77293	392	386	46	1.34	0.35	0.06	0.05	0	0	0.02	1.4	39	5	0.6	8.93	1572	
77292	286	310	19	0.3	0.02	0.05	0.07	0	0.04	0.03	0.8	39	5	0.5	8.38	1430	
77401	260	303	7	0.36	0.04	0	0.04	0	0	0.02	0.5	39	3	0.3	8.39	1352	
77766	26	32	0	0.07	0.04	0.01	0	0.01	0.01	0	1.9	3	3	0.3	7.59	162	
78256	278	339	0	0.39	0.02	0.02	0.76	0.59	0.04	0.11	0.4	44	5	0.9	7.47	707	
78387	344	420	0	0.55	0.07	0	0.04	0	0.01	0.02	1.2	39	3	0.2	8.11	1290	
79417	300	337	14	0.24	0.02	0.24	0.58	0	0	0.11	1.8	42	3	0.6	8.31	2034	
80311	214	203	29	0.97	0.43	0.24	0.03	0.02	0.01	0.01	0.6	34	35	0.7	9.2	555	
80924	238	251	19	0.36	0.06	0.57	0.1	0	0.01	0.05	0.8	36	17	2.3	8.22	2196	
80775	274	334	0	0.28	0.01	0.29	0.38	0	0.01	0.08	1.3	36	3	1.6	7.98	2654	
80964	242	295	0	0.31	0.05	0.01	1.08	0.01	0.01	0			7	0.3	7.73	635	
81582	238	246	22	0.3	0.02	0.89	0.1	0	0.01				3	1.6	8.2	1706	
82251	346	422	0	0.49	0.04	0.12	0.16	0.01	0.01	0.03	1.6	41	3	0.8	8.06	1357	
82582	162	198	0	0.6	0.03	0	0	0.04	0.01	0.03	0.3	38	3	0.3	8.16	507	
83747	556	678	0	0.54	0.04	0	0.09	0	0.03	0.07	0.8	56	3	0.2	7.56	1189	
83882	190	232	0	0.51	0.01	0	0.02	0	0	0.12	0.3	46	3	0.2	7.06	620	
84944	334	407	0	0.94	0.03	0.12	0.1	0.01	0	0.03	1.1	49	3	0.1	7.76	1133	
85153	262	290	14	0.39	0.03	1.55	0.12	0	0.17	0.04	0.6	40	35	12	8.33	1367	

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
85254	1/8/90	18	29	6	Dom	20	5	No	375	95	28	6	85	4	62	18	2.9
85650	2/13/90	18	29	6	Dom			No	619	107	28	9	163	27	122	34	6.6
86153	3/10/90	18	29	6	Dom	112	6	No	314	0	0	0	111	2	40	8	0.3
86217	3/19/90	18	29	6	Dom		8	No	1716	223	66	14	452	58	677	225	0.5
86219	3/19/90	18	29	6	Dom	33	8	No	308	115	33	8	45	18	48	16	4.5
87783	5/17/90	18	29	6	Dom	28	6	No	1048	57	18	3	315	27	276	100	0.1
89484	9/12/90	18	29	6	Dom			Yes	300	0	0	0	101	1	46	7	0.1
89604	9/25/90	18	29	6	Dom			No	349	3	1	0	121	2	41	8	0.9
91081	1/25/91	18	29	6	Dom	100	6	No	417	3	1	0	152	3	43	7	0.2
90996	1/29/91	18	29	6	Dom	25		No	528	225	67	14	87	11	81	39	18.3
93801	8/21/91	18	29	6	Dom	139	6	No	461	3	1	0	167	3	44	6	2.1
93802	8/23/91	18	29	6	Dom	35	6	No	843	174	45	15	217	25	203	47	3.2
93989	9/16/91	18	29	6	Dom		8	No	364	186	48	16	43	4	72	30	4.2
94184	10/3/91	18	29	6	Dom			No	404	175	47	14	66	7	93	40	4.2
94838	11/18/91	18	29	6	Dom	28	8	No	369	195	50	17	47	3	82	24	3
95683	1/21/92	18	29	6	Dom	115	8	No	378	3	1	0	129	3	41	7	2.1
96556	4/20/92	18	29	6	Dom			Yes	35	3	1	0	11	0	0	1	0
96979	5/20/92	18	29	6	Dom	110	6	No	316	0	0	0	113	2	40	7	0
97090	6/1/92	18	29	6	Dom	105	6	Yes	28	0	0	0	8	0	1	1	0
96362	7/7/92	18	29	6	Dom			No	355	154	42	12	56	6	79	33	2.6
101882	2/12/93	18	29	6	Dom			No	312	0	0	0	111	2	39	7	0
102048	2/23/93	18	29	6	Dom			No	588	133	35	11	146	23	81	20	0.6
102162	3/8/93	18	29	6	Dom			No	927	164	46	12	260	17	185	66	5.5
106464	8/13/93	18	29	6	Dom		6	No	364	187	47	17	52	2	77	38	2.1
113605	6/14/94	18	29	6	Dom	117	6	Yes	20	0	0	0	9	0	3	0	0
114332	7/15/94	18	29	6	Dom	125	6	Yes	14	0	0	0	6	0	0	0	0
115346	8/22/94	18	29	6	Dom	117	6	Yes	20	0	0	0	9	1	0	0	0
125195	12/13/95	18	29	6	Dom	38	10	No	307	115	33	8	46	17	56	22	0.3
62358	6/6/83	18	29	7	Dom	30		No	377	177	46	15	45	2	93	21	3
62850	8/8/83	18	29	7	Dom	28	8	No	1108	490	135	37	170	5	344	112	7.6
66335	9/26/84	18	29	7	Dom	26	6	No	214	102	26	9	29	2	44	11	3.4
66996	1/2/85	18	29	7	Dom	18	6	No	203	93	24	8	28	2	34	7	2.1
67446	1/30/85	18	29	7		32	6	No	907	170	53	9	261	5	186	66	3.8
70793	2/19/86	18	29	7	Dom		6	No	416	196	52	16	55	3	58	33	32.8

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
85254	212	259	0	0.76	0.06	0	0	0.06	0.02	0.01	0.4	43	3	0.4	8.11	583	
85650	322	368	12	0.87	0.11	0.14	0.05	0	0	0.02	0.7	35	3	0.3	8.25	968	
86153	196	176	31	0.69	0.15	0.42	0.02	0	0.01	0.01	0.3	39	17	0.9	9.3	499	
86217	280	342	0	0.31	0.02	0.81	0.32	0.07	0.02	0.05	2.4	40	3	2	8.09	2528	
86219	168	205	0	0.39	0.02	0	0.01	0.01	0	0.02	0	42	3	0.1	8.15	484	
87783	394	398	41	1.02	0.27	0.07	0.05	0	0	0.02	1.1	36	3	0.2	8.96		
89484	178	163	26	0.74	0.144	0.34	0.01	0.01	0	0	0.2	37	17	0.6	9.24	461	
89604	216	190	36	1.16	0.32	1.98	0.07	0.03	0.07	0.02	0.5	46	17	0.8	9.25	531	
91081	276	244	46	1.44	0.3	0.56	0.03	0	0	0.01	0.8	48	17	2.2	9.36	650	
90996	284	346	0	0.28	0.02	0.01	0.95	0.03	0	0.07	0.6	48	3	0.2	7.59	837	
93801	324	298	48	1.97	0.18	1.2	0.04	0.33	0.2	0.01	1.1	32	45	2.9	9.15	740	
93802	408	498	0	0.69	0.06	0.02	0.2	0	0.07	0.04	1.6	44	3	0.2	7.96	1292	
93989	166	203	0	0.34	0.008	0.01	0.02	0.01	0	0.08	0.4	46	3	0.2	7.52	572	
94184	174	212	0	0.34	0.01	0	0.12	0	0.01	0.06	0.5	36	3	0.3	7.39	656	
94838	176	215	0	0.49	0.01	0.02	0.09	0.02	0.01	0.02	0.4	43	3	0.5	7.72	579	
95683	234	188	48	0.8	0.04	0.18	0.02	0.01	0	0.01	0.5	50	25	0.4	9.1	571	
96556	26	12	10	0.09	0.01	0	0	0	0.01	0.01	0.4	9	3	0.4	8.61	56	
96979	196	171	34	0.7	0.18	0.33	0.02	0.01	0.01	0.01	0.4	36	20	0.4	9.19	477	
97090	20	10	7	0.04	0.01	0	0	0	0	0.01	0.4	4	3	0.2	8.51	47	
96362	150	183	0	0.34	0.01	0.2	0.09	0	0.09	0.06	0.5	37	10	1.4	7.64	537	
101882	198	163	38	0.66	0.17	0.25	0.01	0.01	0	0.01	0.4	36	35	0.7	9.28	465	
102048	372	454	0	0.59	0.03	0.06	0.15	0.01	0.01	0.03	0.7	42	3	0.5	8.01	867	
102162	460	561	0	1.02	0.09	0.01	0	0.02	0.06	0.05	1.5	36	12	0.4	8.03	1415	
106464	152	185	0	0.37	0.01	0	0.03	0	0	0.1	0.4	40	3	0.2	7.18	567	-0.32
113605	18	0	10	0.03	0.28	0.01	0	0	0	0	1.1	5	5	0.2	9.53	45	-0.9
114332	18	22	0	0.03	0.003	0.02	0	0.02	0.01	0	0.2	2	3	0.7	8.18	37	-2.28
115346	20	0	14	0.03	0.24	0.01	0	0	0	0	1	5	7	1	9.82	48	-0.6
125195	152	185	0	0.31	0.02	0.02	0.01	0.01	0.03	0.02	0.3	37	7	0.3	7.73	465	-0.12
62358	154	188	0	0.51	0.005	0.01	0	0.06	0.04	0.03	0.3	43	5	0.7	7.72		
62850	344	420	0	0.59	0.005	0.01	1.9	0.01	0.02	0.05	1	45	10	0.4	7.66		
66335	100	122	0	0.51	0.01	0	0	0.02	0.08	0.06	0.1	39	3	0.3	7.47		
66996	100	122	0	0.42	0.01	0	0	0	0.03	0.05	0	41	3	0.3	7.25		
67446	464	527	19	0.52	0.07	0	0.03	0	0.04	0.02	0.7	32	12	0.3	8.23		
70793	194	237	0	0.45	0.01	0.03	0.02	0	0	0.12	0.4	49	5	0.2	7.05		

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
72130	5/14/86	18	29	7	Dom	29	8	No	543	288	74	25	72	10	77	17	19.4
74096	11/12/86	18	29	7	Dom	18	6	No	270	128	33	11	33	2	66	17	2.7
76336	6/24/87	18	29	7	Dom	26	6	No	324	153	40	13	48	3	61	18	2.1
77669	11/13/87	18	29	7	Dom	18	6	No	252	126	34	10	30	2	41	13	3.3
77978	12/17/87	18	29	7	Dom	30	8	No	1106	470	132	34	189	4	276	148	5.8
78146	12/31/87	18	29	7	Dom			No	207	111	28	10	25	2	41	13	2.4
83941	7/31/89	18	29	7	Dom	30		No	334	163	42	14	46	5	59	23	5.9
87317	5/8/90	18	29	7	Dom	23	8	No	315	136	38	10	45	3	62	20	6.6
89753	9/25/90	18	29	7	Dom	32	6	No	861	191	50	16	215	27	214	47	4
90259	11/6/90	18	29	7	Dom	30		No	947	14	4	1	318	13	257	56	0.1
91563	2/28/91	18	29	7	Dom			No	377	191	50	16	48	3	84	26	2.4
93797	8/27/91	18	29	7	Dom			Yes	255	0	0	0	85	4	1	12	17.8
96577	4/23/92	18	29	7	Dom	28	8	No	644	95	20	11	186	23	117	23	1.2
96652	4/23/92	18	29	7	Dom	27	8	No	1718	79	20	7	569	13	560	140	5.7
102715	4/1/93	18	29	7	Dom	28	8	No	370	182	48	15	47	3	75	27	0.5
62617	7/6/83	18	29	8	Dom	31	6	No	963	85	21	8	306	10	129	36	3.3
64447	2/16/84	18	29	8	Dom	40	6	No	1920	18	7	0	663	15	639	132	0.2
65148	5/4/84	18	29	8	Dom		6	No	273	135	39	9	34	4	46	10	0.6
73870	10/23/86	18	29	8	Dom	30	8	No	619	236	60	21	106	14	114	63	40.1
73865	10/28/86	18	29	8	Dom	30	8	No	559	127	26	15	129	30	99	40	25.4
77508	10/19/87	18	29	8	Dom	23	6	No	377	173	48	13	56	2	54	10	5.9
81325	10/20/88	18	29	8	Dom			No	1329	21	5	2	473	20	288	95	6.7
83431	7/6/89	18	29	8	Dom			No	585	148	36	14	133	23	112	66	17.2
84913	11/27/89	18	29	8	Dom	100	6	No	491	178	45	16	94	19	89	23	6.2
85320	1/23/90	18	29	8	Dom	25	12	No	1333	19	6	1	451	9	456	124	0.3
85651	2/5/90	18	29	8	Dom			No	438	168	46	13	93	5	72	22	2.6
86158	2/28/90	18	29	8	Dom	40	8	No	1685	18	7	0	575	10	540	116	2.6
88371	6/20/90	18	29	8	Dom	32	8	No	633	219	45	26	119	32	145	72	21.5
92318	5/15/91	18	29	8	Dom			No	361	60	19	3	101	6	64	29	1.3
110829	2/9/94	18	29	8	Dom		6	Yes	84	0	0	0	31	2	4	23	0.4
60006	7/29/82	18	29	9	Dom	30	6	No	556	175	47	14	133	8	88	22	5.9
90909	1/4/91	18	29	9	Dom	25	7	No	671	239	48	29	124	48	121	62	38
93301	7/15/91	18	29	9	Dom	31	8	No	576	35	9	3	187	7	100	26	28
93569	8/1/91	18	29	9	Dom	155	6	No	574	3	1	0	212	4	42	9	1.1

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
72130	352	429	0	0.44	0.01	0.86	0.05	0	0	0.08	0.6	49	25	6.4	7.81		
74096	128	156	0	0.33	0.01	0	0.01	0	0.02	0.06	0.3	42	3	0.1	6.98	422	
76336	168	205	0	0.44	0.01	0.01	0.01	0.01	0.04	0.07	0.4	45	3	0.3	7.34	522	
77669	138	168	0	0.36	0.01	0.01	0.02	0	0.01	0.05	0.3	41	3	0.2	7.2	402	
77978	402	490	0	0.64	0.02	0.05	0.98	0	1.06	0.06	1.2	51	3	0.5	7.49	1621	
78146	106	129	0	0.4	0.01	0.12	0.01	0	0.07	0.07	0.2	34	3	0.6	7.32	348	
83941	170	207	0	0.49	0.01	0	0.02	0	0	0.07	0.3	43	3	0.2	7.42	526	
87317	146	178	0	0.29	0.02	0.05	0.08	0	0.04	0.05	0.2	36	3	0.2	7.4	482	
89753	410	432	34	0.55	0.04	0.01	0.2	0	0.07	0.04	1.4	45	3	0.1	8.41	1309	
90259	410	451	24	0.47	0.04	0.19	0.01	0	0.01	0.01	0.6	35	3	0.1	8.87	1466	
91563	170	207	0	0.57	0.01	0	0	0.02	0.02	0.04	0.4	43	3	0.3	7.55	589	
93797	160	137	29	0.75	0.01	0	0	0	0	0.01	1.2	34	3	0.1	9.14	394	
96577	372	454	0	1.09	0.05	0.01	0	0.01	0	0.02	1.3	42	3	0.3	8	961	
96652	564	688	0	2.44	0.21	0.25	0.52	0	0.23	0.02	3.2	34	12	1.2	8.14	2524	
102715	178	217	0	0.45	0.01	0.07	0.1	0.01	0.02	0.02	0.3	43	5	0.4	7.58	539	
62617	568	693	0	1.9	0.41	0.06	0.02	0.01	0.24	0.02	1.2	54	5	0.4	7.92		
64447	648	703	43	3.28	0.39	0.18	0.01	0.01	0	0	3.6	36	7	0.4	8.56		
65148	156	190	0	0.59	0.03	0.01	0.02	0	0.11	0.03	0.2	34	5	0.2	8.08		
73870	246	300	0	0.53	0.03	0	0.08	0.01	0.08	0.06	0.7	52	3	0.3	7.63	971	
73865	254	310	0	1	0.05	0.04	0.01	0	0	0.04	0.9	45	3	0.4	8.07	890	
77508	230	281	0	0.67	0.04	0.03	0.35	0	0	0.02	0.4	54	3	0.4	7.77	584	
81325	636	708	34	2.46	0.72	0	0.15	0.01	0				10	0.2	8.56	2021	
83431	254	310	0	0.66	0.04	0.01	0.07	0.02	0	0.04	0.7	43	3	0.4	8.12	943	
84913	278	295	22	0.55	0.03	0.01	0	0.02	0.01	0.03	0.6	42	3	0	8.41	776	
85320	366	368	38	2.38	0.26	0.11	0	0	0.02	0.01	2	32	10	0.5	8.67	2042	
85651	268	327	0	0.36	0.01	0.92	0.43	0	0.1	0.08	0.6	30	3	1	7.88	711	
86158	590	647	36	3.68	0.56	0.16	0	0.01	0.06	0.01	3.7	37	7	0.4	8.69	2504	
88371	262	320	0	0.72	0.04	0	0.03	0	0.01	0.06	0.6	45	3	0.4	8.17	1046	
92318	170	193	7	0.66	0.11	0.01	0.24	0	0	0.03	0.6	34	5	0.1	8.4	579	
110829	38	46	0	0.17	0.01	0	0	0.01	0.02	0	1.1	6	3	0.7	7.53	151	
60006	330	403	0	1.07	0.04	0.01	0	0	0.04	0.12	0.8	51	3	0.3	7.74		
90909	328	400	0	0.5	0.03	0.04	0.08	0	0.01	0.11	0.8	43	5	0.7	7.6	1068	
93301	302	329	19	2.04	0.69	0.13	0.01	0.13	0.01	0.01	1.6	42	7	1.4	8.55	904	
93569	408	405	46	2.1	0.5	0.5	0.04	0.01	0	0.01	1.8	46	25	1.4	9.05	901	

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
98462	8/10/92	18	29	9	Dom		8	Yes	1063	42	12	3	369	26	215	65	2.1
58892	3/15/82	18	29	12	Dom	18	6	No	426	54	15	4	117	13	70	18	0.4
58985	3/30/82	18	29	12	Dom	20	10	No	835	298	93	16	159	14	159	79	23.7
85078	12/15/89	18	29	12	Dom	18	10	No	964	325	102	17	173	30	210	96	28.8
60180	8/12/82	18	29	13	Dom		8	No	1024	120	35	8	289	25	175	56	31.1
70917	3/4/86	18	29	13	Dom	20		No	537	235	43	31	92	23	48	2	10.5
76545	7/22/87	18	29	13	Dom			No	495	50	15	3	161	9	55	27	3.5
89754	10/1/90	18	29	13	Dom	100	8	No	925	151	44	10	269	18	60	250	7.1
97859	7/14/92	18	29	13	Dom	80		No	3029	17	2	3	1109	17	130	1038	0.2
82403	3/20/89	18	29	16	Dom	32	6	No	1245	434	126	29	246	10	373	112	16.7
68312	5/9/85	18	29	17	Dom		8	No	747	324	95	21	120	10	197	36	5.1
70490	1/17/86	18	29	17	Dom			No	547	154	45	10	128	6	89	32	3.3
76555	7/22/87	18	29	17	Dom	20	8	No	538	173	48	13	115	5	125	20	10
105476	7/27/93	18	29	17	Dom	135	6	No	378	0	0	0	140	2	35	7	0
59396	5/10/82	18	29	18	Dom		6	No	874	19	6	1	309	12	144	41	4.6
59408	5/10/82	18	29	18	Dom	12		No	835	30	7	3	295	13	144	42	6.4
59853	7/19/82	18	29	18	Dom	18	6	No	891	212	57	17	222	34	175	36	3.4
59856	7/23/82	18	29	18	Dom	32	8	No	959	167	34	20	271	31	164	41	6.3
61574	3/1/83	18	29	18	Dom	18	6	No	700	25	10	0	237	7	146	38	5
61970	4/18/83	18	29	18	Dom	26	6	No	631	130	39	8	167	5	116	43	52.4
64348	1/31/84	18	29	18	Dom	110	6	No	794	37	10	3	275	11	132	37	8.8
64349	1/31/84	18	29	18	Dom	90	12	No	795	46	12	4	274	10	123	35	7.5
67581	2/15/85	18	29	18	Dom	26	6	No	744	197	59	12	175	6	175	44	41.5
68413	5/20/85	18	29	18	Dom			No	876	37	13	1	308	3	121	33	34
69689	10/7/85	18	29	18	Dom	15	10	No	1098	130	39	8	348	8	201	71	56.4
77666	11/10/87	18	29	18	Dom	29	8	No	886	8	3	0	314	9	245	53	0
80227	7/14/88	18	29	18	Dom	26	6	No	78	3	1	0	22	1	1	6	23.1
92410	5/23/91	18	29	18	Dom	150	6	No	359	0	0	0	125	3	39	8	0.1
93553	8/5/91	18	29	18	Dom	124	8	No	391	0	0	0	132	2	34	6	0
96406	4/10/92	18	29	18	Dom	35		No	520	234	74	12	84	6	109	40	12.4
97610	7/8/92	18	29	18	Dom	35	10	No	743	33	10	2	252	19	156	39	0.6
97853	7/9/92	18	29	18	Dom	20	6	No	745	96	30	5	237	6	117	36	6.2
97863	7/16/92	18	29	18	Dom	31	8	No	1127	40	11	3	398	14	158	52	4.2
102416	3/21/93	18	29	18	Dom	35	8	No	698	26	7	2	237	15	122	36	1

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
98462	542	573	43	0.87	0.39	0.01	0.03	0.02	0	0.01	1.4	31	12	0.2	8.69	1644	
58892	212	259	0	0.49	0.05	0.11	0.1	0.03	0.05	0.03	0.3	43	5	0.4	8.17		
58985	378	461	0	0.68	0.01	0.05	0.11	0.12	0.07	0.09	0.9	51	10	0.3	7.9		
85078	362	442	0	0.72	0.03	0.07	0.4	0	0.01	0.04	1.1	55	55	0.5	7.51	1396	
60180	498	578	12	0.77	0.04	0	0.15	0	0.03	0.02	1.4	41	25	0.3	8.3		
70917	388	473	0	1.81	0.03	0.05	0	0.01	0	0.05	0.5	60	7	0.4	7.96		
76545	310	315	31	0.86	0.03	0.15	0.01	0	0.01	0.03	0.6	39	7	2.3	8.75	788	
89754	342	417	0	0.79	0.03	0.12	0.03	0.02	0.19	0.09	2.4	46	12	0.8	8.08	1553	
97859	918	1057	31	3.78	0.93	0.1	0.02	0	0	0.04	13.2	28	70	0.6	8.55	4914	
82403	456	556	0	0.6	0.13	0	0.3	0.09	0.04	0.04	3.5	51	3	0.3	7.72	1821	
68312	348	425	0	0.55	0.02	0.01	0.54	0	0.02	0.06	0.8	41	3	0.1	7.86		
70490	324	395	0	0.47	0.05	0	0.27	0	0.06	0.08	0.6	43	7	0.3	7.78		
76555	278	339	0	0.59	0.01	0	0	0.01	0.05	0.09	1.1	36	5	0.4	7.49	855	
105476	266	242	41	1.23	0.15	1.48	0.04	0.01	0	0.01	0.6	34	70	5	9.21	581	
59396	474	515	26	1.81	0.32	0.01	0.12	0	0.03	0			7	0.5	8.59		
59408	446	500	18	1.65	0.23	0	0	0	0.02	0			7	0.4	8.38		
59853	504	615	0	0.6	0.02	0.3	0.33	0	0.02	0.07	1.2	45	3	1.1	8.02		
59856	566	691	0	0.91	0.07	0.02	0.15	0	0.27	0.02	1.5	47	3	0.4	8.01		
61574	350	354	36	1.05	0.19	0.01	0	0	0.01	0.01	1	32	5	0.4	8.85		
61970	268	327	0	0.78	0.21	0.01	0.44	0.01	0.02	0.05	0.9	34	10	0.9	7.47		
64348	448	503	22	1.39	0.11	0	0.14	0.02	0.04	0.01	1.1	41	5	0.4	8.39		
64349	462	564	0	1.38	0.08	0.01	0.02	0.03	0.05	0.01	1.2	43	5	0.6	8.02		
67581	320	390	0	0.61	0.17	0	0.76	0.01	0.04	0.08	1	34	7	0.3	7.72		
68413	520	581	26	1.63	0.38	0.05	0.09	0	0.01	0.02	1.4	36	17	0.2	8.44		
69689	530	647	0	1.25	0.16	0	0.04	0.01	0.02	0.06	1.8	47	20	0.4	8.08		
77666	388	400	36	0.52	0.05	0.16	0.02	0	0.01	0.01	0.5	34	5	0.9	9.03	1419	
80227	26	32	0	0.08	0.003	0	0.01	0	0.05	0	1.1	12	5	0.4	6.71	118	
92410	228	195	41	0.91	0.26	0.5	0.03	0.02	0	0.01	0.5	37	55	3.3	9.32	564	
93553	224	190	41	1.14	0.18	0.42	0.04	0.1	0	0.01	0.6	35	65	1.2	9.21	616	
96406	252	307	0	0.32	0.01	0	0.69	0.32	0.04	0.06	0.6	36	3	0.4	7.69	781	
97610	384	439	14	0.29	0.04	0.13	0	0	0	0.01	1	35	10	1	8.43	1169	
97853	416	483	12	1.3	0.5	0.18	0.01	0.01	0	0.02	1.2	43	7	1.3	8.35	1135	
97863	700	756	48	2.88	1.02	0.02	0.01	0.01	0	0.02	2.1	32	35	0.4	8.91	1701	
102416	394	407	36	0.98	0.16	1.02	0.03	0.03	0.16	0.01	0.9	31	35	8.3	8.83	1085	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
109874	12/21/93	18	29	18	Dom	126	6	No	340	0	0	0	125	3	42	6	0
63837	11/8/83	18	29	19	Dom	40	8	No	811	208	60	14	192	6	184	57	21.2
64449	2/17/84	18	29	19	Dom	30	8	No	210	96	30	5	36	4	23	6	0.1
66027	8/22/84	18	29	19	Dom	31	6	No	461	172	54	9	89	5	75	19	16.7
66422	10/4/84	18	29	19	Dom	32	6	No	714	3	1	0	264	5	75	23	19.4
72129	6/5/86	18	29	19	Dom	28	8	No	488	125	37	8	112	6	98	27	4.1
74694	1/22/87	18	29	19	Dom	38	6	No	394	3	1	0	153	2	35	6	0
77131	9/15/87	18	29	19	Dom	30	6	No	909	8	3	0	334	10	233	53	0
77132	9/16/87	18	29	19	Dom	30	6	No	961	3	1	0	358	7	233	52	0
79418	5/6/88	18	29	19	Dom	28	6	Yes	401	0	0	0	151	2	35	5	4.7
83273	6/22/89	18	29	19	Dom	26	6	Yes	763	112	35	6	230	8	169	44	2.2
83847	8/25/89	18	29	19	Dom	26	6	Yes									
84678	11/6/89	18	29	19	Dom	26	6	No									
90011	11/6/90	18	29	19	Dom			No	912	125	35	9	263	16	2464	55	2.6
90012	11/6/90	18	29	19	Dom			No	983	91	25	7	325	6	135	52	30.5
90013	11/6/90	18	29	19	Dom		10	No	805	84	22	7	254	15	125	56	35.9
100752	11/21/92	18	29	19	Dom	123		No	472	0	0	0	171	2	36	9	0.4
122062	9/10/95	18	29	19	Dom	35		No	824	12	3	1	286	11	123	34	4.8
69802	10/18/85	18	29	20	Dom	30	6	No	646	212	57	17	130	12	125	29	26.6
75204	3/16/87	18	29	20	Dom	26	6	No	891	136	38	10	261	5	276	53	13.9
85387	1/26/90	18	29	20	Dom	31	6	No	562	162	50	9	127	5	80	25	12.4
75690	4/21/87	18	29	21	Dom	150	6	No	590	3	1	0	222	2	39	10	0
85319	1/17/90	18	29	21	Dom	30		No	779	117	32	9	213	4	230	56	12.1
79680	6/6/88	18	29	22	Dom	38	8	Yes									
99094	9/17/92	18	29	22	Dom	130	6	No	330	5	2	0	110	7	36	9	0
109847	12/23/93	18	29	25	Dom	70	6	No	2544	13	2	2	926	17	7	800	0.4
90257	11/27/90	18	29	27	Dom			No	1303	142	29	17	393	18	202	106	22.2
62841	8/8/83	18	29	29	Dom	15	6	No	1129	210	46	23	309	12	314	153	7
72380	6/30/86	18	29	29	Dom	21	6	No	534	213	62	14	96	5	145	37	4
84672	11/7/89	18	29	29	Dom			No	414	125	32	11	90	3	82	23	9.8
126934	4/22/96	18	29	29	Dom	150		No	1216	9	2	1	472	6	34	209	0.1
61316	1/13/83	18	29	30	Dom			No	4143	10	4	0	1576	30	4	1675	0.5
61315	1/13/83	18	29	30	Dom			No	6854	13	5	0	2568	22	1	3100	0.3
67657	3/1/85	18	29	30	Dom	24		No	843	61	21	2	306	9	219	50	7.8

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
109874	226	193	41	1.04	0.24	0.26	0.04	0.01	0.01	0.02	0.5	34	45	0.4	9.26	533	
63837	372	454	0	0.89	0.03	0.02	0.36	0.02	0.03	0.09	1.1	36	12	0.5	7.76		
64449	148	181	0	0.35	0.03	0.01	0	0.25	0.03	0.02	0.2	24	3	0.5	7.94		
66027	254	310	0	0.62	0.03	0.03	0.02	0.03	0.02	0.04	0.5	43	5	0.2	7.37		
66422	464	444	60	1.14	0.29	0	0	0	0	0	0.7	34	12	0.2	9.17		
72129	254	310	0	0.48	0.05	0.01	1.86	0.01	0.05	0.07	0.6	41	3	0.2	7.53		
74694	280	273	34	1.22	0.29	0.09	0.03	0.03	0.01	0.02	0.8	35	45	0.3	9.07	632	
77131	418	447	31	0.9	0.07	0.45	0.01	0	0.07	0	0.7	31	7	1.3	8.71	1410	
77132	458	476	41	1.22	0.12	0.13	0.01	0	0	0	0.9	33	3	1	8.91	1487	
79418	280	278	31	1.23	0.25	0.44	0.01	0.03	0.01	0	0.7	34	55	0.4	9.04	635	
83273	380	464	0	1.52	0.21	0.03	0.4	0.07	0.21	0.06	1.2	33	7	1.1	8.12	1170	
83847					0.22		0.26										
84678					0.01		0.03										
90011	396	483	0	0.55	0.08	0	0.03	0.01	0	0.02	0.9	40	3	0.2	8.09	1322	
90012	556	678	0	1.96	0.65	0	0.26	0.01	0.01	0.02	1.4	49	12	0.3	8.03	1409	
90013	410	481	10	0.96	0.14	0.33	0.15	0.01	0.02	0.03	0.9	38	35	0.3	8.43	1178	
100752	330	339	31	1.67	0.25	0.38	0.02	0.02	0	0.01	0.9	39	70	0.3	9.19	704	
122062	448	459	43	1.48	0.36	0.24	0	0	0	0	1.3	33	15	0.4	8.98	1272	0.51
69802	332	405	0	0.74	0.03	0	0.42	0	0.06	0.1	0.9	47	10	0.2	7.18		
75204	338	412	0	0.61	0.03	0.06	0.04	0	0.28	0.08	2	43	3	0.5	7.64	1369	
85387	328	400	0	1.32	0.05	0.03	0.01	0.01	0	0.05	0.7	42	3	0.3	7.45	845	
75690	420	444	34	2.72	0.53	0.32	0.02	0	0	0	1.9	40	35	0.4	8.94	916	
85319	268	327	0	0.48	0.02	0.02	0.02	0.01	0.11	0.06	1.6	46	3	0.4	7.39	1179	
79680					0.28								7		9.09		
99094	202	212	17	0.77	0.13	0.09	0.01	0.01	0	0.02	0.5	47	3	0.3	8.91	474	
109847	994	1115	48	2.47	0.36	0.48	0.02	0.01	0	0.04	9.2	44	65	0.9	8.53	4259	0.19
90257	642	783	0	1.75	0.09	0.03	0.84	0.03	0.1	0.06	2.5	60	35	0.3	7.79	1903	
62841	364	444	0	0.7	0.04	0.01	0.42	0.02	0.03	0.04	2.1	41	17	0.4	7.51		
72380	224	273	0	0.43	0.01	0.02	0.41	0.02	0.26	0.12	0.8	27	3	0.3	7.14	856	
84672	200	244	0	0.55	0.06	0.01	0.09	0	0.01	0.05	0.7	43	3	0.1	7.42	632	
126934	696	756	46	3.54	0.49	0.13	0.01	0.02	0	0.05	3.9	37	70	1.3	8.81	1969	0.34
61316	1210	1379	48	2.56	0.15	0.05	0.02	0	0	0.07	13.1	47	70	0.9	8.44		
61315	1520	1732	60	2.16	0.38	0.39	0.03	0	0	0.28	26.1	43	70	1.1	8.36		
67657	416	444	31	2.52	0.33	0.02	0.13	0	0.02	0.03	2.7	32	7	0.4	8.57		

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
69137	8/15/85	18	29	30	Dom	24		No	588	158	45	11	138	9	134	55	2
76402	7/6/87	18	29	30	Dom	25	6	No	812	165	51	9	230	7	200	48	0
71202	3/17/86	18	29	32	Dom	40		No	316	104	30	7	66	5	71	26	2.9
75188	3/11/87	18	29	32	Dom	165	6	No	1354	5	2	0	512	6	38	260	1.3
62183	5/16/83	18	29	33	Dom	22	4	No	1298	370	87	37	256	45	438	118	0
75083	2/2/87	18	29	34	Dom	25	8	No	16760	1092	35	244	5653	87	3844	6000	0.5
76078	5/27/87	18	29	34	Dom	150	6	No	959	5	2	0	376	4	39	118	0.1
93627	8/10/91	18	29	34	Dom	135	6	No	5055	13	2	2	1860	20	5	2050	0.1
95636	1/12/92	18	29	34	Dom	125	6	No	2889	13	2	2	1108	18	7	920	2.6
97575	7/2/92	18	29	34	Dom		6	No	301	179	52	12	34	5	67	27	0.5
98907	8/24/92	18	29	34	Dom			Yes									
84946	11/27/89	18	29	35	Dom	13	6	No	2430	209	49	21	723	61	485	540	43.4
85693	2/16/90	18	29	35	Dom	15	24	No	1270	87	20	9	423	13	177	108	16.1
85845	2/26/90	18	29	35	Dom	130	8	No	6150	13	5	0	2453	16	0	2750	1.8
100599	11/6/92	18	29	35	Dom		10	No	352	182	53	12	44	6	54	23	2.4
100595	11/13/92	18	29	35	Dom			Yes	161	43	13	64	7	56	16	4.3	216
61073	12/2/82	18	29	36	Dom	130	8	No	6659	15	6	0	2614	23	1	3050	0.6
82443	3/30/89	18	29	36	Dom	60	8	No	3792	8	3	0	1462	28	0	1450	0.9
29650	10/13/71	18	30		Dom	20	8	No	243	120	34	9	37		50	13	4.7
122189	7/13/95	18	30	13	Dom			Yes	842	0	0	0	287	3	3	369	0
36986	8/2/75	18	30	18	Dom		8	No	52190	564	28	120	19000	450	8070	22500	0.6
38706	4/22/76	18	30	18	Dom	100	6	No	7064	53	8	8	2520	52	3	3000	1.1
51647	10/18/79	18	30	18	Dom			No	354	107	28	9	80	8	61	29	1.5
127894	6/26/96	18	30	18	Dom			Yes	175	0	0	0	60	1	2	78	0
66491	10/22/84	18	30	29	Dom	22	8	No	1925	276	79	19	576	17	297	740	0
66492	10/22/84	18	30	29	Dom	16	6	No	857	227	63	17	193	11	229	156	1.8
114478	7/22/94	18	30	34	Dom		6	Yes	478	17	5	1	164	13	43	217	0.8
51644	10/10/79	18	30	35	Dom			No	3004	110	31	8	1045	80	282	1275	4.3
73378	9/16/86	18	30	35	Dom			No	2956	88	32	2	996	78	279	1250	1.7
39060	5/24/76	18	34	33	Dom		8	No	459	155	49	8	91	5	125	48	1.1
82248	3/8/89	18	37	20	Dom			No	484	256	76	16	36	4	109	56	35.2
118018	12/14/94	18	37	20	Dom			Yes	560	317	94	20	38	3	130	107	0.1
30896	6/19/72	18	37	29	Dom	370	10	No	359	184	58	10	32		70	48	20.3
33540	1/14/74	18	37	29	Dom	30	8	No	128	43	14	2	23	2	10	11	1.3

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ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
252	307	0	1.04	0.07	0	0.09	0	0.15	0.06	1	45	5	0.2	8.03		
386	471	0	1.26	1.17	0.03	0.82	0	0	0.09	1.3	33	3	0.4	8.07	1286	
150	183	0	0.36	0.03	0.07	0.05	0.05	0.14	0.03		24	7	0.2	7.74		
728	747	70	4.24	0.38	0.54	0.03	0.02	0.01	0.05	5.5	38	70	6.6	8.88	2240	
424	517	0	0.7	0.04	0.16	0.09	0.03	0.04	0.03	2.7	41	7	1.2	7.71		
1026	1252	0	1.43	0.72	0.14	0.24	0	0.04	0.02	39.3	32	17	0.7	7.97	24586	
612	669	38	3.42	0.38	0.12	0.01	0	0	0	3.4	38	55	0.4	8.71	1616	
1326	1457	79	2.66	0.66	0.05	0.01	0	0	0.11	21.4	34	70	0.3	8.59	8429	
1208	1425	24	3.7	0.33	0.06	0	0.01	0	0.06	12.5	40	70	0.5	8.59	4740	
154	188	0	0.25	0.02	0.12	0	0.01	0.18	0.03	0.4	34	3	0.6	7.94	488	
				0.03												
620	756	0	1.14	0.27	0.04	0.25	0	0.02	0.07	3.8	54	70	0.1	7.92	3346	
658	803	0	1.63	0.08	0	0.02	0.01	0.24	0.03	2.7	57	25	0.4	7.72	1884	
1450	1637	65	2.14	0.5	0.17	0.03	0	0	0.23	24.2	39	70	0.6	8.2	9670	
176	205	5	0.37	0.02	0.01	0	0.03	0	0.04	0.4	42	3	0.2	8.29	519	
264	0	0.54	0.03	0.01	0	0	0.01	0.03	0.4	45	3	0.2	7.93	577		
1530	1793	36	2.1	0.38	0.36	0.04	0	0.01	0.28	26.4	45	70	1.4	8.4		
1194	1383	36	2.62	0.15	0.28	0.02	0.01	0.02	0.07	13.5	43	70	0.3	8.43	6418	
126	154	0	0.26	0.02	0.01							3	0.05	7.98		
128	156	0	0.14	0.15	0	0	0.06	0.01	0	20.1	8	5	0.3	8.09	1508	-1.7
1980	1854	230	1.58	0.58	2.14	0.13						45	11	8.5		
1420	1674	24	2.12	0.16	0.26	0.05						70	2.1	8.24		
172	210	0	0.58	0.06	1.12	1.11						70	13	7.92		
32	39	0	0.04	0.05	0.01	0	0.04	0.02	0.01	11.4	1	7	0.2	8.04	324	-2.27
222	271	0	0.61	0.02	0.21	0.06	0.01	0.18	0.14	2.3	28	7	1	7.92		
220	268	0	0.37	0.02	0.03	2.37	0	0.27	0.13	1	34	7	0.5	7.76		
52	63	0	1.14	0.003	0.06	0.01	0	0.28	0	3.3	11	3	0.4	7.77	893	-1.39
296	361	0	7.4	0.03	0.08	0.03						3	0.7	7.82		
298	364	0	7.48	0.02	0.14	0.07	0	0.08	0.02	5.9	100	3	0.4	8.06	5056	
114	139	0	0.99	0.005	0.05	0.04						3	0.9	8.08		
124	151	0	0.09	0.003	0.27	0.04	0	0.65	0.04	0	54	3	1.6	7.03	711	
118	144	0	0.08	0.003	0.01	0.01	0.24	0.27	0.03	0.1	55	7	0.3	7.01	806	-0.52
98	120	0			0.03							7	0.67	7.31		
72	88	0	0.19	0.01	0.03	0						0	0.8	7.85		

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
61348	1/12/83	18	37	29	Dom	215		No	741	409	121	26	44	5	175	114	66
64508	2/27/84	19			Dom			No									
94832	11/19/91	19	17	7	dom			Yes	30	0	0	0	10	1	1	0	3.4
67441	2/4/85	19	26	3	dom	74	8	No	367	71	17	7	91	13	46	24	4.1
59123	4/14/82	19	26	4	dom	70	8	No	312	46	12	4	74	13	28	18	2.1
66784	12/3/84	19	26	4	dom	165	6	No	1240	205	41	25	323	33	268	260	0.1
78517	2/23/88	19	26	4	dom	150	8	No	365	44	11	4	108	3	101	18	4.5
60312	8/18/82	19	26	5	dom	246	8	No	2258	1076	289	86	240	58	765	293	0.8
56551	7/25/84	19	26	13	dom	32	8	No	261	76	19	7	40	18	48	10	3.9
65650	7/25/84	19	26	13	dom	34	8	No	223	80	17	9	30	14	35	10	2.8
64488	2/23/84	19	26	24	dom	175	8	No	477	255	69	20	48	6	146	24	0
81587	10/19/88	19	26	24	dom	63	6	No	499	108	30	8	126	5	165	16	0.7
88910	7/31/90	19	26	24	dom	134	6	No	586	153	43	11	129	5	215	23	0.9
89846	10/16/90	19	26	24	dom	120	8	No	310	164	46	12	30	4	92	23	0.4
90261	11/10/90	19	26	24	dom	115		No	1123	313	89	22	258	10	400	59	15.9
1100372	2/7/94	19	26	24	dom	95		No	597	99	28	7	169	5	220	15	0
70561	1/24/86	19	26	25	dom	50	6	No	935	505	138	39	67	5	264	132	34.6
71163	3/24/86	19	26	25	dom	40	6	No	895	485	130	39	70	5	243	132	34.4
73313	8/27/86	19	26	25	dom	30		No	262	162	50	9	27	2	32	5	0
77243	9/29/87	19	26	25	dom	68	4	No	474	92	27	6	126	4	143	15	0
91912	4/3/91	19	26	25	dom	100	6	No	276	148	41	11	30	5	72	10	1.2
80147	7/15/88	19	26	33	dom	70	6	No	333	80	19	8	78	13	39	20	2.8
80146	7/15/88	19	26	33	dom	20	6	No	31	0	0	0	13	2	1	0	0.7
127800	6/19/96	19	26	33	Dom			No	244	101	29	7	44	6	36	13	0
75283	3/20/87	19	26	34	dom	39	5	No	1154	227	53	23	285	62	238	233	12.3
117863	12/5/94	19	27		Dom			No	381			15			75	18	
74288	12/9/86	19	27	2	Dom	30	6	No	247	48	11	5	54	19	24	7	2
68978	8/1/85	19	27	6	Dom	120	10	No	551	37	10	3	174	15	53	18	17
73749	10/20/86	19	27	6	Dom	95	6	No	553	14	4	1	203	13	52	19	18.6
74364	12/16/86	19	27	6	Dom	95	6	No									
83318	6/26/89	19	27	6	Dom	86	8	No	790	327	75	34	117	39	207	66	19.5
85151	1/2/90	19	27	6	Dom	80	6	No	623	112	25	12	156	31	94	47	36.8
91727	4/1/91	19	27	6	dom	105	6	No	888	46	10	5	277	16	250	70	20.3
92085	4/23/91	19	27	6	dom	80	8	No	577	109	24	12	149	18	74	44	17.8

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
120	146	0	0.1	0	0.11	0.02	0.01	0.46	0.06	0	56	3	0.4	7.12		
20	24	0	0.08	0.003	0	0	0	0.05	0.01	0.9	6	3	0	8.51	53	
202	227	10	0.72	0.236	0.04	0	0	0	0.01	0.4	56	5	0.4	8.21		
176	190	10	0.67	0.18	0.43	0.02	0.02	0	0			5	1.2	8.58		
344	420	0	1.47	0.86	0.51	0.06	0	0.03	0.02	2	56	25	3	7.71		
168	185	10	0.75	0.041	0.04	0	0	0.12	0	0.6	19	3	0.6	8.3	599	
474	578	0	0.63	0.025	0.87	0.42	0	0.02	0.01	2	88	7	5.1	7.22		
118	134	5	0.82	0.19	0.02	0	0	0.04	0.03	0.3	43	3	0.2	8.21		
108	132	0	0.45	0.105	0	0	0	0.01	0.02	0.2	39	5	0.6	8.01		
174	212	0	0.28	0.005	0.07	0.26	0	0.06	0.06	0.3	41	7	1	7.89		
214	261	0	0.8	0.003	3.6	0.05	0.05	0.13			0	55	20	7.81		
196	239	0	0.91	0.006	42	1.26	0	0.03	0.04	0.3	38	3	2.4	7.8	898	
112	137	0	0.24	0.003	0.14	0	0	0.06	0.09	0	32	3	0.9	7.83	483	
396	483	0	0.8	0.006	0	2.7	0	0.11	0.04	0.9	42	3	0	7.75	1640	
236	288	0	0.49	0.033	5.68	0.2	0	0.06	0.03	0.9	29	25	43	7.83	915	0.07
184	224	0	0.27	0.003	0.02	2.54	0.04	0.02	0.19	0.5	34	5	0.2	6.92		
178	217	0	0.27	0.003	0.02	2.34	0.02	0.01	0.09		34	7	0.2	6.91		
192	234	0	0.36	0.014	0	0	0	0.78	0.06	0.3	36	3	0.6	7.2	439	
200	244	0	0.73	0.003	2.86	0.22	0	0.1	0.05	0.6	34	55	30	7.54	746	
130	159	0	0.24	0.004	0.33	0.07	0	0	0.05	0.2	39	5	0.8	8.18	433	
194	207	14	0.64	0.2	0.07	0	0.01	0	0.01	0.5	54	5	0.4	8.3	535	
28	34	0	0.09	0.004	0.01	0	0.03	0.03	0	0.5	9	3	0.2	7.37	69	
150	173	5	0.32	0.04	0.02	0.01	0.02	0.01	0.02	0.3	25	7	0.5	8.23	395	0.33
356	434	0	0.39	0.136	0.13	0.01	0.01	0.02	0.09	1.4	53	3	0.5	7.88	1912	
			0.82	0.08	0.01	0	0	0.02				12		7.67		
140	161	5	1.49	0.655	0.01	0	0	0.04	0.12	0.5	41	3	0.4	8.5	397	
356	405	14	0.98	0.21	0.03	0	0	0.35	0.03	0.7	43	3	0.3	8.42		
366	393	26	0.77	0.18	0	0	0	0	0.01	0.7	45	3	0.2	8.73	867	
				0.012										9.31		
314	383	0	0.21	0.019	0.19	0.02	0.47	0.69	0.07	0.6	52	3	0.8	8	1190	
308	376	0	0.72	0.078	0.03	0	0	0.03	0.07	0.6	53	3	0.6	7.87	963	
314	325	29	1.75	0.523	0.81	0.04	0	0.12	0.03	1.7	49	3	4.8	8.69	1321	
310	378	0	0.43	0.072	0.1	0.01	0	0.68	0.04	0.9	59	3	0.1	7.79	916	

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
93630	8/12/91	19	27	6	dom	16	8	No	342	159	44	12	44	3	66	22	8.6
95685	1/28/92	19	27	6	dom	95		No	538	16	3	2	182	10	55	20	20.6
49805	5/24/79	19	27	7	Dom	70	8	No	674	88	22	8	199	18	103	69	37
55916	2/25/81	19	27	7	Dom	80	4	No	509	14	4	1	193	4	31	10	5.8
57377	8/18/81	19	27	7	Dom	200	12	No	566	264	66	24	65	13	194	65	5.7
58080	12/3/81	19	27	7	Dom	122	6	No	555	64	14	7	170	16	60	17	17.6
58562	2/9/82	19	27	7	Dom	138		No	508	71	17	7	136	26	48	26	28.6
59281	4/20/82	19	27	7	Dom	85	8	No	589	27	6	3	194	14	71	30	17.4
59965	7/20/82	19	27	7	Dom	168	7	No	534	69	16	7	143	24	49	29	30.6
61151	12/6/82	19	27	7	Dom	85	8	No									0.3
63653	10/20/83	19	27	7	Dom	80	6	No	542	14	4	1	193	4	20	11	7.9
64179	1/9/84	19	27	7	Dom	80	8	No	780	105	27	9	210	36	129	90	17.2
64734	3/29/84	19	27	7	Dom			No	486	3	1	0	159	12	30	17	12.7
65607	7/2/84	19	27	7	Dom	134		No	599	110	29	9	181	7	26	14	16.3
73755	10/20/86	19	27	7	Dom		10	No	437	167	42	15	65	12	137	43	4.5
74448	1/5/87	19	27	7	Dom	134	8	No	605	98	26	8	194	7	25	12	17.4
76768	8/17/87	19	27	7	Dom	7	6	No	552	66	15	7	168	16	62	21	25.4
77051	9/14/87	19	27	7	Dom	50	6	Yes									
77242	9/28/87	19	27	7	Dom	40	10	No	291	81	21	7	65	10	75	25	0
77989	12/22/87	19	27	7	Dom			Yes									
87059	4/27/90	19	27	7	Dom		12	No	506	217	54	20	61	12	168	54	4.7
87386	5/1/90	19	27	7	dom	95	6	No	739	51	14	4	249	14	83	35	17.4
90679	12/30/90	19	27	7	dom	60	6	No	370	9	2	1	134	4	28	13	6.4
91529	3/13/91	19	27	7	dom			Yes	536	75	15	9	155	15	55	21	20.6
94505	10/24/91	19	27	7	dom	105	6	No	665	69	16	7	203	14	120	39	12.1
111671	3/30/94	19	27	7	dom		6	Yes	250	32	8	3	85	3	10	9	3.7
68349		19	27	8	Dom	65	8	No	495	22	4	3	169	13	20	9	21.5
66081	9/2/84	19	27	8	Dom	55	4	No	233	110	26	11	25	12	12	7	8.1
72640	7/17/86	19	27	8	Dom	85	6	No	479	176	44	16	88	25	27	14	15
75399	3/31/87	19	27	8	Dom	117	8	No	1032	159	44	12	285	9	474	44	2
91987	4/25/91	19	27	8	dom	78	8	No	609	379	71	49	38	49	40	25	57.5
100993	12/15/92	19	27	8	dom	92	6	No	542	76	19	7	161	15	30	16	3.9
114334	7/21/94	19	27	8	dom	100		No	545	242	49	29	82	41	36	25	2.9
62843	8/3/83	19	27	11	Dom	30	6	No	236	86	18	10	33	11	42	11	2.2

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
93630	152	185	0	0.48	0.006	0.01	0	0.01	0.04	0.08	0.4	0.38	3	0.2	7.04	532	
95685	324	356	19	0.84	0.08	0.01	0	0	0	0.02	0.7	46	3	0.1	8.6	830	
49805	290	354	0	0.58	0.09	0.15	0.01						3	1.3	8.01		
55916	394	403	32	0.65	0.2	0	0	0	0.02				3	0.2	8.87		
57377	126	154	0	0.24	0.01	0	0.01	0	0.15	0.09	0.3	45	3	0.2	7.92		
58080	346	393	12	1.14	0.21	0.74	0.02	0.04	1.97				7	4.2	8.42		
58562	290	344	4	0.85	0.09	0	0	0	0.04	0.04	0.6	54	3	0.3	8.28		
59281	330	368	14	1.88	0.57	0.05	0	0	0.07	0			3	0.3	8.38		
59965	290	354	0	0.75	0.005	0.03	0	0	0.02	0.18	0.6	51	3	0.6	8.18		
61151				0.06				0.02	0.01	0.01	0		5	0.6	7.96		
63653	396	405	38	0.68	0.19	0	0	0	0.01	0.01	0.5	39	3	0.3	8.78		
64179	334	407	0	0.76	0.18	0.18	0.01	0.01	0.23	0.09	1.1	51	7	1.2	8.04		
64734	300	307	29	0.74	0.3	0.02	0	0.01	0.01	0.01	0.5	45	3	0.4	8.91		
65607	452	551	0	1.06	0.02	0	0.36	0	0.01	0.06	0.4	49	5	0.2	7.91		
73755	126	149	2	0.26	0.035	0.01	0.01	0	0.05	0.05	0.3	45	3	0.3	8.21	672	
74448	472	576	0	1.13	0.027	0	0.25	0.02	0.01	0.05	0.6	50	3	0.2	7.83	953	
76768	328	400	0	1.04	0.29	0.05	0	0	0.09	0.04	0.8	52	3	0.6	8.16	867	
77051					0.017												
77242	128	142	7	0.31	0.012	0.74	0.3	0.01	0.17	0.06	0.2	17	3	1.5	8.32	498	
77989						0.01	0										
87059	118	134	5	0.24	0.022	0.01	0.01	0	0.05	0.06	0.1	44	3	0.4	8.22	759	
87386	458	515	22	1.11	0.26	0.42	0.01	0	0.01	0.04	0.9	41	5	2.6	8.56	1141	
90679	256	268	22	1.23	0.535	0	0	0	0	0.01	0.6	43	3	0.2	8.98	601	
91529	336	376	17	1.02	0.235	0	0	0	0.02	0.05	0.9	50	3	0.3	8.45	837	
94505	338	368	22	1.67	0.43	0.23	0.01	0	0.14	0.03	1.3	44	3	0.4	8.3	1022	
111671	188	210	10	0.59	0.018	0	0	0.02	0.04	0.02	0.6	21	3	0.2	8.22	405	-0.14
68349	344	351	34	0.74	0.19	0.2	0	0	0	0.01	0.5	47	10	1.1	8.94		
66081	146	168	5	0.56	0.02	0.05	0.01	0	0.23	0.04	0.2	43	3	0.5	8.22		
72640	362	442	0	0.65	0.053	0.02	0	0	0	0.09	0.5	48	3	0.3	7.88	777	
75399	238	290	0	1.22	0.014	0.12	0.2	0	0.01	0.02	0.9	20	3	1.4	8.13	1589	
91987	402	490	0	0.53	0.003	0	0	0	0.02	0.16	0.5	59	3	0.4	7.5	980	
100993	384	468	0	0.69	0.122	0.17	0.01	0	0.01	0.05	0.6	49	3	1.3	8.17	803	
114334	394	481	0	0.57	0.067	0.03	0	0.02	0	0.15	0.5	52	3	0.3	7.72	864	0.43
62843	108	132	0	0.81	0.065	0.04	0.01	0.02	0	0.03	0.3	43	5	0.4	7.91		

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
63069	8/26/83	19	27	11	Dom	43	8	No	209	89	24	7	23	7	30	7	2.3
77061	9/4/87	19	27	11	Dom	43	8	No	214	105	29	8	24	8	33	10	3.3
82578	4/4/89	19	27	11	Dom	43	8	No	244	126	34	10	25	8	41	15	2.2
73869	10/23/86	19	27	12	Dom	60	8	Yes	202	56	11	7	32	22	33	8	1.6
73868	10/23/86	19	27	12	Dom	80	8	Yes	241	83	20	8	33	23	34	10	2.5
73953	11/4/86	19	27	12	Dom	30	6	No	388	82	18	9	104	10	78	23	18.3
81999	2/3/89	19	27	12	Dom	38		No	215	78	18	8	28	21	33	12	1.8
82043	2/14/89	19	27	12		40		No	217	70	13	9	30	22	31	11	1.8
96978	5/15/92	19	27	12	dom	85	6	No	556	0	0	0	186	3	174	19	0
66928	10/20/84	19	27	13	lake			No	5923	523	28	110	1778	94	2782	800	0.3
77133	9/14/87	19	27	13	Dom	59.5	6	No	666	328	90	25	61	12	291	28	0
80229	7/11/88	19	27	13	Dom	35		No	365	95	20	11	84	16	55	16	18.3
82531	3/29/89	19	27	13	Dom	80	8	No	678	249	65	21	97	11	318	25	2.4
82720	4/17/89	19	27	13	Dom	20	6	No	257	107	23	12	34	17	50	13	5.5
83345	6/29/89	19	27	13	Dom			No	289	5	2	0	104	3	35	9	2.3
85511	1/25/90	19	27	13	Dom	40	6	No	288	90	18	11	52	18	54	15	6.5
96998	5/20/92	19	27	13	dom	35	6	No	415	35	9	3	130	12	56	16	25.6
47478	10/27/78	19	27	14	Dom	20	8	No	366	205	49	20	44	15	129	26	15.4
60938	10/29/82	19	27	14	Dom	30	6	No	194	85	24	6	24	5	32	8	1.1
61103	11/30/82	19	27	14	Dom	30		No	253	121	32	10	31	4	61	11	1.5
61261	12/23/82	19	27	14	Dom	48	6	No	272	91	20	10	33	14	48	11	1.9
65311	6/1/84	19	27	14	Dom	40		No	172	90	23	8	24	6	36	7	1.4
69080	8/7/85	19	27	14	Dom	48	8	No	428	215	58	17	36	15	164	13	0.2
72083	6/6/86	19	27	14	Dom	35	6	No	221	100	25	9	27	9	43	10	3.5
72831	7/22/86	19	27	14	Dom	31	8	No	173	83	25	5	22	5	32	7	2.9
76162	6/8/87	19	27	14	Dom	30	6	No	229	84	17	10	32	12	41	8	3
80425	8/2/88	19	27	14	Dom	72	8	No	1375	414	103	38	219	14	800	20	0
90997	1/23/91	19	27	14	Dom	160	8	No	184	68	19	5	24	7	38	4	0.2
100950	12/9/92	19	27	14	dom		8	No	341	186	48	16	33	11	68	29	0.8
101168	12/28/92	19	27	14	dom			No	549	190	53	14	97	6	232	18	0.2
32864	3/5/80	19	27	15	Dom			No	315	115	33	8	55	19	66	17	1.5
70892	2/25/86	19	27	15	Dom		8	No	317	102	31	6	52	17	43	10	1.2
76372	7/1/87	19	27	15	Dom	25	8	No	214	52	11	6	35	22	32	9	1.7
76492	7/14/87	19	27	15	Dom	40	8	No	310	95	28	6	55	15	47	13	3.5

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
63069	108	122	5	0.35	0.04	0.04	0	0.03	0.36	0.05	0.2	32	5	0.7	8.27		
77061	120	146	0	0.31	0.033	0	0	0	0.02	0.06	0.2	33	3	0.4	8.15	350	
82578	130	159	0	0.29	0.029	0.01	0	0	0.01	0.07	0.3	33	3	0.3	8.14	387	
73869	108	122	5	0.44	0.11	0	0	0	0.01	0.04	0.3	40	3	0.3	8.29	325	
73868	132	161	0	0.43	0.132	0	0	0	0.01	0.07	0.3	40	3	0.3	8.14	382	
73953	204	234	7	0.4	0.032	0.01	0	0.01	0.02	0.03	0.5	28	5	0.3	8.47	640	
81999	118	134	5	0.43	0.118	0	0	0	0	0.06	0.3	38	3	0.3	8.33	349	
82043	116	127	7	0.41	0.096	0.02	0	0	0	0.05	0.3	37	3	0.3	8.26	844	
96978	204	249	0	0.32	0.009	0.02	0.01	0	0	0	1.4	46	3	0.1	8.1	815	
66928	574	544	77	2.36	0.145	0	0.29	0	0	0.01	7.4	4	25	3.9	8.63		
77133	138	168	0	0.24	0.006	0.16	1.7	0	0.04	0.06	0.5	51	3	0.6	7.61	932	
80229	214	217	22	0.48	0.029	0.01	0	0	0.01	0.01	0.4	30	5	0.2	8.35	592	
82531	124	151	0	0.61	0.053	0.1	0.19	0.01	0.02	0.04	0.9	43	3	0.4	7.72	943	
82720	132	161	0	0.37	0.076	0	0	0	0.12	0.07	0.3	36	3	0.4	8.14	412	
83345	178	163	26	0.83	0.355	0.18	0	0.01	0	0	0.5	34	5	0.7	8.97	451	
85511	142	159	7	0.48	0.116	0.06	0	0.01	0.02	0.02	0.3	40	3	0.3	8.32	446	
96998	224	264	5	0.96	0.265	0.01	0	0	0.02	0.01	6	37	3	0.1	8.53	616	
47478	186	227	0	0.5	0.06	0.01	0						3	0.5	7.65		
60938	104	127	0	0.28	0.035	0	0	0	0.12	0.04	0.2	32	3	0.4	7.73		
61103	112	137	0	0.78	0.01	0.01	0	0	0.05	0.05	0.3	34	5	0.6	7.93		
61261	112	137	0	0.8	0.09	0.34	0	0.01	0	0.04	0.4	45	7	2.8	8.16		
65311	102	124	0	0.32	0.05	0.39	0.02	0.03	0.12	0.03	0.2	34	5	1.9	8.13		
69080	122	149	0	1.18	0.064	0.11	0.05	0.01	0.01	0.03	0.8	47	7	0.4	7.39		
72083	110	124	5	0.34	0.07	0.01	0	0.02	0.1	0.05	0.3	32	3	0	8.55		
72831	98	120	0	0.27	0.04	0.27	0.01	0.02	0.02	0.04	0.2	28	3	0.9	7.77	292	
76162	112	137	0	0.77	0.107	0.01	0.01	0.02	0.03	0.03	0.4	45	3	0.3	8.05	354	
80425	112	137	0	0.23	0.015	0.28	2.22	0	0.01	0.02	1.5	55	7	2.8	7.75	1764	
90997	86	90	7	0.27	0.01	0.35	0.15	0	0	0.04	0.2	49	5	1.4	8.22	271	
100950	160	195	0	0.34	0.04	0.01	0	0.02	0.01	0.09	0.4	40	3	0.6	7.98	512	
101168	154	188	0	0.41	0.005	0.58	0.79	0.03	0.04	0.07	0.6	40	7	1.6	7.57	766	
32864	154	188	0	1.34	0.325	0.13	0.01	0					7	0.6	7.91		
70892	192	229	2	1.15	0.285	0	0	0	0.04	0.08	0.5	51	5	0.1	8.21		
76372	108	112	10	0.54	0.238	0.03	0	0	0.24	0.04	0.4	37	3	0.6	8.52	335	
76492	154	188	0	1.15	0.276	0.01	0	0	0.05	0.07	0.5	51	3	0.3	8.08	476	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
84303	9/14/89	19	27	15	Dom	65	8	No	293	112	30	9	38	13	62	16	3
86759	4/10/90	19	27	15	Dom	45		No	247	116	25	13	24	14	41	20	2.8
95359	1/8/92	19	27	15	dom	110	10	Yes	31	0	0	0	13	1	0	0	0.8
96407	4/10/92	19	27	15	dom	125	6	No	329	113	32	8	61	5	118	11	0.2
97343	6/4/92	19	27	15	dom	55	6	No	363	98	26	8	68	9	130	13	0
99440	9/30/92	19	27	15	dom	44	6	No	3174	877	214	83	614	24	1930	118	0.8
101112	12/21/92	19	27	15	dom	44	6	No	3475	970	240	90	637	22	2110	130	0.2
101111	12/21/92	19	27	15	dom	87	6	No	1653	842	233	63	127	16	835	65	0
120588	5/4/95	19	27	15		40		No	234	112	25	12	28	12	37	15	0.6
124813	11/19/95	19	27	15	dom	85	4	No	1756	788	218	59	206	14	897	56	0.3
96209	3/25/98	19	27	15	dom			Yes	56	12	3	1	10	4	1	5	0.3
59025	4/5/82	19	27	16	Dom	120	8	No	862	215	63	14	206	12	218	40	9.8
59283	4/20/82	19	27	17	Dom	160	8	No	579	105	27	9	175	10	28	12	16.3
65018	5/9/84	19	27	17	Dom	105	8	No	2108	348	62	47	563	23	1109	62	14.1
65653	7/18/84	19	27	17	Dom			No	900	236	68	16	223	8	238	48	15.2
67266	1/25/85	19	27	17	Dom	115	6	No	967	202	56	15	258	11	246	40	13.3
69653	9/23/85	19	27	17	Dom	15	8	No	657	50	15	3	211	4	186	25	8.6
78423	2/4/88	19	27	17	Dom	105	8	No	6014	1231	168	197	1311	64	3432	166	66.8
81384	11/17/88	19	27	17	Dom	115	6	No	913	182	48	15	250	13	256	37	0.6
81736	1/5/89	19	27	17	Dom	115	6	No	899	176	49	13	254	12	254	36	13.7
88330	6/11/90	19	27	17	dom	100	6	No	1046	296	41	47	232	46	288	53	19.1
91244	2/14/91	19	27	17	dom			No	629	75	20	6	197	5	112	22	9.4
96181	3/19/92	19	27	17	dom	78	8	Yes	48	20	3	3	8	9	0	1	0
97335	6/19/92	19	27	17	dom	100	6	No	466	152	36	15	96	28	30	20	11.6
108866	11/15/93	19	27	17	dom	115	8	No	1250	355	101	25	274	10	490	70	0.3
53765	6/17/80	19	27	18	Dom	112	8	No	1025	166	45	13	283	7	508	42	0
55303	11/26/80	19	27	18	Dom	112	12	No	911	129	35	10	246	7	420	34	0.1
59829	6/29/82	19	27	18	Dom			No	910	148	41	11	256	8	416	31	0.1
68415	5/20/85	19	27	18	Dom	110	8	No	1072	173	48	13	294	9	524	49	3.1
69825	10/18/85	19	27	18	Dom	109	8	No	4595	679	102	103	1131	37	2808	59	72.6
82004	2/2/89	19	27	18	Dom	81	6	No	374	173	48	13	41	7	134	16	0.3
97341	6/4/92	19	27	18	dom	100	8	No	4278	591	90	89	1104	40	2600	60	58
56539	5/14/81	19	27	19	Dom	107	6	No	348	195	37	25	35	4	93	29	0.2
56530	5/14/81	19	27	19	Dom	107	6	No	348	195	37	25	35	4	93	29	0.2

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
84303	134	163	0	1.44	0.255	0.01	0	0.01	0.01	0.05	0.4	46	3	0.5	8	447	
86759	120	146	0	0.33	0.058	0.76	0.03	0	0.04	0.03	0.2	35	3	1.9	7.88	392	
95359	34	22	10	0.08	0.003	0	0	0	0	0.01	0.7	3	5	0.3	8.62	68	
96407	114	139	0	0.35	0.005	0.87	0.08	0	0	0.05	0.4	36	25	8.2	7.92	482	
97343	110	134	0	0.54	0.016	0.16	0.39	0.19	0	0.03	0.5	52	3	0.6	7.55	509	
99440	154	188	0	0.3	0.004	1.64	0.13	0	0.03	0.02	1.9	42	17	6.6	8.03	3843	
101112	156	190	0	0.27	0.006	0.14	0.02	0	0	0.02	1.9	42	5	0.9	7.55	4026	
101111	238	290	0	0.15	0.004	0.29	2.86	0	0	0.03	0.7	53	5	0.5	7.77	1935	
120588	130	159	0	0.32	0.074	0.41	0.01	0	0	0.04	0.3	38	12	1.1	8.01	375	-0.02
124813	256	312	0	0.15	0.003	0.07	0.98	0	0	0.03	0.8	45	10	0.6	7.45	2104	0.57
96209	30	37	0	0.23	0.006	0.08	0	0	0	0.01	0.3	23	3	0.4	7.76	79	
59025	420	512	0	0.83	0	0.16	1.9	0	0.04	0.11			3	0.7	7.65		
59283	430	525	0	0.93	0.015	0.01	0.17	0.02	0.02	0			3	0.3	7.74		
65018	298	364	0	0.79	0.065	0.03	0.21	0	0.8	0.03	1.1	26	3	0.6	7.96		
65653	408	498	0	0.74	0.005	0.05	1.97	0	0.01	0.06	0.7	39	5	0.2	7.94		
67266	456	556	0	0.87	0.021	0.05	0.01	0	0.01	0.06	0.8	39	3	0.3	7.81		
69653	292	332	12	1.8	0.122	0.13	0	0	0.03	0.03	0.8	34	7	0.5	8.51		
78423	394	481	0	0.8	0.029	0.05	0.25	0	0.97	0.04	1.9	35	5	0.5	7.91	6899	
81384	458	559	0	0.84	0.014	1.74	0.34	0	0.01				12	4.6	8.16	1415	
81736	440	537	0	0.9	0.025	0.01	0.02	0	0	0.04	0.9	41	3	0.3	7.78	1389	
88330	478	583	0	0.62	0.036	0	0.01	0.76	0.22	0.03	0.9	52	3	0.3	7.81	1593	
91244	364	429	7	1.53	0.15	0.09	0.01	0	0	0.05	0.9	37	3	0.4	8.3	983	
96181	50	61	0	0.06	0.003	0.01	0	0	0.07	0.02	0.4	6	3	0.4	7.24	96	
97335	336	410	0	0.5	0.055	0	0	0	0	0.09	0.5	50	3	0.1	7.99	720	
108866	376	459	0	0.75	0.006	0	2.86	0	0.21	0.04	0.9	40	3	0.4	7.98	1702	0.95
53765	234	285	0	1.25	0.01	0.88	0.41	0.01	0.35				7	1.8	7.57		
55303	222	271	0	1.15	0.02	0.29	0.23	0	0.01				3	0.3	7.75		
59829	224	273	0	1.11	0.02	0.87	0.28	0.01	0.05	0.03	0.8	21	3	0.7	8.01		
68415	224	273	0	1.09	0.017	0.14	0.28	0.04	0.01	0.02	0.8	21	7	0.6	7.91		
69825	264	322	0	0.78	0.008	0.14	0.03	0	0.03	0.04	1.2	30	5	0.7	7.72		
82004	116	142	0	0.3	0.004	0.24	1.15	0.01	0.21	0.1	0.3	45	3	1.5	8.02	555	
97341	316	386	0	1.02	0.026	0.08	0.04	0.03	0	0.03	1.5	30	3	0.4	7.92	5455	
56539	138	168	0	0.18	0	1.32	0.05	0	0.07				25	10	7.93		
56530	138	168	0	0.18	0	1.32	0.05	0	0.07				25	10	7.93		

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
58561	2/8/82	19	27	19	Dom	63	8	No	1011	200	52	17	258	6	492	21	0
58859	5/24/82	19	27	19	Dom	80	6	No	2499	381	67	52	660	25	1398	104	3.5
61534	2/15/83	19	27	19	Dom	134	6	No	612	144	41	10	155	5	234	20	0.2
65004	4/26/84	19	27	19	Dom	40	8	No	2428	42	12	3	842	14	511	150	11.4
70384	1/2/86	19	27	19	Dom	160	8	No	533	248	68	19	66	6	176	28	0.1
73280	9/4/86	19	27	19	Dom			Yes									
75510	4/9/87	19	27	19	Dom	140	6	No	858	208	60	14	209	6	370	41	0.1
77918	12/4/87	19	27	19	Dom	178	6	No	504	271	77	19	47	5	188	29	0
83640	7/24/89	19	27	19	Dom	117	8	No	1098	159	44	12	306	9	508	46	4
84803	11/15/89	19	27	19	Dom	70	6	No	314	46	12	4	101	8	60	12	0.2
85358	1/10/90	19	27	19	Dom	134	6	No	678	183	52	13	147	5	272	30	0.1
85700	2/20/90	19	27	19	Dom	30	8	No	296	58	15	5	78	6	67	17	0.9
87857	5/17/90	19	27	19	Dom	80	8	No	301	155	44	11	36	3	86	15	0.6
8757	5/17/90	19	27	19	Dom	80	8	No	301	155	44	11	36	3	86	15	0.6
92350	5/22/91	19	27	19	dom			No	493	0	0	0	167	0	175	26	0
92965	6/22/91	19	27	19	dom	30	6	No	417	237	57	23	39	7	111	20	1.6
108554	11/9/93	19	27	19		139	6	No	384	113	32	8	87	4	91	11	1.7
114646	7/27/94	19	27	19	dom	100		No	671	286	65	30	110	29	138	35	3
96995	5/20/98	19	27	19	dom	60	6	No	585	63	17	5	183	5	143	20	10.6
67957	4/3/85	19	27	20	Dom	95	8	No	438	252	71	18	38	5	122	32	0.9
101418	1/14/93	19	27	21	dom			No	306	166	45	13	32	6	50	23	1.4
50859	8/10/79	19	27	22	Dom	30		No	783	438	121	33	74	10	310	29	20.8
106371	7/29/93	19	27	22	dom	25	10	No	422	157	43	12	87	4	111	32	0.6
66590	10/26/84	19	27	23	Dom	54	8	No	363	178	48	14	40	5	101	20	8.8
66897	12/5/84	19	27	23	Dom	54	8	No	308	133	35	11	47	4	73	13	13.4
67752	3/1/85	19	27	23	Dom			No									
73311	9/11/86	19	27	24	Dom	30		No	234	131	36	10	26	6	46	10	2
81240	11/3/88	19	27	24	Dom	30	6	No	305	173	48	13	31	10	54	21	2.9
84369	10/5/89	19	27	24	Dom	30	8	No	534	47	9	6	163	16	79	21	29.2
84801	11/27/89	19	27	24	Dom			No	288	100	30	6	59	4	49	12	0.1
85034	12/18/89	19	27	24	Dom	73	6	No	827	384	111	26	86	6	414	25	0.4
87817	5/22/90	19	27	24	Dom	53	6	No	258	83	25	5	51	4	43	13	0
88912	7/27/90	19	27	24	dom	20	4	No	344	188	49	16	35	10	72	25	2.3
89001	8/3/90	19	27	24	dom	76	6	No	1200	595	172	40	108	7	640	39	0.2

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ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
232	283	0	1.52	0.005	0.28	0.31	0	0.01	0.02	0.6	30	3	1.6	7.78		
248	268	14	0.38	0.005	0.14	0.01	0.01	0.37	0.01	1	34	3	0.7	8.33		
222	271	0	0.87	0	0.1	0.29	0	0.05	0.04	0.5	32	3	1	7.67		
1130	1257	60	1.15	0.595	0	0.01	0	0	0.01	1.9	24	5	2.5	8.46		
184	224	0	0.28	0.005	0.45	0.24	0	0	0.06	0.4	39	12	2.4	7.97		
						0.22							0.3			
214	261	0	0.95	0.008	0.32	0.63	0.01	0.01	0.05	0.7	31	3	1.4	8.14	1307	
146	178	0	0.26	0.003	0.39	0.06	0	0.02	0.06	0.5	33	3	0.9	7.35	756	
246	300	0	1.08	0.022	0.04	0.23	0	0.01	0.02	0.9	21	3	0.1	8.16	1642	
182	222	0	0.53	0.005	0.2	0.11	0	0.1	0.05	0.4	16	5	1.1	8.16	522	
192	234	0	0.91	0.006	0.14	1.46	0.01	0.08	0.05	0.5	37	3	0.6	7.98	1024	
146	178	0	0.68	0.14	0.29	0.03	0	0.1	0.06	0.3	28	5	2.9	7.99	474	
134	163	0	0.2	0.003	2.01	0.22	0	0.01	0.09	0.2	8	35	12	7.92	475	
134	163	0	0.2	0.003	2.01	0.22	0	0.01	0.09	0.2	8	35	12	7.92	475	
150	183	0	0.29	0.003	0.02	0	0	0	0	0.5	32	3	0.2	7.57	784	
178	198	10	1.06	0.048	0.04	0	0	0	0.03	0.4	49	3	0.4	8.24	615	
200	244	0	0.52	0.008	0.42	0.16	0	0.64	0.05	0.4	34	7	3.8	7.73	585	-0.02
372	454	0	0.09	0.01	0.01	0	0.01	0.02	0.05	1.2	58	7	0.2	7.79	1059	0.59
278	325	7	1.19	0.28	0	0	0	0	0.03	0.7	30	3	0.1	8.27	871	
172	210	0	0.2	0	1.61	0.04	0	0.02	0.14	0.2	34	35	10	7.49		
156	190	0	0.3	0.036	0.01	0	0	0.19	0.05	0.3	40	3	0.3	7.74	452	
208	254	0	0.35	0.03	0.01	0						3	0.3	7.55		
190	232	0	0.22	0.003	0.03	0	0	0.02	0.09	0.8	27	3	0.2	7.59	673	0.1
128	156	0	0.61	0.085	0.01	0	0	0.37	0.03	0.2	51	3	0.4	7.95		
124	151	0	0.74	0.107	0.02	0	0	0.01	0.03	0.2	41	5	0.2	8.07		
				0.073												
134	163	0	0.21	0.022	0.2	0	0	0.06	0.03	0.2	27	7	1.6	7.9	397	
166	203	0	0.34	0.037	0	0	0.01	0.02	0.07			3	0.1	7.98	485	
282	305	19	1.43	0.954	0.36	0.02	0	0	0.03	0.6	48	7	1.5	8.27	805	
164	200	0	0.68	0.007	0.44	0.3	0	0.45	0.05	0.3	38	5	3.2	7.87	457	
126	154	0	0.26	0.003	1.22	0.04	0	0.14	0.02	1	32	25	1.3	7.3	1083	
144	176	0	0.68	0.008	0.1	0.18	0	0	0.03	0.3	36	5	0.5	7.77	405	
186	227	0	0.35	0.037	0	0	0	0	0.08	0.2	40	3	0	8.05	561	
132	161	0	0.28	0.003	0	2.29	0	0.02	0.02	0.8	28	3	0.2	7.35	1495	

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
92317	5/8/91	19	27	24	dom			No	256	83	25	5	52	4	43	11	0
94572	10/27/91	19	27	24	dom	52		No	269	92	27	6	55	4	44	11	0
101318	12/22/92	19	27	24	dom			No	254	83	25	5	50	4	40	10	0
113308	6/3/94	19	27	24	dom	43	6	No	266	66	18	5	66	3	48	21	0.9
116411	10/3/94	19	27	24	Dom			Yes									0.7
117864	12/5/94	19	27	24	Dom			No	247			7			37	14	
71841	5/10/86	19	27	25	Dom	30	8	No	276	113	32	8	42	5	54	19	0
106375	8/20/93	19	27	25	dom	160		No	503	261	70	21	38	10	234	24	0
96138	3/12/92	19	27	28	dom	172	6	No	202	17	5	1	52	9	38	5	0
50900	8/16/79	19	27	29	Dom	150		No	292	173	43	16	30	6	63	18	0.1
94284	12/2/86	19	27	29	Dom	200	10	No	183	76	22	5	24	3	23	13	0
74284	12/2/86	19	27	29	Dom	200	10	No	183	76	22	5	24	3	23	13	0
105164	7/6/93	19	27	29	dom	160	6	No	301	140	38	11	42	4	58	40	0
100763	11/30/94	19	27	29	dom	80	8	No	236	115	33	8	32	3	45	17	0
117853	12/5/94	19	28		Dom			Yes	360	0	0	0	119	0	95	20	0
62360	5/24/83	19	28	1	Dom	145	6	No	523	3	1	0	181	3	42	8	0.3
64871	4/11/84	19	28	1	Dom			No	2817	105	32	6	933	34	1080	293	8.5
74709	1/23/87	19	28	1	Dom	32	6	No	414	172	49	12	74	7	61	15	5.7
74708	1/27/87	19	28	1	Dom	94	8	No	394	68	19	5	88	23	121	33	0
98215	8/4/92	19	28	1	Dom	25	8	No	1488	633	174	48	257	11	350	214	9.2
94932	12/4/91	19	28	2	Dom			No	971	7	1	1	366	5	35	29	0
71151	3/19/86	19	28	3	Dom		6	No	482	149	43	10	109	10	72	14	5.4
81637	10/28/88	19	28	3	Dom	28	8	No	368	200	57	14	43	6	50	12	12.6
127336	5/21/96	19	28	4	Dom	33		No									
70813	2/14/86	19	28	5	Dom	32	7	No	275	138	42	8	33	6	47	9	6.4
70814	2/14/86	19	28	5	Dom	52	7	No	2049	168	59	5	604	16	761	263	74.8
77672	11/16/87	19	28	5	Dom	50	6	No	201	61	18	4	43	4	38	11	2.3
124318	10/15/95	19	28	5	Dom	42	6.625	No	534	9	2	1	182	8	97	30	0.4
68401	5/21/85	19	28	6	Dom	20	6	No	548	133	40	8	142	7	103	33	2.3
71620	4/20/86	19	28	6	Dom	115	7	No	631	5	2	0	209	8	201	76	7.8
81134	10/4/88	19	28	6	Dom	20	6	No	1503	796	228	55	121	11	511	230	0.3
86720	4/4/90	19	28	6	Dom	63	6	No	197	3	1	0	69	3	37	17	1.4
92795	5/30/91	19	28	6	Dom	50	6	No	366	120	35	8	71	11	82	43	9.7
93992	9/8/91	19	28	6	Dom	100	6	No	232	3	1	0	70	4	32	14	0

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
92317	142	173	0	0.67	0.008	0.15	0.16	0	0	0.03	0.4	37	3	0.4	7.83	405	
94572	148	181	0	0.69	0.007	0.12	0.19	0	0	0.04	0.4	36	3	0.7	7.87	455	
101318	138	168	0	0.6	0.008	0.17	0.17	0	0	0.04	0.3	36	3	0.8	8.14	367	
113308	128	156	0	0.89	0.226	0.01	0	0	0	0.02	0.3	40	3	0.2	8.05	419	-0.13
116411																	
117864				0.43	0.05	0.07	0	0	0.08				10		7.87		
71841	136	166	0	0.27	0.004	0.37	0.63	0.01	0.08	0.03	0.4	43	5	0.8	7.74		
106375	92	112	0	21	0.006	0.03	1.3	0	0.01	0.09	0.2	51	3	0.5	7.9	681	0.31
96138	96	102	7	0.28	0.027	0.05	0.05	0	0	0.03	0.2	47	3	0.5	8.36	302	
50900	132	161	0	0.2	0	0.23	0.01						3	2.8	7.57		
94284	96	117	0	0.3	0.003	0.47	0.03	0	0.39	0.04	0.3	30	7	3.4	7.69	277	
74284	96	117	0	0.3	0.003	0.47	0.03	0	0.39	0.04	0.3	30	7	3.4	7.69	277	
105164	422	149	0	0.25	0.003	0.06	0.03	0.01	0.09	0.07	0.1	0.35	7	0.4	7.84	470	0.13
100763	120	146	0	0.23	0.003	0.23	0.21	0.01	0.01	0.07	0.3	28	7	2.8	7.52	367	
117853	124	142	5	0.19	0.004	0.08	0	0	0	0	0.2	47	7	0.3	8.25	540	-1.52
62360	362	325	48	1.84	0.245	0.25	0.02	0	0.04	0.01	0.9	43	17	2.4	9.35		
64871	686	837	0	1.74	0.295	0	0.08	0	0.03	0.02	3.9	39	12	0.3	8.17		
74709	258	315	0	0.57	0.06	0	0.88	0.01	0.02	0.07	0.6	49	3	0.2	7.67	666	
74708	126	149	2	0.21	0.028	0.1	0.33	0.01	0.02	0.09	0.2	43	3	0.3	8.2	638	
98215	534	651	0	0.29	0.012	0	0.05	0	0	0.08	1.6	41	3	0.1	7.85	2203	
94932	746	832	38	5.44	0.786	0.05	0.02	0	0	0.02	7.9	45	7	0.2	8.74	1476	
71151	312	381	0	1	0.145	0	0	0.01	0.05	0.02		39	5	0.1	7.98		
81637	236	288	0	0.49	0.012	0.01	0	0.04	0.02	0.05	0.3	43	3	0.4	8.02	572	
127336					0.76												
70813	156	190	0	0.34	0.017	0	0	0	0.1	0.03	0.2	39	5	0.2	7.91		
70814	340	400	7	0.87	0.092	0.05	0	0.02	0.06	0.03	1.2	30	45	0.4	8.35		
77672	110	120	7	0.21	0.007	0.09	0.01	0	0.03	0.01	0.2	26	3	0.8	8.4	333	
124318	258	227	43	1.42	0.485	0	0	0.01	0.02	0	0.9	27	7	0.1	9.31	835	0.45
68401	298	364	0	0.73	0.034	0.19	0.03	0.01	0.07	0.03	0.7	43	7	3.2	8.08		
71620	172	122	43	0.44	0.078	0.01	0.01	0	0.03	0	0.4	28	5	0.1	9.47		
81134	286	349	0	0.15	0.003	2.85	4.15	0	5.43	0.14	0.6	22	45	9.5	7.39	2014	
86720	108	132	0	0.33	0.003	0.28	0	0	0	0	0.2	1	10	1.9	8.08	353	
92795	134	163	0	0.23	0.004	0.23	0.1	0	0	0.04	0.4	34	12	6.1	7.87	593	
93992	98	71	24	26	0.009	0.03	0	0	0	0.01	0.2	54	3	0.3	8.57	338	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
94436	10/9/91	19	28	6	Dom	62	6	No	319	3	1	0	106	4	53	20	2.2
94418	10/18/91	19	28	6	Dom	58	6	No	247	131	41	7	30	6	50	20	1.6
94937	11/27/91	19	28	6	Dom	55	8	No	461	21	5	2	148	13	89	33	7.1
132307	3/19/97	19	28	6	Dom	130		No	188	3	1	0	61	3	26	5	0
78514	2/16/88	19	28	7	Dom			No	501	288	84	19	50	4	66	13	36
66183	9/11/84	19	28	8	Dom			No	774	263	69	22	146	9	247	70	45.6
66452	10/15/84	19	28	8	Dom		8	No									50.9
80423	7/27/88	19	28	8	Dom	57	8	No	866	5	2	0	319	11	157	34	0
80842	9/2/88	19	28	8	Dom	55	6	No	724	11	1	2	265	8	107	24	0.4
81730	11/23/88	19	28	8	Dom	52	8	No	1040	3	1	0	383	12	188	38	0.8
82973	5/30/89	19	28	8	Dom			No	1399	8	3	0	424	15	213	33	1.4
83698	8/3/89	19	28	8	Dom			No	901	8	3	0	318	12	218	76	0.1
129947	10/10/96	19	28	8	Dom			No	286	42	12	3	82	7	37	12	0.6
65606	7/7/84	19	28	9	Dom	27	8	No	212	96	30	5	35	8	30	8	6.5
74953	2/25/87	19	28	9	Dom			Yes	363	182	45	17	52	8	49	17	7.7
75880	5/12/87	19	28	9	Dom	131	6	No	445	5	2	0	146	6	115	77	0
76831	8/21/87	19	28	9	Dom	24	6	No	865	90	31	3	271	17	151	81	33.3
84263	9/13/89	19	28	9	Dom	38	8	No	1703	5	2	0	598	21	299	200	4.3
84118	9/18/89	19	28	9	Dom			No	519	89	29	4	133	21	62	22	15.6
84331	10/11/89	19	28	9	Dom			Yes									
88655	7/11/90	19	28	9	Dom	65	6	No	294	33	10	2	81	9	61	15	0.1
112261	1/28/94	19	28	9	Dom	46	6	No	1577	78	18	8	520	22	450	156	0.3
116093	9/21/94	19	28	9	Dom			No	451	239	66	18	49	15	74	33	2.5
71150	3/19/86	19	28	10	Dom			Yes	283	8	3	0	100	1	49	42	6.5
80000	7/5/88	19	28	10	Dom	80	6	Yes	1186						259		
99626	10/7/92	19	28	10	Dom	28		No	536	282	93	12	61	6	73	31	12.2
94954	11/25/91	19	28	12	Dom	30	8	No	0.672	291	85	19	117	7	135	45	21.1
73270	9/4/86	19	28	13	Dom	30	6	No	584	61	21	2	186	6	82	18	23.7
73396	9/23/86	19	28	13	Dom		8	No	254	125	35	9	26	6	58	11	9.6
82724	4/25/89	19	28	13	Dom	32	6	No	883	15	6	0	334	16	131	43	7
94957	11/25/91	19	28	13	Dom	24	8	No	781	380	106	28	121	8	140	42	30.1
77763	11/23/87	19	28	14	Dom	40	6	No	2154	65	26	0	726	23	714	253	0
68310	5/9/85	19	28	15	Dom	32	8	No	211	106	26	10	28	11	29	6	1.6
76474	7/14/87	19	28	15	Dom	47	6	No	330	157	43	12	31	12	88	20	0

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
94436	164	156	22	0.51	0.031	0.99	0.01	0	0.02	0.01	0.4	36	17	5.4	8.88	511	
94418	122	149	0	0.21	0.003	0.01	0	0.02	0	0.03	0.5	25	3	0.4	7.59	410	
94937	222	242	14	1.01	0.198	0.05	0	0	0	0.02	0.7	36	7	0.4	8.81	736	
132307	104	107	10	0.26	0.011	0.05	0	0	0.01	0	0.2	54	5	0.7	8.44	273	-1.07
78514	304	371	0	0.51	0.017	0.01	0	0.91	0.22	0.04	0.4	49	3	0.2	7.59	771	
66183	224	273	0	0.31	0.045	0.01	0	0.14	0.02	0.05	1.2	45	5	0.6	8.04		
66452																	
80423	482	500	43	6.7	3.26	0.1	0.01	0	0	0	4.2	28	5	0.5	8.92	1337	
80842	440	444	46	6.84	2.85	0.08	0	0	0.01	0	3	27	7	0.4	8.97	1143	
81730	580	600	53	7.88	3.456	0.39	0.01	0.01	0.09	0	6	34	10	1	8.79	1568	
82973	698	788	31	8.2	4.9	0.18	0	0	0	0	9.4	30	7	0.9	8.49	1801	
83698	368	439	5	5.48	1.33	0.41	0.03	0	0.02	0	2.8	28	10	0.9	8.21	1418	
129947	162	198	0	1.32	0.34	0.22	0.01	0.05	0.01	0.01	0.5	41	12	2.7	8.11	449	-0.15
65606	128	156	0	0.34	0.01	0.01	0	0	0.01	0.04	0.1	32	5	0.2	7.91		
74953	228	278	0	0.32	0.043	0	0	0	0.01	0.04	0.3	45	3	0.2	7.84	596	
75880	104	117	5	0.21	0.005	0.1	0.04	0	0.01	0.01	0.2	51	3	0.3	8.33	734	
76831	400	488	0	0.62	0.1	0.03	0.01	0	0	0.04	1.1	41	20	0.8	8.15	1359	
84263	758	793	65	4.04	2.08	0.34	0.02	0.02	0.08	0.01	3.9	25	25	1.7	9.02	2552	
84118	296	327	17	0.76	0.152	0.04	0.09	0.01	0	0.03			3	0.7	8.46	785	
84331					0.056												
88655	134	134	14	0.3	0.077	0.06	0.14	0.01	0.01	0.03	0.1	50	5	0.5	8.24	451	
112261	576	630	36	3.56	1.9	0.07	0.01	0.01	0.08	0.02	7.7	38	15	0.4	8.47	2385	0.86
116093	232	283	0	0.44	0.015	0.01	0.02	0	0	0.03	0.4	50	5	0.2	7.69	677	0.31
71150	124	151	0	0.27	0.006	0	0.04	0.01	0.05	0	2.9	4	5	0	6.84		
80000				2.08	0.315										7.98		
99626	256	312	0	0.58	0.015	0	0	0.03	0.03	0.07	0.5	45	7	0.6	7.58	774	
94954	340	415	0	0.76	0.027	0.01	0.02	0.3	0.14	0.07	0.9	42	3	0.1	7.48	1013	
73270	344	400	10	2.9	1.2	0	0	0.02	0.01	0.02	1.5	41	3	0.2	8.4	889	
73396	110	134	0	0.37	0.079	0.01	0	0.02	0.02	0.06	0.3	41	3	0.3	8.11	392	
82724	520	561	36	0.96	0.138	0.07	0	0.01	0	0.01	1.2	30	7	1	8.89	1378	
94957	426	520	0	0.79	0.029	0	0.3	0.01	0.05	0.05	1.1	45	7	0.1	7.68	1158	
77763	576	610	46	3.74	1.5	0.04	0.05	0	0	0.01	9.1	39	3	0.3	8.34	3276	
68310	138	159	5	0.31	0.014	0	0	0.02	0.08	0.02	0.2	36	3	0.1	8.21		
76474	124	151	0	0.22	0.01	0.12	0.69	0.01	0	0.08	0.2	49	3	0.6	7.96	499	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
77291	10/5/87	19	28	15	Dom	28	8	No	3238	15	6	0	1140	22	925	540	0.4
82693	4/24/89	19	28	15	Dom	30	8	No	743	5	2	0	268	6	78	21	38.8
82696	4/24/89	19	28	15	Dom	40	8	Yes	309	0	0	0	115	2	21	50	2.4
59961	7/21/82	19	28	16	Dom	65	6	No	621	25	10	0	207	8	126	26	0
60149	8/13/82	19	28	16	Dom	32	8	No	761	0	0	0	279	6	96	22	4.9
66423	10/3/84	19	28	16	Dom	30	7	No	325	66	20	4	75	16	50	20	0
68516	5/23/85	19	28	16	Dom	55	8	No	465	5	2	0	174	3	68	29	3.1
73888	10/26/86	19	28	16	Dom	55	8	No	398	3	1	0	144	3	52	19	1.5
73887	10/26/86	19	28	16	Dom	35	6	No	557	0	0	0	212	4	60	23	10
76335	6/26/87	19	28	16	Dom	60	8	No	570	18	7	0	210	7	76	24	0
76557	7/23/87	19	28	16	Dom	120	8	No	439	186	48	16	43	18	130	62	0
77042	9/10/87	19	28	16	strial	409	10	No	389	28	11	0	118	11	49	63	0.9
77245	9/30/87	19	28	16	Dom	40	6	No	732	3	1	0	268	5	100	26	5.9
77267	9/30/87	19	28	16	Dom			Yes	94	3	1	0	34	2	1	10	3.8
82697	4/24/89	19	28	16	Dom	67	6	No	634	5	2	0	245	8	64	21	7.1
82804	5/5/89	19	28	16	dom	120	8	No	489	216	55	19	47	19	156	71	0.4
82803	5/5/89	19	28	16	dom	50	8	No	560	122	29	12	134	29	60	13	58.7
83072	6/5/89	19	28	16	dom	200	8	No	193	52	16	3	31	9	37	6	1.1
83202	6/12/89	19	28	16	Dom	36	6	No	634	3	1	0	234	6	72	22	11.9
83654	8/1/89	19	28	16	Dom	30	8	No	364	88	27	5	85	13	54	24	15.1
87670	5/17/90	19	28	16	Dom	135	6	No	723	353	95	28	54	21	241	106	0.1
91245	2/14/91	19	28	16	Dom	34	8	Yes	34	0	0	0	13	0	0	0	1.4
96270	3/16/92	19	28	16	Dom	58	6.5	No	628	3	1	0	256	8	61	23	6.1
97015	5/12/92	19	28	16	Dom	130	6	No	885	453	122	36	68	24	324	132	6.9
69677	5/12/92	19	28	16	Dom	43	6	No	529	3	1	0	190	3	70	25	0
108057	10/1/93	19	28	16	Dom	37	6	No	330	0	0	0	115	2	60	14	0.3
111133	3/15/94	19	28	16	Dom	180		No	192	65	21	3	28	12	38	4	0.3
129882	10/8/96	19	28	16	Dom	196	6.625	No	198	66	20	4	26	9	37	6	0
66170	9/4/84	19	28	17	Dom	30	6	No	609	3	1	0	222	5	54	18	8.9
69499	9/18/85	19	28	17	Dom		6	Yes									
72379	6/20/86	19	28	17	Dom	115	6	No	242	38	12	2	58	16	32	4	4.3
72576	7/9/86	19	28	17	Dom	52	6	No	3633	452	82	60	897	108	1844	217	0
73824	10/21/86	19	28	17	Dom			No	539	198	53	16	105	14	86	37	21.1
77706	11/18/87	19	28	17	Dom	44	6	Yes	227	26	7	2	59	14	28	7	0

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
77291	804	878	50	5	3	0.04	0.03	0	0.02	0.01	10.6	31	7	0.7	8.62	4744	
82693	446	442	50	1.51	0.235	0.13	0	0.01	0	0.01	0.8	37	12	1.2	9.15	1106	
82696	164	156	22	0.36	0.022	0	0	0.01	0	0	7.1	1	5	0.4	8.88	510	
59961	306	339	14	2.07	0.53	0.03	0.03	0	0.05	0.02	2.3	41	3	0.5	8.29		
60149	458	359	82	4.06	4.8	0.09	0	0	0	0	3.1	43	7	1	8.5		
66423	166	203	0	0.4	0.04	0.11	0.01	0	0.03	0.02	0.2	39	5	0.3	7.89		
68516	264	220	50	1.14	0.46	0.01	0	0	0	0.15	1.1	36	5	0.2	9.41		
73888	244	200	48	1.1	0.5	0	0	0	0.01	0	1	39	3	0.2	9.42	640	
73887	358	310	62	1.33	0.4	0.19	0	0	0.01	0.01	1.2	36	25	1.1	9.42	894	
76335	354	349	41	2.38	1.27	0.2	0.03	0.02	0.02	0.02	1.4	32	12	6.6	8.96	912	
76557	88	107	0	0.22	0.003	0.32	1.98	0.01	0.01	0.21	0.2	47	5	1	8.09	672	
77042	158	168	12	0.6	0.019	6.2	0.22	0.08	0.03	0.08	1.1	58	65	17	8.75	624	
77245	444	390	74	3.82	1.94	0.01	0	0	0	0	3	40	7	0.7	9.33	1142	
77267	58	61	5	0.75	0.03	0.01	0	0.01	0.02	0	1.4	17	3	0.9	8.6	165	
82697	428	478	22	2.3	0.715	0.12	0	0.01	0	0	1.6	29	10	0.6	9.41	999	
82804	94	115	0	0.21	0.003	0.04	2.08	0	0	0.11	0.2	45	3	0.3	7.86	742	
82803	322	383	5	0.57	0.07	0.03	0	0.01	0	0.06	0.7	41	3	0.3	8.25	865	
83072	90	110	0	0.23	0.017	0.09	0.19	0.01	0	0.05	0.2	51	3	0.5	8.08	284	
83202	394	300	89	1.69	0.69	0.33	0.01	0	0.11	0.01	1.4	39	3	3.4	9.59	1013	
83654	198	217	12	0.33	0.024	0.07	0	0	0.01	0.04	0.5	32	3	0.6	8.32	580	
87670	110	134	0	0.18	0.007	0.75	2.21	0.01	0	0.01	0.2	50	7	4.8	7.93	1003	
91245	30	2	17	0.1	0.005	0.01	0	0	0	0	1.6	4	3	0.1	9.76	65	
96270	426	285	115	1.9	0.49	2.49	0.03	0	0	0.01	1.2	30	55	16	9.78	994	
97015	126	154	0	0.17	0.003	0.32	2.9	0	0.05	0.09	0.5	49	3	0.5	7.84	1252	
69677	304	268	50	1.92	0.783	0.46	0.01	0	0	0.01	1.3	40	10	1.7	9.32	791	
108057	160	156	19	0.73	0.152	0.42	0.02	0.01	0	0.01	0.4	37	15	0.5	8.89	500	
111133	92	102	5	0.22	0.015	0.2	0.15	0	0	0.05	0.2	45	5	0.6	8.22	282	-0.02
129882	86	105	0	0.23	0.016	0.11	0.33	0	0.01	0.07	0.2	53	7	1.2	7.94	273	-0.35
66170	394	281	98	0.72	0.18	0.94	0.03	0.01	0.02	0.01	0.6	43	45	14	9.63		
69499							0.11										
72379	140	146	12	0.27	0.03	0.07	0.01	0.02	0.04	0.02	0.3	30	3	0.8	8.94	391	
72576	378	461	0	1.54	0.516	0.08	0.01	0	0.01	0.02	12.3	35	3	0.4	8.1	4819	
73824	292	356	0	0.38	0.05	0	0.1	0	0.02	0.02	0.5	49	3	0.3	7.75	863	
77706	144	156	10	0.47	0.08	0.17	0.01	0	1.26	0.01	0.3	34	7	3.8	8.63	360	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
80560	8/16/88	19	28	17	Dom	65	8	No	876	342	99	23	119	10	368	42	0
80861	9/1/88	19	28	17	Dom	31	6	No	225	81	26	4	43	7	40	15	2.8
87779	5/11/90	19	28	17	Dom	28	8	No	270	130	39	8	31	9	45	21	2.1
88345	6/27/90	19	28	17	Dom	57		Yes	2320	365	95	31	593	41	1025	275	0.7
95360	1/8/92	19	28	17	Dom			No	1535	125	32	11	462	31	643	140	2
97142	5/21/92	19	28	17	Dom	97	6	No	1140	11	1	2	437	8	90	86	0.1
99776	10/9/92	19	28	17	Dom			No	234	115	31	9	29	9	46	17	0.4
114951	8/11/94	19	28	17	Dom		6	No	918	4	0	1	322	9	228	38	0.2
58543	2/7/82	19	28	18	Dom	42	6	No	1654	91	28	5	521	34	637	174	6
59633	6/8/82	19	28	18	ɔ fish			No	5683	498	28	104	1750	95	2628	740	0.5
60155	8/11/82	19	28	18	Dom		6	No	1758	84	27	4	563	31	667	200	5
61146	12/13/82	19	28	18	Dom	30	8	No	590	8	3	0	201	11	98	48	2.6
61742	3/21/83	19	28	18	Dom	26	8	No	1643	8	3	0	560	30	564	102	0.8
62201	4/25/83	19	28	18	Dom	38	6	No	2287	101	32	5	710	31	976	207	0.3
62611	6/13/83	19	28	18	Dom	18	6	No	2883	475	149	25	734	27	1380	253	2.3
62747	7/21/83	19	28	18	Dom	60	7	No	407	28	8	2	128	11	54	17	16.3
65013	4/18/84	19	28	18	Dom	35	16	No	3103	105	42	0	995	36	1570	124	0.2
65436	6/7/84	19	28	18	Dom	28	8	No	3294	582	177	34	812	30	1522	297	3
65566	7/12/84	19	28	18	Dom	39		No	759	15	6	0	365	11	163	35	13.2
65780	8/2/84	19	28	18	Dom	42	8	No	1262	23	9	0	420	16	482	99	8.3
66175	9/7/84	19	28	18	Dom	28	10	No	199	110	34	6	23	5	37	12	3.7
66997	1/2/85	19	28	18	dom	36	8	No	381	89	24	7	97	8	62	27	18.4
69078	8/11/85	19	28	18	Crops	50		No	3784	523	94	70	935	114	2000	238	1.1
69805	10/18/85	19	28	18	Dom	30	6	No	344	10	4	0	119	4	37	9	3.4
69953	10/29/85	19	28	18	Dom	42	8	No	1073	13	5	0	360	13	400	70	7.8
72084	6/6/86	19	28	18	Dom			Yes	1524	73	26	2	453	26	628	140	0.4
73427	9/23/86	19	28	18	Dom	40	8	No	609	18	7	0	208	7	100	15	1.9
73765	10/21/86	19	28	18	Dom			Yes									
74830	2/10/87	19	28	18	Dom			No	206	63	17	5	34	17	30	9	3.4
76107	5/29/87	19	28	18	Dom	123	6	No	673	383	104	30	50	13	205	36	0
76542	7/22/87	19	28	18	Dom	64	8	No	1251	647	183	46	98	13	606	96	0
76828	8/24/87	19	28	18	Dom		8	No	394	72	19	6	103	8	88	33	17.4
76829	8/24/87	19	28	18	Dom			No	1325	716	2204	50	94	12	633	90	0
77290	10/5/87	19	28	18	Dom	48	6	No	683	287	82	20	93	9	264	26	0

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
80560	196	239	0	0.47	0.162	1.46	0.9	0	0	0.02	1.6	47	45	8.7	8.08	1165	
80861	120	137	5	0.33	0.011	0.06	0	0.01	0.07	0.04	0.2	33	3	0.5	8.29	372	
87779	132	161	0	0.28	0.006	0.09	0.03	0	0.01	0.05	0.2	33	3	0.2	7.68	435	
88345	318	388	0	1.57	0.152	0.01	0.51	0	0.01	0.04	3.8	45	3	0.3	8.12		
95360	342	373	22	2.38	0.143	2.22	0.08	0.01	0.21	0.03	2.4	21	12	1.7	8.41	2327	
97142	738	842	29	3.84	0.75	0.21	0.02	0	0	0.02	7	33	25	0.6	8.53	1767	
99776	122	149	0	0.34	0.021	0.02	0.06	0.01	0.01	0.02	0.3	39	3	0.2	8	361	
114951	414	417	43	8	3.77	0.05	0	0	0	0	5.5	32	12	0.5	9.13	1426	-0.15
58543	352	425	2	3.6	0.46	0	0	0	0.01	0.02	3.8	43	3	1.1	8.3		
59633	524	478	66	2.46	0.14	0.05	0.03	0	0.01	0.01	8	4	7	1.1	8.88		
60155	358	407	12	3.1	0.26	0	0	0	0	0.01	3.3	39	3	0.5	8.22		
61146	286	290	29	4.52	1.35	1.09	0.02	0	0.06	0.02	1.5	39	25	5.2	8.9		
61742	538	525	65	4.28	1.89	0.09	0.01	0	0	0.01	5.6	34	3	0.5	9.02		
62201	402	447	18	1.17	0.15	0	0.02	0	0	0.07	3.7	30	7	0.5	8.44		
62611	324	395	0	1.75	0.05	0	0.02	0	0.01	0.02	3.9	36	5	0.1	8		
62747	228	249	12	1.38	0.37	0	0	0	0.01	0	0.6	36	7	0.1	8.53		
65013	500	547	31	4.48	2.35	0.01	0	0	0.02	0.01	9.4	32	3	0.7	8.36		
65436	326	398	0	1.55	0.06	0	0.01	0	0.03	0.02	4.4	41	5	0.2	8.03		
65566	366	388	29	3.4	1.54	0.15	0.01	0	0	0.01	2.1	39	3	1.1	8.46		
65780	294	295	31	1.41	0.86	0	0	0	0	0.01	2	30	5	0.3	8.82		
66175	106	115	7	0.24	0.01	0.05	0	0	0.02	0.04	0	26	5	0.4	8.27		
66997	188	205	12	0.36	0.034	0	0	0	0.01	0	0.2	26	3	0.3	8.32		
69078	340	415	0	1.4	0.4	0.1	0.01	0	0.09	0.02	11.2	36	5	0.7	8.04		
69805	222	227	22	0.45	0.07	0.01	0	0	0.02	0	0.4	41	5	0.3	8.89		
69953	302	300	34	1.38	0.83	0	0	0	0.01	0.01	1.8	28	5	0.2	9		
72084	270	310	10	1.41	0.327	0	0.02	0	0.02	0.01	4.5	30	3	0	8.42		
73427	342	368	24	3.72	1.13	0.05	0	0	0	0.01	2.1	39	3	0.5	8.58	928	
73765					0.012										8.21		
74830	114	129	5	0.36	0.06	0	0	0	0	0.03	0.3	38	3	0.1	8.42	332	
76107	246	300	0	0.22	0.029	0.21	0.5	0	0.25	0.15	0.5	49	3	0.8	7.77	963	
76542	130	159	0	0.18	0.006	1.86	3.35	0	0.01	0.03	0.6	51	25	14	7.61	1582	
76828	150	183	0	0.62	0.102	0.11	0.01	0	0.01	0.02	0.7	38	3	0.9	8.15	645	
76829	154	188	0	0.2	0.007	0.23	3.46	0	0	0.03	0.8	50	5	2.5	7.42	1692	
77290	218	266	0	0.27	0.008	0.57	1	0	0.02	0.03	1.4	48	7	3.9	7.76	1000	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
78311	1/29/88	19	28	18	Dom	62	6	No	417	23	6	2	131	15	47	14	15.5
78602	2/25/88	19	28	18	Dom	30	6	No	208	92	27	6	30	5	35	9	2.2
78740	3/8/88	19	28	18	Dom	112	7	No	596	124	33	10	153	8	195	42	7.2
79192	4/22/88	19	28	18	Dom		6	No	510	55	17	3	192	7	136	26	6.2
79867	6/20/88	19	28	18	Dom	42	6	No	316	31	9	2	88	8	61	19	11.3
80710	8/29/88	19	28	18	Dom	45	6	No	272	26	7	2	81	7	33	8	2.6
81135	10/3/88	19	28	18	Dom	134	6	No	688	382	105	29	54	11	208	36	0
82168	2/22/89	19	28	18	Dom	53	6	No	1741	193	51	16	486	36	735	168	2
82167	2/23/89	19	28	18	Dom	37	6	No	4797	815	209	71	1131	86	2010	720	18.1
82160	2/28/89	19	28	18	Dom	85	6	Yes	786	389	111	27	74	8	329	46	0.5
82980	5/22/89	19	28	18	Dom	35	8	No	278	8	3	0	85	5	38	12	6.3
82976	5/22/89	19	28	18	Dom	55	6	No	251	24	8	1	74	3	38	11	2.6
84211	10/4/89	19	28	18	Dom			No	253	101	24	10	31	20	45	22	3.3
84800	11/27/89	19	28	18	Dom			Yes	1437	734	195	60	125	15	713	74	0.4
85154	12/29/89	19	28	18	Dom			Yes	1606						788		
87318	5/8/90	19	28	18	Dom			Yes	610	269	60	29	76	18	249	40	0.4
88625	7/16/90	19	28	18	Dom			Yes	104						24		
93122	7/9/91	19	28	18	Dom			Yes	648	114	29	10	170	9	258	47	12.5
93303	7/23/91	19	28	18	Dom	80		Yes	921	0	0	0	319	11	248	71	9.1
97140	6/4/92	19	28	18	Dom	105	6	Yes	350	98	26	8	80	8	63	24	9.5
98217	7/28/92	19	28	18	Dom			Yes	214	54	15	4	44	5	56	27	0.2
98130	7/31/92	19	28	18	Dom	115	6	No	752	410	113	31	55	10	316	49	0
103870	5/18/93	19	28	18	Dom	106	6	Yes	250	3	1	0	82	1	46	49	0.3
105654	7/20/93	19	28	18	Dom		6	Yes	119	12	3	1	34	2	23	10	0.5
127845	6/25/96	19	28	18		60	10	No	4809	557	152	43	1330	57	2458	640	0
59341		19	28	19	Dom	23	4	No	3314	168	41	16	930	76	1759	120	0.2
58559	2/2/82	19	28	19	Dom	51	6	No	250	45	13	3	68	5	45	11	1.6
59630	6/9/82	19	28	19	Dom	36	8	No	691	35	14	0	238	13	116	18	0.9
60209	8/18/82	19	28	19	Dom	30	6	No	333	43	14	2	415	3	51	12	8.7
66425	9/28/84	19	28	19	Dom		8	No	202	56	14	5	34	19	30	6	2.7
66419	9/28/84	19	28	19	Dom		8	No	195	81	21	7	28	12	27	6	2.5
67852	3/12/85	19	28	19	Dom	28	10	No	207	107	33	6	23	5	38	10	2.5
67975	4/2/85	19	28	19	Dom	20	6	No	726	147	39	12	184	16	121	48	87
68060	4/9/85	19	28	19	Dom		7	No	192	80	22	6	24	13	30	5	2.9

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ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
254	237	36	0.67	0.28	0.02	0	0	0.01	0.01	0.4	39	3	0.3	8.97	653	
112	137	0	0.33	0.011	0.07	0	0	0	0.04	0.2	29	3	0.5	7.76	342	
194	237	0	1.14	0.228	0.22	0.28	0	0.01	0.06	0.9	45	3	1	8.1	918	
306	373	0	2	0.038	0.08	0	0	0	0.04	2.1	35	3	0.4	8.09	955	
136	151	7	1.07	0.32	0.02	0	0	0	0.1	0.5	40	3	0.4	8.38	502	
142	149	12	1.33	0.3	0.03	0	0.01	0	0.01	0.4	38	3	0.4	8.74	408	
248	303	0	0.22	0.01	0.16	0.61	0	0.01	0.16	0.6	48	5	0.6	8.1	963	
340	381	17	1.86	0.108	0.02	0.18	0	0.01	0.04	2.7	42	3	0.7	8.2	2601	
294	359	0	1.46	0.024	0.02	0.01	0	0.11	0.02	4.9	41	3	0.5	7.79	6347	
178	217	0	0.22	0.004	3.26	2	0.01	0.9	0.04	1	45	45	18	7.63	1083	
142	149	12	0.93	0.23	0.06	0	0	0	0	0.4	38	3	0.4	8.76	415	
132	146	7	2.02	0.116	0.09	0.03	0	0	0	0.4	33	3	0.6	8.44	386	
120	122	12	0.25	0.027	0.03	0.01	0	0.01	0.04	0.3	35	3	0.4	8.29	404	
166	203	0	0.23	0.003	0.03	0.2	0.05	0.11	0.02	1.1	47	3	0	7.71	1775	
						3.57									1923	
148	142	19	0.19	0.042	0.1	0.07	0.01	0	0.01	0.3	26	3	0.2	8.88	895	
						0.17										
152	185	0	0.52	0.048	0.06	0.01	0.01	0.1	0.01	2	30	5	0.5	7.59	1006	
358	354	41	2.9	1.466	0.02	0	0	0	0	2.4	38	5	0.7	8.79	1436	
176	215	0	0.44	0.034	0	0	0	0	0.02	0.4	37	3	1.1	8.06	532	
64	78	0	0.14	0.011	0.04	0.2	0.01	0.13	0.01	1.9	29	3	0.2	7.92	334	
130	159	0	0.18	0.003	0.28	2.1	0	0	0.05	0.3	45	3	1.3	7.79	962	
68	83	0	0.08	0.006	0	0.01	0	0.02	0.01	1.9	34	3	0.2	7.67	395	
50	61	0	0.17	0.017	0.01	0	0.03	0.05	0	2	16	3	0.2	7.73	186	-1.39
254	310	0	1.29	0.049	0.82	0.46	0	0.44	0.02	6.2	39	25	6.8	7.73	6463	0.65
384	468	0	4.88	2.1	0.33	0.08	0.04	0.04	0.02			1		8.18		
126	154	0	1.24	0.33	0.02	0.01	0.06	0.01	0.01	0.4	43	3	0.4	8.15		
398	486	0	3.88	0.44	0.19	0.02	0	0.01	0.02	3.1	47	3	1.1	8.04		
216	264	0	1.96	0.01	0	0.16	0	0	0.02	0.6	32	3	0.3	8.15		
104	112	7	0.29	0.03	0.03	0	0	0.03	0.03	0.1	32	3	0.1	8.51		
114	120	10	0.27	0.03	0.16	0	0	0.01	0.06	0.1	28	5	0.8	8.36		
104	127	0	0.22	0.01	0.02	0.01	0	0.02	0.04	0.1	26	3	0.3	8.01		
304	371	0	1.07	0.13	0	0	0	0.01	0.08	0.8	45	5	0.4	8.06		
104	127	0	0.31	0.05	0	0	0	0.01	0.04	0.2	30	3	0.4	8.16		

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
68649	6/14/85	19	28	19	Dom			No	538	8	3	0	197	9	49	17	1.1
8650	6/17/85	19	28	19	Dom	30		No	644	29	10	1	209	27	76	21	33.1
69957	11/7/85	19	28	19	Dom	30	8	No	379	5	2	0	126	6	37	10	3.6
70107	11/22/85	19	28	19	Dom	30	8	No	378	5	2	0	132	6	36	11	4.3
70108	11/27/85	19	28	19	Dom	60	6	No	244	10	4	0	76	8	32	8	3.2
70165	12/3/85	19	28	19	Dom	30	12	No	325	5	2	0	107	7	37	10	6.9
70519	1/21/86	19	28	19	Dom		8	No	194	58	15	5	30	19	28	9	2.7
70522	1/22/86	19	28	19	Dom	30		Yes									
71012	3/7/86	19	28	19	Dom		8	No	213	17	5	1	65	7	31	7	2.7
71178	3/19/86	19	28	19	Dom	30	8	No	699	41	13	2	229	14	101	22	8.9
71851	5/13/86	19	28	19	Dom	36	6	No	397	14	4	1	127	12	52	18	8.6
72243	6/16/86	19	28	19	Dom			No	269	22	7	1	76	6	33	9	2.9
72818	7/22/86	19	28	19	Dom		6	No	384	51	14	4	102	19	73	30	0
72817	7/22/86	19	28	19	Dom	30	6	No	216	112	35	6	24	5	39	11	4.2
72830	7/23/86	19	28	19	Dom	47	8	No	573	37	13	1	191	7	117	15	0.4
73295	9/4/86	19	28	19	Dom		6	No	195	92	27	6	24	7	33	7	3
73511	9/23/86	19	28	19	Dom	46	8	No	696	25	10	0	232	8	149	14	1.3
74493	12/23/86	19	28	19	Dom	55	8	No	302	17	5	1	104	3	47	14	8.6
74680	1/16/87	19	28	19	Dom	60	6	No	260	24	8	1	82	3	44	13	3.7
74752	1/28/87	19	28	19	Dom	30	6	No	265	17	5	1	87	6	33	9	4.2
74861	2/4/87	19	28	19	Dom		8	No	485	5	2	0	179	8	45	10	1.2
74847	2/10/87	19	28	19	Dom	42	6	No	366	36	11	2	118	6	47	10	0
75068	2/23/87	19	28	19	Dom	46	8	Yes									
75078	3/3/87	19	28	19	Dom	50	8	No	361	43	14	2	113	3	56	14	8.4
75216	3/16/87	19	28	19	Dom	60	8	No	302	0	0	0	103	2	62	12	0.2
75202	3/16/87	19	28	19	Dom	70	6	No	299	0	0	0	101	2	62	9	0
75685	4/23/87	19	28	19	Dom	79	6	No	1064	567	161	40	80	11	474	71	0
75850	5/12/87	19	28	19	Dom	30	6	No	202	58	15	5	38	16	29	7	3.8
76630	7/29/87	19	28	19	Dom	34	8	No	679	114	29	10	168	10	323	14	2.3
76881	8/28/87	19	28	19	Dom			No	20	0	0	0	6	0	0	0	0.9
77092	9/10/87	19	28	19	Dom	40	6	No	275	8	3	0	89	9	31	8	3.8
77129	9/21/87	19	28	19	Dom	40	8	No	204	70	18	6	29	15	29	6	3.7
77367	10/13/87	19	28	19	Dom	40	8	No	622	14	4	1	216	13	130	60	23.6
77664	11/10/87	19	28	19	Dom	32	6	No	325	107	33	6	54	18	42	12	5.2

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
358	334	50	4.84	1.13	0.39	0.01	0	0	0.02	1.5	45	10	0	9.06		
388	395	38	0.81	0.1	0.18	0.01	0	0	0.01	0.9	41	7	0	8.79		
250	237	34	1.33	0.23	0.83	0.02	0	0.07	0.01	0.7	41	25	4.5	9.36		
242	207	43	1.48	0.31	0.21	0	0	0.01	0.01	0.7	45	7	2.1	9.1		
134	154	5	0.36	0.07	0.12	0.02	0.01	0.04	0.01	0.4	34	12	4.8	8.68		
190	149	41	1.03	0.175	0.06	0	0	0.01	0	0.6	43	5	0.9	8.99		
108	122	5	0.27	0.03	0	0	0	0.01	0.02	0.2	34	5	0.1	8.47		
				0.003												
128	142	7	0.31	0.08	0.04	0	0	0.01	0		30	5	0.2	8.62		
432	512	7	3.1	0.62	0.5	0.02	0	0.01	0.03		43	25	5.3	8.22		
234	256	14	1.29	0.54	0.52	0.03	0.01	0.03	0.03	0.5	41	15	6.8	8.74		
154	149	19	0.61	0.166	0.47	0.01	0.01	0.48	0.01	0.4	41	7	3.1	8.91	399	
180	181	19	399	0.28	0.01	0	0	0.02	0.04	0.6	39	3	0.3	8.66	628	
118	144	0	0.21	0.013	0	0	0	0.02	0.03	0.2	26	3	0.4	8.04	354	
320	371	10	3.76	1.1	0.07	0.04	0.01	0.02	0.03	1.9	39	3	0.4	8.33	913	
112	137	0	0.26	0.033	0.01	0	0.01	0.01	0.04	0.2	28	3	0.2	7.91	314	
358	388	24	3.92	1.21	0.05	0.01	0	0	0.02	2.6	40	3	0.4	8.42	1055	
174	207	2	0.96	0.32	0.1	0	0	0.01	0.01	0.4	32	3	0.7	8.29	482	
146	178	0	1.64	0.11	0.12	0.01	0	0.01	0.02	0.4	34	3	1	7.83	434	
160	146	24	0.51	0.076	0.06	0	0	0.01	0.01	0.4	39	3	0.6	9.15	427	
334	359	24	3.92	0.91	0.32	0.01	0	0	0.01	1.8	45	3	1	8.69	756	
232	264	10	2.82	0.66	0.22	0.03	0	0	0.02	1.2	40	5	2	8.39	581	
			0.65	0.036												
206	251	0	1.9	0.021	0	0.15	0.07	0.01	0.02	0.6	31	3	0.2	8.01	585	
140	132	19	0.76	0.169	0.37	0.03	0.01	0.02	0.01	0.4	48	7	1	8.92	460	
142	129	22	0.81	0.16	0.38	0.02	0	0.02	0.02	0.4	48	12	1.1	9.02	461	
180	220	0	0.2	0.007	0.14	2.62	0	0.01	0.04	1.1	49	3	1.8	7.64	1360	
116	122	10	0.34	0.043	0.01	0	0.01	0.01	0.05	0.3	34	3	0.3	8.61	332	
138	149	10	0.74	0.15	0.03	0.01	0	0.02	0.05	1.9	41	3	0.3	8.24	999	
12	5	5	0.06	0.003	0.01	0	0.01	0.01	0	0.3	6	3	0.1	9.07	33	
170	144	31	0.38	0.046	0.33	0.01	0	0.4	0.01	0.3	35	3	2.6	9.43	439	
114	129	5	0.35	0.065	0	0	0	0	0.05	0.3	37	3	0.4	8.34	322	
242	256	19	2.76	0.9	0.01	0	0	0.01	0.03	1.3	37	3	0.4	8.82	985	
186	227	0	0.43	0.012	0.02	0	0	0.01	0.04	0.4	45	3	0.4	8.1	509	

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
77707	11/19/87	19	28	19	Dom	35		Yes	52	0	0	0	16	9	4	2	3
77765	11/30/87	19	28	19	Dom	40	6	No	254	3	1	0	87	2	35	9	2.7
78151	1/6/88	19	28	19	Dom	30	4	No	210	100	30	6	31	7	36	11	2.5
78257	1/25/88	19	28	19	Dom	38	6	No	197	47	14	3	44	7	31	8	2.7
78253	1/25/88	19	28	19	Dom	40	8	No	197	66	20	4	38	10	31	10	2.6
78252	1/26/88	19	28	19	Dom	40	6	No	440	27	9	1	148	7	68	17	7.1
78917	3/29/88	19	28	19	Dom	35	6	Yes	495	10	4	0	160	7	75	29	6.9
79064	4/11/88	19	28	19	Dom		8	No	472	207	53	18	47	25	112	82	17.5
79385	5/7/88	19	28	19	Dom	60	6	No	195	73	21	5	34	5	30	7	2.7
80145	7/15/88	19	28	19	Dom	112	7	Yes	82	3	1	0	27	1	6	10	9.4
82402	3/24/89	19	28	19	Dom		8	No	229	85	21	8	30	19	38	17	4.1
82530	3/28/89	19	28	19	Dom			No	252	61	18	4	57	11	40	15	3.5
82579	4/6/89	19	28	19	Dom	40	6	No	293	28	8	2	84	5	42	11	9.2
82719	4/11/89	19	28	19	Dom	57	8	No	236	99	28	7	31	5	43	9	0.6
82721	4/12/89	19	28	19	Dom	30	8	No	309	14	4	1	96	5	43	15	3.8
82718	4/20/89	19	28	19	Dom	32	8	No	691	92	32	3	223	10	91	45	17.3
83547	7/11/89	19	28	19	Dom		6	No	419	22	7	1	131	7	82	30	5.7
83540	7/12/89	19	28	19	Dom	36	8	No	343	41	13	2	96	7	70	8	2.7
84802	11/16/89	19	28	19	Dom	39	6	No	241	63	17	5	52	11	39	14	3.8
84911	11/27/89	19	28	19	Dom	38	6	No	322	47	14	3	89	6	61	9	2.4
85152	12/19/89	19	28	19	Dom	145	6	No	431	3	1	0	156	5	37	8	0
85654	2/5/90	19	28	19	Dom	30	8	No	474	42	12	3	144	13	65	22	23.7
86154	3/12/90	19	28	19	Dom			Yes	32	0	0	0	12	0	3	2	3.3
86218	3/19/90	19	28	19	Dom			No	821	71	22	4	264	11	153	33	13.3
86758	4/15/90	19	28	19	Dom	34		No	242	22	7	1	70	3	34	9	3
86734	4/17/90	19	28	19	Dom			Yes									
87782	5/11/90	19	28	19	Dom	47	6	No	269	12	3	1	87	4	36	12	1.6
88335	6/11/90	19	28	19	Dom	57	6	No	428	45	13	3	133	9	51	13	15.9
88343	6/27/90	19	28	19	Dom		6	Yes	147	5	2	0	48	3	7	10	12.7
89303	8/29/90	19	28	19	Dom			Yes	75	0	0	0	24	1	10	3	0.2
89486	9/12/90	19	28	19	Dom			No	240	65	16	6	45	17	39	18	3.1
90065	10/31/90	19	28	19	Dom	30	4	No	371	199	55	15	49	3	64	23	0
91528	3/13/91	19	28	19	Dom			No	733	61	18	4	228	7	131	48	27.9
92399	5/16/91	19	28	19	Dom	60	6	No	228	76	22	5	40	4	43	10	0

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
77707	40	44	2	0.26	0.026	0.01	0	0	0	0	1	4	3	0.2	8.76	108	
77765	144	146	14	0.82	0.35	0	0	0.01	0	0	0.5	32	3	1.3	9.04	399	
78151	128	137	10	0.25	0.017	0.04	0	0	0.03	0.02	0.2	26	3	0.4	8.36	366	
78257	110	134	0	0.58	0.15	0.16	0.02	0.01	0.01	0.02	0.3	38	3	1.2	8.1	316	
78253	118	120	12	0.25	0.026	0.07	0	0.01	0.01	0.02	0.2	29	3	0.7	8.5	336	
78252	262	320	0	3.26	0.19	0.12	0.01	0	0	0.02	1.4	36	3	0.6	8.19	717	
78917	242	246	24	1.69	0.475	0.07	0	0	0	0	0.9	39	3	0.6	8.96	741	
79064	108	117	7	0.33	0.053	0	0	0	0	0.09	0.3	38	3	0.2	8.38	740	
79385	110	134	0	0.33	0.027	0.11	0	0	0	0.03	0.2	33	3	0.5	8.05	316	
80145	36	24	10	0.22	0.012	0	0	0	0.04	0	0.9	17	3	0.3	8.79	144	
82402	114	124	7	0.26	0.027	0	0	0	0.01	0.03	0.2	35	3	0.1	8.33	369	
82530	138	134	17	0.32	0.044	0.01	0	0.01	0	0.02	0.3	32	3	0.3	8.52	410	
82579	160	171	12	1.42	0.365	0.16	0.02	0	0	0.01	0.4	38	5	0.8	8.34	438	
82719	120	146	0	0.29	0.005	0.43	0.56	0	0	0.05	0.4	43	12	4.4	7.9	354	
82721	164	181	10	1.07	0.37	0	0	0	0	0.01	0.6	37	3	0.4	8.39	471	
82718	400	425	31	0.56	0.072	0.01	0	0	0	0.03	0.8	28	7	0.5	8.75	1083	
83547	192	171	31	1.82	0.46	0	0	0	0	0.01	0.9	40	3	0.4	8.53	659	
83540	180	181	19	1.41	0.425	0.07	0.02	0	0	0.02	1.1	40	3	0.4	8.26	529	
84802	118	124	10	0.51	0.118	0.2	0.01	0	0.05	0.03	0.3	38	3	1.5	8.26	380	
84911	168	181	12	1.33	0.4	0.24	0.03	0	0	0.02	0.9	40	3	0.1	8.28	498	
85152	298	246	58	1.3	0.037	0.03	0	0	0	0.01	0.6	52	35	0.3	9.27	660	
85654	258	290	12	0.94	0.262	0.09	0	0.01	0.03	0.01	0.5	38	3	0.4	8.61	738	
86154	20	24	0	0.13	0.016	0	0	0	0	0	0.4	3	3	0.1	7.8	72	
86218	452	551	0	2.44	0.555	0.06	0.01	0	0	0.04	0.3	39	3	0.4	8.07	1252	
86758	136	142	12	1.02	0.265	0.11	0	0	0	0.01	0.4	37	3	1	8.36	375	
86734				0.47	0.032												
87782	148	166	7	1.66	0.651	0.17	0.01	0	0.08	0	0.3	38	3	0.9	8.51	421	
88335	252	307	0	2.64	0.148	0.62	0.02	0	0	0.02	0.7	42	3	1.3	8.13	670	
88343	84	102	0	0.95	0.018	0	0	0	0	0	0.8	24	3	0.3	7.72	246	
89303	42	51	0	0.75	0.186	0	0	0	0.04	0	1.9	13	3	0.1	7.26	126	
89486	120	127	10	0.38	0.05	0.01	0	0	0	0.04	0.2	35	3	0.4	8.59	383	
90065	218	266	0	0.31	0.004	0.01	0.13	0.01	0.02	0.09	0.5	36	3	0.1	7.58	605	
91528	348	425	0	1.79	0.625	0.07	0.01	0	0	0.03	1.5	41	3	0.5	8.15	1131	
92399	110	134	0	0.78	0.007	0.35	0.15	0	0.12	0.04	0.4	39	3	0.8	7.92	352	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
92728	6/19/91	19	28	19	Dom	40	6	Yes	53	3	1	0	17	1	0	2	10.9
93460	7/29/91	19	28	19	Dom	43	6	No	653	77	21	6	198	9	141	35	5.7
93390	7/29/91	19	28	19	Dom	43	6	Yes	118	9	2	1	44	2	16	12	3
93625	8/13/91	19	28	19	Dom			No	978	109	27	10	257	11	498	17	2.1
93626	8/13/91	19	28	19	Dom		8	No	260	35	14	0	62	5	41	10	2.7
93825	8/25/91	19	28	19	Dom	30	8	No	615	30	7	3	188	18	164	85	2.3
93977	8/28/91	19	28	19	Dom	60	8	No	263	125	37	8	37	6	54	24	1.2
94020	9/19/91	19	28	19	Dom	60	6	No	368	31	9	2	118	5	58	13	2.2
94245	10/3/91	19	28	19	Dom	100	6	No	229	82	23	6	40	4	47	10	0
95454	1/8/92	19	28	19	Dom			Yes	222	3	1	0	77	3	3	23	23.5
95456	1/16/92	19	28	19	Dom			Yes	95	29	5	4	18	4	7	9	0
95801	2/11/92	19	28	19	Dom			Yes	393	14	4	1	142	5	48	14	2.2
96140	3/19/92	19	28	19	Dom			Yes	304	17	5	1	102	5	21	18	11.6
96572	4/27/92	19	28	19	Dom			Yes	39	5	2	0	9	1	0	1	0
96573	4/27/92	19	28	19	Dom			Yes	140	5	2	0	43	3	5	7	0
96975	5/7/92	19	28	19	Dom	30	8	No	253	100	30	6	43	11	49	21	2
96903	6/4/92	19	28	19	Dom		8	No									
100382	11/8/92	19	28	19	Dom	60	6.625	No	232	87	25	6	36	5	50	10	0
103336	4/22/93	19	28	19	Dom	34	6	Yes	80	0	0	0	28	1	4	7	0.6
103863	5/18/93	19	28	19	Dom	36	6	No	489	68	19	5	139	8	123	30	0.1
104494	6/11/93	19	28	19	Dom	30	6	No	637	26	7	2	215	10	110	44	4.2
104506	6/15/93	19	28	19	Dom	40	6	Yes	102	67	17	6	14	1	19	3	0
105166	7/9/93	19	28	19	Dom		6	Yes	257	14	4	1	79	7	6	22	11.8
105653	7/20/93	19	28	19	Dom	34	8	No	260	12	3	1	85	5	46	19	0.6
105656	7/20/93	19	28	19	Dom	33	6	Yes	69	3	1	0	20	2	36	2	0
106369	8/3/93	19	28	19	Dom		8	Yes	105	12	3	1	30	1	11	1	0
106566	8/26/93	19	28	19	Dom	47		No	218	63	17	5	44	8	35	10	0
107008	9/2/93	19	28	19	Dom		6	No	286	74	18	7	62	18	51	38	1.1
109450	12/8/93	19	28	19	Dom	37		No	243	0	0	0	83	3	45	7	0.2
115891	9/19/94	19	28	19	Dom			No	247	104	30	7	42	3	51	22	0.7
60313	8/18/82	19	28	20	Dom	28	5	No	271	105	32	6	44	11	39	13	5.3
61514	2/16/83	19	28	20	Dom	36	6	No	369	3	1	0	123	6	37	11	6.7
64178	1/10/84	19	28	20	Dom	34		No	401	71	20	5	106	13	56	18	18.2
66972	12/14/84	19	28	20	Dom	40	6	No	259	23	6	2	76	7	38	12	4.6

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
92728	30	37	0	0.13	0.01	0	0	0	0	0.01	1	7	3	0.1	8.17	94	
93460	314	383	0	2.08	0.035	0.01	0.01	0	0	0.04	2.1	36	3	0	8.14	1008	
93390	72	88	0	0.51	0.003	0.01	0	0	0.03	0	2	15	3	0	7.67	230	
93625	172	200	5	1.24	0.28	0.02	0	0.01	0.01	0.03	4.3	41	3	0.1	8.2	1384	
93626	136	156	5	0.95	0.25	0.01	0.02	0	0.01	0.02	0.6	41	3	0.1	8.21	404	
93825	176	185	14	0.71	0.072	0.16	0	0	0	0.02	0.7	39	3	0.6	8.77	983	
93977	122	149	0	0.26	0.012	0.18	0.01	0	0	0.02	0.4	27	3	1.1	8.08	432	
94020	214	261	0	1.72	0.22	0.02	0	0	0.01	0.03	1.1	34	3	0.2	7.91	585	
94245	110	134	0	0.74	0.008	0.31	0.18	0	0.07	0.05	0.5	41	3	0.9	7.94	358	
95454	118	120	12	0.7	0.023	0	0	0.01	0.03	0.01	0.8	26	3	0.4	8.5	360	
95456	56	68	0	0.17	0.015	0.08	0	0	0.03	0.01	0.4	21	5	0.6	7.82	165	
95801	246	271	14	1.57	0.5	0.02	0	0	0	0.01	1	34	3	0.1	8.7	634	
96140	190	232	0	2.5	0.087	0	0	0	0	0.01	1	31	3	0.4	8.15	499	
96572	26	17	7	0.11	0.016	0.01	0	0	0	0.01	0.2	17	3	0.4	8.27	55	
96573	88	107	0	0.66	0.7	0.01	0	0.01	0	0.01	3.2	24	3	0.3	7.68	200	
96975	120	137	5	0.23	0.019	0.03	0	0.01	0	0.03	0.4	30	3	0.1	8.21	404	
96903					0.168												
100382	100	122	0	0.36	0.003	0.08	0.46	0	0	0.05	0.4	40	3	0.6	7.95	337	
103336	50	46	7	0.11	0.009	0.01	0	0.01	0.03	0	1.2	6	3	0.5	8.74	139	
103863	212	244	7	2.48	0.5	1.39	0.01	0	0	0.03	1.3	37	25	9.2	8.44	755	
104494	312	337	22	2.4	0.44	0.01	0	0.01	0.01	0.01	1.3	42	7	0.4	8.71	958	0.53
104506	78	95	0	0.03	0.008	0.01	0.01	0	0.01	0.01	0.2	2	3	0.4	8.07	190	-0.08
105166	110	134	0	0.43	0.004	0	0	0.04	0.02	0.01	1.1	19	3	0.3	7.8	393	-0.95
105653	122	120	14	0.67	0.158	0.75	0.01	0	0	0.01	0.3	39	3	0.9	8.75	401	-0.04
105656	16	20	0	0.02	0.003	0	0	0	0	0	1.7	3	3	0.1	7.97	120	-2.28
106369	76	93	0	0.03	0.004	0.18	0	0.01	0.02	0.02	2.8	2	5	0.6	7.48	179	-1.45
106566	112	137	0	0.9	0.062	0.12	0.12	0	0	0.02	0.3	41	3	0.6	7.84	326	-0.24
107008	122	124	12	0.35	0.037	0.03	0	0	0	0.06	0.4	34	3	0.5	8.57	467	0.58
109450	118	100	22	0.55	0.164	0.21	0.01	0	0	0	0.3	43	12	0.7	8.97	356	
115891	116	142	0	0.32	0.008	0.06	0	0	0	0.03	0.3	34	5	0.5	7.83	396	-0.17
60313	142	159	7	0.4	0.03	0.06	0	0	0.04	0.04	0.2	41	3	0.6	8.2		
61514	224	171	50	0.58	0.095	0.34	0.01	0	0.02	0.01	0.5	39	15	4.8	9.15		
64178	220	259	5	0.79	0.17	0.01	0	0.03	0.26	0.02	0.4	41	3	0.4	8.21		
66972	132	142	10	0.68	0.18	0	0	0	0.07	0.01	0.2	30	5	0.4	8.45		

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
67974	4/1/85	19	28	20	Dom	20	6	No	516	61	16	5	158	12	67	26	41
68155	4/24/85	19	28	20	Dom	30	8	No	330	156	51	7	45	12	52	8	7.2
68804	7/16/85	19	28	20	Dom	32	6	No	284	159	47	10	33	9	42	9	2.6
68945	7/25/85	19	28	20	Dom	28	8	No	190	105	32	6	22	5	31	8	4
69959	10/30/85	19	28	20	Dom	26	6	No	426	192	62	9	60	16	54	17	19.9
70811	2/18/86	19	28	20	Dom	44	8	No	325	47	14	3	85	10	44	10	4.4
67850	3/18/86	19	28	20	Dom	28	10	No	362	17	5	1	117	11	42	10	6.6
71467	4/17/86	19	28	20	Dom			No	431	40	11	3	127	15	45	12	13.9
71601	4/28/86	19	28	20	Dom		8	No	537	3	1	0	194	4	52	16	5.6
71613	4/28/86	19	28	20	Dom			No	259	77	26	3	54	7	38	10	8.3
71774	5/1/86	19	28	20	Dom	36	6	No	188	88	27	5	22	6	29	9	2.2
71973	5/27/86	19	28	20	Dom			Yes									
74236	12/1/86	19	28	20	Dom	185	6	No	541	3	1	0	202	7	84	85	1.8
74290	12/11/86	19	28	20	Dom	26	6	No	203	98	31	5	25	7	32	9	2.5
74751	2/1/87	19	28	20	Dom	50	6	No	218	94	26	7	31	8	38	10	2.1
75381	3/27/87	19	28	20	Dom	40	6	Yes	40	5	2	0	12	2	1	0	4.5
75574	4/15/87	19	28	20	Dom		8	Yes									
77134	9/15/87	19	28	20	Dom	20	8	No	326	196	62	10	31	6	38	16	0.1
81738	1/10/89	19	28	20	Dom	26		Yes	39	0	0	0	14	6	1	0	2
81902	1/23/89	19	28	20	Dom	30	6	No	594	3	1	0	220	6	75	28	28.2
82977	5/24/89	19	28	20	Dom	30	6	No	290	125	40	6	42	5	41	14	7
84027	9/8/89	19	28	20	Dom	128	6	No	209	86	26	5	23	7	45	6	0.4
88132	6/11/90	19	28	20	Dom			Yes	283	136	43	7	40	10	45	18	9.2
88354	6/12/90	19	28	20	Dom	92	6	No	536	295	80	23	41	10	193	27	0
88355	6/12/90	19	28	20	Dom	30	6	No	513	150	45	9	110	16	68	36	46
88705	7/17/90	19	28	20	Dom	92	6	No	526	282	75	23	41	11	182	27	0.2
90485	12/14/90	19	28	20	Dom			No	332	56	16	4	98	4	44	14	0
93461	7/29/91	19	28	20	Dom			No	336	101	29	7	73	3	46	15	9
94576	10/24/91	19	28	20	Dom	42		No	322	108	35	5	65	9	47	14	12.4
95209	12/17/91	19	28	20	Dom	32	6	No	267	137	40	9	32	5	57	22	2.3
95536	1/14/92	19	28	20	Dom			No	563	170	50	11	112	19	94	31	40.8
105657	7/16/93	19	28	20	Dom		6	No	704	256	71	19	122	11	254	63	0
108867	11/17/93	19	28	20	Dom			No	203	79	25	4	35	7	29	10	0.9
108833	11/23/93	19	28	20	Dom			No									

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
67974	284	312	17	0.66	0.13	0	0	0	0.05	0.03	0.4	36	5	0.4	8.43		
68155	198	242	0	0.56	0.01	0	0	0	0	0.07	0.3	41	5	0.2	7.76		
68804	178	217	0	0.26	0.01	0	0	0	0.01	0.04	0.2	32	3	0.1	8.18		
68945	112	137	0	0.24	0.01	0	0	0	0.01	0.04	0.2	26	3	0.1	8.01		
69959	248	293	5	0.3	0.02	0.01	0	0	0.01	0.06	0.6	45	10	0.3	8.21		
70811	194	212	12	0.72	0.17	0.06	0	0	0.01	0.02	0.5	41	7	0.2	8.61		
67850	222	212	29	0.86	0.32	0.01	0	0	0.01	0.01	0.7	41	5	0.3	8.88		
71467	270	300	14	1.11	0.18	0.01	0	0.01	0.01	0.02	0.6	41	5	0	8.46		
71601	358	246	94	371	0.27	0.46	0.01	0.01	0.01	0	0.7	39	17	2.7	9.65		
71613	150	183	0	0.47	0.01	0.09	0.01	0.03	0.08	0.03	0.3	36	7	0.3	8.09		
71774	102	124	0	0.22	0.01	0.01	0	0	0.01	0.02	0.2	28	5	0.1	8.15		
71973					0.003												
74236	240	215	38	0.76	0.107	0.02	0	0.02	0	0	1.1	31	3	0.4	9.39	918	
74290	114	139	0	0.23	0.01	0.34	0.05	0.03	0.12	0.03	0.2	31	3	1.3	8.17	320	
74751	120	146	0	0.42	0.02	0.03	0.23	0	0.01	0.02	0.3	44	3	0.3	8.09	357	
75381	22	27	0	0.08	0.01	0.01	0.01	0.31	0.5	0.01	1.3	3	3	0.7	7.14	78	
75574					0.003								3		8.13		
77134	210	256	0	0.23	0.02	0.01	0.75	0	0.01	0.04	0.3	33	3	0.5	7.91	532	
81738	36	15	14	0.14	0.01	0	0	0	0.01	0	0.5	5	3	0.3	9.37	87	
81902	346	271	74	0.55	0.08	0.23	0.01	0.01	0	0.03			10	2.7	9.47	899	
82977	158	193	0	0.34	0.02	0	0	0	0	0.02	0.3	36	3	0.2	7.84	448	
84027	90	110	0	0.28	0.01	0.16	0.17	0	0	0.06	0.1	43	3	0.5	8.05	298	
88132	144	176	0	0.51	0.006	0	0	0.01	0	0.05	0.4	39	3	0.4	7.79	456	
88354	160	195	0	0.19	0.004	0.31	1.65	0.01	0.04	0.21	0.1	46	3	0.6	7.64	756	
88355	248	303	0	0.56	0.04	0	0	0.08	0	0.06	0.4	42	5	0.4	7.91	799	
88705	162	198	0	0.18	0.004	0.53	1.59	0.01	0.08	0.2	0.1	45	7	1.8	7.78	748	
90485	210	256	0	1.42	0.14	0.58	0.08	0	0	0.02	0.6	34	3	0.8	8.12	547	
93461	202	237	5	0.31	0.04	0.02	0.07	0.01	0.04	0.05	0.4	31	3	0.1	8.28	545	
94576	180	220	0	0.62	0.02	0	0	0.01	0.04	0.05	0.5	38	3	0.6	8.11	520	
95209	136	166	0	0.23	0.01	0.11	0	0.02	0	0.05	0.5	26	3	0.3	7.91	459	
95536	272	332	0	0.51	0.05	0	0	0	0	0.07	0.6	43	5	0.2	7.82	876	
105657	180	200	10	0.25	0	0.74	0.96	0	0	0.03	0.8	45	12	2.9	8.27	995	0.95
108867	116	122	10	0.44	0.04	0.03	0	0	0	0.01	0.3	30	7	0.6	8.47	315	0.4
108833							0										

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
109851	1/4/94	19	28	20	Dom	100		No									
114659	8/2/94	19	28	20	Dom	32		No	189								0.5
117855	12/8/94	19	28	20	Dom			No	612	289	76	24	106	7	75	66	2.2
120356	4/20/95	19	28	20	Dom	100	8	Yes									
120834	5/10/95	19	28	20	Dom	100	8	Yes	399	213	59	16	35	10	141	28	0
122338	7/27/95	19	28	20	Dom			No	244	85	24	6	39	8	40	17	0.4
126727	4/10/96	19	28	20	Dom			No	232	58	15	5	51	10	43	15	0.4
126955	4/25/96	19	28	20	Dom	35		No	228								
132901	5/1/97	19	28	20	Dom	90	6	No	422	237	65	18	38	8	156	21	0
133666	6/23/97	19	28	20	Dom	35	6	No	177	69	21	4	35	6	29	8	0.6
137425	3/30/98	19	28	20	Dom			No	457	71	22	4	124	10	106	36	3.5
59280	4/23/82	19	28	21	Dom	33	8	No	405	104	30	7	90	5	59	20	30.8
60932	11/4/82	19	28	21	Dom			No	455	59	17	4	117	14	53	20	24
61147	12/8/82	19	28	21	Dom	36	6	No	351	108	30	8	74	10	53	18	25.5
66172	9/5/84	19	28	21	Dom	26.5	6	No	427	125	32	11	80	27	51	7	19.3
66999	1/2/85	19	28	21	Dom			No	509	148	38	13	113	13	94	28	41.2
67445	2/2/85	19	28	21	Dom			No	398	77	21	6	98	12	50	17	24.2
71440	4/9/86	19	28	21	Dom		8	No	633	29	10	1	206	8	122	23	0
71466	4/17/86	19	28	21	Dom			No	206	108	30	8	24	5	35	10	2.2
72989	8/15/86	19	28	21	Dom			No	335	101	29	7	68	11	47	14	18.1
73033	8/20/86	19	28	21	Dom	37	8	No	449	56	16	4	129	8	66	21	23.2
74449	1/5/87	19	28	21	Dom			No	286	5	2	0	88	6	58	13	0
77667	11/3/87	19	28	21	Dom	32	8	No	747	40	11	3	246	5	188	106	7.1
77665	11/10/87	19	28	21	Dom	36	8	No	604	15	6	0	208	8	71	17	13.2
79044	4/4/88	19	28	21	Dom	14		No	291	38	12	2	103	7	46	17	3.1
79190	4/22/88	19	28	21	Dom			No	350	75	20	6	85	14	41	10	14.1
80149	7/15/88	19	28	21	Dom	30	8	No	248	49	13	4	55	13	39	15	1.7
81120	10/14/88	19	28	21	Dom			No	489	136	38	10	106	19	59	2	37.6
82044	2/14/89	19	28	21	Dom	32	6	No	308	172	54	9	29	6	51	21	3.2
82529	3/29/89	19	28	21	Dom	30	5	No	410	81	26	4	104	9	58	16	15.6
87056	4/19/90	19	28	21	Dom			No	411	116	35	7	89	10	54	22	26.4
122591	8/25/91	19	28	21	Dom	35	7	No	399								3.9
94955	11/26/91	19	28	21	Dom	29	8	No	409	54	15	4	117	9	44	13	9.5
98562	8/18/92	19	28	21	Dom			Yes	382	190	53	14	34	9	125	24	0

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
109851							0										
114659					0.014										8.12		
117855	352	429	0	0.22	0.02	0.55	0.02	0.01	0.1	0.07	0.5	41	17	1.9	7.88	972	0.73
120356							0										
120834	124	151	0	0.22	0.004	0.02	1.09	0	0.01	0.14	0.2	45	3	0.4	7.92	594	0.22
122338	110	124	5	0.38	0.042	0.07	0	0.02	0	0.02	0.3	39	7		8.22	367	0.1
126727	114	139	0	0.24	0.04	0.04	0	0	0	0.02	0.3	37	8	0.4	7.77	368	-0.54
126955															7.82		
132901	138	168	0	0.21	0.007	0.14	0.97	0	0	0.09	0.4	41	3	1.1	7.79	640	0.18
133666	102	124	0	0.3	0.02	0.01	0	0	0.01	0.02	0.3	28	3	0.6	8.04	294	-0.015
137425	184	220	2	0.32	0.05	0.16	0	0.01	0.29	0.03	0.6	32	3	2	8.21	733	0.25
59280	190	203	12	0.71	0.03	0.01	0	0.03	0.04	0			3	0.2	8.32		
60932	242	276	10	0.74	0.1	0	0	0	0.01	0.02	0.5	43	5	0.3	8.23		
61147	182	198	12	0.62	0.05	0.1	0.01	0.01	0.02	0.04	0.5	45	17	7.5	8.33		
66172	234	285	0	0.42	0.04	0	0.01	0	0.03	0.08	0.3	47	5	0.3	8.08		
66999	232	283	0	0.36	0.03	0.01	0	0	0.02	0.04	0.3	36	5	0.3	7.97		
67445	214	232	14	0.6	0.08	0	0	0	0	0.04	0.4	41	5	0.2	8.29		
71440	356	410	12	1.93	0.47	0.04	0.02	0	0.04	0.02	2.1	39	5	0.1	8.26		
71466	118	144	0	0.27	0.01	0.02	0	0.01	0	0.02	0.2	30	5	0	7.98		
72989	180	210	5	0.73	0.15	0	0	0.02	0.04	0.04	0.5	40	3	0.2	8.33	530	
73033	244	298	0	0.65	0.1	0.06	0.01	0.01	0.04	0.02	0.6	41	3	0.5	8.19	721	
74449	118	124	10	0.21	0.03	0.05	0.02	0.02	0.01	0.01	0.3	49	3	0.3	8.49	436	
77667	230	281	0	0.88	0.29	0.17	0.09	0.05	0.03	0.02	1.3	39	45	16	7.77	1174	
77665	386	388	41	3.78	1.46	0.04	0	0	0.01	0.01	2.6	40	5	0.5	9.01	949	
79044	200	244	0	0.47	0.11	0.01	0	0	0	0.02	0.3	30	3	0.3	8.11	538	
79190	210	212	22	0.69	0.09	0	0	0	0	0.03	0.5	43	3	0.2	8.2	545	
80149	118	144	0	0.54	0.07	0.01	0	0	0	0.01	0.3	45	3	0.2	8.01	386	
81120	276	337	0	0.46	0.05	0	0.02	0	0	0.06	0.5	44	5	0.3	8.17	763	
82044	158	193	0	0.23	0.01	0.01	0	0.01	0.02	0.06	0.4	30	3	0.2	7.81	491	
82529	230	281	0	0.52	0.19	0.03	0	0.02	0.01	0.03	0.6	37	3	0.2	8.1	628	
87056	224	259	7	0.41	0.05	0.02	0	0	0.28	0.05	0.3	39	3	0.02	8.33		
122591					0.24												
94955	258	256	29	1.23	0.265	0.4	0	0	0	0.02	1	42	7	2.6	8.77	617	
98562	114	129	5	0.2	0.003	0.06	1.13	0	0.03	0.14	0.2	44	3	0.7	8.2	534	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
99263	9/8/92	19	28	21	Dom	40	6	No	531	3	1	0	200	5	48	12	0.6
101783	2/12/93	19	28	21	Dom	40	6	Yes									
109878	12/29/93	19	28	21	Dom			Yes	427	77	21	6	106	7	133	39	0.3
113310	6/6/94	19	28	21	Dom	35	7	No	385	51	14	4	110	5	56	17	3.3
118371	12/20/94	19	28	21	Dom	50	10	No	504	108	30	8	136	8	67	29	3.7
130497	11/18/96	19	28	21	Dom	35	6	No	405								
134871	9/3/97	19	28	21	Dom	35	6	No	388								
59386	5/11/82	19	28	22	Dom	25	8	No	455	162	50	9	85	13	55	20	0
59629	6/15/82	19	28	22	Dom			No	439	156	46	10	86	3	61	20	18.2
59661	6/16/82	19	28	22	Dom			No	254	85	24	6	52	3	48	14	6.8
63321	9/12/82	19	28	22	Dom	37	6	No	511	178	48	14	102	11	78	33	21.8
60606	9/17/82	19	28	22	Dom	120		No	324	196	47	19	36	16	46	13	11.8
60931	11/4/82	19	28	22	Dom			No	262	84	22	7	61	5	35	7	0.1
61262	12/20/82	19	28	22	Dom	30	8	No	504	147	44	9	123	8	60	32	35.3
61954	3/31/83	19	28	22	Dom	40	6	No	303	86	23	7	71	5	51	17	2
62200	5/12/83	19	28	22	Dom	20	8	No	1137	38	12	2	372	14	271	250	0.4
63318	9/12/83	19	28	22	Dom		6	No	457	22	7	1	132	9	76	45	5.2
63834	10/28/83	19	28	22	Dom	40	9	No	1136	223	58	19	273	10	290	120	69.1
63890	11/21/83	19	28	22	Dom	40	8	No	412	168	44	14	65	11	82	30	14.6
64177	1/9/84	19	28	22	Dom	40	8	No	206	57	18	3	39	10	36	8	0.2
64180	1/9/84	19	28	22	Dom	38	6	No	473	5	2	0	168	4	62	26	3.2
64346	1/27/84	19	28	22	Dom	32		No	76	3	1	0	20	2	1	10	5.3
65177	5/9/84	19	28	22	Dom	29	6	No	397	202	48	20	50	18	47	18	15.2
65437	6/8/84	19	28	22	Dom			No	382	103	28	8	59	38	94	23	0
66176	9/18/84	19	28	22	Dom	110	8	Yes									
7	9/27/84	19	28	22	Dom	28	6	No	497	228	65	16	89	8	82	20	7.7
66440	10/15/84	19	28	22	Dom			No	386	49	13	4	114	9	49	27	3.5
66589	10/29/84	19	28	22	Dom			No	294	163	42	14	33	4	47	14	3.2
66895	12/10/84	19	28	22	Dom	40	8	No	452	161	43	13	91	11	80	29	16.1
67578	2/19/85	19	28	22	Dom	30	8	No	621	95	25	8	179	10	131	39	21.9
69198	8/13/85	19	28	22	Dom	31	8	No	567	160	41	14	122	21	132	48	3.7
69404	9/5/85	19	28	22	Dom	28	6	No	241	109	32	7	42	13	45	12	0.3
70036	11/19/85	19	28	22	Dom	100	10	No	196	17	5	1	50	7	19	5	0
70168	12/6/85	19	28	22	Dom			No	180	99	28	7	21	5	30	9	1.4

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
99263	362	310	65	2.94	0.96	0.05	0	0.01	0	0.01	2	43	3	0.4	9.44	799	
101783					0.003												
109878	126	154	0	0.24	0.01	0.02	0.24	0	0.05	0.04	0.2	46	3	0.4	8.05	645	-0.09
113310	200	229	7	1.09	0.28	0.02	0	0	0	0.02	0.6	42	7	0.3	8.22	571	0.11
118371	272	322	5	0.84	0.15	0	0	0	0.06	0.05	0.7	42	3	0.2	8.43	770	0.77
130497					0.24										8.09		
134871					0.18												
59386	262	320	0	0.32	0.01	0	0	0.01	0.02	0.04			3	0.03	7.59		
59629	220	268	0	0.34	0.03	0.01	0	0.01	0.14	0.03	0.4	51	3	0.3	7.78		
59661	126	149	2	0.64	0.01	0	0	0	0.11	0.02	0.4	39	3	0.4	8.22		
63321	272	332	0	0.26	0.01	0	0	0	0.05	0.03	0.5	36	5	0.4	7.78		
60606	212	249	5	0.19	0.01	0.01	0	0	0.19	0.04	0.3	36	3	0.4	8.2		
60931	178	217	0	0.35	0.01	0.12	0.02	0.2	0.47	0.03	0.4	24	5	0.8	7.6		
61262	302	368	0	0.25	0.005	0.03	0	0	0.06	0.05	0.8	26	5	0.5	7.68		
61954	164	200	0	0.55	0.05	0.02	0	0.04	0.01	0.01	0.5	41	5	0.8	7.88		
62200	254	310	0	1.33	0.23	0.05	0.01	0	0.1	0.01	1.8	39	7	1	8.12		
63318	172	181	14	1.27	0.105	0.01	0	0	0.01	0.03	0.6	43	7	0.5	8.24		
63834	340	415	0	1.12	0.13	0	0.02	0	0.16	0.07	1.3	49	5	0.4	8		
63890	196	239	0	0.3	0.01	0.01	0.01	0.04	0.4	0.02	0.6	36	7	0.3	8.05		
64177	108	112	10	0.19	0.03	0.15	0	0	0.03	0.01	0.2	30	5	0.9	8.69		
64180	270	246	41	0.86	0.11	0.56	0	0	0	0	0.7	41	12	3.8	9.14		
64346	28	24	5	0.1	0.005	0	0	0.02	0.04	0	0.7	19	3	0.4	8.62		
65177	250	305	0	0.42	0.01	0.11	0.01	0	0	0.03	0.3	49	3	1.3	8.18		
65437	140	171	0	0.22	0.01	0.2	0.67	0	0.05	0.19	0.2	47	10	1.4	8.1		
66176					0.01												
7	314	383	0	0.3	0.03	0.05	0	0.05	0.04	0.06	0.6	24	17	0.7	7.78		
66440	192	210	12	1.03	0.15	0	0	0	0.01	0.01	0.4	34	3	0.1	8.37		
66589	164	200	0	0.36	0.02	0.01	0	0	0.02	0.02	0.1	45	7	0.5	7.92		
66895	238	290	0	0.46	0.02	0	0	0.03	0.06	0.02	0.6	28	7	0.4	7.96		
67578	288	351	0	0.86	0.13	0.29	0.02	0	0.01	0.05	0.8	43	7	1.9	8.12		
69198	242	295	0	0.65	0.02	0.06	0.14	0.01	0.04	0.04	1	47	5	0.3	7.93		
69404	132	161	0	0.3	0.01	0.11	0	0.01	0.05	0.03	0.3	24	7	0.6	7.78		
70036	104	98	14	0.61	0.01	0.02	0	0	0.02	0	0.3	54	5	0.2	8.83		
70168	112	137	0	0.22	0.01	0	0	0.02	0.04	0.02	0.2	30	3	0.5	7.83		

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
70164	12/6/85	19	28	22	Dom			No	267	130	37	9	40	4	56	19	13.1
70166	12/8/85	19	28	22	Dom	30	10	No	450	143	39	11	105	6	68	25	15.5
71607	4/22/86	19	28	22	Dom	34	6	No	557	204	57	15	96	13	135	50	45.4
71602	4/28/86	19	28	22	Dom			No	289	105	27	9	53	9	37	11	2.6
72085	6/6/86	19	28	22	Dom			Yes	36	0	0	0	11	1	0	2	9.1
72470	7/8/86	19	28	22	Dom			No	449	131	36	10	94	8	99	35	17.8
74138	11/21/86	19	28	22	Dom	40	6	Yes									
74289	12/2/86	19	28	22	Dom	30	8	No	411	84	22	7	94	12	89	37	5.9
74291	12/11/86	19	28	22	Dom			No	293	151	39	13	31	4	48	20	5.5
74846	2/10/87	19	28	22	Dom			No	208	87	25	6	36	5	39	8	3.9
76927	8/31/87	19	28	22	Dom	32	8	No	203	89	24	7	31	6	34	10	4.6
77366	10/6/87	19	28	22	Dom	45	8	No	230	86	23	7	38	9	37	11	3.7
77988	12/21/87	19	28	22	Dom			Yes									
78145	1/14/88	19	28	22	Dom	30	8	No	465	51	14	4	134	9	108	49	8.5
78916	3/29/88	19	28	22	Dom	50	8	No	449	236	63	19	42	14	115	30	0
79061	4/5/88	19	28	22	Dom	30	8	No	335	133	40	8	51	7	52	20	32.4
79856	6/10/88	19	28	22	Dom	32	4	No	207	103	28	8	24	5	31	5	3.5
79857	6/10/88	19	28	22	Dom	43	8	No	246	91	25	7	42	6	32	8	2
79864	6/21/88	19	28	22	Dom			No	329	133	35	11	40	18	80	18	0
80424	8/4/88	19	28	22	Dom			No	236	84	22	7	40	16	35	10	3.4
80644	9/7/88	19	28	22	Dom	33	6	No	482	165	43	14	85	19	109	35	13.3
80963	10/4/88	19	28	22	Dom			No	354	121	32	10	69	10	64	24	14.3
81585	10/13/88	19	28	22	Dom	40	8	No	387	92	27	6	101	7	66	25	5.9
81586	10/18/88	19	28	22	Dom	30	8	No	920	66	18	5	292	11	147	39	36.3
81681	11/7/88	19	28	22	Dom	31	6	No	855	172	44	15	223	16	189	51	45.1
82065	2/16/89	19	28	22	Dom	85		No	382	116	30	10	77	15	68	17	2.7
82066	2/16/89	19	28	22	ation			No	705	90	26	6	201	11	117	35	5.1
82576	4/10/89	19	28	22	Dom	30	8	No	445	86	23	7	111	17	85	25	3.3
82580	4/10/89	19	28	22	Dom	30	8	No	332	81	21	7	73	11	55	19	2.9
83275	6/22/89	19	28	22	Dom			No	544	261	68	22	42	30	162	39	1
83287	6/23/89	19	28	22	Dom	25	8	No	262	109	27	10	32	18	37	15	4.7
83830	8/22/89	19	28	22	Dom	30	6	No	1412	144	46	7	438	15	308	67	22.3
84374	10/16/89	19	28	22	Dom			Yes	273								
84912	11/30/89	19	28	22	Dom	45	8	No	243	98	26	8	40	9	36	15	2.3

ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
134	163	0	0.17	0.01	0.01	0	0	0.07	0.05	0.3	19	5	0.6	7.35		
264	322	0	0.6	0.03	0	0	0.01	0.07	0.04	0.5	43	5	0.5	7.89		
204	249	0	0.19	0.02	0	0	0	0.03	0.03	0.6	36	10	0.2	7.9		
180	220	0	0.54	0.05	0	0	0.01	0.03	0.03	0.3	41	3	0.1	8.05		
20	24	0	0.05	0.003	0	0	0.01	0.05	0	0.5	6	3	0	7.7		
198	232	5	0.64	0.09	0.01	0	0	0.01	0.02	0.6	42	3	0.1	8.22	724	
				0.003												
170	207	0	0.86	0.03	0.01	0.02	0	0.05	0.03	0.8	49	3	0.4	8.06	648	
148	181	0	0.37	0.02	0.02	0	0	0.01	0.02	0.3	46	3	0.4	7.99	457	
118	144	0	0.25	0.01	0.01	0	0	0.01	0.01	0.2	32	3	0.2	8.14	352	
110	134	0	0.23	0.01	0	0	0.18	0.01	0.01	0.2	29	3	0.3	7.82	343	
128	156	0	0.23	0.01	0.01	0	0	0.08	0.01	0.2	38	3	0.4	8.11	376	
				0.003												
172	181	14	1.68	0.12	0	0	0.01	0.01	0.01	0.8	45	3	0.3	8.36	753	
184	224	0	0.33	0.03	0.7	0.69	0	0	0.06	0.3	54	7	3.6	7.79	679	
156	190	0	0.53	0.01	0.16	0.01	0	0.01	0.03	0.3	42	7	1.2	8.14	524	
118	144	0	0.29	0.01	0.01	0	0.01	0.03	0.03	0.2	37	3	0.2	8.15	329	
144	161	7	0.42	0.01	0.06	0	0.01	0	0.02	0.3	46	3	0.4	8.21	382	
138	168	0	0.39	0.02	0.11	0.67	0	0.02	0.06	0.3	53	3	0.5	7.99	505	
134	154	5	0.32	0.02	0.02	0	0	0.03	0.02	0.3	39	3	0.2	8.29	384	
214	232	14	0.3	0.03	0.01	0	0.02	0	0.04	0.7	34	3	0.3	8.28	765	
182	222	0	0.32	0.003	0	0.04	0	0.02	0			7	0.4	8.16	583	
214	232	14	0.28	0.02	0	0	0	0.09				3	0.4	8.26	627	
506	559	29	2.9	0.72	0	0.01	0.01	0.01				7	0.4	8.51	1389	
378	422	19	0.6	0.09	0.01	0.02	0.01	0.09	0.04	0.9	40	3	0.5	8.26	1300	
212	259	0	0.58	0.05	0.03	0.13	0	0	0.03	0.7	50	3	0.4	8.01	600	
360	439	0	1.92	0.57	1.58	0.24	0	0.02	0.07	2	42	70	47	8.18	1033	
226	276	0	0.82	0.03	0.01	0.08	0	0.01	0.03	1.1	45	3	0.6	8.06	687	
172	210	0	0.72	0.027	0.05	0.01	0.01	0.01	0.02	0.7	46	5	1.3	7.87	510	
180	220	0	0.32	0.03	0.27	0.96	0.01	0	0.11	0.2	49	3	1.2	7.88	790	
136	166	0	0.35	0.03	0.04	0	0	0.03	0.02	0.2	43	3	0.3	8.15	406	
698	852	0	3.38	0.73	0.06	0.01	0	0	0.04	6.5	39	7	0.3	7.99	2093	
			0.45	0.02												
134	163	0	0.26	0.007	0.01	0.01	0.01	0.04	0.02	0.2	36	3	0	8.08	396	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
86584	3/28/90	19	28	22	Dom	145	8	No	218	79	25	4	27	9	47	6	0.4
88342	6/27/90	19	28	22	Dom		8	No	233	90	23	8	38	9	40	19	2.4
88654	7/7/90	19	28	22	Dom			No	371	184	49	15	56	3	72	21	5.6
89298	8/29/90	19	28	22	Dom	30	8	Yes	46	0	0	0	16	1	0	1	2.7
89842	10/18/90	19	28	22	Dom	70	6	No	372	141	35	13	40	30	109	24	0
89985	10/18/90	19	28	22	Dom	40	10	No	439	125	37	8	101	7	75	35	13.7
91362	2/21/91	19	28	22	Dom			No	354	188	44	19	37	18	49	29	13.9
91854	4/10/91	19	28	22	Dom			No	246	117	32	9	36	6	44	21	2.1
93873	9/4/91	19	28	22	Dom	70	6	No	290	118	29	11	30	20	71	14	0
96218	3/24/92	19	28	22	Dom	40	8	No	942	307	90	20	215	13	187	78	24.7
96997	5/20/92	19	28	22	Dom	30	8	Yes	112	3	1	0	37	1	9	9	10.2
97187	5/26/92	19	28	22	Dom	30	6	No	267	126	39	7	37	7	56	24	1.6
97144	6/2/92	19	28	22	Dom	70	8	No	333	90	23	8	48	38	77	23	0
98229	8/4/92	19	28	22	Dom			Yes									
99739	10/14/92	19	28	22	Dom	30		No	292	152	41	12	32	7	65	28	0.4
100997	12/16/92	19	28	22	Dom	101	6	No	467	236	60	21	56	17	100	39	1
101170	12/28/92	19	28	22	Dom	30	8	No	521	118	29	11	122	20	101	35	1.8
101169	12/28/92	19	28	22	Dom	30	8	No	332	76	19	7	73	11	55	18	1.2
106676	8/23/93	19	28	22	Dom	30	6	Yes	777	51	14	4	262	8	150	57	2
111132	3/11/94	19	28	22	Dom		6	No	1034	185	46	17	278	34	274	67	2
114181	7/13/94	19	28	22	Dom	120		No	226	3	1	0	71	3	39	6	0.1
119122	1/16/95	19	28	22	Dom	27	8	No	526	195	55	14	89	12	113	48	5.3
60378	9/3/82	19	28	23	Dom		8	No	281	145	40	11	39	10	40	14	8.7
60937	11/12/82	19	28	23	Dom	100	6	No	322	93	24	8	45	30	84	18	0.2
61150	12/7/82	19	28	23	Dom	109	6	No	420	133	35	11	60	35	116	31	0.5
61434	1/26/83	19	28	23	Dom	33	8	No	312	169	51	10	33	5	44	15	11.6
61413	2/1/83	19	28	23	Dom	38	6	No	520	102	31	6	140	11	86	31	34.7
61975	4/18/83	19	28	23	Dom	33	6	No	500	167	47	12	99	13	110	31	19
62184	5/10/83	19	28	23	Dom	32	8	No	809	108	30	8	221	12	145	47	35.4
62619	7/12/83	19	28	23	Dom	30	6	No	300	16	3	2	89	8	35	11	4.2
62670	7/19/83	19	28	23	Dom	30	8	No	391	54	15	4	112	10	75	28	2.4
62848	8/4/83	19	28	23	Dom	30	8	No	436	19	6	1	148	7	58	17	18.1
63085	8/29/83	19	28	23	Dom	30	8	No									
63635	9/27/83	19	28	23	Dom	25	6	No	525	23	6	2	170	12	49	19	2

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
86584	94	115	0	0.24	0.01	0.34	0.2	0	0	0.07	0	51	5	2.6	8.16	314	
88342	114	139	0	0.24	0.01	0.05	0	0.01	0.01	0.01	0.1	39	3	0.3	8.08	374	
88654	196	239	0	0.44	0.01	0.02	0.25	0	0.02	0.06	0.3	40	5	0.7	7.14	584	
89298	36	29	7	0.19	0.01	0.02	0	0	0	0	2.1	8	3	0.1	8.74	82	
89842	126	154	0	0.24	0.02	0.2	0.79	0	0.01	0.07	0	49	3	1.1	7.96	565	
89985	222	261	5	0.26	0.02	0.02	0	0.01	0.06	0.02	0.3	36	3	0.1	8.2	712	
91362	184	224	0	0.23	0.01	0.02	0	0	0.11	0.05	0.4	40	3	0	8.14	574	
91854	130	159	0	0.2	0.01	0.08	0.01	0.01	0.02	0.02	0.3	28	3	0.6	7.82	419	
93873	120	146	0	0.27	0.02	0.12	0.77	0	0	0.08	0.2	49	3	0.3	7.5	437	
96218	474	578	0	0.19	0.015	0	0	0	0.09	0.06	1	39	3	0.5	7.79	1437	
96997	62	66	5	0.33	0.04	0.02	0	0.02	0	0.01	3.6	9	3	0.1	8.45	170	
97187	120	137	5	0.28	0.005	0.02	0	0	0	0.03	0.4	27	3	0.1	8.22	421	
97144	140	156	7	0.24	0.04	0.11	0.4	0	0.01	0.09	0.2	50	3	0.3	8.28	495	
98229					0.015												
99739	128	156	0	0.22	0.01	0.02	0	0	0.06	0.05	0.4	30	3	0.3	8.08	447	
100997	222	271	0	0.24	0.01	0.48	0.18	0	0.08	0.04	0.4	41	12	3.6	8.07	704	
101170	248	303	0	0.75	0.02	0.03	0.07	0.02	0.01	0.04	1.1	45	3	0.4	7.91	774	
101169	166	203	0	0.82	0.03	0	0	0.01	0	0.02	0.8	48	3	0.3	7.95	477	
106676	380	429	17	2.88	1.31	0	0	0.03	0.01	0.02	2.9	43	5	0.4	8.37	1211	0.67
111132	460	522	19	0.65	0.04	0.04	0.05	0	0	0.07	4.6	40	3	0.4	8.38	1599	1.1
114181	112	107	14	0.66	0.16	0.41	0.02	0.01	0	0.01	0.3	42	25	1.5	8.87	329	-0.62
119122	212	259	0	0.21	0.01	0.04	0.03	0	0.01	0.02	0.2	36	5	0.2	8.04	804	0.53
60378	168	205	0	0.25	0.01	0	0.02	0	0.01	0.02	0.2	34	5	0.4	8.09		
60937	122	134	7	0.21	0.005	0.29	0.7	0	0	0.11	0.2	45	5	0.8	8.29		
61150	152	185	0	0.2	0	1.21	1.07	0	0.41	0.15	0.2	47	35	12	7.93		
61434	172	210	0	0.21	0.01	0.04	0	0	0.15	0.02	0.2	28	3	0.6	7.99		
61413	256	312	0	0.37	0.01	0.02	0.02	0.01	0.1	0.02	0.4	34	3	0.3	8.06		
61975	224	273	0	0.22	0.01	0.01	0	0.01	0.04	0.02	0.6	43	7	1.8	7.81		
62184	400	488	0	0.78	0.17	0	0	0	0.02	0.03	1.5	41	5	0.6	8.1		
62619	158	163	12	0.41	0.005	0.17	0	0.01	0.01	0.01	0.4	43	7	0.8	8.77		
62670	190	217	6	0.9	0.09	0.02	0	0	0.02	0.01	0.6	39	5	0.2	8.28		
62848	244	254	22	1.09	0.44	0.04	0.01	0.02	0	0.01	0.7	36	5	0.5	8.83		
63085					0.41										8.9		
63635	338	364	24	1.17	0.16	0.01	0	0.02	0.03	0.01	0.8	36	3	0.4	8.69		

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
63650	10/17/83	19	28	23	Dom	30	8	No									
64511	2/21/84	19	28	23	Dom	31	6	No	326	163	44	13	35	11	43	15	22.7
64510	2/24/84	19	28	23	Dom	39	6	No	314	51	14	4	76	12	58	25	2.7
65176	5/4/84	19	28	23	Dom	40	6	No	276	0	0	0	90	6	41	8	0.1
65178	5/16/84	19	28	23	Dom	37		No	293	21	5	2	80	22	36	11	7.5
65359	6/5/84	19	28	23	Dom	30	8	No	400	85	24	6	91	20	56	17	37.5
65857	8/14/84	19	28	23	Dom	32		No	318	168	49	11	39	9	57	15	1.3
66028	8/23/84	19	28	23	Dom	30	8	No	289	138	42	8	40	8	46	13	7.7
66029	8/23/84	19	28	23	Dom	35	8	No	210	61	16	5	45	5	33	9	2.9
66334	9/24/84	19	28	23	Dom	34	8	No	365	98	26	8	61	36	86	24	0.1
66332	9/28/84	19	28	23	Dom	36	8	No	254	12	3	1	73	15	34	9	6
66766	11/7/84	19	28	23	Dom	36	8	No									
67000	12/20/84	19	28	23	Dom	39	6	No	237	40	11	3	56	11	37	11	2.2
67438	1/31/85	19	28	23	Dom	30	6	No	1080	5	2	0	398	11	149	42	17
67583	2/20/85	19	28	23	Dom	30	8	No	347	173	43	16	45	15	44	11	13.2
67658	3/5/85	19	28	23	Dom	30	6	No	658	215	68	11	149	7	92	31	35.3
67971	4/3/85	19	28	23	Dom	35	9	No	727	226	64	16	162	19	157	48	2.4
67972	4/3/85	19	28	23	Dom	35	9	No	174	89	24	7	25	7	29	6	2.2
68156	4/24/85	19	28	23	Dom			No	600	10	4	0	203	12	89	45	16.1
68311	5/6/85	19	28	23	Dom	35	6	No	281	70	18	6	62	22	37	11	15.1
68541	6/4/85	19	28	23	Dom		8	No	509	154	42	12	114	10	114	42	5.1
68647	6/21/85	19	28	23	Dom	29	8	No	415	208	62	13	54	11	50	11	34.7
68788	6/26/85	19	28	23	Dom	93	6	No	366	98	26	8	61	37	98	24	0
68806	7/9/85	19	28	23	Dom	35	8	No	622	99	28	7	177	17	60	15	45.8
69955	10/24/85	19	28	23	Dom			No	336	172	41	17	36	17	43	12	18.3
70293	12/26/85	19	28	23	Dom	92	8	No	287	3	1	0	90	4	68	16	0
71013	3/3/86	19	28	23	Dom	30	6	No	377	157	43	12	67	9	73	23	12
71465	4/16/86	19	28	23	Dom	35	8	No	488	249	52	29	53	24	100	34	27.4
72010	4/29/86	19	28	23	Dom	38	6	No	203	81	21	7	24	12	29	7	2.1
71754	5/2/86	19	28	23	Dom			No	321	102	26	9	44	30	85	17	0
71753	5/2/86	19	28	23	Dom	40		No	321	162	50	9	47	7	54	13	6.6
71840	5/9/86	19	28	23	Dom	35	6	No	646	172	44	15	142	14	157	91	24.9
72038	5/29/86	19	28	23	Dom	92	6	No	268	76	19	7	66	34	97	25	0
72471	7/8/86	19	28	23	Dom			No	617	143	39	11	148	25	84	34	25.1

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
63650					0										7.66		
64511	164	176	12	0.42	0.01	0.02	0	0	0	0	0.2	47	5	1.3	8.27		
64510	128	156	0	0.66	0.03	0.01	0	0	0.02	0	0.4	45	3	1.1	7.91		
65176	150	100	41	0.47	0.08	0.05	0.01	0.08	0	0	0.2	51	10	0.4	9.23		
65178	160	156	19	0.28	0.01	0.03	0	0	0.01	0.01	0.2	39	5	0.8	8.81		
65359	192	234	0	0.43	0.02	0.01	0.01	0.01	0.03	0.03	0.4	45	5	0.2	7.91		
65857	184	224	0	0.38	0.02	0	0.3	0.05	0.02	0.03	0.2	32	3	0.3	7.87		
66028	164	200	0	0.23	0.005	0.07	0.01	0	0	0.02	0.2	30	5	0.3	8.01		
66029	108	132	0	0.43	0.02	0.58	0.04	0.01	0.02	0.02	0.2	36	10	3.5	8.19		
66334	140	171	0	0.16	0.005	0.1	0.71	0	0.01	0.22	0.1	45	3	0.5	8.09		
66332	134	139	12	0.4	0.03	0.69	0.03	0	0.02	0.01	0.1	41	17	3.4	8.74		
66766						0.07									8.36		
67000	114	139	0	0.66	0.03	0.01	0	0	0.01	0.02	0.1	45	5	0.3	8.13		
67438	648	693	48	3.68	1.73	0	0	0	0	0.01	2.9	34	15	0.2	8.74		
67583	228	273	2	0.46	0.01	0.01	0	0.01	0	0.03	0.2	45	3	0.4	8.2		
67658	388	473	0	0.48	0.04	0	0	0	0	0.06	0.5	30	7	0.3	7.93		
67971	382	466	0	0.46	0.01	0	0.09	0	0	0.02	1.1	41	5	0.5	8		
67972	116	142	0	0.27	0.02	0.04	0.01	0	0.03	0.02	0.2	30	5	0.6	8.13		
68156	298	325	19	0.75	0.15	0.85	0.08	0	0.01	0.02	0.6	47	35	12	8.36		
68311	158	168	12	0.24	0.006	0	0	0.01	0	0.01	0.3	36	3	0.1	8.36		
68541	246	300	0	0.9	0.03	0	0.69	0	0.01	0.02	0.7	45	7	0.1	7.73		
68647	244	298	0	0.53	0.01	0.05	0	0	0	0.06	0.4	45	5	0	8.05		
68788	144	151	12	0.2	0.01	0.02	0.68	0	0.02	0.2	0.4	47	3	0.1	8.57		
68806	374	427	14	0.81	0.06	0	0	0	0.01	0.05	0.5	45	5	0.1	8.26		
69955	202	237	5	0.33	0.01	0	0	0	0.02	0.03	0.3	43	5	0.2	8.28		
70293	116	132	5	0.31	0.04	0.27	0.05	0	0.01	0.01	0.3	47	10	2.6	8.29		
71013	208	254	0	0.18	0.01	0	0.01	0.08	0.15	0.02		34	5	0.1	7.93		
71465	234	285	0	0.23	0.01	0.03	0.01	0	0.04	0.03	0.4	39	5	0.1	7.89		
72010	112	137	0	0.31	0.04	0.02	0	0	0.03	0.04	0.2	39	3	0.1	8.13		
71754	124	151	0	0.23	0.005	0.07	0.68	0	0.02	0.12	0.2	45	7	0.5	7.94		
71753	192	234	0	0.21	0.005	0.04	0	0.01	0.02	0.03	0.3	30	7	0.2	8.13		
71840	198	242	0	0.36	0.03	0.01	0	0.01	0	0.06	0.7	47	3	0	7.86		
72038	144	176	0	0.19	0.005	0.08	0.54	0.01	0.14	0.13	0.2	43	3	0.5	7.3		
72471	356	434	0	0.57	0.05	0.02	0	0	0.02	0.01	0.6	45	3	0.1	8.1	978	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
72832	7/23/86	19	28	23	Dom	35	6	No	487	172	54	9	101	4	106	28	3.7
73443	9/15/86	19	28	23	dom	87	8	No	325	13	5	0	99	5	70	19	0
73752	10/20/86	19	28	23	Dom	30	6	No	326	26	7	2	99	12	70	25	6.8
73947	11/6/86	19	28	23	Dom	40	8	No	368	27	6	3	106	22	69	19	15.5
74207	11/25/86	19	28	23	Dom			No	406	3	1	0	144	6	44	14	18.8
74283	12/11/86	19	28	23	Dom			No	320	189	59	10	29	5	47	13	12.9
74361	12/16/86	19	28	23	Dom	40		No	374	188	57	11	51	8	62	17	19.4
74510	1/13/87	19	28	23	Dom	37	6	No	301	144	41	10	34	14	47	11	10.1
74649	1/27/87	19	28	23	Dom			No	290	17	5	1	84	12	43	11	0
75122	3/17/87	19	28	23	Dom	90	6	No	326	67	17	6	57	33	79	20	0
75383	4/1/87	19	28	23	Dom	90	6	No	360	76	19	7	66	34	90	23	0
75887	5/12/87	19	28	23	Dom			Yes									
76032	5/20/87	19	28	23	Dom	30	8	No	377	100	27	8	59	39	100	25	0
76081	5/29/87	19	28	23	Dom	30	6	No	338	175	42	17	36	16	41	10	18.1
76879	8/27/87	19	28	23	Dom	40	8	No	293	3	1	0	94	4	67	18	0
76880	8/27/87	19	28	23	Dom	40	8	No	290	3	1	0	95	4	69	16	0
77402	10/7/87	19	28	23	Dom	37	6	No	441	150	42	11	90	11	74	28	19.5
77403	10/7/87	19	28	23	Dom	31	6	No	671	121	32	10	186	12	139	36	22.2
77474	10/19/87	19	28	23	Dom	30	8	No	386	107	28	9	58	39	100	26	0
77671	11/16/87	19	28	23	Dom	31	8	No	814	124	33	10	238	14	172	48	35
77912	12/14/87	19	28	23	Dom	140	6	Yes	400	0	0	0	122	20	104	27	0
78232	1/21/88	19	28	23	Dom	90	8	No					96				
78425	2/3/88	19	28	23	Dom	80	6	No	370	145	35	14	42	25	95	21	0
78424	2/3/88	19	28	23	Dom	30		No	1378	43	14	2	473	13	242	73	39.8
78388	2/9/88	19	28	23	Dom	30	8	No	326	5	2	0	107	8	88	18	0
78772	3/15/88	19	28	23	Dom	30	6	No	517	51	14	4	151	17	82	41	68.8
78809	3/22/88	19	28	23	Dom	30		Yes	235								
79415	4/28/88	19	28	23	Dom	27	6	No	346	68	19	5	93	5	42	10	1.4
79440	5/11/88	19	28	23	Dom	30	6	Yes									0
79854	6/8/88	19	28	23	Dom	30	8	No	251	53	13	5	53	15	44	18	2.6
80350	7/19/88	19	28	23	Dom	33	8	No	581	154	50	7	132	17	52	28	51.9
80509	8/23/88	19	28	23	Dom			No	383	74	18	7	97	13	50	10	32.1
80645	9/7/88	19	28	23	Dom	30	6	No	768	72	19	6	245	12	126	41	42.2
80760	9/14/88	19	28	23	Dom	33	8	Yes									7.2

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
72832	264	322	0	0.42	0.02	0.01	0	0.08	0.06	0.05	1	31	3	0.4	7.94	780	
73443	136	78	43	0.32	0.051	0.74	0.05	0	0.01	0.02	0.2	48	12	4.5	9.55	489	
73752	140	171	0	0.44	0.14	0.01	0	0	0	0.01	0.4	43	3	0.2	8.17	526	
73947	176	176	19	0.34	0.03	0.06	0.01	0	0.01	0.01	0.3	41	3	0.6	8.62	584	
74207	238	246	22	0.9	0.1	0.01	0	0	0	0	0.6	45	3	0.4	9.12	632	
74283	196	239	0	0.21	0.01	0.06	0	0	0.2	0.03	0.2	30	3	0.6	7.99	530	
74361	208	254	0	0.22	0.03	0	0	0	0.01	0.03	0.3	33	3	0.3	8.12	608	
74510	180	220	0	0.23	0.005	0.07	0	0	0.07	0.02	0.3	30	3	0.8	8.19	495	
74649	160	176	10	0.24	0.08	0.04	0.09	0	0.01	0.02	0.3	52	3	0.4	8.38	436	
75122	124	151	0	0.26	0.007	0.07	0.41	0	0	0.09	0.3	43	3	0.4	7.99	520	
75383	142	173	0	0.2	0.006	0.02	0.57	0	0.04	0.14	0.2	44	3	0.4	8.04	566	
75887							0										
76032	146	178	0	0.21	0.01	0.07	0.68	0	0	0.2	0.2	47	3	0.2	7.92	601	
76081	202	232	7	0.34	0.01	0.01	0	0	0	0.02	0.4	44	3	0.1	8.23	541	
76879	116	127	7	0.32	0.05	0.12	0.03	0.01	0	0.01	0.2	46	3	0.3	8.52	455	
76880	118	124	10	0.31	0.04	0.09	0.02	0	0	0	0.2	46	3	0.2	8.56	453	
77402	220	268	0	0.24	0.01	0	0	0	0.07	0.02	0.5	39	3	0.3	8.09	705	
77403	314	354	14	0.73	0.13	0.01	0.01	0	0.04	0.03	0.8	40	3	0.3	8.36	1034	
77474	144	176	0	0.21	0.01	0.12	0.69	0	0.01	0.19	0.2	47	3	0.5	8.02	604	
77671	374	442	7	0.75	0.104	0.56	0.03	0	0.09	0.03	0.9	39	10	5.3	8.23	1252	
77912	144	176	0	0.18	0.004	0	0	0.01	0.03	0	0.2	45	3	0.4	7.82	633	
78232															6.88		
78425	154	188	0	0.3	0.04	0.28	0.65	0.01	0.02	0.06	0.3	52	3	1.4	7.91	564	
78424	734	842	26	2.44	0.6	0.03	0	0	0.08	0.01	2.8	41	25	0.4	8.47	2058	
78388	128	156	0	0.16	0.02	0.2	0.09	0	0.06	0.01	0.2	44	5	0.6	8.13	512	
78772	190	207	12	0.39	0.07	0	0	0	0.02	0.02	0.4	37	3	0.3	8.53	802	
78809				0.39	0.03								3				
79415	222	271	0	1.74	0.17	0.01	0.01	0	0	0.01	0.8	41	3	0.2	8.13	549	
79440					0.01												
79854	118	144	0	0.46	0.05	0.04	0	0.01	0	0.02	0.3	44	3	0.4	8.07	407	
80350	336	400	5	0.63	0.37	0.01	0	0.05	0	0.01	1.2	41	3	0.1	8.33		
80509	214	251	5	0.81	0.23	0.01	0	0.02	0.01	0.02	0.5	38	5	0.2	8.39	605	
80645	390	417	29	0.43	0.06	0	0	0.01	0	0.01	0.8	43	3	0.3	8.6	1205	
80760					0.022												

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
81679	11/14/88	19	28	23	Dom	82	6	No	269	3	1	0	83	5	66	12	2.4
81408	11/29/88	19	28	23	Dom		6	No	719	218	66	13	157	13	124	45	57.1
81606	12/20/88	19	28	23	Dom	25		No	305	142	37	12	47	12	46	16	5.8
82552	4/4/89	19	28	23	Dom	90	6	Yes	23	0	0	0	6	4	0	1	0
82554	4/11/89	19	28	23	Dom	48	8	Yes	10	0	0	0	3	1	0	0	0
82884	5/15/89	19	28	23	Dom			Yes	393	0	0	0	127	7	102	27	0.6
83697	8/10/89	19	28	23	Dom			No	520	255	79	14	63	8	124	42	41.6
83841	8/28/89	19	28	23	Dom	104	6	No	294	76	19	7	50	23	79	15	6.3
84476	10/26/89	19	28	23	Dom		6	No	929	169	48	12	229	23	223	120	30.2
85622	2/13/90	19	28	23	Dom	30	8	No	270	61	16	5	61	9	45	17	9.8
85846	2/26/90	19	28	23	Dom	30	10	No	624	160	46	11	125	10	133	49	30.2
86585	4/4/90	19	28	23	Dom	89	8	No	352	88	22	8	55	41	82	22	0
88279	6/18/90	19	28	23	Dom			No	331	53	13	5	87	10	46	13	15.6
88344	6/27/90	19	28	23	Dom	125		No	4	0	0	0	2	0	0	0	0
88618	7/16/90	19	28	23	Dom		6	Yes	95	12	3	1	21	5	6	12	6.1
88907	8/1/90	19	28	23	Dom	38	6	No	423	164	41	15	68	20	78	32	15.8
89002	8/7/90	19	28	23	Dom		8	No	853	193	59	11	229	12	147	58	44.9
89487	9/12/90	19	28	23	Dom	35	6	No	794	88	22	8	228	22	129	66	47.9
89607	9/18/90	19	28	23	Dom	30	8	No	734	144	38	12	201	14	150	42	30.5
89755	10/3/90	19	28	23	Dom	30		No	293	157	43	12	37	10	25	14	6
89840	10/17/90	19	28	23	Dom	100	6	No	272	84	22	7	42	18	66	13	0
89958	10/29/90	19	28	23	Dom			No	1107	44	11	4	360	15	210	118	62.3
90263	11/27/90	19	28	23	Dom			No	617	183	47	16	130	11	171	91	14.2
90264	11/29/90	19	28	23	Dom	20	6	No	578	161	48	10	124	32	74	32	8.6
90459	12/18/90	19	28	23	Dom			Yes	138								45.1
90460	12/18/90	19	28	23	Dom		6	Yes		0							54.5
90905	1/22/91	19	28	23	Dom			No	149	3	1	0	44	2	8	9	30.7
90907	1/22/91	19	28	23	Dom			No	869	258	67	22	183	36	151	75	23.9
91562	3/5/91	19	28	23	Dom	36	6	No	495	212	57	17	90	14	58	23	5.7
91665	3/25/91	19	28	23	Dom	90		No	330	19	6	1	93	10	86	17	1.9
91761	4/1/91	19	28	23	Dom	40		No	406	121	32	10	57	42	107	29	0
91861	4/8/91	19	28	23	Dom	30	6	No	459	240	63	20	52	11	116	41	11.2
92320	5/15/91	19	28	23	Dom			No	437	163	44	13	89	9	89	27	16.1
92861	6/25/91	19	28	23	Dom			No	285	141	35	13	31	15	49	23	9.3

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

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ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
108	112	10	0.22	0.036	1.24	0.04	0.01	0.03	0.03	0	39	35	7.1	8.45	407	
354	432	0	0.32	0.01	0	0.01	0.02	0.01				5	0.3	7.95	1109	
192	234	0	0.25	0.02	0.03	0	0.03	0.01	0.02	0.3	34	3	0.4	8.16	510	
20	24	0	0.04	0.003	0.01	0.01	0.01	0.07	0.01	0.2	5	3	0.3	7.76	45	
10	12	0	0.04	0.05	0	0	0	0.04	0	0.2	2	3	0.2	8.05	17	
142	173	0	0.2	0.01	0.04	0	0	0.02	0.01	0.2	46	3	0.7	8.12	609	
190	232	0	0.26	0.01	0.04	0	0	0	0.03	0.4	31	3	0.1	8.11	801	
110	134	0	0.27	0.01	1.7	0.64	0	0.06	0.03	0.2	40	65	18	7.71	449	
314	383	0	0.65	0.03	0	0	0.01	0.05	0.09	1.4	43	3	0.2	7.68	1448	
126	139	7	0.23	0.02	0.06	0	0.01	0.01	0.02	0.2	37	3	0.4	8.32	421	
224	273	0	0.3	0.013	0.02	0	0.02	0.02	0.03	0.7	32	3	0.6	7.82	898	
146	178	0	0.22	0.04	0.05	0.39	0	0	0.14	0	48	3	0.4	8.1	549	
178	193	12	0.25	0.01	0.57	0.02	0	0	0.01	0.2	48	3	3.5	8.57	511	
4	5	0	0.04	0.01	0	0	0	0	0	0	1	3	0.4	8.12	14	
34	41	0	0.13	0.004	0.01	0	0	0.15	0.1	0.2	30	3	0.2	7.08	145	
206	251	0	0.16	0.006	0.1	0	0.01	0.01	0.03	0.4	44	3	0.4	7.94	679	
426	520	0	0.39	0.02	0.01	0	0.01	0	0.03	0.8	36	7	0.3	8.16		
364	429	7	0.48	0.08	0.01	0	0.01	0	0.02	0.6	45	3	0.4	8.22	1229	
364	444	0	0.48	0.06	0.07	0	0.01	0.01	0.03	1.2	40	3	0.1	8.08	1133	
180	220	0	0.27	0.01	0.01	0	0	0.01	0.02	0.1	33	3	0.2	7.95	484	
114	139	0	0.1	0.014	0.07	0.45	0	0	0.09	0.1	47	3	0.3	7.99	419	
442	486	26	0.33	0.04	0.01	0	0.01	0	0.01	0.9	41	3	0.2	8.64	1705	
172	210	0	0.49	0.05	0.03	0	0	0.01	0.06	0.7	43	3	0.1	8.08	992	
342	417	0	0.33	0.08	0.01	0	0.02	0.2	0.1	0.7	48	3	0.1	7.97	902	
															227	
				0.004												
58	71	0	0.12	0.003	0	0	0	0.04	0.1	1	10	3	0.3	7.88	222	
442	539	0	0.5	0.03	0	0	0.07	0.07	0.03	0.8	49	3	0.3	7.99	1314	
328	351	24	0.54	0.01	0.01	0	0.01	0.01	0.03	0.6	46	3	0.4	8.71	785	
122	149	0	0.16	0.01	0.26	0	0.03	0.05	0.01	0.3	50	3	0.4	7.71	503	
152	185	0	0.2	0.01	0.16	0.79	0	0	0.16	0.2	49	5	1	7.96	643	
184	224	0	0.19	0.01	0.01	0	0	0.02	0.03	0.4	46	3	0.3	8.09	724	
220	268	0	0.19	0.01	0.03	0.01	0	0.02	0.03	0.8	36	3	0	7.96	706	
130	159	0	0.27	0.03	0.02	0	0	0	0.02	0.2	40	3	0	7.76	457	

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
93123	7/9/91	19	28	23	Dom			Yes	263	3	1	0	88	3	3	45	58.3
93826	8/27/91	19	28	23	Dom	30	8	No	394	242	67	18	36	11	64	26	8.4
93874	9/4/91	19	28	23	Dom	50	8	No	428	90	23	8	108	13	78	20	7.1
94183	10/3/91	19	28	23	Dom			Yes	43	3	1	0	17	1	0	1	1.1
95684	1/22/92	19	28	23	Dom	32	8	No	801	386	100	33	113	23	180	71	27.6
95770	1/30/92	19	28	23	Dom	22	8	No	914	156	41	13	255	24	197	61	32.6
95950	3/3/92	19	28	23	Dom	40	6	No	729	206	43	24	158	32	112	44	31.6
96361	4/7/92	19	28	23	Dom		8	No	533	211	58	16	97	9	121	39	41.2
96983	5/20/92	19	28	23	Dom		6	No	672	129	35	10	188	13	135	41	24.3
98218	8/4/92	19	28	23	Dom		6	No	337	115	28	11	43	30	89	18	0
101416	1/14/93	19	28	23	Dom			No	797	26	7	2	276	13	111	38	7.4
102629	3/29/93	19	28	23	Dom	100	6	No	266	72	19	6	40	17	66	12	0
103868	5/18/93	19	28	23	Dom		6	No	440	91	25	7	99	9	87	40	1.1
107011	9/1/93	19	28	23	Dom			No	493	262	72	20	55	15	91	36	3.7
107499	9/15/93	19	28	23	Dom			No	308	140	38	11	47	8	70	23	1.3
107810	9/27/93	19	28	23	Dom			No	319	127	36	9	59	9	52	21	1.5
109754	12/29/93	19	28	23	Dom	101		No									
110074	1/6/94	19	28	23	Dom	40	6	No	683	162	35	18	165	29	114	46	5.3
110072	1/11/94	19	28	23	Dom	32	6	Yes	649	16	3	2	218	11	118	116	2
119299	2/15/95	19	28	23	Dom			Yes	212	26	7	2	50	12	32	9	0.1
119518	2/23/95	19	28	23	Dom			No	1376	223	58	19	382	16	313	172	23.5
119516	2/23/95	19	28	23	Dom			Yes	20	0	0	0	7	4	2	3	0
133386	6/6/97	19	28	23	Dom	92	8	No	360	9	2	1	113	18	95	38	0
136781	1/29/98	19	28	23	Dom	30	6	No	1032	494	130	41	130	24	280	99	14.6
61104	11/30/82	19	28	24	Dom	30	7	No	754	60	14	6	237	21	147	39	8.9
61516	2/14/83	19	28	24	Dom	32	6	No	276	85	19	9	45	20	34	11	2.1
63972	12/13/83	19	28	24	Dom	180	6	No	221	13	5	0	59	8	41	6	0
65015	4/30/84	19	28	24	Dom	90	8	No	230	0	0	0	77	2	42	6	0.2
65309	6/4/84	19	28	24	Dom	32	8	No	391	173	46	14	63	13	55	17	0.4
65605	6/25/84	19	28	24	Dom	25	6	No	432	99	28	7	118	13	43	14	0.6
66040	8/16/84	19	28	24	Dom	90	8	Yes									
66174	9/10/84	19	28	24	Dom	26	8	No	467	31	9	2	149	12	48	14	23.2
66746	11/16/84	19	28	24	Dom	28	6	No	356	131	41	7	70	7	41	13	11.5
67219	12/30/84	19	28	24	Dom			No	526	118	39	5	139	11	63	20	18.8

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
93123	88	107	0	0.08	0.003	0	0	0.1	0.48	0	1.5	16	3	0.3	8.13	450	
93826	224	273	0	0.25	0.01	0	0	0	0.04	0.03	0.3	31	3	0.4	7.89	641	
93874	232	283	0	0.32	0.03	0.01	0	0	0.01	0.02	0.4	42	3	0.1	7.65	679	
94183	38	46	0	0.15	0.004	0.01	0	0	0.2	0.01	0.7	7	3	0.4	7.9	87	
95684	352	429	0	0.28	0.02	0.01	0	0.07	0.24	0.04	0.5	40	5	0.1	7.85	1202	
95770	422	515	0	0.39	0.05	0	0.01	0	0.13	0.06	1.7	46	5	0.1	8.12	1398	
95950	410	500	0	0.38	0.03	0	0	0	0	0.05	1	44	3	0.1	8.02	1125	
96361	218	266	0	0.37	0.02	0.01	0	0.01	0	0.03	0.5	35	5	0.4	8.04	797	
96983	320	390	0	0.49	0.06	0.08	0	0.02	0.04	0.03	1.1	39	3	0.1	8.06	1057	
98218	126	154	0	0.25	0.02	0.01	0.56	0	0	0.16	0.2	46	3	0.1	7.94	491	
101416	424	459	29	0.6	0.15	0.01	0	0.04	0	0.02	1	41	5	0.3	8.48	1223	
102629	112	137	0	0.29	0.02	0.06	0.41	0.01	0	0.09	0.2	45	3	0.5	7.91	384	
103868	184	224	0	0.49	0.03	0.03	0	0.05	0.01	0.03	0.6	48	3	0.2	7.93	668	
107011	242	295	0	0.55	0.01	0.01	0	0	0	0.04	0.5	49	7	0.4	8.03	741	0.86
107499	146	178	0	0.19	0.02	0.01	0	0	0.01	0.02	0.4	34	3	0.4	8.03	488	0.39
107810	182	222	0	0.3	0.01	0.02	0	0	0.02	0.01	0.3	34	3	0.5	8.19	515	0.6
109754					0.07												
110074	368	425	12	0.32	0.02	0	0	0.01	0	0.04	0.9	45	7	0.2	8.38	1082	0.9
110072	234	285	0	0.45	0.04	0.02	0	0.04	0.06	0	0.4	38	3	0.8	7.93	1092	-0.81
119299	104	127	0	0.68	0.06	0.26	0.08	0.03	0.04	0.01	0.4	42	12	2.4	7.96	311	-0.71
119518	428	522	0	1.14	0.07	0.26	0	0.09	0	0.12	1.9	42	7	0.7	8.11	2108	0.89
119516	22	27	0	0.03	0.003	0.01	0.01	0.03	0.04	0	0.1	6	7	0.6	8.1	49	-1.27
133386	128	156	0	0.15	0.008	0.12	0.05	0	0.01	0.02	0.2	42	3	0.2	8	593	-1.15
136781	340	415	0	0.25	0.02	0.01	0	0.01	0.12	0.06	0.6	41	5	0.2	7.86	1584	0.9
61104	410	490	5	0.65	0.31	0	0.03	0.07	0.02	0.01	1.1	34	10	0.7	8.22		
61516	160	195	0	0.18	0.005	0.01	0	0.01	0.13	0.02	0.2	36	5	0.3	8.01		
63972	104	107	10	0.31	0.01	0.02	0.14	0	0.02	0.01	0.1	43	3	0.3	8.69		
65015	112	112	12	0.53	0.21	0.22	0.01	0	0	0	0.3	41	7	0.4	8.81		
65309	246	300	0	0.22	0.02	0.04	0	0	0.15	0.01	0.5	39	7	1.6	7.72		
65605	304	337	17	0.64	0.04	0.03	0	0.01	0.03	0.03	0.4	41	3	0.2	8.25		
66040					0.205												
66174	276	307	14	0.9	0.23	0.31	0.06	0.1	0.28	0.01	0.4	43	15	3.4	8.52		
66746	214	261	0	0.49	0.05	0.01	0	0.01	0.06	0.05	0.1	26	7	0.2	7.72		
67219	316	342	22	0.45	0.1	0.01	0	0	0.01	0.02	0.6	28	7	0.3	8.33		

Shaded Parameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
67217	1/21/85	19	28	24	Dom			No	596	8	3	0	215	10	52	10	17.8
67580	2/19/85	19	28	24	Dom		8	No	226	130	42	6	31	3	27	6	2.2
68315	4/30/85	19	28	24	Dom	35	8	No	447	38	12	2	141	14	53	18	18.9
68364	5/16/85	19	28	24	Dom			No	199	18	7	0	49	9	35	5	0.2
69402	8/28/85	19	28	24	Dom	94	6	No	246	0	0	0	81	3	49	9	0
69837	10/21/85	19	28	24	Dom	94	6	Yes									
70058	11/14/85	19	28	24	Dom	30	8	No	686	33	10	2	229	12	68	14	28.4
70295	12/31/85	19	28	24	Dom			No	214	0	0	0	68	2	43	6	0
70889	2/25/86	19	28	24	Dom			No	382	181	56	10	61	11	52	15	3.5
71269	3/31/86	19	28	24	Dom	100	10	No	230	0	0	0	74	3	42	7	0.1
71610	4/28/86	19	28	24	Dom			No	236	77	21	6	46	5	45	14	6.7
72080	6/6/86	19	28	24	Dom		8	No	430	83	25	5	120	9	48	16	6.4
73065	8/22/86	19	28	24	Dom	110	8	No	292	5	2	0	90	5	69	15	0
73297	9/3/86	19	28	24	Dom	30	8	No	207	108	35	5	25	3	27	5	0
73271	9/4/86	19	28	24	Dom	30	6	No	361	58	15	5	95	12	45	10	13.7
73585	9/25/86	19	28	24	Dom	38	8	No	363	205	67	9	37	6	40	10	11.8
74285	12/10/86	19	28	24	Dom	105	6	Yes	77	0	0	0	12	0	0	0	0
75053	3/10/87	19	28	24	Dom			No	260	105	32	6	50	8	31	6	1.9
75055	3/10/87	19	28	24	Dom			No	395	98	31	5	107	6	52	5	8.7
75280	3/17/87	19	28	24	Dom	29	6	No	920	253	88	8	252	6	112	32	7.1
75491	4/13/87	19	28	24	Dom	30	6	No	391	165	38	17	69	15	44	11	5.2
76080	6/2/87	19	28	24	Dom			No	484	51	17	2	151	5	65	17	23.3
76254	6/17/87	19	28	24	Dom	180	6	No	232	0	0	0	73	3	47	8	0
77476	10/19/87	19	28	24	Dom	30	8	No	448	69	21	4	132	10	46	15	4.6
77767	11/30/87	19	28	24	Dom	180	6	Yes	6	0	0	0	1	0	0	0	0
77975	12/21/87	19	28	24	Dom	30	8	No	308	167	52	9	33	8	44	13	7.7
78251	1/26/88	19	28	24	Dom	30	8	No	484	237	65	18	81	13	73	24	4.2
78773	3/15/88	19	28	24	Dom	39	6	No	25	0	0	0	10	0	0	0	2.3
79139	3/31/88	19	28	24	Dom	102	6	No	246	0	0	0	79	3	55	11	0
80173	7/15/88	19	28	24	Dom			No	565	125	40	6	156	9	68	16	11.2
80925	9/12/88	19	28	24	Dom	33	8	No	557	157	43	12	126	10	73	31	25.3
81304	11/15/88	19	28	24	Dom	27	6	No	760	257	83	12	172	7	117	41	18
85690	2/13/89	19	28	24	Dom	90	8	No	350	3	1	0	113	5	84	28	0.7
84261	9/29/89	19	28	24	Dom	115	8	No	270	3	1	0	82	4	55	7	0.4

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ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
410	432	34	0.7	0.07	0	0	0.02	0.01	0	0.5	45	5	0.2	8.67		
162	198	0	0.34	0.01	0.01	0	0.01	0.01	0.04	0	24	5	0.3	8		
248	283	10	1.1	0.28	0.01	0.01	0.02	0.02	0.02	0.7	36	5	0.3	8.25		
98	105	7	0.4	0.03	0	0.04	0	0	0.03	0.3	39	5	0.2	8.39		
108	102	14	0.46	0.14	0.25	0.01	0	0	0	0.3	41	10	0.5	8.93		
				0.03												
450	505	22	1.26	0.28	0	0	0	0.01	0.02	0.9	41	5	0.5	8.62		
100	107	7	0.38	0.1	0.13	0.01	0	0.02	0.01	0.2	41	7	0.6	8.5		
258	315	0	0.39	0.03	0	0	0.01	0.03	0.02	0.3	39	5	0.2	7.8		
120	117	14	0.5	0.14	0.25	0.02	0	0.01	0		39	12	0.5	8.86		
126	144	5	0.41	0.02	0.01	0	0.01	0	0.01	0.3	34	5	0.1	8.21		
292	332	12	1.02	0.16	0.02	0	0	0	0.03	0.7	36	3	0.1	8.49		
120	146	0	0.31	0.06	0.12	0.03	0	0	0	0.3	42	3	0.5	7.95	449	
138	168	0	0.35	0.003	0.02	0	0.01	0	0.03	0.2	27	3	0.3	8.05	332	
216	249	7	0.8	0.21	0.01	0	0	0	0.01	0.5	37	3	0.2	8.43	551	
234	285	0	0.34	0.008	0.01	0	0	0	0.02	0.3	39	3	0.3	7.87	576	
30	17	10	0.14	0.04	0	0	0	0.01	0	0.5	38	3	0.3	9.38	57	
174	207	2	0.42	0.06	0.01	0.01	0.01	0.01	0.02	0.3	27	3	0.3	8.2	433	
248	303	0	0.83	0.2	0	0	0.01	0	0.04	1	27	3	0.3	8.02	647	
644	786	0	0.53	0.01	0.01	0	0	0.16	0.09	1.6	31	3	0.3	7.85	1438	
270	329	0	1.12	0.05	0.01	0	0	0.03	0.05	0.5	56	3	0.3	7.88	642	
272	303	14	1.97	0.69	0	0	0	0	0.01	1	40	3	0.1	8.37	754	
106	110	10	0.44	0.16	0.12	0.01	0	0	0	0.2	40	3	0.2	8.64	347	
302	349	10	1.07	0.17	0	0	0	0.02	0.02	0.7	37	3	0.3	8.32	719	
4	5	0	0.05	0.02	0.01	0	0.02	0.02	0	0.2	1	3	0.2	7.77	11	
188	229	0	0.36	0.005	0.12	0	0.03	0.15	0.02	0.3	39	3	1.1	7.58	493	
328	400	0	0.28	0.02	0	0.18	0	0	0	0.7	36	3	0.4	7.81	821	
22	27	0	0.06	0.003	0	0	0	0	0	0.6	3	3	0.3	8.05	51	
102	105	10	0.33	0.07	0.1	0.01	0	0.01	0	0.2	40	5	0.3	8.72	376	
372	454	0	2.24	0.617	0.01	0.01	0	0	0.02	1	31	3	0.3	8.15	883	
308	376	0	0.74	0.12	0.01	0	0.15	0.02	0.03	0.7	34	35	0.6	7.02	872	
450	549	0	0.83	0.03	0	0	0.05	0.01				3	0.2	7.65	1189	
134	154	5	0.2	0.01	0.44	0.03	0	0	0.01	0.1	46	5	0.9	8.27	539	
128	112	22	0.57	0.08	0.21	0.01	0.01	0	0.01	0.2	45	12	1.7	9.13	398	

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
84514	10/26/89	19	28	24	Dom			No	629	58	15	5	199	17	82	23	14.7
85483	1/30/90	19	28	24	Dom	32	6	No	665	199	60	12	148	10	91	31	43.8
86157	3/8/90	19	28	24	Dom	23	8	No	510	8	3	0	167	12	79	30	12.9
86283	3/19/90	19	28	24	Dom	115	6	No	235	0	0	0	77	2	44	5	0
87051	5/1/90	19	28	24	Dom			Yes	618	38	12	2	203	10	70	26	26.2
87548	5/9/90	19	28	24	Dom	97	8	No	311	30	7	3	67	32	69	18	1.1
88134	6/11/90	19	28	24	Dom			Yes	40	0	0	0	17	1	0	6	1.7
88857	7/26/90	19	28	24	Dom	32	10	No	651	394	110	29	74	13	101	30	8.9
89301	8/28/90	19	28	24	Dom			No	213	81	24	5	37	9	33	16	2.8
90014	11/6/90	19	28	24	Dom			No	245	0	0	0	81	2	43	6	0.2
90010	11/6/90	19	28	24	Dom	35	6	No	880	166	45	13	226	24	222	112	25.8
92186	5/6/91	19	28	24	Dom	32	6.5	No	413	85	21	8	101	13	62	23	35.8
94513	10/21/91	19	28	24	Dom	36	7	No	909	21	5	2	309	12	137	52	45
94952	11/25/91	19	28	24	Dom	30	8	No	523	224	70	12	89	11	81	30	8.8
95769	1/28/92	19	28	24	Dom	32	8	No	704	361	95	30	108	19	105	25	9.5
95884	2/11/92	19	28	24	Dom	110		No	273	0	0	0	91	3	58	13	0
95949	2/25/92	19	28	24	Dom	30		No	356	76	22	5	81	14	44	17	19
96139	3/19/92	19	28	24	Dom		8	No	560	330	94	23	58	14	81	32	18.3
97850	7/15/92	19	28	24	Dom	94	8	No	406	173	48	13	38	32	112	44	0
102421	3/10/93	19	28	24	Dom	20	6	No	568	302	88	20	63	14	121	45	5.5
110828	2/11/94	19	28	24	Dom	200	6	Yes	357	10	4	0	120	6	37	12	0.8
119519	2/22/95	19	28	24	Dom			No	4	3	1	0	3	1	1	1	0.1
120336	4/14/95	19	28	24	Dom	33	8	No	820	21	5	2	272	11	115	35	12.9
120589	5/4/95	19	28	24	Dom			No	353	124	31	11	71	12	50	19	0.9
120590	5/4/95	19	28	24	Dom			No	266	3	1	0	87	3	61	12	0.1
33202	11/26/73	19	28	25	Dom	10	8	No	991	460	128	34	154	10	248	57	22.8
50235	6/6/79	19	28	25	Dom			No	522	301	76	27	67	4	132	38	2.6
50841	8/14/79	19	28	25	Dom			No									
51042	9/4/79	19	28	25	Dom			No									
51528	9/30/79	19	28	25	Dom			No									
60311	8/24/82	19	28	25	Dom	34	6	No	248	136	38	10	27	5	35	11	0.9
63959	12/7/83	19	28	25	Dom	107	6	No	206	0	0	0	64	2	37	5	0.2
66185	9/18/84	19	28	25	Dom		8	No	306	150	37	14	41	3	42	16	2.1
66810	12/3/84	19	28	25	Dom	30	8	No	352	146	42	10	73	6	62	16	2.4

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
84514	398	461	12	0.7	0.18	0.01	0	0	0.01	0.02	0.9	37	3	1.3	8.26	967	
85483	364	444	0	1.19	0.29	0	0	0	0.23	0.03	1	38	3	0.2	8.12	988	
86157	264	293	14	0.68	0.1	1.18	0.04	0	0.01	0	0.5	45	7	2.5	8.62	797	
86283	118	120	12	0.53	0.15	0.25	0.01	0	0	0	0.2	41	12	0.7	9.05	360	
87051	368	381	34	1.32	2.15	0.02	0	0	0	0	0.8	36	5	0.4	8.93	938	
87548	120	146	0	0.19	0.005	0.03	0.23	0	0.01	0.07	0.1	44	3	0.1	7.91	473	
88134	36	44	0	0.1	0.003	0	0	0.03	0.01	0.01	1.1	6	3	1.1	8.14	78	
88857	412	503	0	0.26	0.01	0	0.01	0	0.01	0.02	0.1	39	3	0.2	8.06	1002	
89301	116	132	5	0.31	0.02	0.01	0	0.01	0.01	0.01	0.1	24	3	0.2	8.31		
90014	126	120	17	0.77	0.21	0.32	0.01	0.01	0	0.01	0.4	42	15	0.2	9.02	365	
90010	294	359	0	0.72	0.03	0.02	0	0.01	0.01	0.08	1.5	46	3	0.1	7.8	1332	
92186	190	212	10	0.87	0.26	0.01	0	0.02	0.01	0.02	0.6	39	3	0.1	8.38	641	
94513	456	483	36	4.48	2.28	0.03	0.01	0.02	0	0.01	3.6	37	7	0.6	8.6	1359	
94952	310	378	0	0.38	0.03	0	0	0.01	0	0.03	0.6	38	3	0.1	7.57	814	
95769	468	571	0	0.24	0.01	0	0.01	0	0.08	0.03	1.5	41	5	0.1	7.97	1108	
95884	124	132	10	0.62	0.16	0.34	0.03	0.02	0.02	0.01	0.4	36	12	0.7	8.57	419	
95949	190	232	0	0.44	0.014	0.01	0	0	0	0.02	0.3	42	3	0.2	8.16	536	
96139	340	415	0	0.31	0.01	0.01	0	0	0.01	0.04	0.8	39	3	0.4	7.58	892	
97850	124	151	0	0.18	0.04	0.16	0.59	0.05	0	0.08	0.2	46	3	0.6	8.02	594	
102421	256	312	0	0.16	0.003	0.01	0.03	0.01	0.01	0.04	0.4	34	3	0.4	8.01	837	
110828	228	176	50	0.76	0.05	0.59	0.03	0.03	0	0.02	0.4	54	25	1.7	9.45	547	0.85
119519	10	12	0	0.08	0.003	0	0	0	0	0	0.1	3	12	0.3	6.84	16	-3.56
120336	410	461	19	3.78	1.63	0.05	0.01	0.01	0	0	2.6	37	5	0.3	8.62	1262	0.34
120589	220	268	0	0.29	0.02	0.03	0.01	0	0.02	0.02	0.4	37	7	0.5	8.12	563	0.4
120590	122	124	12	0.41	0.1	0.08	0.02	0	0	0.01	0.2	43	15	0.6	8.77	411	-0.69
33202	400	488	0	0.61	0.01	0	0.07						2	0.5	7.96		
50235	234	285	0	0.44	0.005	0	0.43	0	0.06	0.1			3	0.1	7.42		
50841							0.47										
51042							0.48										
51528							0.46										
60311	142	173	0	0.33	0.01	0.02	0.01	0	0.06	0.02	0.2	36	3	0.4	7.92		
63959	98	100	10	0.25	0.04	0.37	0.02	0.01	0.02	0	0.1	41	7	2	8.64		
66185	174	212	0	0.87	0.02	0	0.02	0.01	0.03	0.04	0.2	49	5	0.3	7.95		
66810	226	276	0	0.48	0.03	0	0.11	0	0.01	0.05	0.5	32	5	0.3	7.97		

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
67235	1/14/85	19	28	25	Dom	36	6	No	440	113	32	8	114	7	90	25	1.1
70309	12/18/85	19	28	25	Dom	30	6	No	405	186	53	13	66	4	80	22	3.2
71608	4/28/86	19	28	25	Dom			No	271	76	22	5	50	10	61	18	0
72378	6/23/86	19	28	25	Dom	60	8	No	302	131	36	10	50	6	66	15	1.5
72376	6/27/86	19	28	25	Dom			No	427	153	43	11	85	5	75	24	3.5
75056	3/10/87	19	28	25	Dom	40	8	No	872	79	20	7	280	13	156	60	55.7
75054	3/10/87	19	28	25	Dom			No	332	105	27	9	43	31	86	16	0
75057	3/10/87	19	28	25	Dom			No	632	134	34	12	177	12	110	35	8.7
75069	3/10/87	19	28	25	Dom	40	8	Yes									
76556	7/23/87	19	28	25	Dom	45	6	No	201	82	23	6	28	6	32	8	1.4
77040	9/14/87	19	28	25	Dom	40	6	No	245	0	0	0	81	2	49	7	0
77770	11/24/87	19	28	25	Dom			No	516	222	61	17	91	8	96	34	0.8
78919	3/29/88	19	28	25	Dom	48	8	Yes	29	0	0	0	7	1	0	0	0
79998	7/5/88	19	28	25	Dom	32	6	No	257	128	33	11	29	7	43	12	2.4
81324	10/20/88	19	28	25	Dom	92	8	No	218	0	0	0	71	2	36	6	0
81323	10/20/88	19	28	25	Dom			No	222	0	0	0	72	3	45	7	0
83881	9/26/89	19	28	25	Dom	25	6	No	293	110	29	9	52	18	33	16	0.5
84399	10/18/89	19	28	25	Dom	35	6	No	271	167	47	12	25	4	40	18	0.3
85032	12/19/89	19	28	25	Dom			No	1014	19	6	1	356	11	189	87	58.1
85691	2/16/90	19	28	25	Dom			No	580	208	57	16	109	8	148	35	2.4
85692	2/16/90	19	28	25	Dom			No	348	156	41	13	60	7	49	16	0.9
86160	2/27/90	19	28	25	Dom	100	12	No	239	0	0	0	74	2	53	9	0
86156	3/12/90	19	28	25	Dom			Yes	55	0	0	0	13	1	0	5	6.3
89008	8/14/90	19	28	25	Dom	30	8	No	377	192	52	15	52	6	53	13	10.6
97958	7/22/92	19	28	25	Dom	110	8	No	210	3	1	0	66	3	43	7	0
113606	6/14/94	19	28	25	Dom	40	6	Yes	366	194	53	15	56	7	60	17	0
118162	12/20/94	19	28	25	Dom			No	210	22	7	1	51	9	35	9	0.1
124381	1/18/95	19	28	25	Dom	30		No	1018	166	40	16	308	14	161	73	0.4
34301	6/21/74	19	28	26	Dom	36	8	No	635	361	100	27	140	8	186	35	3.1
38508	3/25/76	19	28	26	Dom	32	12	No	431	177	51	12	70	4	80	25	2.5
58563	2/1/82	19	28	26	Dom	82		No	241	77	21	6	27	23	57	10	1.2
59287	4/26/82	19	28	26	Dom			No	1333	650	181	48	191	12	328	158	21.4
59301	5/6/82	19	28	26	Dom	33		No	672	181	46	16	146	22	173	63	0.1
59405	5/14/82	19	28	26	Dom	30	6	No	628	359	104	24	75	6	126	55	0.2

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
67235	242	295	0	0.45	0.06	0	0.02	0	0.17	0.03	1	34	5	0.3	8.06		
70309	220	268	0	0.45	0.008	0	0.32	0	0.06	0.08	0.6	36	7	0.6	7.65		
71608	112	137	0	0.22	0.04	0.37	0.17	0.01	0.02	0.05	0.2	45	15	1.4	8.27		
72378	158	193	0	0.41	0.01	0.01	0.06	0.02	0.01	0.02	0.4	35	3	0.1	8.03	500	
72376	238	290	0	0.67	0.03	0.01	0.07	0.03	0.04	0.07	0.7	39	3	0.2	7.78	683	
75056	414	486	10	0.34	0.04	0	0	0	0	0.01	0.9	42	3	0.2	8.49	1369	
75054	126	154	0	0.24	0.006	0.63	0.69	0	0.1	0.14	0.2	45	7	7.5	7.9	514	
75057	358	437	0	0.45	0.08	0.01	0	0	0.01	0.06	0.9	37	3	0.2	7.94	1018	
75069					0.035												
76556	108	132	0	0.43	0.02	0.02	0.01	0.11	0	0.03	0.3	38	3	0.4	7.84	321	
77040	118	124	10	0.57	0.17	0.47	0.02	0.01	0.34	0	0.3	40	7	1.1	8.9	373	
77770	284	346	0	0.37	0.03	0.33	0.2	0.01	0.01	0.07	0.6	35	3	1.9	8.03	822	
78919	10	12	0	0.07	0.09	0.02	0	0.01	0.02	0	0.4	11	3	0.6	7.46	40	
79998	140	171	0	0.3	0.01	0.01	0	0	0	0.02	0.3	36	3	0.2	8.06	403	
81324	112	107	14	0.5	0.14	0.09	0	0	0				3	0.3	8.97	333	
81323	98	95	12	0.46	0.13	0.2	0	0	0				5	0.6	8.89	338	
83881	190	207	12	0.39	0.08	0	0	0	0.01	0.02	0.3	32	3	0.3	8.29	485	
84399	158	193	0	0.32	0.04	0.14	0.23	0	0.04	0.02	0.2	36	5	0.7	8.02	438	
85032	438	461	36	0.38	0.04	0.03	0	0	0	0	1	40	3	0	8.89	1562	
85691	278	339	0	0.36	0.04	0.03	0.03	0.01	0.02	0.05	1.4	37	3	0.2	8.02	895	
85692	220	268	0	0.38	0.01	0.3	0.13	0	0.06	0.03	0.4	38	3	0.8	7.97	558	
86160	106	105	12	0.34	0.05	0.04	0.01	0	0	0	0.1	39	3	0.1	8.67	362	
86156	20	24	0	0.06	0.003	0	0	0	0.04	0	0.2	21	3	0	7.35	79	
89008	230	281	0	0.35	0.02	0	0	0.01	0.04	0.03	0	45	3	0.1	7.82	601	
97958	100	93	14	0.33	0.04	0.07	0.03	0.01	0.01	0.01	0.2	41	3	0.2	8.78	305	
113606	234	285	0	0.44	0.02	0.36	0.09	0.02	0.01	0.03	0.5	41	10	1.1	7.84	583	0.38
118162	98	105	7	0.38	0.04	0.18	0.04	0	0.05	0.02	0.2	49	25	1.5	8.23	298	-0.47
124381	602	734	0	1.93	0.3	0.03	0.08	0.01	0	0.03	3.6	39	25	0.2	8.07	1559	0.85
34301	400	488	0	0.78	0.02	0.02	0.36						5	0.3	7.96		
38508	202	246	0	0.61	0.01	0.01	0.15						3	0.4	7.9		
58563	86	105	0	0.29	0.005	0.16	0.74	0	0.29	0.19	0.1	47	7	2.3	7.79		
59287	500	610	0	0.43	0.01	0.01	0.65	0	0.06	0.05			3	0.3	7.56		
59301	256	312	0	0.61	0.025	0.18	0.17	0.01	0.07	0			5	1.3	7.91		
59405	312	381	0	0.34	0	1.19	2.52	0.01	0.4	0.22			5	1.5	7.13		

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
59395	5/14/82	19	28	26	Dom	32	8	No	346	149	43	10	61	5	59	16	4.6
59854	6/29/82	19	28	26	Dom	50	8	No	666	374	105	27	66	6	186	42	1
59962	7/14/82	19	28	26	Dom	42		No	275	140	38	11	34	18	33	10	3.1
60071	8/2/82	19	28	26	Dom	100	8	No	241	72	19	6	34	22	60	10	0.6
62063	4/25/83	19	28	26	Dom	32	6	No	322	130	37	9	59	6	58	21	3.5
62179	5/5/83	19	28	26	Dom			No									
62220	5/19/83	19	28	26	Dom	32	6	No	565	145	40	11	132	12	87	25	4.3
66745	11/7/84	19	28	26	Dom	25	7	No	331	128	38	8	61	4	53	17	3.5
68317	5/6/85	19	28	26	Dom		8	No	198	90	26	6	22	4	29	5	0.1
68808	7/16/85	19	28	26	Spa			No	252	100	27	8	51	4	36	10	2.3
69076	8/13/85	19	28	26	Dom	80		No	461	241	65	19	44	12	133	32	3.8
72008	5/23/86	19	28	26	Dom	30	8	No	231	131	31	13	24	5	28	9	1.3
72409	6/26/86	19	28	26	Dom	30	8	No	480	286	78	22	37	7	135	29	0
74081	11/18/86	19	28	26	Dom			No	426	95	25	8	100	7	141	34	8.3
75689	4/27/87	19	28	26	Dom	37	8	No	299	105	32	6	56	5	52	11	8.9
76163	6/9/87	19	28	26	Dom			No	506	95	25	8	123	7	158	39	9.1
76414	7/6/87	19	28	26	Dom	30		Yes									
77117	9/18/87	19	28	26	Dom	40	6	No	370	162	45	12	61	3	75	21	5.2
78084	1/6/88	19	28	26	Dom		6	No		153	43	11	62	3			
79778	6/1/88	19	28	26	Dom			No	291	5	2	0	89	6	71	12	1.5
83653	7/27/89	19	28	26	Dom	28	8	No	790	32	11	1	275	4	112	29	18.9
83884	9/6/89	19	28	26	Dom		8	No	746	86	23	7	237	10	96	31	26.1
85484	1/29/90	19	28	26	Dom	36	6	No	256	120	33	9	35	5	39	17	4.5
88509	6/28/90	19	28	26	Dom		8	Yes	241	56	14	5	42	21	54	7	0
89009	8/14/90	19	28	26	Dom			No	315	103	28	8	63	5	49	18	6.1
94500	10/25/91	19	28	26	Dom			No	191	0	0	0	64	3	42	4	0
94935	12/4/91	19	28	26	Dom		8	Yes	708	93	24	8	216	14	76	153	3.3
94949	12/4/91	19	28	26	Dom		8	No	757	93	24	8	228	14	203	77	15.4
95358	1/8/92	19	28	26	Dom	30	6	No	333	51	14	4	89	8	59	17	10.2
96976	5/11/92	19	28	26	Dom	30	6	No	753	0	0	0	273	7	214	62	0.2
99010	9/15/92	19	28	26	Dom	30	6	No	674	330	94	23	95	6	183	44	0.4
100881	12/8/92	19	28	26	Dom	24	6	No									9
104832	6/25/93	19	28	26	Dom		6	No	220	0	0	0	69	2	47	6	0
116944	10/22/94	19	28	26	Dom	25	9	No	686	299	80	24	126	13	125	39	0.5

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
59395	192	234	0	0.57	0.005	0.03	0.01	0.01	0.1	0.01			3	0.3	7.87		
59854	256	312	0	0.22	0	3.85	0.92	0	0.03	0.11	0.7	36	45	37	8.03		
59962	166	203	0	0.2	0.005	0.01	0	0.02	0.01	0.02	0.3	39	3	0.4	7.8		
60071	96	117	0	0.24	0	0.52	0.43	0.01	0.09	0.06	0.2	43	7	2.1	8.08		
62063	174	212	0	0.45	0.01	0	0.05	0	0.04	0.02	0.3	39	5	0.7	8.02		
62179																	
62220	338	412	0	0.84	0.15	0.02	0.12	0.01	0.02	0.02	1.2	41	5	0.7	8.15		
66745	180	220	0	0.54	0.01	0	0	0	0.03	0.05	0.2	32	3	0.2	7.76		
68317	106	129	0	0.25	0.006	0.64	0.06	0	0.01	0.01	0.2	39	20	2.3	7.99		
68808	154	188	0	0.63	0.02	0.08	0.02	0	0.05	0.03	0.3	39	5	0.1	8.1		
69076	166	203	0	0.21	0.01	0.35	0.5	0	0.05	0.06	0.2	43	7	1.4	7.77		
72008	148	181	0	0.24	0.03	0	0	0.01	0.03	0.02	0.2	32	3	0.1	7.91		
72409	196	239	0	0.18	0.006	0.49	0.39	0.01	0.03	0.04	0.3	38	7	4.3	7.91	733	
74081	132	161	0	0.37	0.06	0.01	0	0.01	0.01	0.02	0.5	43	3	0.2	7.97	674	
75689	160	195	0	0.25	0.01	0.02	0.05	0	0.01	0	0.4	46	3	0.3	7.89	468	
76163	154	188	0	0.4	0.15	0	0	0	0.01	0.02	0.9	40	3	0.3	8.05	788	
76414					0.006												
77117	194	237	0	0.44	0.009	0.01	0.17	0	0.06	0.07	0.5	34	3	0.3	7.67	601	
78084						0	0.2	0	0.44	0.06	0.5	35					
79778	116	127	7	0.22	0.03	0.04	0.02	0	0	0	0.2	48	3	0.1	8.46	492	
83653	440	512	12	3.94	1.55	0	0.15	0	0.01	0.05	2.9	41	17	0.3	8.25	1185	
83884	444	512	14	0.48	0.13	0	0	0	0	0.01	0.9	48	3	0.4	8.22	1138	
85484	136	166	0	0.28	0.02	0.02	0.04	0	0.06	0.02	0.2	36	3	0.1	7.95	402	
88509	102	124	0	0.27	0.03	0.11	0.29	0	0	0.03	0	48	3	0.4	8.09	361	
89009	170	207	0	0.32	0.03	0.2	0.01	0.14	0.02	0.02	0	41	3	1.6	8.16	502	
94500	94	85	14	0.32	0.05	0.04	0.06	0	0	0.02	0.2	39	3	0.4	8.56	315	
94935	298	339	12	1.48	0.15	0	0	0	0.01	0.05	1.7	44	3	0.2	8.22	1191	
94949	256	312	0	1.47	0.15	0.02	0	0	0.02	0.04	1.6	44	3	0.2	7.78	1158	
95358	172	210	0	0.57	0.07	0.01	0.01	0	0	0.02	0.4	43	5	0.3	8.13	530	
96976	278	339	0	0.3	0.003	0.64	0.01	0	0.01	0.01	0.7	29	7	0.1	8.17	1202	
99010	308	376	0	0.46	0.004	0.39	1.76	0	0	0.18	0.7	30	12	4.8	7.48	980	
100881																	
104832	100	93	14	0.27	0.04	0.44	0.02	0	0	0.01	0.2	42	7	3.7	8.94	312	-0.99
116944	410	500	0	0.3	0.03	0.32	0.05	0.04	0.6	0.05	1.4	35	5	1.1	7.93	1122	0.86

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
58755	2/26/82	19	28	27	Dom	35	8	No	315	123	31	11	45	19	37	11	3
59737	6/15/82	19	28	27	Dom	40		No	236	93	24	8	33	7	37	11	2.5
60177	8/5/82	19	28	27	Dom		7	No	390	31	9	2	120	10	88	23	5
60153	8/11/82	19	28	27	Dom		8	No	328	142	37	12	52	9	54	17	9.5
60839	10/14/82	19	28	27	Dom	30	6	No	170	73	21	5	23	5	29	7	0.4
61046	11/23/82	19	28	27	Dom	38	8	No	745	3	1	0	251	1	208	59	3.1
62186	5/15/83	19	28	27	Dom	32	8	No	210	54	15	4	52	3	39	23	4.2
63887	11/15/83	19	28	27	Dom			No	706	97	29	6	194	8	185	57	5.5
66184	9/11/84	19	28	27	3			No	181	86	23	7	24	6	30	6	3.2
67216	1/14/85	19	28	27	Dom	35	10	No	338	148	38	13	52	9	54	15	30
68363	5/15/85	19	28	27	Dom			No	531	291	80	22	65	4	78	39	28.2
68361	5/15/85	19	28	27	Dom			No	530	221	57	19	88	10	88	45	31.7
69688	9/26/85	19	28	27	Dom	40		No	274	142	42	9	46	3	36	10	4.4
71752	5/2/86	19	28	27	Dom			No	1183	477	135	34	185	8	364	108	2.4
73586	10/2/86	19	28	27	Dom			Yes	290	5	2	0	88	6	72	13	0.5
73949	11/6/86	19	28	27	Dom			No	311	159	39	15	33	12	48	14	8.9
74491	12/17/86	19	28	27	Dom	30	7	No	491	250	72	17	69	5	115	30	2.1
75688	4/13/87	19	28	27	Dom	63	6	No	556	305	84	23	46	16	166	36	0
75983	5/15/87	19	28	27	Dom	30	6	No	291	105	27	9	61	7	57	18	0
75925	5/19/87	19	28	27	Dom	32	8	No	636	321	92	22	85	6	155	76	25.1
76028	5/21/87	19	28	27	Dom	42	6	No	221	95	25	8	30	6	32	9	3.9
76309	6/22/87	19	28	27	Dom	18	8	No	195	98	26	8	22	6	28	8	5.2
76307	6/30/87	19	28	27	Dom			No	904	493	143	33	91	6	237	120	2.3
76490	7/16/87	19	28	27	Dom	30	6	No	560	46	15	2	178	8	108	37	21.2
76489	7/20/87	19	28	27	Dom	35	10	No	351	80	22	6	85	7	52	13	8.5
76544	7/22/87	19	28	27	Dom			No	851	447	131	29	95	6	251	70	4.9
76628	8/4/87	19	28	27	Dom	24	8	Yes	1132	12	3	1	404	2	310	142	26.8
77173	9/23/87	19	28	27	Dom			No	400	198	58	13	60	5	56	13	2.3
77404	10/7/87	19	28	27	Dom	84	6	No	231	33	10	2	47	20	49	7	0
77478	10/19/87	19	28	27	Dom	30	7	No	456	219	63	15	69	6	92	22	2
78778	3/7/88	19	28	27	Dom	37	6	No	262	148	41	11	24	5	33	9	0.8
79844	6/8/88	19	28	27	Dom	35	6	No	661	398	108	31	41	10	203	42	0.2
80414	8/9/88	19	28	27	Dom			Yes	235								
80832	9/21/88	19	28	27	Dom	103	6	No	340	12	3	1	104	9	88	18	0

ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
186	207	8	0.31	0.03	0	0	0	0.06	0.03	0.3	47	3	0.2	8.22		
116	122	8	0.41	0.07	0.01	0	0.01	0.03	0.02	0.3	36	3	0.4	8.3		
172	190	8	1.24	0.45	0	0	0	0	0.01	0.8	41	5	0.3	8.53		
164	200	0	0.25	0.02	0	0	0	0.09	0.02	0.3	41	3	0.4	7.98		
96	117	0	0.22	0.01	0.05	0	0	0.03	0.02	0.2	30	3	0.7	7.74		
266	325	0	0.12	0.005	0.03	0.01	0.01	1.66	0	0.7	39	7	0.7	7.63		
88	107	0	0.23	0.01	0.27	0	0.01	0.45	0.02	0.2	19	10	2.6	7.66		
270	305	12	0.98	0.41	0.02	0.01	0.01	0.01	0.03	2.1	43	7	0.6	8.22		
104	112	7	0.25	0.02	0	0	0	0.03	0.03	0.6	30	5	0.3	8.23		
170	207	0	0.28	0.02	0	0	0	0.02	0.02	0.2	41	5	0.1	8.16		
290	354	0	0.51	0.03	0.01	0.21	0	0.06	0.04	0.5	45	7	0.2	7.83		
256	312	0	0.56	0.04	0	0	0	0.17	0.1	0.5	47	5	0.2	7.8		
186	227	0	0.33	0.008	0	0	0.69	0.03	0.05	0.3	30	5	0.2	8.04		
370	451	0	0.27	0.003	0.03	2.94	0	0	0.09	1.3	34	25	0.3	7.48		
112	132	2	0.21	0.03	0.03	0.02	0	0.01	0	0.2	48	3	0.3	8.32	434	
174	212	0	0.36	0.03	0	0	0.01	0.03	0.05	0.3	46	5	0.2	8.01	496	
258	315	0	0.3	0.006	0	0.01	0	0.07	0.03	0.6	42	3	0.2	7.86	768	
202	246	0	0.33	0.02	0.07	0.98	0	0	0.1	0.3	51	3	0.4	8.16	829	
156	190	0	0.48	0.05	0	0	0	0.21	0.02	0.6	38	3	0.8	7.33	490	
222	271	0	0.21	0.005	0	0	0	0.01	0.08	0.7	34	3	0.2	7.57	1036	
120	146	0	0.51	0.03	0.01	0	0	0.12	0.02	0.3	44	3	0.2	7.95	349	
106	120	5	0.23	0.01	0.01	0	0	0.04	0.03	0.2	28	3	0.2	8.22	315	
288	361	0	0.27	0.006	0.01	0.14	0	0.03	0.08	0.9	40	3	0.2	7.67	1376	
244	298	0	2.02	0.42	0.01	0	0	0.06	0.02	1	41	7	0.3	8.18	874	
194	237	0	0.54	0.112	0	0	0	0	0.01	0.7	44	3	0.3	7.91	554	
304	371	0	0.23	0.006	0.01	0.02	0	0.17	0.08	0.7	41	3	0.4	7.72	1225	
340	415	0	0.25	0.003	0	0.05	0.04	0.39	0	1	36	3	0.3	7.51	1734	
256	312	0	0.57	0.01	0.02	0.57	0.01	0.09	0.06	0.4	44	3	0.4	7.61	641	
100	88	17	0.32	0.01	0.07	0.23	0	0.01	0.04	0.2	38	3	0.9	8.43	355	
248	303	0	0.32	0.007	0.01	0.31	0	0.01	0.03	0.6	41	3	0.3	7.85	725	
162	198	0	0.39	0.01	0.04	0.03	0.02	0.09	0.02	0.2	42	3	0.4	8.09	407	
236	288	0	0.26	0.01	0.05	0.69	0	0.29	0.07	0.2	45	3	0.3	8.01	945	
															419	
124	127	12	0.15	0.01	1.24	0.1	0	0.03	0.01	0.1	47	7	2.1	8.34	518	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
81605	12/19/88	19	28	27	Dom	70	6	No	540	266	70	22	45	31	176	39	0.4
82581	4/4/89	19	28	27	Dom			No	329	132	33	12	34	22	82	18	0.1
83073	5/30/89	19	28	27	Dom	27	8	No	820	30	12	0	280	3	119	30	16.3
83283	6/22/89	19	28	27	Dom	64	6	No	275	107	28	9	30	18	69	14	0.2
83543	7/18/89	19	28	27	Dom	50	8	No	831	480	136	34	67	7	250	57	2
84262	9/14/89	19	28	27	Dom	63	6	No	576	311	85	24	46	16	177	37	0.5
84395	10/13/89	19	28	27	Dom	87	6	No	317	127	36	9	39	14	82	16	0.1
84367	10/16/89	19	28	27	Dom	30		No	661	277	78	20	113	11	143	45	33.8
85033	12/14/89	19	28	27	Dom	35	6	No	302	35	9	3	89	3	45	17	2.7
85704	2/15/90	19	28	27	Dom	87	6	Yes					98				
86756	4/10/90	19	28	27	Dom	80	6	No	294	118	29	11	31	20	73	14	0
87117	5/1/90	19	28	27	Dom	30	7.5	No	194	94	26	7	26	4	31	10	2
88624	7/13/90	19	28	27	Dom	102	6	No	275	76	19	7	49	17	65	12	0
89006	8/3/90	19	28	27	Dom			No	501	202	51	18	91	12	83	38	13
89007	8/14/90	19	28	27	Dom			No	226	110	29	9	31	6	37	17	2.5
89493	9/13/90	19	28	27	Dom	80	8	Yes	298	0	0	0	99	2	36	30	0.1
89841	10/17/90	19	28	27	Dom			Yes	154	50	15	3	41	2	15	30	0
91250	2/3/91	19	28	27	Dom	180		No	193	19	6	1	53	7	38	5	0.1
92396	5/21/91	19	28	27	Dom	16		No	265	144	38	12	28	6	52	23	2.4
92796	6/3/91	19	28	27	Dom	72	6	No	410	192	52	15	45	15	104	45	1
93391	7/30/91	19	28	27	Dom	40	8	No	311	123	31	11	58	9	62	27	5.5
93993	9/9/91	19	28	27	Dom	80	6	No	240	84	22	7	29	19	51	9	0
94190	10/2/91	19	28	27	Dom	30	6	No	361	76	19	7	96	6	58	23	2.7
94833	11/18/91	19	28	27	Dom	30	6	Yes	144	9	2	1	51	2	3	35	12.4
95357	1/8/92	19	28	27	Dom		6	Yes	440	130	34	11	96	8	72	26	2.8
95811	2/11/92	19	28	27	Dom			Yes									
95984	2/20/92	19	28	27	Dom	40	6	No	974	281	76	22	203	14	294	138	40.6
96359	3/28/92	19	28	27	Dom	31	6	No	356	171	42	16	45	19	52	34	13.7
96899	5/5/92	19	28	27	Dom	72	6	No	431	225	62	17	39	17	123	25	0
105165	7/9/93	19	28	27	Dom			No	391	116	30	10	83	8	64	31	4.5
106336	8/18/93	19	28	27	Dom	35	6	Yes	4	0	0	0	5	0	0	0	0
106335	8/18/93	19	28	27	Dom	35	6	No	659	0	0	0	229	1	212	43	0
117858	12/8/94	19	28	27	Dom			No	238	46	12	4	43	21	48	9	0
121959	7/6/95	19	28	27	Dom	75	6	No									

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
81605	184	224	0	0.27	0.03	0.36	1	0.01	0	0.11	0.2	51	3	1.4	8.06		
82581	132	161	0	0.3	0.02	0.04	0.62	0	0	0.08	0.2	49	3	0.3	8.07	483	
83073	466	564	2	3.26	1.24	0.33	0.14	0.03	0	0.01	3.1	38	35	1.1	8.21	1232	
83283	108	132	0	0.3	0.01	0.12	0.53	0	0.02	0.06	0.2	48	3	0.4	8.01	415	
83543	304	371	0	0.2	0.004	0.37	0.11	0	0	0.07	0.5	39	7	1.6	7.67	1154	
84262	214	261	0	0.32	0.02	0.14	0.95	0.01	0	0.1	0.2	47	3	1.3	8.18	833	
84395	124	151	0	0.3	0.01	0.05	0.57	0	0.01	0.09	0.2	48	3	0.3	8.03	473	
84367	310	378	0	0.16	0.01	0.01	0	0.01	0.03	0.05	0.9	35	3	0.5	7.83	1018	
85033	158	193	0	1.43	0.25	0	0	0	0	0.01	0.3	45	3	0	8.16	466	
85704																	
86756	118	144	0	0.27	0.02	0.04	0.59	0	0	0.06	0.1	50	3	0.4	7.8	438	
87117	104	127	0	0.25	0.01	0	0	0	0	0.02	0.1	26	3	0.1	7.76	320	
88624	120	146	0	0.34	0.02	0.05	0.13	0	0	0.04	0.1	46	3	0.6	7.85	427	
89006	268	317	5	0.66	0.05	0.01	0	0.01	0.18	0.09	0.4	53	3	0.1	8.28	802	
89007	116	142	0	0.26	0.02	0.01	0	0	0.11	0.02	0.1	30	3	0.2	7.96	374	
89493	144	166	5	0.29	0.01	0.03	0	0	0	0	0	50	3	0.5	8.21	454	
89841	90	110	0	0.29	0.004	0.02	0.28	0	0.3	0.02	0.8	7	3	1	7.43	308	
91250	92	102	5	0.32	0.04	0.06	0.04	0	0	0.02	0.2	47	3	0.1	8.49	291	
92396	128	142	7	0.23	0.01	0.03	0	0.01	0.09	0.03	0.3	29	3	0.1	8.37	438	
92796	142	173	0	0.35	0.01	2.53	0.61	0	0.09	0.07	0.3	43	70	21	8	633	
93391	156	190	0	0.33	0.03	0	0	0	0.03	0.01	0.4	33	3	0.1	8.04	536	
93993	108	132	0	0.27	0.01	0.06	0.36	0	0	0.05	0.2	44	3	0.3	8.03	365	
94190	206	251	0	1.31	0.29	0	0	0	0.03	0.02	0.9	39	3	0.3	7.92	591	
94833	58	71	0	0.09	0.003	0.05	0.05	0	0.04	0.01	1.5	6	3	0.3	7.32	267	
95357	246	300	0	1.08	0.19	0.01	0	0.04	0.07	0.03	0.4	61	5	0.4	7.96	689	
95811					0.004												
95984	226	276	0	0.77	0.04	0.02	0.03	0	0.06	0.06	1.1	46	3	0.4	7.52	1472	
96359	186	227	0	0.27	0.01	0.07	0.01	0.05	0.04	0.06	0.4	36	5	0.4	8.07	558	
96899	160	195	0	0.33	0.01	0.16	0.91	0	0	0.09	0.3	50	3	0.6	8.05	608	
105165	174	212	0	1.21	0.03	0.01	0	0	0.02	0.02	0.5	46	3	0.3	7.98	585	0.33
106336	10	12	0	0.03	0.003	0.06	0	0	0.06	0	0.2	5	3	0.4	6.57	23	
106335	240	293	0	0.22	0.01	0.02	0	0.02	0.03	0	0.2	45	3	0.2	7.81	1050	
117858	98	120	0	0.26	0.03	0.04	0.04	0	0.02	0.03	0.2	46	12	0.3	7.9	346	-0.57
121959					0.01												

Shaded Parameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
123267	9/1/95	19	28	27	Dom			No	510	58	15	5	157	6	107	43	1.3
127771	6/20/96	19	28	27	Dom	80		No	211	76	22	5	27	15	44	6	0
130922	12/17/96	19	28	27	Dom	33		No	673	376	106	27	72	8	192	46	1.6
135009	9/8/97	19	28	27	Dom	77	6	No	238	80	22	6	29	22	53	10	0
59628	6/2/82	19	28	28	Dom	28	4	No	820	315	93	20	175	8	216	54	8
59564	6/9/82	19	28	28	Dom	35	8	No	371	198	58	13	36	4	86	19	0
59733	6/23/82	19	28	28	Dom			No	291	19	6	1	80	4	35	11	2.2
59857	7/7/82	19	28	28	Dom			No	313	175	47	14	37	9	43	13	2.6
60181	8/5/82	19	28	28	Dom			No	324	36	11	2	97	7	43	13	7.7
60673	9/23/82	19	28	28	Dom	38		No	571	0	0	0	199	1	94	28	10.5
61148	12/8/82	19	28	28	Dom	29	6	No	415	210	61	14	56	4	67	20	4.6
63322	9/13/83	19	28	28	Dom			No	575	227	61	18	101	11	90	35	26.9
64439	2/14/84	19	28	28	Dom	76.5	10	No		168	46	13	33	11			
66390	10/4/84	19	28	28	Dom	33	8	No	373	45	13	3	110	5	51	16	13.5
67442	2/6/85	19	28	28	Dom	30	6	No	826	340	98	23	161	5	193	60	0.3
119584	3/10/85	19	28	28	Dom			No	214	75	20	6	23	10	47	7	0
67956	3/26/85	19	28	28	Dom	28		No	371	200	57	14	46	6	50	13	12.7
68546	6/5/85	19	28	28	Dom	92		No	318	159	44	12	31	9	99	20	0
70106	12/2/85	19	28	28	Dom	35	8	No	400	213	62	14	53	4	60	17	13
70794	2/13/86	19	28	28	Dom			Yes	582	266	80	16	97	5	112	33	5.4
71109	3/19/86	19	28	28	Dom			Yes									
71230	3/26/86	19	28	28	Dom		8	No	339	113	32	8	68	9	50	14	8.8
71464	4/16/86	19	28	28	Dom	32	8	No	538	313	89	22	59	6	106	28	3.8
72198	6/17/86	19	28	28	Dom	30	8	Yes	572	288	84	19	84	7	123	36	7.3
72377	6/25/86	19	28	28	Dom	35	6	No	666	282	80	20	125	3	99	32	26.6
72474	7/7/86	19	28	28	Dom		8	No	604	321	97	19	86	5	106	30	6.5
73005	8/15/86	19	28	28	Dom			No	330	186	53	13	34	4	88	18	0
73064	8/22/86	19	28	28	Dom	45	8	No	706	10	4	0	250	10	180	51	2.8
73955	11/6/86	19	28	28	Dom			No	375	165	48	11	63	4	73	16	6.2
74132	11/24/86	19	28	28	Dom			No	2258	290	78	23	614	42	951	300	1.1
74492	12/31/86	19	28	28	Dom	30	6	No	321	108	30	8	68	4	47	13	12.3
74564	1/6/87	19	28	28	Dom	40	8	No	274	125	35	9	28	8	60	10	0
74682	1/13/87	19	28	28	Dom	30		No	434	198	58	13	77	4	86	18	4.7
74913	2/9/87	19	28	28	Dom			No	327	176	54	10	38	7	49	14	17.4

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
123267	242	261	17	1.96	0.33	0.01	0	0	0.02	0.02	0.9	45	10	0.2	8.35	797	0.34
127771	102	124	0	0.24	0.007	0.4	0.46	0	0	0.07	0.2	45	10	1	8.14	313	-0.04
130922	284	334	0	0.24	0.006	0.03	0.42	0.02	0.02	0.06	0.6	41	3	0.2	7.94	977	0.82
135009	94	115	0	0.22	0.003	0.06	0.61	0	0	0.08	0.2	45	3	0.3	8.13	359	-0.09
59628	352	429	0	0.48	0.005	0.01	1.28	0.03	0.02	0.06	0.9	34	3	0.3	7.66		
59564	148	181	0	0.31	0	0.61	0.25	0	0.04	0.03			15	8.3	7.61		
59733	148	161	8	2.14	0.775	0.07	0	0	0.15	0.01	0.4	41	3	0.6	8.45		
59857	186	227	0	0.29	0.01	0	0	0	0.01	0.05	0.3	45	3	0.3	7.9		
60181	182	198	10	0.51	0.06	0	0	0	0.03	0.02	0.3	41	3	0.3	8.46		
60673	278	339	0	0.43	0.01	0	0	0.05	0.03	0	0.6	39	5	0.2	7.65		
61148	250	305	0	0.57	0	0	1.4	0	0.26	0.06	0.4	36	5	0.6	7.73		
63322	294	359	0	0.32	0.06	0	0	0	0.03	0.06	0.6	43	5	0.4	7.78		
64439					0.01	0.04	1.05	0	0	0.14	0.1	45					
66390	202	227	10	0.9	0.19	0.57	0.04	0	0	0.03	0.4	43	25	6.9	8.37		
67442	428	522	0	0.54	0.01	1.46	2.26	0	0.01	0.09	0.7	24	35	9.8	7.48		
119584	90	110	0	0.29	0.006	0.5	0.65	0	0	0.01	0.2	47	17	1.9	7.64	285	-0.64
67956	228	278	0	0.49	0.013	0	0.01	0.01	0.01	0.05	0.3	43	5	0.6	7.55		
68546	106	129	0	0.23	0.004	0.05	0.99	0	0	0.1	0.2	45	3	0.1	8.02		
70106	242	295	0	0.25	0.008	0.13	0	0	0.04	0.06	0.6	39	3	1.2	7.85		
70794	338	412	0	0.47	0.02	0	0.65	0.18	0.02	0.11	0.6	39	5	0.1	7.63		
71109							0.07										
71230	206	251	0	0.5	0.05	0	0	0	0.05	0.03		41	5	0.1	7.94		
71464	306	373	0	0.24	0.003	0.02	0.15	0.04	0.38	0.05	0.5	34	5	0.1	7.37		
72198	312	381	0	0.29	0.003	0.11	0.44	0.12	0.66	0.08	0.6	34	5	1.1	7.77		
72377	414	505	0	0.58	0.02	0.01	0.23	0.01	0.01	0.06	0.7	43	3	0.2	7.82	1076	
72474	380	464	0	0.27	0.007	0	2.16	0	0.01	0.15	0.6	30	3	0.1	7.69	975	
73005	154	188	0	0.29	0.003	0.7	0.27	0	0.09	0.04	0.2	31	25	5.7	7.91	530	
73064	316	342	22	1.5	0.57	0	0.01	0	0.01	0.01	1.2	24	7	0.5	8.83	1127	
73955	224	273	0	0.51	0.008	0	1.52	0	0.01	0.09	0.4	42	3	0.2	7.16	605	
74132	268	327	0	1.61	0.03	0.17	0.02	0	0.04	0.02	3.7	41	7	1.1	7.82	3342	
74492	196	239	0	0.43	0.007	0.06	0.51	0	0.03	0.04	0.4	38	3	0.5	7.5	518	
74564	122	149	0	0.25	0.004	0.31	0.5	0	0.23	0.04	0.2	45	3	1.6	8.01	405	
74682	254	310	0	0.37	0.004	0	0.76	0	0.04	0.08	0.5	36	3	0.2	7.41	715	
74913	182	222	0	0.42	0.037	0	0	0	0.07	0.05	0.3	37	3	0.2	7.87	529	

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
75199	3/15/87	19	28	28	Dom	100	8	No	375	90	26	6	95	7	49	16	22.7
75490	4/13/87	19	28	28	Dom	30	6	No	756	394	115	26	104	6	165	53	3.5
75927	5/11/87	19	28	28	Dom	42	8	No	360	174	50	12	57	3	68	17	4.2
75879	5/12/87	19	28	28	Dom			No	704	347	101	23	119	5	159	40	0.1
76029	5/22/87	19	28	28	Dom	165	6	No	188	51	17	2	31	10	37	5	0
76256	6/15/87	19	28	28	Dom	38	7	No	515	253	70	19	87	3	59	18	14.1
76399	7/1/87	19	28	28	Dom	31	8	No	470	253	75	16	61	4	79	16	9.8
76834	8/21/87	19	28	28	Dom	30	6	No	525	282	80	20	73	7	84	23	6.3
77177	9/23/87	19	28	28	Dom			No	292	3	1	0	92	6	70	13	1
77244	9/28/87	19	28	28	Dom	34	6	No	503	215	63	14	95	5	86	24	5.9
77673	11/17/87	19	28	28	Dom	40	6	No									
78149	1/14/88	19	28	28	Dom	35	8	No	273	125	37	8	42	3	41	11	3.4
78858	3/15/88	19	28	28	Dom	76	6	No	318	150	42	11	28	7	81	19	0
78775	3/15/88	19	28	28	Dom	27	6	No	587	245	70	17	106	6	171	45	1.1
78771	3/15/88	19	28	28	Dom			No	662	319	93	21	111	13	129	33	0
79209	4/20/88	19	28	28	Dom	55	6	No	285	114	29	10	29	19	70	14	0
79191	4/22/88	19	28	28	Dom	32	10	No	604	235	71	14	120	4	101	32	20.9
79855	6/9/88	19	28	28	Dom	20		No	581	278	80	19	84	8	134	37	4.5
80646	9/7/88	19	28	28	Dom	82	6	No	268	120	33	9	27	8	62	13	0
81121	10/14/88	19	28	28	Dom	66	6	No	251	112	30	9	28	10	60	12	0
81411	11/29/88	19	28	28	Dom			No	553	283	82	19	79	11	72	28	10.8
81410	11/29/88	19	28	28	Dom		6	No	323	164	46	12	33	7	92	22	0.3
82247	3/8/89	19	28	28	Dom			No	284	79	20	7	61	7	42	18	7.5
82826	5/1/89	19	28	28	Dom	100	6	No	220	86	23	7	25	9	49	8	0.5
83290	6/19/89	19	28	28	Dom	50	8	No	506	299	80	24	42	6	155	34	0.5
84329	10/11/89	19	28	28	Dom	28	6	No	395	209	59	15	32	6	103	21	0.5
86159	3/12/90	19	28	28	Dom	147	8	No	193	53	18	2	29	1	38	5	0
87320	5/8/90	19	28	28	Dom		6	No	203	53	18	2	29	10	38	5	0.3
87950	5/29/90	19	28	28	Dom	42	6	No	318	172	49	12	30	6	75	13	0
90994	1/29/91	19	28	28	Dom	20	6	No	799	3	1	0	297	1	151	55	0.2
92798	6/17/91	19	28	28	Dom	71	8	No	280	129	35	10	29	10	68	14	0
92862	6/25/91	19	28	28	Dom	120	8	No	197	51	17	2	31	10	37	5	0
94956	11/25/91	19	28	28	Dom	134	6	No	203	62	20	3	26	11	39	5	0
94933	12/4/91	19	28	28	Dom	85	6	Yes	254	0	0	0	79	2	58	10	0

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
75199	212	259	0	0.47	0.054	0	0	0	0.01	0.04	0.5	40	3	0.9	8.04	599	
75490	388	473	0	0.24	0.004	0	0.45	0.37	0	0.07	0.9	39	3	0.3	7.26	1151	
75927	202	246	0	0.39	0.003	0.13	0.07	0	0.25	0.04	0.4	31	3	0.9	7.41	606	
75879	412	503	0	0.38	0.005	0.88	2.52	0	0.01	0.07	0.8	24	5	1.4	7.65	1168	
76029	88	102	2	0.31	0.02	0.03	0.16	0	0	0.06	0.2	47	3	0.2	8.2	282	
76256	346	422	0	1.04	0.019	0.03	0.05	0.12	0.33	0.06	0.5	46	3	0.5	7.65	828	
76399	290	354	0	0.3	0.004	0.02	0.6	0	0.02	0.08	0.5	36	3	0.3	7.44	766	
76834	322	393	0	0.55	0.007	0.19	0.38	0	0.01	0.14	0.5	42	3	0.8	7.43	855	
77177	112	127	5	0.21	0.03	0.02	0.01	0.02	0	0.01	0.2	48	3	0.3	8.35	444	
77244	300	366	0	0.44	0.01	0.01	0.8	0	0.01	0.11	0.6	37	3	0.3	7.68	824	
77673							0.01										
78149	166	203	0	0.47	0.007	0	0	0	0.12	0.04	0.3	39	3	0.2	7.95	446	
78858	100	122	0	0.23	0.008	0.1	0.79	0.02	0.04	0.09	0.2	46	3	0.8	7.79	459	
78775	240	293	0	0.23	0.003	0.91	0.93	0.01	0.01	0.05	0.7	22	17	5.7	7.7	920	
78771	404	493	0	0.4	0.003	0	0.29	0.05	0	0.01	0.7	25	3	0.4	7.53	1077	
79209	116	142	0	0.26	0.017	0.2	0.6	0	0.34	0.08	0.2	50	3	0.9	7.58	434	
79191	344	420	0	0.47	0.007	0.01	1.2	0	0.03	0.08	0.7	37	3	0.3	7.67	951	
79855	286	349	0	0.4	0.005	0.01	0.37	0	0	0.09	1	29	3	0.2	7.92	909	
80646	108	132	0	0.26	0.009	0.08	0.67	0.02	0.05	0.08	0.2	48	3	0.4	8.01	392	
81121	108	132	0	0.25	0.01	0.25	0.6	0	0	0.06	0.1	47	7	0.9	8.04	383	
81411	350	427	0	0.49	0.017	0	0.36	0.05	0.01				3	0.3	7.41	848	
81410	118	144	0	0.23	0.01	0.41	0.74	0.01	0.01	0	0	0	5	2.5	7.91	476	
82247	146	163	7	0.32	0.042	0.04	0	0.01	0.16	0.03	0.3	45	3	0.7	8.24	450	
82826	98	120	0	0.26	0.01	0.16	0.8	0	0.02	0.06	0.2	44	3	0.6	7.97	325	
83290	194	237	0	0.21	0.003	1.39	0.16	0	0.01	0.04	0.3	27	70	25	7.89	754	
84329	172	210	0	0.24	0.003	1.15	0.38	0.04	0.07	0.04	0.2	37	3	9.8	7.8	589	
86159	86	105	0	0.22	0.015	0.03	0.14	0	0	0.05	0.1	44	3	0.3	7.96	290	
87320	86	90	7	0.23	0.018	0.39	0.14	0	0	0.06	0.1	45	5	3.4	8.39	283	
87950	136	166	0	0.21	0.004	0.14	0.21	0	0.67	0.04	0	45	3	0.1	7.91	467	
90994	430	525	0	0.58	0.006	0.08	0.03	0	0.01	0	0.8	26	3	0.3	7.61	1248	
92798	110	134	0	0.25	0.012	0.38	0.72	0	0.01	0.07	0.2	47	3	1.1	7.99	422	
92862	88	107	0	0.25	0.02	0.07	0.14	0	0	0.05	0.2	46	3	0.1	8.05	285	
94956	92	102	5	0.26	0.018	0.07	0.14	0	0	0.05	0.2	45	3	0.2	8.31	287	
94933	102	124	0	0.3	0.01	0.14	0	0.1	0	0	0.2	46	7	1.6	7.5	376	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
99099	9/10/92	19	28	28	Dom	50	6	No	236	103	28	8	26	8	54	9	0
99098	9/16/92	19	28	28	Dom		6	No	275	131	36	10	28	8	71	15	0
101647	1/2/93	19	28	28	Dom	100		Yes		0							
101324	1/12/93	19	28	28	Dom	100	8	Yes									
103566	5/3/93	19	28	28	Dom	100	8	Yes									
106569	8/18/93	19	28	28	Dom		8	No	218	91	25	7	26	13	46	9	0
109048	12/2/93	19	28	28	Dom	100	8	Yes									
109841	12/21/93	19	28	28	Dom	31	6	No	367	186	53	13	60	5	58	20	0.5
112639	5/13/94	19	28	28	Dom	142	6	No	188	81	24	5	24	8	38	6	0.1
117381	10/31/94	19	28	28	Dom	90	8	No	190	75	20	6	23	10	37	5	0.1
118807	1/12/95	19	28	28	Dom	28	8	Yes									0
118808	1/12/95	19	28	28	Dom	32	8	No									2.51
118809	1/19/95	19	28	28	Dom	30	6	No									0
126306	3/13/96	19	28	28	Dom			No	192	65	21	3	26	10	40	5	0
131562	1/28/97	19	28	28	Dom	60	6	No	217	96	27	7	25	6	51	8	0
60178	8/5/82	19	28	29	Dom			No	336	112	30	9	62	9	65	19	5.1
61152	12/14/82	19	28	29	Dom	34	8	No		224	60	18	57	7			
61350	1/10/83	19	28	29	Dom	34	8	No	336	152	46	9	53	8	47	13	17.2
62746	7/20/83	19	28	29	Dom			No	269	161	53	7	27	2	32	7	0
70455	12/10/85	19	28	29	Dom	30	8	No	678	300	87	20	119	5	149	48	12.4
70201	12/12/85	19	28	29	Dom			No	711	297	86	20	134	6	168	52	0.7
70733	2/16/86	19	28	29	Dom	30	6	Yes									
73444	9/11/86	19	28	29	Dom	32	6	No	596	13	5	0	210	18	87	25	3.9
75164	3/10/87	19	28	29	Dom	30	8	No	327	118	34	8	67	5	60	20	5.6
75382	4/1/87	19	28	29	Dom	30	6	No	825	0	0	0	317	1	190	53	0
77074	9/9/87	19	28	29	Dom	30	8	No	463	233	67	16	67	4	96	27	0.4
77518	10/27/87	19	28	29	Dom	156	8	No	196	76	24	4	24	8	39	5	0
77519	10/27/87	19	28	29	Dom	174	8	No	205	62	20	3	29	10	39	4	0
77649	10/28/87	19	28	29	Dom	75	8	No	337	167	47	12	32	7	96	23	0
80561	8/22/88	19	28	29	Dom	60	6	No	344	171	47	13	32	7	104	19	0
81132	10/25/88	19	28	29	Dom	130	6	No	265	83	25	5	46	7	47	38	5.6
81239	11/3/88	19	28	29	Dom	130	6	No	215	3	1	0	56	18	43	6	0
81806	12/14/88	19	28	29	Dom	95	6	No	307	153	43	11	28	7	80	20	0.3
81966	1/10/89	19	28	29	Dom	84	6	No	236	94	26	7	26	8	55	8	0.2

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
99099	100	122	0	0.26	0.01	0.02	0.69	0	0	0.07	0.2	47	3	0.2	8.09	328	
99098	110	134	0	0.24	0.009	0.2	0.75	0	0	0.09	0.2	47	3	1	8.08	394	
101647							0.01										
101324							0.02										
103566							0.01										
106569	104	117	5	0.28	0.01	0.19	0.41	0	0	0.06	0.2	46	3	0.5	8.22	325	0.26
109048							0										
109841	230	271	5	0.32	0.003	0.07	0.04	0.01	0.01	0.06	0.4	37	3	0.6	8.2	585	0.73
112639	90	100	5	0.24	0.01	0.2	0.18	0	0	0.02	0.2	46	5	0.4	8.26	278	0.07
117381	88	107	0	0.29	0.008	0.27	0.67	0.01	0.01	0.02	0.2	49	7	1.1	7.99	268	-0.29
118807																	
118808																	
118809																	
126306	90	110	0	0.23	0.01	0.11	0.14	0	0	0.06	0.2	42	10	0.4	7.48	270	-0.77
131562	90	110	0	0.25	0.009	0.24	0.49	0.01	0	0.04	0.2	46	3	1.3	7.91	313	-0.24
60178	154	188	0	0.46	0.1	0.01	0	0	0.02	0.02	0.4	36	5	0.3	8.13		
61152						0.01	1.33	0.06	0.06	0.12	0.4	43					
61350	196	239	0	0.39	0.01	0.01	0	0	0.04	0.05	0.3	43	3	0.2	7.83		
62746	184	224	0	0.25	0.01	0.1	0	0	0.6	0.03	0.2	30	5	0.6	7.79		
70455	342	417	0	0.47	0.008	0	1.56	0.03	0.01	0.06	0.7	32	5	0.1	7.77		
70201	356	434	0	0.37	0.004	0.03	1.24	0	0.02	0.05	0.8	30	5	0.8	7.53		
70733							0										
73444	364	366	38	1.81	1.03	0.06	0.02	0.01	0.03	0	1.4	33	12	0.5	8.97	947	
75164	176	215	0	0.9	0.009	0.01	0.01	0.05	0.05	0.04	0.5	31	3	0.3	7.76	544	
75382	400	488	0	0.46	0.005	0	0	0.02	0.02	0	1	27	3	0.4	7.54	1300	
77074	262	320	0	0.39	0.003	0.58	2.39	0	0.12	0.11	0.6	28	7	5.1	7.41	767	
77518	92	107	2	0.27	0.013	0.11	0.18	0	0	0.05	0.2	48	3	0.4	8.2	289	
77519	92	107	2	0.26	0.016	0.14	0.16	0	0	0.04	0.2	57	3	0.6	8.23	287	
77649	124	151	0	0.23	0.004	0.52	0.83	0	2.24	0.08	0.2	45	5	3.7	7.99	519	
80561	120	146	0	0.24	0.005	0.3	0.9	0	0.02	0.06	0.2	44	3	1.9	8	517	
81132	100	102	10	0.26	0.014	3.01	0.18	0.04	0.03	0.05	0.1	42	45	6.8	8.39	413	
81239	96	107	5	0.26	0.01	0.09	0.01	0	0	0			3	0.8	8.29	313	
81806	116	142	0	0.24	0.007	0.15	0.81	0	0.01	0.09	0.1	47	3	0.8	7.95	462	
81966	100	122	0	0.28	0.01	0.13	0.6	0	0	0.11			3	0.7	7.77	337	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
82046	2/14/89	19	28	29	Dom	36	8	No	457	222	59	18	64	8	68	19	20.8
82165	2/22/89	19	28	29	Dom	80	6	No	302	148	41	11	29	8	80	18	0.2
82824	5/9/89	19	28	29	Dom			No	325	159	44	12	31	7	88	22	0.5
83542	7/14/89	19	28	29	Dom			No	613	278	80	19	97	5	176	27	0.6
84668	11/8/89	19	28	29	Dom			Yes	755	0	0	0	263	2	226	61	1.5
85318	1/19/90	19	28	29	Dom	60		No	328	168	46	13	29	8	90	21	0.2
86722	4/5/90	19	28	29	Dom	139	8	No	206	83	25	5	23	7	41	5	0
88332	5/31/90	19	28	29	Dom	35	6	No	403	112	30	9	95	5	52	26	0.5
88709	7/19/90	19	28	29	Dom	160	6	No	204	38	12	2	37	12	38	5	0.2
89959	10/29/90	19	28	29	Dom	29	8	No	402	167	47	12	75	3	48	16	18.7
90071	11/6/90	19	28	29	Dom	139	8	Yes									
90258	11/27/90	19	28	29	Dom	84	6	Yes	246	0	0	0	77	1	54	10	0
90265	11/30/90	19	28	29	Dom	30	8	No	406	215	63	14	61	4	58	22	2.3
90993	1/29/91	19	28	29	Dom			No	298	157	43	12	30	9	84	20	0.2
91663	3/25/91	19	28	29	Dom			No	319	59	17	4	92	4	45	13	0
91760	3/26/91	19	28	29	Dom			No	228	100	27	8	24	8	51	7	0.1
91855	4/10/91	19	28	29	Dom			No	508	149	40	12	106	19	73	28	44.8
92141	5/1/91	19	28	29	Dom	30	6	No	332	113	32	8	71	4	50	15	0
93629	8/12/91	19	28	29	Dom	165	6	No	202	65	21	3	25	10	39	4	0
94831	11/18/91	19	28	29	Dom			Yes	17	3	1	0	3	1	1	0	0
95210	12/13/91	19	28	29	Dom		8	No	511	203	60	13	95	14	82	25	15
95719	2/3/92	19	28	29	Dom	120	6	No	199	76	24	4	24	8	38	5	2.6
95800	2/11/92	19	28	29	Dom	150	8	No	207	88	27	5	24	8	49	7	0
95802	2/11/92	19	28	29	Dom			No	420	151	44	10	85	3	58	16	26.4
95948	2/25/92	19	28	29	Dom			Yes	238	41	13	2	56	12	43	23	0
97559	7/2/92	19	28	29	Dom	34	8	No	560	282	75	23	82	8	85	29	4.6
98278	8/10/92	19	28	29	Dom	32	8	Yes									
99297	9/7/92	19	28	29	Dom	40	6	No	423	173	48	13	65	17	59	27	4.2
99091	9/15/92	19	28	29	Dom	150	6	No	200	83	25	5	23	7	41	6	0
99393	9/30/92	19	28	29	Dom	149	6	No	203	53	18	2	31	11	38	5	0.2
100516	11/9/92	19	28	29	Dom	100	8	Yes									
101417	1/14/93	19	28	29	Dom	35	6	No	316	0	0	0	100	3	77	19	0.3
102430	3/16/93	19	28	29	Dom	20	6	No								38	6.9
107500	9/16/93	19	28	29	Dom	100	6	No	196	67	22	3	26	11	38	5	0.5

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
82046	266	325	0	0.52	0.025	0.02	0.74	0.09	0.01	0.12	0.6	42	3	0.3	7.74	724	
82165	114	139	0	0.23	0.007	0.2	0.7	0.01	0.01	0.09	0.2	48	3	1.1	7.92	456	
82824	114	139	0	0.21	0.007	0.28	0.78	0	0.22	0.08	0.2	45	3	2.1	7.84	481	
83542	268	327	0	0.4	0.003	0.42	2.01	0.01	0	0.06	0.8	30	5	0.9	8.08	931	
84668	254	310	0	0.29	0.003	0.01	0.01	0	0	0	0.8	35	3	0.1	7.59	1170	
85318	118	144	0	0.23	0.008	0.17	0.73	0.01	0	0.1	0.1	46	5	1.2	7.83	484	
86722	98	100	10	0.26	0.013	0.03	0.18	0	0	0.06	0.1	46	3	0.4	8.24		
88332	236	288	0	0.58	0.113	0.01	0.11	0.01	0	0.02	0.3	42	3	0.5	7.99	645	
88709	86	105	0	0.24	0.016	0.76	0.13	0	0	0.04	0	50	12	2.1	8.18	284	
89959	254	310	0	0.26	0.04	0.01	0.04	0	0	0.06	0.2	39	3	0.2	7.98	647	
90071							0.08										
90258	104	122	2	0.29	0.009	0.05	0	0.16	0.01	0	0.2	45	3	0.5	7.2	367	
90265	278	339	0	0.43	0.004	0.02	0.02	0.01	0.12	0.05	0.5	33	3	0.5	7.48	662	
90993	116	142	0	0.25	0.008	0.44	0.75	0.07	0	0.02	0.2	49	3	1.1	7.9	472	
91663	196	239	0	1.22	0.113	0.31	0.1	0	0	0.02	0.6	34	3	1.1	8.06	517	
91760	98	120	0	0.27	0.01	1.08	0.49	0	0	0.06	0.2	46	5	1.1	8.04	336	
91855	252	307	0	0.46	0.05	0.01	0.06	0.02	0.03	0.06	0.6	44	3	0.4	8.07	794	
92141	204	249	0	0.58	0.015	0.1	0.13	0	0.03	0.04	0.8	36	3	0.3	7.99	542	
93629	88	93	7	0.26	0.013	0.62	0.15	0	0.01	0.03	0.2	46	3	2.3	8.26	289	
94831	14	17	0	0.09	0.003	0	0.01	0	0.02	0.01	0.1	4	3	0.1	7.86	34	
95210	308	376	0	0.43	0.007	0.04	0.02	0.02	0.12	0.02	0.9	37	3	0.3	7.82	822	
95719	90	110	0	0.26	0.01	0.14	0.18	0.01	0	0.05	0.2	45	5	0.4	8.12	287	
95800	88	107	0	0.32	0.008	0.06	0.17	0	0	0.06	0.2	44	3	0.2	8.1	315	
95802	238	290	0	0.4	0.03	0.03	0.01	0.01	0.32	0.03	0.5	44	3	0.2	7.9	662	
95948	100	122	0	0.28	0.01	0.43	0.01	0.01	0.01	0.02	0.2	39	12	1.9	7.91	370	
97559	344	420	0	0.5	0.03	0	1.47	0	0.01	0.16	0.6	43	3	0.6	7.86	841	
98278							0.33										
99297	226	276	0	0.52	0.04	0.17	0	0.02	0.03	0.09	0.5	48	3	0.1	8.15	627	
99091	92	98	7	0.25	0.007	0.5	0.14	0	0.01	0.04	0.2	42	3	1.1	8.34	277	
99393	92	98	7	0.2	0.02	0.4	0.13	0	0	0.05	0.2	47	5	1.6	8.22	269	
100516							0.02										
101417	114	115	12	0.22	0.009	0.01	0	0	0	0	0.2	45	5	0.3	8.35	452	
102430																	
107500	92	98	7	0.23	0.02	0.23	0.18	0	0	0.06	0.2	48	3	0.9	8.25	277	0.12

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
108398	10/28/93	19	28	29	Dom			Yes									
113312	6/1/94	19	28	29	Dom	84		No	215	89	24	7	25	8	50	8	0.1
116221	10/18/94	19	28	29	Dom	42	8	No	365	101	32	5	77	9	51	25	6.7
117865	12/1/94	19	28	29	Dom			No									3.6
120010	3/28/95	19	28	29	Dom	87	8	No	268	122	34	9	28	9	70	14	0
120343	4/13/95	19	28	29	Dom			No	283	134	37	10	29	8	77	16	0.1
127115	5/2/96	19	28	29	Dom	180	8	No	207	83	25	5	23	8	44	6	0.1
128501	7/25/96	19	28	29	Dom	160		No	263	118	34	8	29	8	72	12	0
132191	3/12/97	19	28	29	Dom	93	6	No									0
60838	10/26/82	19	28	30	Dom			No	521	245	70	17	67	6	115	33	2.5
61972	4/12/83	19	28	30	Dom			No	365	52	16	3	121	3	48	12	6.1
62178	5/5/83	19	28	30	Dom			No									
68154	4/22/85	19	28	30	Dom		10	No	303	160	46	11	44	4	52	14	7.6
70146	12/3/85	19	28	30	Dom		10	No	279	130	37	9	42	4	43	13	6.8
72131	6/6/86	19	28	30	Dom	40	8	No	575	222	59	18	104	7	100	35	27.4
72444	7/7/86	19	28	30	Dom	30	4	No	355	183	52	13	42	2	82	24	0
72499	7/8/86	19	28	30	Dom	30	8	No	193	99	28	7	26	3	34	8	0
72472	7/8/86	19	28	30	Dom			No	228	99	28	7	29	3	35	7	5.8
72487	7/9/86	19	28	30	Dom	40	8	No									
73904	11/4/86	19	28	30	Dom		8	No	492	267	79	17	58	4	117	46	0.3
75201	3/12/87	19	28	30	Dom	90	8	No	440	242	67	18	41	6	135	18	0.2
75277	3/18/87	19	28	30	Dom	35	6	No	382	45	13	3	116	3	54	15	15.5
75379	3/27/87	19	28	30	Dom	40	10	No	286	144	41	10	42	4	45	13	5.6
75514	4/13/87	19	28	30	Dom	27	6	No	215	106	31	7	30	3	33	8	2.8
76159	6/9/87	19	28	30	Dom	34	8	No	519	243	66	19	78	7	87	27	25.9
76775	8/17/87	19	28	30	Dom			No	215	91	25	7	25	6	44	8	0
77246	9/29/87	19	28	30	Dom	35	6	No	376	115	33	8	89	4	60	18	3.7
77511	10/26/87	19	28	30	Dom	183		No	202	73	21	5	25	6	43	6	0
78776	3/7/88	19	28	30	Dom	35	8	No	337	106	31	7	78	4	48	14	1.8
79775	6/2/88	19	28	30	Dom	112	8	No	417	230	64	17	40	6	127	16	0.3
81712	11/21/88	19	28	30	Dom	137	6	No	201	85	24	6	23	7	42	5	0.6
81713	11/21/88	19	28	30	Dom	30	6	No	201	87	25	6	23	7	44	6	0.5
82233	1/25/89	19	28	30	Dom	32	8	No	625	241	70	16	121	6	155	37	10.7
82401	3/16/89	19	28	30	Dom	23	8	No	639	87	25	6	176	14	173	55	0.7

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
108398							0										
113312	94	115	0	0.27	0.007	0.17	0.63	0	0	0.08	0.2	45	5	0.6	7.91	314	-0.27
116221	178	217	0	1.06	0.13	0.01	0	0.01	0.02	0.05	0.6	38	3	0.3	7.87	561	0.07
117865					0.05	0.11	0.71										
120010	108	132	0	0.24	0.01	0.05	0.71	0	0.01	0.09	0.2	48	7	0.4	7.82	394	-0.16
120343	112	137	0	0.25	0.007	0.28	0.72	0	0	0.09	0.2	47	3	1.1	8.03	418	0.1
127115	92	112	0	0.25	0.01	0	0	0.01	0	0.04	0.2	43	3	0.1	8	290	-0.17
128501	102	100	12	0.24	0.01	0.56	0.49	0.01	0	0.08	0.2	43	12	2.2	8.24	385	0.24
132191						0.45	0.67										
60838	254	310	0	0.41	0.005	0.01	0.47	0	0.03	0.06	1	30	3	0.3	7.67		
61972	238	290	0	2.34	0.01	0	0	0	0.07	0.03	0.7	28	5	0.6	7.85		
62178																	
68154	176	215	0	0.49	0.005	0	0.03	0	0.01	0.14	0.4	30	5	0.2	7.67		
70146	156	190	0	0.57	0.004	0	0.03	0	0.03	0.12	0.4	30	5	0.6	7.64		
72131	304	371	0	0.85	0.145	0.01	0.98	0.01	0	0.12	0.7	43	3	0.2	7.85		
72444	170	207	0	0.29	0.005	0.06	0.12	0	0.02	0.08	0.4	33	3	0.2	7.48	562	
72499	118	144	0	0.39	0.02	0.01	0.41	0.03	0.01	0.04	0.3	26	3	0.1	8.01	326	
72472	125	154	0	0.24	0.01	0	0.81	0	0.04	0.04	0.3	36	3	0	7.68	356	
72487					0.17	0	1										
73904	234	285	0	0.23	0.007	0.65	2.75	0.01	0.71	0.12	0.4	35	70	3.9	7.5	786	
75201	176	215	0	0.22	0.003	2.14	0.78	0	0.01	0.08	0.5	35	35	16	7.83	666	
75277	206	251	0	1.55	0.19	0.01	0	0.01	0.02	0.02	0.5	34	3	0.3	8.14	595	
75379	170	207	0	0.51	0.01	0.02	0.08	0	0.02	0.12	0.4	27	3	0.4	7.67	471	
75514	128	156	0	0.39	0.01	0.01	0.44	0.01	0.02	0.02	0.3	36	3	0.3	7.83	357	
76159	280	342	0	0.55	0.04	0	1.55	0	0	0.14	0.6	43	5	1.5	7.64	832	
76775	90	110	0	0.27	0.01	0.04	0	0.01	0.03	0.03	0.2	48	3	0.5	7.82	319	
77246	226	276	0	0.69	0.01	0	0.11	0	0.07	0.07	0.5	32	5	0.3	7.76	619	
77511	86	105	0	0.27	0.005	0.75	0.23	0	0.01	0.04	0.2	44	12	4.5	7.97	295	
78776	208	254	0	0.67	0.01	0.03	0.27	0	0.31	0.06	0.5	31	3	0.4	7.89	540	
79775	180	220	0	0.18	0.003	0.96	0.55	0	0.01	0.08	0.7	40	17	4.4	7.96	680	
81712	96	117	0	0.29	0.01	0.06	0.01	0	0.01	0.03	0.2	41	3	0.5	8.17		
81713	98	90	14	0.28	0.007	1.26	0.15	0.01	0	0.04	0.2	37	17	2.8	8.23		
82233	304	371	0	0.38	0.005	0	0.01	0	0	0.13	1.1	31	3	0.5	7.84	1001	
82401	248	303	0	1.27	0.142	0.06	0.2	0	0	0.03	1	47	3	0.5	8.04	992	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
83328	6/26/89	19	28	30	Dom	90	6	No	189	62	20	3	28	9	39	6	0.4
85652	2/5/90	19	28	30	Dom	50	8	No	313	164	46	12	45	4	44	11	14.2
88552	7/2/90	19	28	30	Dom		4	No	361	168	46	13	44	16	61	22	6.3
89010	8/14/90	19	28	30	Dom			No	226	115	33	8	29	3	40	19	0.7
90260	11/27/90	19	28	30	Dom			No	260	135	39	9	30	4	61	12	0.1
93976	9/3/91	19	28	30	Dom		8	No	194	76	22	5	24	7	39	6	0
94762	11/13/91	19	28	30	Dom	34	8	No	567	289	76	24	82	8	83	29	26.1
99392	10/1/92	19	28	30	Dom	25	8	No	278	144	41	10	37	3	58	24	0.2
101174	12/28/92	19	28	30	Dom	106		No	454	185	51	14	67	22	121	34	0.2
103700	5/3/93	19	28	30	Dom	140	6	No	208	33	10	2	41	13	40	5	0
103869	5/18/93	19	28	30	Dom	30	6	No	324	167	47	12	48	4	50	16	2.5
133006	5/15/97	19	28	30	Dom			No									0
59970	7/10/82	19	28	31	Dom	24	6	No	1867	423	120	30	430	13	776	247	0
59907	7/17/82	19	28	31	Dom		6	No	1530	491	137	36	312	13	557	233	0.3
61044	11/16/82	19	28	31	Dom	20	8	No	1445	525	146	39	234	9	528	203	0.2
62847	8/4/83	19	28	31	Dom	30	6	No	1000	250	62	23	209	21	392	116	0.9
64868	4/11/84	19	28	31	Dom	178	8	No	180	60	19	3	32	8	39	5	0
65310	5/29/84	19	28	31	Dom			No	765	258	80	14	165	6	131	49	64.5
65539	7/10/84	19	28	31	ation	50	8	No	713	228	60	19	136	16	241	68	0
65778	8/6/84	19	28	31	Dom	36	4	No	750	165	43	14	180	18	238	88	6.5
69276	1/4/85	19	28	31	Dom	42	8	No	1079	132	38	9	309	18	354	114	0.2
67584	2/13/85	19	28	31	Dom	30	8	No	885	244	63	21	183	18	305	128	1.5
68157	4/25/85	19	28	31	Dom	32	8	No	1868	765	212	57	288	11	680	320	0.1
68316	5/7/85	19	28	31	Dom	27	8	No	2130	887	246	66	317	13	857	290	0
69687	10/7/85	19	28	31	Dom	178	6	No	189	60	19	3	33	8	40	5	0
73398	9/17/86	19	28	31	Dom	40	6	No	292	114	29	10	37	11	74	16	0
73516	9/29/86	19	28	31	Dom	35	6	No	2371	44	16	1	767	26	1000	223	0
74561	1/8/87	19	28	31	Dom	30	8	No	294	73	21	5	67	4	57	14	0
74754	1/22/87	19	28	31	Dom	25	8	No	1264	428	112	36	250	29	364	144	16.1
75849	5/12/87	19	28	31	Dom			No	1097	344	98	24	251	6	289	89	21.4
76629	7/29/87	19	28	31	Dom	27	8	No	747	269	73	21	146	12	159	56	7.8
76769	8/17/87	19	28	31	Dom			No	312	125	32	11	38	11	83	20	0
77668	11/13/87	19	28	31	Dom	30		No	1715	578	162	42	316	10	640	248	0
77768	11/30/87	19	28	31	Dom			No	825	294	83	21	178	7	178	44	11.8

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ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
90	95	7	0.25	0.014	0.12	0.11	0	0	0.03	0.2	48	3	0.5	8.22	282	
196	239	0	0.54	0.005	0.02	0.13	0.01	0.04	0.15	0.3	29	3	0.1	7.88	518	
184	224	0	0.7	0.07	0	0	0	0.09	0.06	0.2	51	3	0.3	7.93	565	
110	134	0	0.29	0.006	0.01	0.04	0	0.01	0.04	0	29	3	0.1	7.8	374	
130	159	0	0.33	0.003	0.18	0.01	0	0.02	0.04	0.3	28	3	0.6	7.72	420	
90	110	0	0.28	0.014	0.01	0.2	0	0	0.05	0.2	46	3	0.2	8.14	286	
334	407	0	0.5	0.03	0	1.37	0.01	0	0.16	0.6	42	5	0.1	7.74	897	
134	163	0	0.27	0.006	0.02	0.04	0	0	0.06	0.3	30	3	0.1	7.57	431	
176	215	0	0.26	0.016	0.85	0.32	0	0	0.06	0.3	47	17	3.6	8.11	655	
80	98	0	0.32	0.02	0.41	0.12	0	0	0.04	0.2	49	5	1.6	8.1	277	
194	237	0	0.54	0.005	0.12	0.25	0.02	0.03	0.13	0.4	29	3	0.7	7.74	517	
286	349	0	0.79	0.04	0	0.04	0	0.02	0.03	2.6	49	3	0.4	8.15		
252	307	0	0.5	0.02	0.05	0.05	0.01	0.11	0.05	1.4	51	3	0.9	7.6		
256	312	0	0.39	0.02	0.83	0.06	0	0.01	0.04	1	47	12	2.9	7.96		
180	220	0	0.85	0.06	0.22	0.01	0.01	0.01	0.03	1.1	51	5	2.2	8.16		
90	110	0	0.18	0.02	0.04	0.28	0.01	0.01	0.08	0.1	39	3	0.3	7.95		
366	447	0	0.55	0.01	0.02	0	0.01	0.01	0.1	0.8	51	5	0.4	7.73		
210	256	0	0.54	0.03	0.01	0	0	0.03	0.03	0.6	51	3	0.2	7.99		
202	246	0	0.53	0.02	0.07	0.19	0.04	0.04	0.04	0.7	49	7	0.5	8.08		
284	332	7	1.53	0.25	0.01	0	0	0.02	0.05	1.4	45	3	0.1	8.21		
176	215	0	0.93	0.03	0.35	0.04	0	0.04	0.04	0.7	45	5	2.3	7.96		
268	327	0	0.53	0.02	0.58	0.02	0.01	0.05	0.05	1.1	43	10	2.5	7.67		
342	417	0	0.37	0.03	0.01	0.25	0	0.02	0.06	1.5	45	5	0.2	7.67		
92	112	0	0.22	0.02	0.08	0.28	0	0.01	0.08	0.2	41	5	0.2	8.16		
114	139	0	0.27	0.02	0.59	0.73	0	0.01	0.08	0.2	54	12	2.3	8.08	444	
414	451	26	2.9	0.45	0.05	0	0	0.02	0.02	4.3	53	3	0.3	8.41	3491	
152	185	0	0.61	0.02	0.18	0.26	0	0.01	0.03	0.6	46	3	1.1	7.97	467	
418	510	0	0.45	0.03	0	0.02	0	0	0.07	1.8	55	3	0.2	7.74	1879	
454	554	0	0.75	0.04	0	0.07	0	0	0.05	1.6	41	5	0.2	7.93	1693	
366	447	0	0.85	0.04	0.07	0.05	0	0.03	0.01	1	52	3	0.9	7.77	1130	
106	129	0	0.28	0.01	0.06	0.82	0	0	0.08	0.2	55	3	0.4	7.84	471	
294	359	0	0.6	0.03	0.02	0.12	0	0.04	0.03	1.4	54	3	0.3	7.78	2406	
434	529	0	0.63	0.04	0.01	0.47	0.54	0.05	0.04	1.1	45	3	0.3	7.96	1270	

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
77916	12/10/87	19	28	31	Dom	91	6	No	324	127	33	11	39	11	91	18	0
78770	3/8/88	19	28	31	Dom	67	8	Yes	392	0	0	0	124	4	109	25	0
79582	5/23/88	19	28	31	Dom	115	6	No	242	100	27	8	30	9	46	8	0
79762	6/13/88	19	28	31	Dom			No	1192	467	131	34	227	10	302	143	7.9
80209	7/7/88	19	28	31	Dom	30	6	No	2186	5	2	0	770	2	810	323	0
80148	7/15/88	19	28	31	Dom		6	No	1518	240	68	17	418	15	690	173	0
80240	7/22/88	19	28	31	Dom	48	6	No	1262	145	43	9	357	10	490	120	0
80421	7/27/88	19	28	31	Dom	25	8	No	1014	372	101	29	179	17	316	96	0
80972	9/9/88	19	28	31	Dom	60	6	No	692	7	1	1	250	9	123	63	0.5
81241	11/3/88	19	28	31	Dom	54	6	No	930	350	94	28	163	18	300	94	0
83729	8/1/89	19	28	31	Dom	40		Yes	384	178	48	14	50	5	95	30	1
83730	8/1/89	19	28	31	Dom	40		Yes	360	178	50	13	44	3	62	21	1.7
83750	8/17/89	19	28	31	Dom	83	6	No	237	47	14	3	45	17	51	9	0.1
85512	1/24/90	19	28	31	Dom			No	232	51	14	4	41	18	46	8	0.7
85841	2/23/90	19	28	31	Dom			No	375	166	45	13	38	9	119	25	0.3
88254	6/18/90	19	28	31	Dom			No	192	60	19	3	31	8	42	5	1
89482	9/13/90	19	28	31	Dom	70	8	No	1383	321	79	30	309	27	545	170	10.6
90066	11/1/90	19	28	31	Dom			No	381	164	46	12	64	7	49	17	2
91527	3/13/91	19	28	31	Dom			No	444	209	54	18	49	12	142	31	0.7
92725	6/19/91	19	28	31	Dom	38	6	No	933	238	64	19	221	15	330	97	0
93657	8/5/91	19	28	31	Dom	65	6	No	585	303	75	28	45	13	238	41	0
93804	8/19/91	19	28	31	Dom	43	8	No	296	62	15	16	62	16	52	15	0
94934	12/4/91	19	28	31	Dom	27	6	Yes	1194	459	126	35	238	10	336	84	4.2
95258	12/23/91	19	28	31	Dom	39		No	702	193	51	16	156	10	204	62	0
95879	2/20/92	19	28	31	Dom		6	No	370	168	46	13	38	10	113	25	0
95985	2/23/92	19	28	31	Dom	55	6	No	627	296	82	22	74	10	212	52	3.4
96837	5/17/92	19	28	31	Dom	36	6	No	316	85	19	9	57	15	74	25	0
96999	5/20/92	19	28	31	Dom		6	Yes	516	40	11	3	166	6	66	124	0
97960	7/21/92	19	28	31	Dom	30	6	No	440	207	58	15	60	8	84	35	3.2
100307	11/5/92	19	28	31	Dom	103		No	254	3	1	0	80	3	44	8	0.1
109449	12/10/93	19	28	31	Dom		6	No	1157	358	97	28	271	13	290	93	1
109877	12/29/93	19	28	31	Dom			No	448	45	13	3	138	7	78	21	3.7
127383	5/28/96	19	28	31	Dom	39	6	No	285	85	19	9	48	14	72	19	0
137574	4/13/98	19	28	31	Dom	45		No	639	214	56	18	132	10	158	50	0.1

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
110	134	0	0.27	0.01	0.07	1	0.01	0.01	0.1	0.2	53	3	0.9	7.67	477	
126	154	0	0.29	0.01	0.02	0.01	0	0	0	0.2	54	3	0.4	8.06	582	
116	142	0	0.29	0.02	0.06	0.3	0	0.01	0.04	0.2	51	3	0.3	8.1	364	
474	578	0	0.71	0.03	0.21	0.04	0	0	0.06	1.3	48	3	0.3	7.84	1808	
350	427	0	0.63	0.03	0	0	0	0.01	0	1.8	51	3	0.2	7.81	3330	
318	388	0	1.22	0.07	0.06	0	0	0.07	0.03	2.6	49	5	0.4	7.98	2271	
278	339	0	0.74	0.14	0.03	0	0	0.01	0.02	2.3	49	3	0.3	8	1888	
360	429	5	0.4	0.03	0.01	0.03	0	0	0.03	1.3	50	5	0.1	8.21	1526	
336	351	29	4.01	1.67	0.13	0	0.01	0.42	0			10	0.4	8.85	1113	
292	356	0	0.61	0.03	0.13	0	0	0.02	0.02	0	0	3	0.8	7.82	1358	
160	195	0	0.49	0.003	0.02	0.13	0.7	0.11	0.04	0.4	34	3	0.6	8.17	593	
194	237	0	0.97	0.003	0.03	0.15	1.43	0.17	0.08	0.4	30	3	0.6	8.18	552	
102	115	5	0.27	0.007	0.14	0.36	0	0.05	0.06	0.1	41	5	0.4	8.21	354	
102	124	0	0.28	0.006	1.24	0.59	0	0	0.05	0.1	42	5	0.9	7.5	348	
112	137	0	0.3	0.009	0.07	0.63	0	0.03	0.05	0.1	54	3	0.4	7.77	540	
94	115	0	0.26	0.02	2.18	0.31	0.13	0.03	0.08	0.1	41	12	5.8	8.02	303	
270	329	0	1.28	0.21	0	0	0	0.01	0.03	2.1	53	3	0.4	7.96	2036	
230	281	0	0.71	0.03	0	0.04	0	0	0.01	0.5	51	3	0.1	7.99	604	
142	173	0	0.27	0.008	0.23	1	0	0	0.1	0.3	54	3	1	7.89	671	
244	298	0	0.65	0.04	0.08	0.01	0	0	0.02	1.6	51	3	0.3	7.76	1437	
112	137	0	0.24	0.012	0.06	2.26	0	0	0.1	0.2	54	3	0.3	7.7	825	
146	178	0	0.41	0.01	0.07	0.23	0	0	0.04	0.3	53	3	0.2	8.18	456	
538	656	0	0.82	0.03	0.02	0.03	0.02	0	0.07	1.3	46	3	0.2	7.63	1762	
256	312	0	0.85	0.05	0.07	0	0	0.01	0.04	0.9	50	3	0.5	7.78	1068	
120	146	0	0.29	0.008	0.11	0.66	0	0	0.05	0.2	52	3	0.4	7.93	554	
182	222	0	0.35	0.003	0.45	0.18	0	0.03	0.08	0.4	47	3	0.5	7.67	928	
114	139	0	0.38	0.013	0.02	0.53	0	0	0.04	0.2	52	3	0	7.79	459	
164	200	0	0.46	0.011	0	0	0	0.09	0.01	2.6	38	3	0.1	7.94	832	
200	244	0	0.35	0.02	0.04	0.66	0	0	0.04	0.5	42	3	0.2	7.57	659	
122	124	12	0.29	0.026	0.28	0.02	0	0.01	0.01	0.2	43	5	2.1	8.72	351	
526	642	0	0.52	0.03	0.02	0.12	0.05	0.04	0.03	1.7	48	10	0.5	8.03	1754	1213
232	273	5	1	0.29	0	0	0.02	0.02	0.01	0.7	40	3	0.4	8.36	680	0.27
114	139	0	0.3	0.014	0.08	0.65	0.01	0	0.04	0.2	49	3	0.3	7.7	431	-0.51
288	351	0	0.62	0.04	0.59	0.02	0	0	0.04	0.9	52	7	7.3	7.95	995	0.57

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
76161	6/9/81	19	28	32	Dom	25	6	No	710	233	57	22	148	13	135	58	34
64802	3/23/84	19	28	32	Dom		8	No	520	283	87	16	57	3	72	26	52.4
64841	3/23/84	19	28	32	Dom		8	No	461	252	71	18	65	2	74	16	12.1
67954	3/29/85	19	28	32	Dom	100	6	Yes	286	128	33	11	30	9	69	14	0
71486	4/17/86	19	28	32	Dom	35	6	No	341	192	57	12	40	5	49	12	19.2
71986	5/28/86	19	28	32	Dom		6	No	507	273	73	22	62	10	68	20	32.4
76209	6/11/87	19	28	32	Dom			No	207	100	30	6	25	3	38	8	0.7
76543	7/22/87	19	28	32	Dom	32	6	No	311	126	39	7	60	5	35	13	6.2
80183	7/8/88	19	28	32	Dom	31	6	No	343	85	24	6	81	5	46	3	2
80422	7/25/88	19	28	32	Dom	135	6	No	193	67	22	3	28	11	39	5	0
80864	9/8/88	19	28	32	Dom	40	6	No	416	231	61	19	49	9	56	13	2.8
81589	10/25/88	19	28	32	Dom	92	6	No	293	111	33	7	37	14	65	19	0.9
82553	4/10/89	19	28	32	Dom	135	6	No	199	56	19	2	28	12	39	4	0.1
82742	4/28/89	19	28	32	Dom	28	6	No	331	176	54	10	36	3	49	14	7.7
84462	10/16/89	19	28	32	Dom	106	6	No	216	71	20	5	27	13	44	5	0.6
88369	6/21/90	19	28	32	Dom	35	6	No	442	251	84	10	45	3	77	25	23.6
89300	8/24/90	19	28	32	Dom	28	6	No	345	193	54	14	37	3	49	15	13.9
93353	7/19/91	19	28	32	Dom	30	6	No	494	199	55	15	93	4	76	39	5.8
97583	6/30/92	19	28	32	Dom			No	424	0	0	0	161	3	43	7	0.2
99438	9/30/92	19	28	32	Dom	86	6	No	324	147	39	12	37	14	76	19	0
100806	12/3/92	19	28	32	Dom	25	8	No	505	247	66	20	72	9	65	21	7.7
65019	4/23/84	19	28	33	Dom	34	6	No	166	88	27	5	23	2	27	7	0.7
69574	9/27/85	19	28	33	Dom	25	8	No	1788	523	160	30	396	22	573	146	0
70795	2/19/86	19	28	33	Dom		6	No	272	106	31	7	42	9	42	15	15.8
71179	3/18/86	19	28	33	Dom	35	6	No	509	153	38	14	107	16	94	27	21.2
71177	3/19/86	19	28	33	Dom	30	6	No	338	183	55	11	45	3	44	16	0.1
71370	4/8/86	19	28	33	Dom	30	8	No	410	162	45	12	80	5	60	16	5.5
71775	5/1/86	19	28	33	Dom	80		No	233	100	27	8	24	8	49	8	0
72498	7/8/86	19	28	33	Dom	30	6	No	491	282	85	17	62	4	71	24	0
73512	9/23/86	19	28	33	Dom	30	6	No	390	202	56	15	46	5	58	13	7.9
74093	11/12/86	19	28	33	Dom	74	6	No	286	136	38	10	28	8	76	17	0
74565	1/6/87	19	28	33	Dom	44	6	No	287	137	40	9	31	5	60	12	0
74562	1/7/87	19	28	33	Dom	44	6	No	266	135	39	9	30	5	65	12	0
74695	1/22/87	19	28	33	Dom	32	8	No	333	194	48	18	35	3	40	11	4.3

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
76161	332	405	0	0.62	0.06	0	0.02	0	0.27	0.08	0.9	55	3	0.3	7.85	1146	
64802	256	312	0	0.38	0.02	0.03	0.04	0	0.07	0.06	0.4	49	5	0.4	7.78		
64841	288	351	0	0.54	0.005	0	0.03	0.02	0.01	0.09	0.4	45	3	0.2	7.43		
67954	110	134	0	0.26	0.01	0.04	0.48	0	0	0.06	0.2	51	5	0.5	7.84		
71486	210	256	0	0.24	0.01	0	0.03	0	0.05	0.09	0.3	32	5	0.1	6.96		
71986	306	373	0	0.36	0.02	0.04	0	0.06	0.04	0.06	0.5	49	3	0.2	7.82		
76209	106	129	0	0.3	0.01	0.01	0.08	0	0	0.02	0.2	33	3	0.2	7.8	331	
76543	202	246	0	0.34	0.02	0.01	1.03	0	0	0.05	0.3	31	7	0.6	7.85	519	
80183	202	246	0	0.89	0.03	0	0	0	0	0.01	0.4	48	5	0.2	8.05	534	
80422	88	107	0	0.24	0.02	0.79	0.11	0	0	0.05	0.2	46	15	2	8.01	284	
80864	270	305	12	0.24	0.005	0.05	0.1	0.01	0.01	0.05	0.4	49	3	0.4	8.26	647	
81589	118	110	17	0.29	0.02	0.05	0.42	0	0				3	0.5	8.26	432	
82553	90	110	0	0.23	0.018	0.01	0	0	0	0	0.1	43	3	0.4	8.03	281	
82742	188	229	0	0.39	0.012	0	0	0	0.08	0.04	0.3	42	3	0.2	7.89	513	
84462	104	127	0	0.29	0.01	0.09	0.38	0.01	0.01	0.06	0.2	45	3	0.4	8.14	321	
88369	226	276	0	0.44	0.02	0	0	0.07	1	0.04	0.3	41	3	0.9	7.2	688	
89300	196	239	0	0.29	0.01	0.01	0	0	0.04	0.03	0.1	45	3	0.4	7.82	539	
93353	276	337	0	0.78	0.01	0.01	0.28	0	0.05	0.07	0.6	39	3	0.3	7.7	803	
97583	294	261	48	1.71	0.33	0.11	0.01	0	0	0.01	0.9	44	7	0.2	9.28	638	
99438	144	166	5	0.25	0.012	0.08	0.71	0	0	0.08	0.2	50	3	0.4	8.22	475	
100806	296	361	0	0.41	0.02	0	0	0.02	0.01	0.06	0.5	49	3	0.2	7.95	745	
65019	106	129	0	0.27	0.01	0.04	0	0	0.01	0.02	0.2	28	3	0.4	8.13		
69574	632	771	0	0.54	0.005	0.1	0.7	0	0.01	0.03	4.1	47	10	0.7	7.87		
70795	142	173	0	0.29	0.012	0.01	0	0	0.02	0.01	0.3	34	5	0.2	8.12		
71179	270	329	0	0.81	0.135	0	0.08	0	0.05	0.06		45	7	0.2	7.92		
71177	226	276	0	0.58	0.02	0	0.31	0	0.04	0.07		34	12	0.2	7.63		
71370	266	325	0	0.34	0.03	0.01	0.08	0	0.26	0.05		36	5	0.1	8.14		
71775	102	124	0	0.26	0.01	0.24	1.41	0	0.02	0.04	0.2	47	10	0.5	8.11		
72498	328	400	0	0.41	0.004	0.26	0.42	0	0.09	0.09	0.4	37	7	0.9	7.6	795	
73512	218	266	0	0.4	0.02	0	0	0.01	0	0.04	0.4	45	3	0.2	7.94	584	
74093	112	137	0	0.23	0.01	0.03	0.71	0.01	0.01	0.08	0.2	46	3	0.3	7.9	438	
74565	124	151	0	0.26	0.01	0.04	0.01	0.01	0.03	0.02	0.2	13	3	1	7.28	422	
74562	124	151	0	0.26	0.01	0.02	0.01	0	0.02	0.02	0.2	43	3	0.6	7.33	423	
74695	212	259	0	0.41	0.01	0.16	0.36	0.01	0.14	0.02	0.4	52	3	1.1	7.83	527	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
75084	3/9/87	19	28	33	Dom	35	8	No	237	115	33	8	26	5	61	11	0.1
75158	3/13/87	19	28	33	Dom	28	8	No	1730	497	143	34	388	30	540	130	0.3
76077	5/27/87	19	28	33	Dom	28	6	No	830	404	117	27	131	6	183	50	21.8
76842	8/25/87	19	28	33	Dom	54	6	Yes	299	0	0	0	102	1	68	13	0
78001	12/22/87	19	28	33	Dom	26		No	418	130	42	6	101	3	49	12	10.2
79453	5/17/88	19	28	33	Dom			No	387	225	67	14	39	3	60	15	5.7
82162	2/22/89	19	28	33	Dom	29	8	No	226	119	36	7	28	3	38	17	0.8
82886	5/16/89	19	28	33	Dom			Yes	335	186	58	10	41	5	52	19	4.1
83177	6/12/89	19	28	33	Dom		6	No	339	178	58	8	37	3	60	28	5.9
83433	7/7/89	19	28	33	Dom	65		No	327	0	0	0	107	1	82	18	4.6
88370	6/19/90	19	28	33	Dom	27	8	No	537	326	91	24	48	7	93	23	6.8
88710	7/19/90	19	28	33	Dom	46	8	No	333	172	49	12	43	4	73	12	0.4
90615	12/24/90	19	28	33	Dom	28	6	No	524	316	87	24	50	5	109	43	0
95686	1/21/92	19	28	33	Dom	21	6	No	501	267	79	17	701	5	71	29	5.5
96296	3/27/92	19	28	33	Dom	32	6	No	644	248	68	19	126	16	97	31	36
96981	5/7/92	19	28	33	Dom	30	6	No	637	361	108	22	86	5	96	57	16.7
97016	5/13/92	19	28	33	Dom	85	6	No	303	145	40	11	29	10	77	20	0
97781	7/17/92	19	28	33	Dom	100	6	Yes	68	3	1	0	21	0	0	0	0
99627	10/7/92	19	28	33	Dom	36	6	No	407	211	58	16	50	5	74	26	3.2
100751	11/24/92	19	28	33	Dom	172	6	No	214	17	5	1	56	7	40	5	0
101114	12/18/92	19	28	33	Dom	80	6	No	291	134	37	10	30	9	65	13	0
105794	8/3/93	19	28	33	Dom	82	6	Yes	311	0	0	0	3	138	60	10	0
108058	10/1/93	19	28	33	Dom	37	6	No	254	110	29	9	28	13	60	113	0.2
119582	3/8/95	19	28	33	Dom	40	6	No	519	173	43	16	98	17	88	39	6.1
122337	7/25/95	19	28	33	Dom	79	6	No	262	112	30	9	27	9	61	14	0.2
126040	2/21/96	19	28	33	Dom	70	6	No	220	95	25	8	25	12	48	8	0
139459	11/15/96	19	28	33	Dom			No	276	131	36	10	28	10	64	12	0
58560	1/26/82	19	28	34	Dom	30	6	No	496	252	71	18	55	4	137	48	8.3
60076	8/2/82	19	28	34	Dom	34	6	No	337	163	47	11	41	4	61	19	7.3
61184	12/14/82	19	28	34	Dom	35	8	No	468	268	76	19	44	5	115	49	18.4
61236	12/23/82	19	28	34	Dom	30		No	544	315	88	23	62	6	89	21	3
61533	3/1/83	19	28	34	Dom			No	226	137	40	9	24	2	29	10	0.2
61710	3/15/83	19	28	34	Dom	30	8	No	166	90	26	6	16	2	21	5	0.2
62842	8/16/83	19	28	34	Dom	30	6	No	432	145	40	11	87	6	58	18	10.2

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
75084	102	124	0	0.27	0.004	0.84	0.02	0.03	0.07	0.02	0.2	42	7	5.8	7.88	365	
75158	654	798	0	0.57	0.04	1	0.03	0.03	0	0.02	4.5	49	3	0.4	7.64	2528	
76077	416	508	0	0.41	0.004	0.03	1.54	0	0.06	0.1	1.1	37	3	0.2	7.71	1306	
76842	134	163	0	0.24	0.004	0.07	0	0	0	0	0.2	44	3	0.8	7.85	463	
78001	280	342	0	0.61	0.01	0	0	0	0.01	0.06	0.4	36	3	0.3	7.92	679	
79453	230	281	0	0.4	0.01	0	0	0.02	0.13	0.07	0.3	45	3	0.3	7.68	611	
82162	120	146	0	0.21	0.01	0.01	0.08	0.01	0.11	0.03	0.3	30	3	0.5	7.95	378	
82886	198	242	0	0.29	0.01	0.01	0.02	0	0.03	0.06	0.3	31	3	0.3	7.84	544	
83177	158	193	0	0.46	0.01	0.02	0	0.11	0.07	0.06	0.3	37	3	1	7.68	522	
83433	128	127	14	0.25	0.01	0.02	0.01	0	0	0	0.1	46	3	0.6	8.2	495	
88370	298	364	0	0.34	0.016	0.05	0.01	0	0.11	0.08	0.3	43	3	0.6	7.65	815	
88710	178	217	0	0.24	0.003	1.33	0	0.01	0.21	0.09	0	29	15	3.8	7.51	521	
90615	252	307	0	0.23	0.003	1.07	3.78	0	0.23	0.11	0.5	42	12	3.7	7.4	807	
95686	302	368	0	0.56	0.02	0	0.57	0	0.02	0.11	0.6	43	5	0.1	7.76	787	
96296	366	447	0	0.64	0.02	0	0.01	0.01	0.09	0.08	0.8	46	5	0.4	7.71	953	
96981	350	427	0	0.25	0.01	0	0.35	0.02	0.02	0.1	0.6	38	3	0.1	7.6	972	
97016	120	132	7	0.23	0.01	0.22	0.85	0.04	0	0.11	0.2	48	3	0.6	8.23	433	
97781	54	0	29	0.19	0.36	0	0	0	0	0.01	5.7	9	3	0.3	9.73	94	
99627	204	249	0	0.44	0.02	0	0	0	0	0.05	0.4	46	5	0.2	8.04	601	
100751	106	105	12	0.31	0.01	0.1	0.31	0	0.01	0.01	0.2	45	3	0.7	8.66	302	
101114	124	151	0	0.24	0.01	0.04	0.48	0	0	0.07	0.2	43	3	0.2	8.13	393	
105794	106	129	0	0.26	0.01	0.01	0	0	0	0	0.2	36	3	0.4	8.19	453	
108058	102	124	0	0.25	0.01	0.12	0.65	0	0	0.08	0.2	45	3	0.7	7.82	367	-0.07
119582	242	295	0	0.84	0.133	0	0.07	0.02	0.06	0.07	0.7	48	15	0.4	7.76	785	0.2
122337	102	124	0	0.28	0.01	0.17	0.59	0	0	0.08	0.2	43	10	1.2	8.03	387	-0.03
126040	108	132	0	0.28	0.01	0.44	0.52	0	0	0.07	0.2	46	10	1.8	7.96	327	-0.14
139459	114	139	0	0.23	0.009	0.2	0.66	0	0	0.09	0.2	43	3	0.8	7.98	404	0.05
58560	152	185	0	0.71	0.005	0	1.59	0.1	3.15	0.1	0.4	45	3	0.4	7.3		
60076	160	195	0	0.31	0.005	0.03	0.16	0.02	0.01	0.06	0.3	34	3	1.4	8.01		
61184	164	200	0	0.23	0.005	0.01	0	0.01	0.1	0.06	0.5	34	3	0.6	7.36		
61236	344	420	0	0.31	0.01	0.01	0.15	0	0.06	0.05	0.6	43	5	0.6	7.61		
61533	150	183	0	0.35	0.005	0.01	0.17	0.01	0.02	0.02	0.2	39	3	0.2	7.72		
61710	100	122	0	0.25	0.005	0.18	0.07	0	0.01	0.01	0.01	0.1	24	7	1.5	7.78	
62842	252	307	0	0.55	0.02	0.02	0	0.01	0.02	0.03	0.5	43	5	0.4	7.82		

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
65442	6/13/84	19	28	34	Dom			No	817	364	93	32	116	8	240	96	17.6
65440	6/25/84	19	28	34	Dom			No	535	123	36	8	131	11	62	27	37.4
66032	8/13/84	19	28	34	Dom	32	6	No	260	153	43	11	25	3	30	8	0
66173	9/5/84	19	28	34	Dom		6	No	431	80	22	6	115	6	75	31	17.1
66998	12/28/84	19	28	34	Dom	23	8	No	412	189	51	15	61	6	89	33	22
67239	1/14/85	19	28	34	Dom			No	667	297	76	26	96	8	202	78	25.6
67439	1/28/85	19	28	34	Dom	26	8	No	1620	672	203	40	248	17	570	170	61.2
67851	3/12/85	19	28	34	Dom	35	6	No	1216	660	190	45	115	8	374	134	6.9
67848	3/15/85	19	28	34	Dom	31	6	No	230	133	40	8	24	3	23	4	0.8
68058	4/15/85	19	28	34	Dom	30	8	No	364	203	58	14	39	3	68	25	2.8
68916	7/16/85	19	28	34	Dom	40	6	No	205	123	36	8	19	4	30	8	2.2
69077	8/12/85	19	28	34	Dom	27		Yes	710	0	0	0	255	1	131	93	32.2
70039	11/19/85	19	28	34	Dom	30	6	No	427	113	32	8	102	6	57	20	9
70655	2/3/86	19	28	34	Dom			No	1448	30	12	0	495	10	420	95	2.9
70654	2/3/86	19	28	34	Dom			No	218	128	33	11	22	6	29	9	0.9
71015	3/6/86	19	28	34	Dom	29	8	No	416	193	51	16	61	7	91	27	13.3
71166	3/24/86	19	28	34	Dom		8	No	240	137	40	9	24	3	34	11	0.1
71848	5/20/86	19	28	34	Dom	36	8	No	279	174	50	12	22	4	49	23	8.4
72079	5/30/86	19	28	34	Dom			No	228	100	27	8	31	6	32	9	0.2
72572	7/10/86	19	28	34	Dom	29	8	No	408	175	47	14	62	5	72	25	29.4
72642	7/18/86	19	28	34	Dom	29	8	No	245	144	38	12	21	4	35	10	2.3
72836	7/23/86	19	28	34	Dom	30	6	No	819	423	123	28	105	6	190	58	3.4
72835	7/23/86	19	28	34	Dom	35	6	No	815	321	94	0.89	151	4	230	45	3.1
72911	8/8/86	19	28	34	Dom			No	1798	186	58	10	506	35	545	10	7
73296	9/3/86	19	28	34	Dom			No	331	175	52	11	37	2	66	14	3.1
73397	9/23/86	19	28	34	Dom	34	8	No	243	149	40	12	22	4	36	9	2.1
73797	10/16/86	19	28	34	Dom	30		No	425	219	63	15	47	5	98	42	13.3
73951	10/28/86	19	28	34	Dom	32	8	No	220	124	33	10	23	4	29	8	0.7
73866	10/28/86	19	28	34	Dom			No	267	164	49	10	21	4	45	10	0.9
73950	10/28/86	19	28	34	Dom	35	8	No	257	139	39	10	28	5	37	9	0
74206	12/2/86	19	28	34	Dom	30	6	No	254	153	43	11	23	3	35	9	0
74681	1/20/87	19	28	34	Dom	30	8	No	322	198	58	13	30	3	54	17	0
74648	1/27/87	19	28	34	Dom			No	223	91	25	7	31	5	32	8	0.1
75260	3/16/87	19	28	34	Dom	86	6	No	220	80	22	6	29	14	45	7	0

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
65442	228	278	0	0.36	0.03	0	0	0.12	0.06	0.04	1.5	47	3	0.1	7.97		
65440	272	332	0	0.71	0.08	0.01	0.05	0	0	0.03	0.4	47	10	0.3	8.07		
66032	166	203	0	0.35	0.02	0.12	0.16	0.01	0.1	0.02	0.1	41	5	0.2	7.9		
66173	204	234	7	0.72	0.03	0.01	0.01	0	0.02	0.02	0.3	51	5	0.3	8.29		
66998	170	207	0	0.28	0.02	0	0	0	0.01	0.06	0.2	41	5	0.3	8		
67239	194	237	0	0.36	0.03	0.01	0	0.01	0.03	0.04	1	45	5	0.2	7.83		
67439	376	459	30	0.52	0.02	0	4.28	0	0.01	0.14	2.6	30	15	0.3	7.52		
67851	348	425	0	0.48	0.01	0.02	7.31	0.01	0.02	0.23	0.9	36	5	0.2	7.46		
67848	152	185	0	0.3	0.002	0.19	0.02	0	0	0.02	0.1	39	5	0.4	7.78		
68058	188	229	0	0.31	0.013	0	0.06	0	0.01	0.03	0.3	36	5	0.5	7.62		
68916	124	151	0	0.3	0.02	0.03	0	0.01	0.05	0.03	0.2	34	3	0.2	8.01		
69077	268	327	0	0.26	0.01	0.01	0	0.01	0	0	0.6	32	5	0.3	7.39		
70039	249	303	0	0.69	0.03	0	0	0.01	0	0.02	0.5	47	5	0.2	8.09		
70655	592	678	22	2.86	0.49	0.01	0.01	0	0.01	0.01	2.8	39	5	0.2	8.51		
70654	152	185	0	0.38	0.03	0.01	0.03	0	0.12	0.02	0.2	39	5	0.2	7.9		
71015	194	237	0	0.28	0.02	0	0	0.01	0.03	0.05		41	5	0.3	7.52		
71166	146	178	0	0.4	0.01	0.5	0.27	0.01	0.06	0.02		36	25	3.4	7.79		
71848	136	166	0	0.25	0.02	0.01	0	0.01	0.01	0.03	0.2	32	3	0.1	7.95		
72079	138	163	2	0.38	0.02	0.02	0.02	0.01	0.05	0.02	0.2	43	3	0.1	8.3		
72572	186	227	0	0.39	0.03	0.27	0.01	0.01	0	0.04	0.4	44	3	0.4	7.97	638	
72642	154	188	0	0.32	0.02	0.02	0.19	0	0.54	0.03	0.2	36	3	0.3	7.96	393	
72836	412	503	0	0.23	0.005	0.01	0.42	0.09	0	0.08	0.9	37	7	0.3	7.28	1246	
72835	368	449	0	0.47	0.01	0.46	0.89	0	0.01	0.07	1.2	42	7	0.9	7.64	1226	
72911	736	898	0	2.58	2.95	0.03	0.18	0	0.01	0.03	10.2	36	7	0.6	8.01	2599	
73296	170	207	0	0.36	0.03	0.01	0.22	0.03	0	0.03	0.3	40	3	0.3	7.84	511	
73397	156	190	0	0.25	0.03	0	0.01	0	0	0.03	0.2	36	3	0.3	7.92	406	
73797	164	200	0	0.33	0.01	0.02	0	0.01	0.02	0.04	0.5	40	3	0.3	7.72	665	
73951	144	176	0	0.4	0.03	0.02	0.03	0	0.02	0.02	0.2	41	5	0.3	8.02	362	
73866	156	190	0	0.3	0.02	0.01	0.03	0	0	0.02	0.2	37	3	0.4	7.75	427	
73950	158	193	0	0.4	0.01	0.2	0.17	0	0.02	0.02	0.3	42	7	0.5	7.86	411	
74206	160	195	0	0.36	0.03	0.03	0.12	0	0.01	0.01	0.2	44	3	0.4	7.85	406	
74681	186	227	0	0.34	0.01	0.17	0.45	0	0.61	0.06	0.3	37	3	1.6	7.77	531	
74648	126	154	0	0.41	0.03	0.02	0.02	0	0.02	0.02	0.2	44	3	0.4	7.91	341	
75260	102	124	0	0.28	0.01	0.08	0.51	0	0.01	0.08	0.2	47	3	0.4	8.15	336	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
75215	3/17/87	19	28	34	Dom	86	6	No	219	77	21	6	29	14	46	6	0.1
75477	4/5/87	19	28	34	Dom	37	8	No	332	174	50	12	35	5	85	18	0.7
76160	6/8/87	19	28	34	Dom	24	8	No	199	96	27	7	23	4	31	7	0.1
76469	7/13/87	19	28	34	Dom	30	8	No	812	414	121	27	104	6	215	74	1.8
76631	8/3/87	19	28	34	Dom	25	6	No	821	350	102	23	150	7	141	21	26.6
76830	8/24/87	19	28	34	Dom		6	No	486	256	71	19	54	5	92	38	37.1
77114	9/14/87	19	28	34	Dom	21	8	No	474	248	73	16	59	4	101	23	4.6
77135	9/21/87	19	28	34	Dom	27	8	No	258	117	32	9	36	6	49	13	0.9
77477	10/19/87	19	28	34	Dom	30	8	No	492	260	76	17	63	4	97	29	11.3
77652	11/10/87	19	28	34	Dom	40	6	No	339	159	44	12	51	6	49	22	6.2
77802	11/25/87	19	28	34	Dom	83	6	No	248	95	25	8	30	15	58	11	0.4
77915	12/14/87	19	28	34	Dom	35	6	No	884	50	15	3	288	1	209	94	54
78150	1/14/88	19	28	34	Dom	40	8	No	196	13	5	0	55	6	36	6	0
78739	3/8/88	19	28	34	Dom			Yes	382	3	1	0	137	1	59	26	6.2
78914	3/29/88	19	28	34	Dom	27	8	No	256	100	27	8	47	5	45	12	0.2
78603	3/29/88	19	28	34	Dom	30		No	328	71	20	5	79	5	45	13	6.2
79529	5/24/88	19	28	34	Dom			No	301	168	49	11	33	2	53	17	3.7
79865	6/21/88	19	28	34	Dom			Yes	1431	8	3	0	505	3	463	145	15.8
79999	7/5/88	19	28	34	Dom	22	6	No	211	101	29	7	25	4	35	10	1.2
80133	7/18/88	19	28	34	Dom			Yes	1520								
80239	7/26/88	19	28	34	Dom	32	6	Yes	35	14	4	1	8	1	1	1	0
81122	10/14/88	19	28	34	Dom			No	266	163	44	13	22	4	42	18	2.1
81131	10/25/88	19	28	34	Dom	32	8	No	217	84	22	7	35	5	33	10	1.9
81604	12/19/88	19	28	34	Dom	70	6	No	248	100	27	8	29	16	55	10	0.2
82000	2/2/89	19	28	34	Dom	32	6	No	284	172	49	12	26	4	36	15	1.8
82289	3/9/89	19	28	34	Dom	30	6	No	347	183	47	16	35	6	79	20	1.4
82740	4/28/89	19	28	34	Dom	77	6	No	237	100	27	8	25	10	56	9	0.7
82827	5/3/89	19	28	34	Dom			No	371	121	32	10	73	5	51	28	32.6
83070	6/5/89	19	28	34	Dom	70	6	No	248	103	28	8	30	17	57	11	1
83885	9/6/89	19	28	34	Dom			No	408	257	75	17	38	4	52	17	3.1
84849	11/28/89	19	28	34	Dom	12	6	No	537	239	71	15	88	3	97	25	24.3
85175	1/5/90	19	28	34	dom	13.5	6	No	562	243	71	16	88	3	101	25	23.4
85842	2/20/90	19	28	34	Dom			No	503	117	32	9	126	7	81	34	10.8
85843	2/23/90	19	28	34	Dom	130	8	No	241	93	24	8	28	15	55	10	0.3

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
104	127	0	0.27	0.003	0.07	0.51	0	0.01	0.08	0.2	47	3	0.3	7.96	336	
142	173	0	0.31	0.01	0.72	0.39	0	0.05	0.03	0.2	42	5	2.4	8.02	517	
114	139	0	0.36	0.01	0.01	0.04	0	0	0.01	0.2	38	3	0.4	7.93	317	
338	412	0	0.28	0.003	0.03	0.45	0	0.23	0.08	0.7	36	3	0.4	7.52	1256	
488	595	0	0.55	0.03	0	0.27	0	0.12	0.07	1.2	49	5	0.3	7.5	1205	
196	239	0	0.42	0.01	0.01	0.41	0.01	0	0.05	0.4	42	3	0.2	7.49	762	
254	310	0	0.42	0.01	0.01	0	0	0.01	0.04	0.4	43	3	0.4	8.01	756	
134	163	0	0.47	0.02	0.28	0.06	0	0.01	0.03	0.3	45	3	2.1	8	421	
252	307	0	0.39	0.01	0	0	0	0.01	0.05	0.5	39	3	0.3	7.74	778	
202	246	0	0.44	0.03	0.23	0.01	0	0.02	0.03	0.3	41	3	1.3	7.99	559	
108	132	0	0.27	0.01	1.72	0.63	0	0.01	0.08	0.2	43	45	16	7.63	384	
288	351	0	0.58	0.01	0.01	0.59	0.08	0.01	0.01	0.8	42	3	0.8	7.59	1380	
106	95	17	0.21	0.01	0.03	0.03	0	0	0.01	0.2	45	3	0.4	8.57	307	
194	237	0	0.31	0.01	0.01	0.01	0.04	0.02	0	0.4	38	3	0.4	7.72	598	
142	173	0	0.67	0.02	0.25	0.19	0	0.01	0.02	0.3	39	3	2.5	7.88	416	
192	2234	0	0.61	0.03	0	0	0	0	0.01	0.4	50	3	0.3	7.64	506	
162	198	0	0.31	0.03	0	0.14	0.03	0	0.02	0.2	38	3	0.1	7.78	481	
440	537	0	0.27	0.01	0.02	0.07	0	0	0	1.4	35	7	0.3	7.89	2227	
112	137	0	0.36	0.01	0.01	0.03	0	0.01	0.01	0.2	39	3	0.3	7.98	329	
30	37	0	0.07	0.003	0.01	0	0.02	0.08	0.01	0.2	5	3	0.3	7.3	75	
148	181	0	0.31	0.02	0.07	0.14	0	0.04	0.02	0.2	37	5	0.4	8.05	431	
110	134	0	0.46	0.03	0.02	0.01	0.01	0	0.01	0.2	47	3	0.2	7.9	321	
112	137	0	0.26	0.01	0.25	0.46	0	0	0.07	0.1	48	3	0.8	8.16	374	
180	220	0	0.27	0.01	0	0	0.01	0.18	0.02	0.2	37	3	0.3	7.87	457	
154	168	10	0.29	0.01	0	0	0	0.01	0.02	0.3	41	3	0.6	8.33	522	
108	122	5	0.26	0.005	3.03	0.4	0	0.05	0.07	0.2	32	45	13	8.21	358	
170	207	0	0.62	0.03	0.03	0.01	0	0	0.03	0.4	46	3	0.3	8.01	581	
112	137	0	0.26	0.01	0.19	0.48	0.01	0	0.07	0.1	48	3	0.8	8.01	384	
268	327	0	0.48	0.01	0.01	0.04	0.01	0	0.05	0.3	45	3	0.2	7.63	643	
278	339	0	0.69	0.01	0.02	0.26	0	0	0.08	0.5	48	3	0	7.47	816	
304	371	0	0.64	0.01	0.02	0.31	0	0.01	0.08	0.5	46	3	0.4	7.47	854	
264	322	0	0.97	0.02	0.02	0	0	0	0.03	0.5	45	3	0.3	7.96	780	
108	132	0	0.29	0.01	0.54	0.59	0.03	0.02	0.1	0.1	44	3	1.4	7.99	366	

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
86282	3/19/90	19	28	34	Dom	110	8	No	216	61	18	4	32	20	46	7	0.2
86581	3/29/90	19	28	34	Dom	15	6	No	588	264	76	18	100	4	106	26	23.1
87050	5/1/90	19	28	34	Dom			No	284	161	43	13	26	5	47	17	3.7
88008	5/24/90	19	28	34	Dom	27	8	No	265	157	43	12	26	4	36	12	0.9
88333	6/7/90	19	28	34	Dom	32	6	No	257	103	28	8	40	4	42	17	2.3
88368	6/19/90	19	28	34	Dom	45	6	No	721	8	3	0	263	7	67	13	10
88708	7/18/90	19	28	34	Dom	27		No	329	193	54	14	36	4	50	18	0.3
89532	8/29/90	19	28	34	Dom	100	6	No	221	71	20	5	28	15	46	7	0.4
89987	10/23/90	19	28	34	Dom			No	468	210	61	14	71	4	84	24	19
90677	1/7/91	19	28	34	Dom	30		No	351	210	61	14	32	3	66	27	2.3
92137	5/6/91	19	28	34	Dom			No	204	19	6	1	47	10	37	5	0
92355	5/7/91	19	28	34	Dom			No	449	302	88	20	39	4	55	20	3.8
92354	5/7/91	19	28	34	Dom	83	6	No	246	95	25	8	29	15	54	8	0
92351	5/22/91	19	28	34	Dom	35		No	375	195	55	14	54	4	61	19	9
93302	7/23/91	19	28	34	Dom			No	259	89	24	7	45	5	45	17	19.6
93990	9/16/91	19	28	34	Dom			No	760	272	61	29	142	8	234	108	13.6
94931	12/4/91	19	28	34	Dom		6	No	347	63	17	5	88	5	44	25	6.4
95215	12/21/91	19	28	34	Dom	30		No	330	194	53	15	28	5	65	26	2.2
95535	1/14/92	19	28	34	Dom	20	6	No	816	351	101	24	147	7	96	37	14.5
95886	2/17/92	19	28	34	Dom	35		No	314	187	50	15	26	5	55	24	1.5
95951	3/3/92	19	28	34	Dom			No	243	95	25	8	28	15	55	10	0
96395	4/13/92	19	28	34	Dom	30		No	280	100	27	8	55	5	54	20	4.2
97388	6/8/92	19	28	34	Dom	30	8	No	310	165	48	11	34	3	56	26	1.1
100750	11/24/92	19	28	34	Dom	28	6	No	376	77	21	6	110	6	57	23	1.2
105655	7/28/93	19	28	34	Dom	135	6	No	350	208	60	14	32	3	64	27	0.2
109883	12/29/93	19	28	34	Dom			Yes	376	198	56	14	52	4	64	25	0.2
113607	6/16/94	19	28	34	Dom		6	No	387	214	66	12	48	6	79	33	0.3
114952	8/11/94	19	28	34	Dom		6	No	326	149	40	12	50	7	64	27	0.3
123488	9/15/95	19	28	34	Dom			No	1822	762	216	54	284	6	599	151	10.5
58402	1/18/82	19	28	35	Dom	175	6	No	212	3	1	0	75	0	44	9	0
58494	2/3/82	19	28	35	Dom	30	6	No	435	206	56	16	68	6	57	20	20.6
59023	3/31/82	19	28	35	Dom	30	8	No	203	14	4	1	48	1	23	5	6.1
59127	4/14/82	19	28	35	Dom	35	6	No	422	198	56	14	60	8	63	20	20
59285	5/4/82	19	28	35	Dom			No	340	178	45	16	37	7	49	12	20.9

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
86282	104	127	0	0.29	0.01	0.75	0.25	0	0.01	0.09	0.1	42	17	6.9	8.02	338	
86581	320	390	0	0.51	0.01	0	0.38	0.01	0	0.08	0.5	48	5	0.6	7.47	904	
87050	150	183	0	0.23	0.03	0	0	0	0.02	0.03	0.1	33	3	0.2	7.84	456	
88008	162	198	0	0.34	0.02	0.01	0.05	0.01	0.14	0.02	0.1	35	3	0.2	8.15	431	
88333	126	144	5	0.42	0.01	0	0	0	0	0.01	0.2	46	3	0.2	8.21	394	
88368	486	476	58	4.68	2.06	0.24	0	0	0	0.01	3.5	41	5	1.3	8.99	1115	
88708	190	232	0	0.29	0.007	0.02	0.12	0.01	0.02	0.03	0.2	37	3	0.3	7.73	529	
89532	98	120	0	0.28	0.01	0.1	0.41	0.05	0.02	0.06	0	46	3	0.2	8.13	325	
89987	238	290	0	0.55	0.01	0	0.06	0	0	0.07	0.3	47	3	0.2	7.43	722	
90677	178	217	0	0.33	0.02	0.01	0.23	0	0	0.02	0.3	41	3	0.3	7.92	561	
92137	90	100	5	0.32	0.03	0.03	0.06	0	0	0.02	0.2	47	3	0	8.39	294	
92355	296	361	0	0.45	0.01	0.01	0.03	0	0.02	0.05	0.3	43	3	0	7.97	715	
92354	106	129	0	0.29	0.007	0.36	0.6	0	0.03	0.08	0.2	45	3	2.5	7.99	373	
92351	218	266	0	0.25	0.01	0.01	0	0.01	0.01	0.04	0.4	34	3	0.1	7.78	609	
93302	128	156	0	0.57	0.04	0.1	0.02	0	0	0.02	0.3	45	5	1	8	405	
93990	186	227	0	0.29	0.06	0	0	0.01	0.03	0.04	1.2	38	3	0.3	7.67	1172	
94931	182	222	0	0.75	0.05	0	0	0	0.02	0.03	0.4	51	3	0.1	8.14	534	
95215	164	200	0	0.31	0.02	0.02	0.06	0.01	0.03	0.04	0.3	39	3	0.3	7.86	519	
95535	416	508	0	0.42	0.01	0	0.1	0.02	0.08	0.05	1.1	47	10	0.2	7.53	1192	
95886	166	203	0	0.28	0.03	0.01	0.02	0.15	0	0.04	0.3	37	3	0.1	7.76	494	
95951	112	137	0	0.28	0.01	0.37	0.59	0.01	0.01	0.09	0.2	44	7	1.4	8.04	375	
96395	128	156	0	0.57	0.03	0.13	0.01	0.01	0	0.03	0.3	46	5	1	7.89	427	
97388	150	183	0	0.28	0.02	0.01	0.01	0	0	0.04	0.4	42	3	0.1	8.1	457	
100750	228	278	0	1.12	0.02	0	0	0.02	0	0.02	0.5	47	3	0.2	8.19	602	
105655	170	207	0	0.45	0.01	0.03	0.04	0	0	0.04	0.3	43	3	0.1	7.71	522	0.3
109883	210	256	0	0.59	0.01	0.01	0.24	0	0.01	0.06	0.4	44	3	0.4	7.86	583	0.37
113607	196	239	0	0.29	0.007	0.02	0.01	0.03	0	0.06	0.4	33	5	0.2	7.82	603	0.37
114952	158	193	0	0.46	0.03	0.13	0	0.01	0	0.03	0.4	44	7	0.2	7.97	508	0.22
123488	524	639	0	0.54	0.01	0.06	2.04	0.01	0	0.07	2.3	44	17	0.7	7.32	2455	0.75
58402	94	115	0	0.31	0.03	0	0.03	0.02	0	0	0.3	43	5	1.1	7.68		
58494	252	307	0	0.53	0.03	0	0	0.02	0.03	0.06	0.4	54	7	1.2	7.68		
59023	80	98	0	0.3	0.08	1.75	0.1	0.01	0.03	0.08			45	18	7.26		
59127	240	293	0	0.47	0.02	0.03	0.01	0.02	0.03	0.04			3	0.3	8.1		
59285	180	220	0	0.44	0.04	0	0	0.12	0.14	0			3	0.2	7.65		

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
59980	7/26/82	19	28	35	dom	30	6	No	922	192	49	17	229	12	192	74	47.1
64024	12/12/83	19	28	35	Dom	32	8	No	568	246	67	19	85	7	116	43	29.1
65601	6/25/84	19	28	35	Dom	14	8	No	324	155	44	11	46	6	43	12	13.9
67444	1/29/85	19	28	35	Dom	26	8	No	302	164	41	15	33	5	45	12	13.3
67849	3/18/85	19	28	35	Dom		10	No	346	135	39	9	68	4	54	16	7.1
78784	7/8/85	19	28	35	Dom	40	10	No	571	239	61	21	106	10	105	31	23
69801	10/9/85	19	28	35	Dom		8	No	238	101	29	7	38	5	40	12	0.9
74560	1/4/86	19	28	35	Dom	30	8	No	969	86	23	7	311	11	196	75	51.3
70456	1/13/86	19	28	35	Dom	31	6	No	536	253	70	19	82	7	98	23	13.6
70723	1/30/86	19	28	35	Dom	34	6	No	632	377	108	26	80	7	115	41	3
71352	4/8/86	19	28	35	Dom			No	520	182	48	15	107	3	69	28	30
71850	5/13/86	19	28	35	Dom			No	217	123	31	11	23	6	29	8	2.3
72238	6/13/86	19	28	35	Dom	28	8	No	401	235	61	20	36	5	58	16	9
73750	10/20/86	19	28	35	Dom	40	8	No	321	163	47	11	43	5	46	13	19.5
73867	10/27/86	19	28	35	Dom	32	8	No	374	157	43	12	58	5	57	14	12.7
73954	11/6/86	19	28	35	Dom			No	495	229	62	18	82	10	63	28	0
74080	11/18/86	19	28	35	Dom	40	6	No	452	94	26	7	126	6	64	25	6.2
74651	1/27/87	19	28	35	Dom			No	375	167	47	12	56	6	59	16	14.3
75085	2/28/87	19	28	35	Dom	30	6	No	584	271	77	19	91	7	135	39	5.8
75086	2/28/87	19	28	35	Dom	30	6	No	522	277	78	20	67	5	96	22	4.2
75493	4/13/87	19	28	35	Dom	106	6	No	239	0	0	0	81	2	40	6	0
75640	4/21/87	19	28	35	Dom	30	6	No	370	68	19	5	99	5	52	16	5.2
75882	4/30/87	19	28	35	Dom	26	8	No	363	178	50	13	50	6	54	15	11.7
76005	5/26/87	19	28	35	Dom	30	8	No	310	130	37	9	47	4	42	25	16.7
77062	9/8/87	19	28	35	Dom	34	6	No	320	164	41	15	34	7	52	12	17.2
77072	9/9/87	19	28	35	Dom	96	6	No	237	3	1	0	75	3	49	7	0
77769	11/24/87	19	28	35	Dom	30	8	No	366	171	47	13	52	7	51	12	15.9
77974	12/14/87	19	28	35	Dom	30	8	No	317	115	31	9	58	6	74	27	5.8
78519	2/22/88	19	28	35	Dom	30	8	No	396	192	52	15	60	8	59	16	16.1
78777	3/7/88	19	28	35	Dom		6	No	263	28	8	2	80	4	34	10	3.6
78738	3/8/88	19	28	35	Dom	30	8	No	278	104	25	10	43	19	41	10	24.4
78857	3/16/88	19	28	35	Dom	33	8	No	371	171	47	13	50	5	53	13	8
79195	4/22/88	19	28	35	Dom		8	No	307	167	47	12	33	5	53	26	10.1
79193	4/22/88	19	28	35	Dom		8	No	683	216	55	19	145	13	127	44	37.5

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
59980	360	439	0	0.45	0.085	0	0	0	0	0.04	1.1	51	5	0.3	7.96		
64024	234	285	0	0.4	0.025	0.02	0	0	0.1	0.07	0.6	49	7	0.2	7.77		
65601	184	224	0	0.3	0.02	0.01	0.01	0.17	0.16	0.03	0.2	43	5	0.3	7.98		
67444	172	210	0	0.41	0.03	0	0	0.01	0.03	0.02	0.2	47	5	0.2	7.81		
67849	198	242	0	0.43	0.04	0.01	0.15	0.01	0.05	0.04	0.3	41	3	0.2	7.59		
78784	324	395	0	0.38	0.03	0	0	0	0	0.04	0.7	49	5	0.1	7.79		
69801	134	163	0	0.28	0.012	0.04	0.03	0	0.07	0.01	0.3	34	5	0.3	8.05		
74560	422	490	12	0.42	0.12	0	0	0	0	0.02	1.1	46	3	0.3	8.33	1494	
70456	304	371	0	0.49	0.03	0	1.31	0.02	0.02	0.07	0.6	49	7	0.2	7.63		
70723	388	473	0	0.41	0.004	0.01	0.09	0.01	0.06	0.07	0.7	34	7	0.2	7.76		
71352	304	371	0	0.49	0.05	0	0	0	0.02	0.09		41	3	0.1	7.93		
71850	136	166	0	0.28	0.03	0	0	0	0.01	0.02	0.2	36	3	0	8.02		
72238	236	288	0	0.34	0.03	0	0	0.04	0.14	0.03	0.3	47	3	0.1	7.76	614	
73750	180	220	0	0.34	0.02	0	0	0.02	0.14	0.02	0.3	44	3	0.2	7.45	521	
73867	204	249	0	0.43	0.04	0	0	0	0	0.05	0.3	54	3	0.2	7.52	582	
73954	338	412	0	0.51	0.02	0.01	0.04	0	0.02	0.07	0.5	48	5	0.3	7.6	801	
74080	276	337	0	1.05	0.03	0	0	0.03	0.01	0.02	0.6	47	3	0.2	7.94	729	
74651	218	266	0	0.34	0.01	0	0	0.02	0.07	0.03	0.4	47	3	0.5	7.6	591	
75085	288	351	0	0.56	0.01	0.13	0.22	0	0	0.04	0.9	47	3	0.8	8.05	920	
75086	318	388	0	0.29	0.01	0.01	0.37	0.01	0.08	0.09	0.7	47	3	0.2	7.75	830	
75493	124	117	17	0.35	0.06	0.11	0.01	0	0.01	0	0.2	41	3	0.4	8.92	365	
75640	206	251	0	0.74	0.05	0	0	0	0.01	0.02	0.6	49	3	0.2	8.15	567	
75882	220	268	0	0.34	0.02	0	0	0	0.1	0.03	0.4	42	3	0.1	7.95	591	
76005	152	185	0	0.38	0.03	0.22	0	0.16	0.07	0.02	0.3	40	3	1	7.64	497	
77062	164	200	0	0.41	0.04	0	0	0.01	0	0.03	0.3	48	3	0.4	7.86	501	
77072	108	122	5	0.27	0.01	0.34	0.02	0	0	0.01	0.2	47	3	4.6	8.27	348	
77769	216	264	0	0.48	0.03	0	0	0.03	0.05	0.03	0.4	45	3	0.2	7.88	583	
77974	132	161	0	0.46	0.02	0.03	0.01	0	0	0.02	0.5	47	3	0.4	7.6	508	
78519	244	298	0	0.32	0.02	0	0.01	0.05	0.01	0.04	0.5	45	3	0.7	7.83	641	
78777	140	156	7	0.62	0.1	0	0	0.02	0.02	0.01	0.3	46	3	0.3	8.23	401	
78738	136	166	0	0.27	0.02	0.03	0	0.01	0.03	0.02	0.3	44	3	0.3	7.93	444	
78857	216	264	0	0.39	0.02	0	0	0.03	0.08	0.03	0.4	46	3	0.4	7.8	564	
79195	160	195	0	0.44	0.01	0.01	0.03	0	0.06	0.02	0.3	41	3	0.2	7.89	488	
79193	338	412	0	0.39	0.04	0	0	0	0.01	0.05	0.7	45	3	0.2	7.91	1087	

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
79763	6/13/88	19	28	35	Dom		8	No	377	176	44	16	48	17	79	20	12.3
79868	6/14/88	19	28	35	Dom	71	6	No	286	3	1	0	84	5	59	8	0.2
80510	8/23/88	19	28	35	Dom	45	8	Yes	81	10	4	0	26	1	1	2	5.5
81583	10/13/88	19	28	35	Dom	30	8	No	275	153	38	14	33	10	39	14	4.3
81303	11/15/88	19	28	35	Dom			No	313	172	49	12	41	5	52	16	1.7
81809	12/19/88	19	28	35	Dom	38	8	No	213	114	34	7	26	5	34	19	1
82479	3/28/89	19	28	35	Dom			No	279	28	8	2	77	3	38	13	6.2
82528	3/29/89	19	28	35	Dom	31	6	No	535	3	1	0	200	2	82	45	12.5
82885	5/15/89	19	28	35	Dom	40	8	No	434	146	37	13	89	9	68	18	15.3
82979	5/19/89	19	28	35	Dom	32		No	353	191	55	13	41	4	55	21	7.6
83346	6/27/89	19	28	35	Dom	96	8	No	256	55	12	6	44	24	58	10	0.3
83541	7/11/89	19	28	35	Dom	30	8	No	392	199	55	15	55	6	59	15	9.4
84304	10/2/89	19	28	35	Dom	100	6	No	242	70	18	6	35	17	53	9	0.6
84368	10/16/89	19	28	35	Dom			No	1142	119	31	10	343	17	240	88	105.4
84557	10/30/89	19	28	35	Dom		6	No	237	63	17	5	35	17	52	9	0.8
85844	2/22/90	19	28	35	Dom	32	8	No	274	91	25	7	51	4	45	19	2.3
86580	3/30/90	19	28	35	Dom	40	8	No	426	238	74	13	41	7	54	24	35
86721	4/5/90	19	28	35	Dom	100	8	No	279	100	27	8	33	20	64	15	0
86588	4/9/90	19	28	35	Dom			Yes									
88133	6/11/90	19	28	35	Dom			No	452	193	54	14	83	5	75	28	12.7
88856	7/25/90	19	28	35	Dom	71	6	No	259	3	1	0	76	7	54	7	0.2
89839	10/17/90	19	28	35	Dom			No	391	197	54	15	56	7	60	15	7.4
90614	1/2/91	19	28	35	Dom			Yes	15	0	0	0	3	1	0	0	0
91360	2/22/91	19	28	35	Dom			No	237	84	22	7	28	16	51	7	0
92138	5/6/91	19	28	35	Dom	100		Yes	11	0	0	0	2	1	0	0	0
92357	5/14/91	19	28	35	Dom	100	8	No	289	110	29	9	31	20	67	14	0
92353	5/22/91	19	28	35	Dom		8	No	250	86	23	7	35	15	50	10	0
93120	7/9/91	19	28	35	Dom			Yes	11	0	0	0	4	2	0	0	0
93463	7/29/91	19	28	35	Dom	32	6	No	240	122	34	9	26	4	45	20	3.1
93628	8/4/91	19	28	35	Dom	83	6	No	222	49	13	4	39	16	45	5	0
93624	8/13/91	19	28	35	Dom	30	8	No	338	177	51	12	45	5	41	18	14.4
94419	10/18/91	19	28	35	Dom		6	No	230	81	21	7	31	18	50	8	0
95799	2/11/92	19	28	35	Dom			No	354	134	37	10	68	5	53	18	8.2
96574	4/27/92	19	28	35	Dom	100	6	Yes	10	0	0	0	2	1	0	0	0

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ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
192	234	0	0.33	0.02	0.09	0	0	0	0.05	0.4	45	3	0.1	7.88	609	
120	132	7	0.26	0.03	1.11	0.03	0	0	0	0.2	57	25	9	8.47	405	
54	66	0	0.09	0.003	0.01	0	0.05	0.02	0.01	0.5	8	3	0.1	6.82	143	
168	176	14	0.3	0.03	0	0.01	0.01	0.08				3	0.4	8.24	450	
188	229	0	0.37	0.003	0.17	0.1	0.02	0.03				3	0.2	7.67	514	
124	151	0	0.24	0.03	0	0.01	0.01	0.03	0.02	0.2	25	3	0.4	7.97	365	
150	134	24	0.54	0.09	0	0	0	0.01	0	0.2	43	3	0.3	8.3	417	
264	322	0	0.46	0.03	0	0	0.05	0	0	0.6	45	5	0.2	7.49	837	
240	293	0	0.43	0.06	0.01	0	0.01	0.02	0.03	0.5	48	3	0.4	8.04	673	
196	239	0	0.51	0.03	0	0	0	0.34	0.02	0.3	38	3	0.2	7.95	559	
116	142	0	0.23	0.01	0.2	0.55	0	0.03	0.08	0.2	45	5	0.4	8.12	397	
244	298	0	0.35	0.01	0	0	0	0.06	0.03	0.3	45	3	0.3	7.93	624	
108	132	0	0.29	0.004	1.5	0.42	0	0.01	0.06	0.2	41	25	6.3	8.02	358	
442	486	26	0.36	0.08	0	0	0.01	0	0.06	1.2	39	5	0.6	8.29	1692	
104	127	0	0.3	0.004	1.04	0.42	0.02	0.01	0.07	0.1	42	15	5.3	8.03	355	
138	168	0	0.53	0.02	0.02	0	0	0	0.02	0.2	49	3	0.3	7.95	425	
226	276	0	0.35	0.02	0	0	0	0.18	0.08	0.2	38	3	0.5	7.57	665	
122	149	0	0.27	0.01	0.05	0.57	0	0	0.12	0.1	45	3	0.3	8.13	430	
				0.003												
244	298	0	0.43	0.04	0.3	0	0.01	0.01	0.07	0.5	50	3	0.3	7.52	714	
116	127	7	0.26	0.03	0.06	0.02	0	0	0	0	51	3	0.1	8.43	383	
244	298	0	0.35	0.01	0.02	0	0.03	0.09	0.03	0.2	47	3	0.2	7.64	634	
12	15	0	0.05	0.003	0	0.01	0	0	0	0.2	6	3	0.2	7.57	26	
106	129	0	0.27	0.01	0.12	0.52	0	0	0.09	0.2	44	3	0.4	8.02	357	
10	12	0	0.05	0.005	0.01	0	0	0	0	0.2	5	3	0	7.56	22	
116	142	0	0.27	0.01	0.04	0.64	0	0	0.12	0.2	45	3	0.1	8.14	435	
120	146	0	0.29	0.01	0.74	0.42	0	0	0.06	0.2	44	5	2.7	8.07	386	
14	17	0	0.05	0.005	0.01	0.01	0.01	0.05	0	0.2	7	3	0.3	8.03	34	
102	124	0	0.24	0.003	0.02	0.02	0.03	0.04	0.03	0.3	30	3	0.1	7.68	386	
100	112	5	0.32	0.007	0.42	0.24	0	0.01	0.04	0.2	41	3	0.4	8.21	353	
194	237	0	0.37	0.02	0	0	0.02	0.01	0.03	0.3	39	3	0.1	7.72	544	
108	132	0	0.27	0.01	0.15	0.52	0	0	0.08	0.2	43	3	0.5	7.76	360	
202	246	0	0.47	0.05	0.01	0.03	0.01	0.02	0.03	0.4	28	3	0	7.82	567	
8	10	0	0.03	0.004	0	0	0	0.01	0	0.2	5	3	0.3	7.98	16	

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
96996	5/20/92	19	28	35	Dom	36	6	No	364	193	51	16	51	10	48	12	3.8
102422	3/12/93	19	28	35	Dom		6	No	723	129	32	12	201	11	107	48	4.9
105161	7/14/93	19	28	35	Dom	108		No	249	0	0	0	82	2	45	9	0.2
107007	8/27/93	19	28	35	Dom			No	489	224	65	15	76	9	89	35	5.2
108869	11/19/93	19	28	35	Dom	100	6	No	428	26	7	2	133	13	95	23	0.9
113305	5/18/94	19	28	35	Dom		6	No	239	0	0	0	80	3	45	9	0.1
117282	11/8/94	19	28	35	Dom	38	8	No	592	201	54	16	127	13	155	39	0.1
117780	12/8/94	19	28	35	Dom	40		No	223	61	16	5	36	15	46	9	0
120342	4/13/95	19	28	35	Dom			No	498	223	63	16	83	4	69	28	3.8
48272	1/23/79	19	28	36	Dom			No	357	204	57	15	53	4	72	23	3.4
50545	7/19/79	19	28	36	Dom			No	789	76	19	7	276	12	125	44	30.2
50546	7/19/79	19	28	36	Dom			No	804	79	20	7	279	14	121	39	1
61738	3/7/83	19	28	36	Dom	25	8	No	359	148	41	11	58	6	53	17	16.3
61623	3/8/83	19	28	36	Dom			No	418	203	55	16	60	9	57	17	2.4
61776	3/22/83	19	28	36	Dom	30	6	No	372	157	43	12	58	6	50	16	26.6
62067	4/20/83	19	28	36	Dom			No	871	85	24	6	272	15	142	53	2.4
62750	7/25/83	19	28	36	Dom	30	8	No	561	199	55	15	111	10	121	37	1.8
62956	8/22/83	19	28	36	Dom	30	8	No									
64801	3/13/84	19	28	36	Dom	38	8	No	616	227	61	18	125	10	96	49	44.7
64795	3/16/84	19	28	36	Dom	33	8	No	406	242	64	20	43	10	70	18	5.1
65435	6/22/84	19	28	36	Dom			No	846	61	18	4	248	31	228	78	1.9
66026	8/15/84	19	28	36	Dom	30	8	No	771	388	106	30	112	7	155	86	20.1
66445	10/11/84	19	28	36	Dom			No	517	276	74	22	70	11	79	25	2.7
66444	10/11/84	19	28	36	Dom			No	405	227	66	15	44	5	54	13	9.1
66446	10/11/84	19	28	36	Dom			No	521	3	1	0	186	7	77	78	2.9
71165	3/24/86	19	28	36	Dom	31	8	No	391	187	55	12	44	15	82	21	0
72279	6/17/86	19	28	36	Dom	22	4	No	1413	555	158	39	264	6	300	200	44.6
72550	7/15/86	19	28	36	Dom	40	8	No									
73751	10/20/86	19	28	36	Dom			No	282	127	36	9	41	6	47	13	0
74490	12/31/86	19	28	36	Dom	21	6	No	594	291	82	21	83	10	137	40	4
75163	3/17/87	19	28	36	Dom	130	8	No	284	5	2	0	89	6	69	14	0.5
75282	3/19/87	19	28	36	Dom			Yes	48	3	1	0	19	1	5	6	0
75687	4/27/87	19	28	36	Dom	30	8	No	400	174	53	10	51	18	104	23	0
76770	8/17/87	19	28	36	Dom	20	8	No	814	398	110	30	115	8	164	95	26.1

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
96996	242	295	0	0.36	0.03	0.01	0.07	0	0	0.03	0.4	37	3	0.1	8.06	559	
102422	394	437	22	0.47	0.116	0.02	0	0.01	0	0.03	0.9	51	12	0.4	8.36	1096	
105161	122	100	24	0.29	0.02	0.15	0.01	0	0	0	0.2	41	7	0.6	8.85	359	
107007	238	271	10	0.58	0.04	0	0.03	0	0.01	0.07	0.5	44	3	0.5	8.31	725	1.07
108869	204	234	7	0.21	0.02	0.18	0.12	0.01	0	0.02	0.4	43	7	0.4	8.36	657	-0.05
113305	118	120	12	0.27	0.03	0.18	0.02	0	0	0.01	0.2	42	5	0.3	8.57	353	
117282	274	334	0	0.5	0.04	0.45	0.12	0	0	0.04	0.8	43	15	2	8.03	881	0.62
117780	104	127	0	0.27	0.01	0.45	0.47	0	0	0.06	0.2	43	17	0.9	8.01	332	-0.31
120342	294	359	0	0.6	0.06	0	0.03	0	0.01	0.03	0.5	54	3	0.2	7.86	759	0.56
48272	194	237	0	0.5	0.01	0.01	0.03	0.01	0.04	0.2			5	0.1	7.4		
50545	440	537	0	1.62	0.2	0	0	0.01	0.01				7	0.2	7.93		
50546	486	539	22	1.75	0.33	0.04	0.09	0	0.09	0.1			7	0.5	8.31		
61738	204	249	0	0.33	0.01	0	0	0.02	0.09	0.02	0.4	47	3	0.2	7.55		
61623	268	327	0	0.37	0.03	0	0.38	0	0	0.02	0.3	47	5	0.2	7.87		
61776	200	244	0	0.47	0.03	0	0	0.03	0.02	0.05	0.3	51	5	0.2	7.66		
62067	492	586	7	1.14	0.2	0.01	0.24	0	0.02	0.02	1.3	43	10	0.6	8.22		
62750	276	337	0	0.92	0.05	0.02	0.04	0	0.03	0.01	1	49	5	0.2	8		
62956					0.05												
64801	306	373	0	0.39	0.045	0.01	0	0	0.02	0.12	0.5	43	3	0.2	7.98		
64795	238	290	0	0.21	0.02	0	0.41	0.01	0.01	0.04	0.3	47	3	0.1	8.02		
65435	282	310	17	0.87	0.16	0.33	0.18	0	0.02	0.01	0.8	41	10	2	8.33		
66026	346	422	0	0.35	0.01	0.08	0.07	0	0.01	0.05	0.7	43	5	0.3	7.8		
66445	318	388	0	0.36	0.03	0	0.53	0	0.02	0.05	0.3	41	7	0.1	7.93		
66444	250	305	0	0.22	0.04	0	0.14	0	0.02	0.01	0.2	45	7	0.2	7.56		
66446	222	198	36	0.68	0.09	0	0	0	0.01	0	0.8	28	3	0.1	9.25		
71165	188	229	0	0.25	0.01	0.11	0.2	0.01	0.02	0.05		47	7	0.4	8.07		
72279	572	698	0	0.6	0.01	0.02	0.19	0	0	0.11	1.9	51	3	0.3	7.88	2198	
72550							0.15										
73751	158	193	0	0.42	0.03	0.13	0.18	0	0	0.04	0.3	43	3	0.9	7.74	442	
74490	300	366	0	0.36	0.02	0.04	0.04	0	0.19	0.02	0.7	48	3	0.6	7.76	912	
75163	114	129	5	0.24	0.03	0.05	0.03	0.03	0.01	0.01	0.2	49	3	0.3	8.35	445	
75282	26	17	7	0.11	0.003	0.02	0	0.03	0.01	0.02	1.2	4	3	0.3	9.29	99	
75687	164	190	5	0.28	0.01	0.05	0.14	0	0.02	0.05	0.2	50	3	0.4	8.26	624	
76770	346	422	0	0.35	0.01	0.01	0.05	0.06	0.05	0.07	1	44	3	0.2	7.62	1280	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
78147	1/14/88	19	28	36	Dom	30	6	No	371	203	55	16	43	10	73	18	0
78800	3/18/88	19	28	36	Dom	31	6	No	507	267	74	20	67	7	65	23	24.7
79419	5/2/88	19	28	36	Dom	29	5	No	695	344	95	26	102	8	147	70	15.9
81584	10/7/88	19	28	36	Dom			No	525	8	3	0	180	8	86	81	1.8
81928	1/13/89	19	28	36	Dom		8	No	228	3	1	0	73	4	40	7	0.1
82232	3/9/89	19	28	36	Dom	30	6	No	427	72	19	6	114	10	96	30	9.6
83749	8/17/89	19	28	36	Dom			No	387	206	56	16	46	11	79	19	0
83842	8/28/89	19	28	36	Dom			No	483	211	58	16	87	6	59	29	2.8
86281	3/13/90	19	28	36	Dom			No	236	0	0	0	79	3	43	7	0.1
87816	5/21/90	19	28	36	Dom			Yes	27	8	3	0	5	1	2	0	0
87858	5/22/90	19	28	36	Dom		8	No	375	173	46	14	63	7	50	17	13.9
92142	5/6/91	19	28	36	Dom			No	219	110	29	9	27	7	34	14	0
93462	7/25/91	19	28	36	Dom	30	8	No	482	241	62	21	67	10	99	23	0
93991	9/13/91	19	28	36	Dom	80	6	No	751	295	80	23	146	7	173	60	7.3
95214	12/6/91	19	28	36	Dom	35	6	No	80	3	1	0	24	0	1	4	14.3
95635	1/14/92	19	28	36	Dom	30	8	No	681	401	111	30	73	8	139	51	3.4
96980	5/8/92	19	28	36	Dom	22	6	No	674	340	95	25	91	12	161	53	5.8
101183	12/31/92	19	28	36	Dom	35	6	No	392	163	44	13	70	8	72	21	1.9
104405	6/2/93	19	28	36	Dom	33	6	No	301	144	41	10	36	7	54	22	0.5
119517	2/23/95	19	28	36	Dom	102		No	265	0	0	0	91	2	36	6	0
130248	11/1/96	19	28	36	Dom	95	6	No	388	0	0	0	131	6	111	27	0
126655	4/4/96	19	28	39	Dom			No	395	211	58	16	36	9	142	26	0
112146	4/21/94	19	28	40	Dom			Yes	477	182	25	29	77	26	115	55	4.4
94442	10/7/91	19	29		Dom	85	6	No	259	0	0	0	86	2	45	8	0
81588	10/24/88	19	29	1	Dom	83	6	No	317	0	0	0	102	2	65	12	0.5
62372	5/23/83	19	29	2	Dom	30	8	No									
69631	8/5/85	19	29	2	Dom	32	6	No	4579	5	2	0	1531	27	1393	210	1.8
72641	7/15/86	19	29	2	Dom	120	8	No	339	0	0	0	113	2	56	14	3.1
73428	9/11/86	19	29	2	Dom	27	6	No	942	10	4	0	350	7	180	158	0
77917	11/30/87	19	29	2	Dom	30	6	No	1198	124	38	7	368	113	231	92	13.6
80056	6/28/88	19	29	2	Dom	80	8	No	912	8	3	0	350	5	45	14	0.2
81243	11/3/88	19	29	2	Dom	88	6	Yes	973	3	1	0	366	6	34	29	2.1
83545	7/19/89	19	29	2	Dom	92	6	No	844	3	1	0	333	4	52	16	2.4
85361	1/10/90	19	29	2	Dom	90		No	538	3	1	0	195	3	25	12	0.2

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
214	261	0	0.25	0.02	0.01	0.3	0.01	0	0.03	0.4	43	3	0.3	7.99	608	
308	376	0	0.47	0.02	0.13	0.19	0.01	0	0.04	0.5	50	3	0.8	7.79	797	
328	400	0	0.36	0.01	0	0.01	0	0.22	0.02	0.6	45	3	0.1	8.02	1103	
228	220	29	0.69	0.1	0	0	0.01	0.01				3	0.4	9.19	882	
120	117	14	0.38	0.06	0.06	0	0	0.01	0			7	0.4	8.73	349	
184	205	10	0.58	0.05	0.06	0.03	0	0	0.02	0.6	43	3	0.9	8.32	665	
212	259	0	0.26	0.02	0.02	0.33	0	0	0.03	0.3	43	3	0.2	8.05	610	
308	376	0	0.58	0.04	0.02	0.74	0.07	0.04	0.1	0.5	42	7	0.4	7.62	761	
122	129	10	0.3	0.04	0.06	0.01	0	0.01	0	0.1	41	3	0.4	8.84	365	
18	22	0	0.06	0.003	0	0.07	0.21	0.96	0	0.2	3	3	0.1	7.17	57	
228	278	0	0.46	0.02	0.01	0	0	0.03	0.03	0.2	45	3	0.1	7.9	615	
116	132	5	0.31	0.04	0.05	0.08	0	0	0.02	0.3	35	3	0.1	8.3	356	
262	320	0	0.43	0.02	0.53	0.41	0.01	0.04	0.02	0.4	43	3	0.6	8.03	754	
354	432	0	0.4	0.014	0	0.24	0.13	0.06	0.05	0.8	46	3	0.2	7.51	1172	
42	51	0	0.1	0.003	0	0.01	0	0.01	0.01	0.5	15	3	0.2	7.62	138	
350	427	0	0.43	0.01	0.02	0.76	0.02	0.07	0.18	0.6	47	3	0.5	7.64	1009	
310	378	0	0.35	0.02	0.01	0.16	0	0.02	0.04	0.7	47	3	0.1	8.15	974	
222	271	0	0.37	0.03	0.44	0.12	0	0.01	0.04	0.5	43	7	2.1	7.96	586	
146	178	0	0.43	0.02	0.12	0.2	0.01	0.01	0.05	0.3	45	7	0.4	7.65	450	0.02
154	149	19	0.47	0.12	0.13	0.01	0.01	0	0	0.3	42	25	0.5	9.06	395	-0.6
138	168	0	0.22	0.05	0.07	0.04	0	0	0.01	0.2	43	3	0.4	8.06	621	-1.66
128	156	0	0.23	0.004	0.05	1.2	0	0	0.13	0.2	43	8	0.4	8.03	583	0.34
178	193	12	0.25	0.012	0.11	0.01	0.07	0.09	0.05	0.7	27	3	0.6	8.44	765	0.52
138	115	26	0.73	0.28	0.5	0.02	0	0	0.01	0.4	37	20	1.6	8.91	404	
146	139	19	1.04	0.33	0.59	0.03	0.01	0.01				25	0.9	8.76	475	
			7	0.75										8.94		
1590	1476	228	12.9	6.2	0.13	0.02	0	0.01	0	20	19	35	0.7	9.09		
170	188	10	0.8	0.19	0.46	0.02	0.02	0.05	0.01	0.5	40	25	0.4	8.77	515	
374	456	0	0.53	0.17	0.02	0.11	0	0.07	0	6.1	15	3	0.3	7.88	1546	
592	722	0	0.88	0.07	0.01	0.52	0	0.03	0.01	1.7	54	12	0.5	8.08	1814	
686	715	60	5.72	1.18	0.39	0.04	0.01	0.01	0.02	6.2	48	25	2.5	8.69	1371	
742	808	48	5.56	0.653	0.37	0.02	0	0.01	0.01			7	0.5	8.72	1466	
650	695	48	5.8	1.42	0.17	0.03	0	0	0.01	5.7	37	25	1.3	8.56	1281	
394	432	24	3.1	0.525	0.06	0.01	0.01	0	0.01	5.9	32	3	0.8	8.67	821	

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
89302	8/29/90	19	29	2	Dom			Yes	148	0	0	0	51	1	0	2	0.3
89481	9/12/90	19	29	2	Dom	90	6	Yes	149	0	0	0	50	1	0	2	0
89854	10/11/90	19	29	2	Dom			Yes									
98466	8/14/92	19	29	2	Dom	30	6	No	739	210	66	11	165	9	189	92	0.6
76843	8/24/87	19	29	3	Dom			No	320	0	0	0	108	2	60	12	0
83069	6/5/89	19	29	3	Dom	32	6	No	373	40	11	3	111	19	40	19	12.8
89003	8/8/90	19	29	3	Dom	280	6	No	412	3	1	0	147	3	39	9	0.2
120016	3/23/95	19	29	3	Dom	113		Yes	38	17	5	1	6	0	20	1	0
59017	3/31/82	19	29	4	Dom	30	8	No	235	36	11	2	54	8	34	10	0
59021	4/1/82	19	29	4	Dom	30	6	No	926	158	37	16	246	20	181	54	0.2
65448	2/14/84	19	29	5	Dom	20	12	No	982	468	141	28	133	5	251	108	7.3
68917	7/17/85	19	29	5	Dom			No	249	99	28	7	30	24	33	7	1.4
69956	10/28/85	19	29	5	Dom	32	7	No	901	323	93	22	175	7	155	65	33.1
72859	7/31/86	19	29	5	Dom	100	8	No	323	3	1	0	108	2	66	12	0.1
78601	2/29/88	19	29	5	Dom	30	12	No	1039	377	113	23	207	6	238	71	13.9
79776	6/2/88	19	29	5	Dom	150	8	No	462	3	1	0	174	3	28	6	0.4
94440	10/17/91	19	29	5	Dom	32	6	No	649	204	57	15	147	10	113	42	2.9
59679	6/22/82	19	29	6	Dom			No	523	3	1	0	187	7	75	75	0
62624	7/15/83	19	29	6	Dom	24	8	No		80	22	6	252	11			
65438	6/12/84	19	29	6	Dom	28	8	No	528	196	57	13	96	17	87	34	40.5
71750	5/2/86	19	29	6	Dom			No	810	332	90	26	162	10	96	17	8.8
75373	3/31/87	19	29	6	Dom		12	No	810	341	92	27	167	7	86	13	8.3
76108	6/1/87	19	29	6	Dom	28	8	No	660	19	6	1	215	24	139	41	0
95797	2/11/92	19	29	6	Dom	25		No	285	163	44	13	30	4	52	22	2.2
97141	6/4/92	19	29	6	Dom	33		No	443	222	64	15	43	24	64	21	39.4
60963	11/19/82	19	29	7	Dom	130		No	320	0	0	0	108	2	57	11	0.6
63833	11/15/83	19	29	7	Dom	30	8	No	980	121	37	7	251	44	351	99	0.2
68785	7/8/85	19	29	7	Dom	32	12	No	822	360	98	28	154	8	92	16	11.1
59166	4/2/82	19	29	8	Dom		6	No	2659	182	43	18	822	41	944	475	3.9
59969	7/20/82	19	29	8	Dom	30	6	No	1007	262	72	20	241	8	266	78	6.6
65621	7/10/84	19	29	8	Dom	52	8	No	1868	194	58	12	533	44	801	110	0
66973	12/7/84	19	29	8	Dom	41	6	No	315	0	0	0	116	5	9	138	0
66893	12/10/84	19	29	8	Dom			No	1074	361	100	27	226	10	293	82	14.5
67218	1/17/85	19	29	8	Dom		6	No	626	171	42	16	146	23	113	75	25.7

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
89302	110	90	22	0.59	0.06	0.02	0.01	0	0	0	6.3	12	3	0.2	9.1	223	
89481	108	88	22	0.59	0.28	0.01	0	0	0	0	6.1	13	3	0.4	9.11	221	
89854					0.011										8.98		
98466	230	281	0	1.09	0.102	0.01	0.72	0	0	0.06	1.2	40	3	0.1	7.65	1153	
76843	156	146	22	0.74	0.147	0.28	0.03	0.03	0	0	0.4	44	17	0.4	8.99	494	
83069	212	224	17	0.28	0.02	0.07	0	0.01	0	0	0.3	39	3	0.5	8.75	582	
89003	282	237	53	0.92	0.04	0.05	0	0	0	0	1	39	7	0.2	9.28	664	
120016	10	12	0	0.02	0.004	0	0	0	0	0	0.3	1	5	0.4	7.4	66	-2.33
59017	116	142	0	0.56	0.105	0.06	0	0.01	0.01	0.02			3	0.4	7.75		
59021	490	598	0	0.79	0.08	0.11	0.05	0.01	0.11	0.05			7	1.2	7.98		
65448	378	461	0	0.41	0.02	0	2.47	0	0.79	0.03	1.2	41	5	0.5	7.86		
68917	152	185	0	0.28	0.02	0.02	0.08	0.01	0.05	0.02	0.3	39	5	0.2	8.09		
69956	464	566	0	0.65	0.05	0	1.54	0	0.04	0.14	1.2	51	25	0.3	7.53		
72859	146	149	14	0.96	0.26	0.24	0.03	0.07	0.03	0.01	0.4	46	35	2.2	8.77	487	
78601	492	600	0	0.49	0.02	0.02	3.03	0	0.02	0.03	1.7	41	7	0.4	7.51	1557	
79776	340	298	58	1.92	0.014	0.3	0.01	0	0.14	0	1.2	53	55	0.5	9.32	705	
94440	362	442	0	0.8	0.087	0.04	1.29	0.01	0.05	0.07	0.9	44	3	0.4	7.93	1002	
59679	216	195	28	0.62	0.06	0	0	0.01	0.15	0	1.1	24	3	0.7	9.38		
62624						0.01	0.04	0.02	0.02	0.02	1.1	41					
65438	252	307	0	0.27	0.02	0.03	0.02	0	0.03	0.02	0.4	43	5	0.1	8.16		
71750	590	720	0	0.57	0.04	0	0.14	0	0.02	0.06	1	51	10	0.1	7.48		
75373	600	732	0	0.51	0.04	0	0.06	0	0.5	0.07	0.9	55	3	0.4	7.43	1250	
76108	320	351	19	0.68	0.09	0.23	0.04	0	0.22	0.01	1	39	3	1.8	8.53	1073	
95797	148	181	0	0.24	0.004	0.02	0	0.01	0.02	0.04	0.4	31	3	0.1	7.29	477	
97141	224	273	0	0.27	0.045	0.01	1.25	0	0.02	0.05	0.4	47	3	0.2	7.73	651	
60963	158	139	26	0.57	0.08	0.33	0.01	0	0	0	0.3	54	20	1.4	9.24		
63833	266	325	0	0.28	0.01	0.02	0.04	0	0.27	0.03	0.6	36	5	0.7	7.67		
68785	598	730	0	0.5	0.04	0	0.12	0	0.1	0.06	1	51	7	0.1	7.47		
59166	402	490	0	0.78	0.07	0	0.24	0.01	0.42	0.05			7	0.4	7.94		
59969	416	508	0	0.91	0.04	0.01	2.17	0	0	0.06	1.3	47	35	0.6	7.83		
65621	382	422	22	0.67	0.04	0.28	0.61	0	0.08	0.03	2.3	43	15	0.6	8.3		
66973	62	71	2	0.08	0.04	0	0	0	0.02	0	0.8	21	5	0.3	8.3		
66893	446	544	0	0.75	0.03	0	2.93	0	0.01	0.09	1	39	20	0.3	7.69		
67218	264	322	0	0.59	0.03	0.01	0.1	0.01	0	0.05	0.5	43	5	0.2	8.1		

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
67236	1/21/85	19	29	8	Dom			No	1508	284	71	26	413	9	450	200	3.8
68061	4/3/85	19	29	8	Dom	90	6	No	312	0	0	0	105	2	62	12	0.2
71025	3/12/86	19	29	8	Dom	30	6	No									
71623	4/29/86	19	29	8	Dom	21	6	No	1656	3	1	0	566	5	503	243	2.9
73312	8/28/86	19	29	8	Dom	30	8	No	2252	1235	280	130	203	1	874	237	0
73136	8/28/86	19	29	8	Dom	100	6	Yes	13	0	0	0	5	0	1	0	0
74489	12/31/86	19	29	8	Dom	110	8	No	325	0	0	0	112	2	52	10	0
74845	2/9/87	19	29	8	Dom	123	8	No	300	0	0	0	102	2	61	11	0
74895	2/19/87	19	29	8	Dom	115	6	No	306	0	0	0	104	2	61	10	0.1
75189	3/11/87	19	29	8	Dom	21	6	No	192	0	0	0	43	39	8	55	3.6
76700	8/5/87	19	29	8	Dom	32	8	No	741	262	75	18	159	5	105	44	26.2
80058	6/5/88	19	29	8	Dom	134	6	No	444	5	2	0	156	3	65	11	0.2
80238	7/26/88	19	29	8	Dom			No	326	3	1	0	108	2	56	10	0
81136	9/26/88	19	29	8	Dom	213	6	No	302	5	2	0	97	2	36	5	0
81638	10/27/88	19	29	8	Dom	94	6	No	313	0	0	0	104	2	65	11	0.8
81665	11/1/88	19	29	8	Dom	224	6	No	280	3	1	0	88	3	26	6	0.5
81680	11/7/88	19	29	8	Dom	136	6	No	377	0	0	0	134	3	62	12	0.5
81677	11/7/88	19	29	8	Dom	132	6	No	369	0	0	0	125	2	62	11	0.5
82974	5/30/89	19	29	8	Dom			Yes	27	0	0	0	5	0	9	0	0.8
84556	10/30/89	19	29	8	Dom	28	6	No	831	198	56	14	208	8	147	43	12.1
87058	4/23/90	19	29	8	Dom	26	9	No	796	12	3	1	276	9	163	73	0.4
88906	8/1/90	19	29	8	Dom	110	6	No	317	0	0	0	103	2	63	12	0.9
91247	2/14/91	19	29	8	Dom	122	6	No	323	0	0	0	112	2	60	10	0.3
92139	5/6/91	19	29	8	Dom			Yes	41	0	0	0	10	0	6	0	0
95666	1/29/92	19	29	8	Dom		8	No	1601	100	22	11	516	16	475	190	2.3
95880	2/20/92	19	29	8	Dom	132	6	No	371	0	0	0	130	2	62	12	0
103090	4/16/93	19	29	8	Dom	35	10	Yes	920	76	19	7	305	8	107	260	0.4
119124	2/2/95	19	29	8	Dom			No	1319	213	49	22	376	11	325	135	0.1
78518	2/23/88	19	29	9	Dom			Yes	199	0	0	0	67	1	37	6	0
102414	3/22/93	19	29	9	Dom	35	8	No	1151	44	11	4	389	24	191	128	4.9
79997	7/5/88	19	29	10	Dom	140	6	No	408	3	1	0	149	2	67	18	0
81710	11/15/88	19	29	10	Dom	100	8	No	315	4	0	1	103	2	62	11	1.8
99286	9/22/92	19	29	11	Dom	20		No	1190	448	125	33	210	23	364	70	12.5
93125	7/5/91	19	29	13	Dom	90	6	Yes	3509	115	8	23	1248	19	164	1275	0

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
436	532	0	0.53	0.07	0	5.16	0	0.02	0.13	1.3	43	10	0.2	7.94		
140	132	19	0.83	0.25	0.49	0.03	0.01	0.01	0.01	0.3	36	25	0.9	8.85		
			3.5	0.75												
414	505	0	0.86	0.08	0.01	0	0	0.48	0	1.7	34	10	0.2	8.17		
458	559	0	0.14	0.003	0.01	0	0	0	0.02	0.3	15	3	0.3	7.66	2848	
12	5	5	0.04	0.007	0.01	0	0.01	0.01	0	0.6	4	3	0.4	9.5	30	
174	159	26	0.62	0.09	0.34	0.02	0.01	0.02	0	0.3	48	12	1.1	9.19	495	
140	127	22	0.79	0.16	0.41	0.03	0	0.07	0.01	0.4	49	7	1.5	9.03	460	
140	137	17	0.84	0.24	0.42	0.02	0.01	0.01	0.01	0.4	44	17	0.4	8.97	467	
54	46	10	0.12	0.003	0	0	0	0	0	0.8	17	3	0.4	9	356	
412	503	0	0.65	0.07	0	1.01	0	0.04	0.09	0.9	52	5	0.4	7.47	1145	
250	188	58	1.18	0.18	0.25	0.03	0.03	0.01	0.01	0.7	47	45	5	9.29	671	
172	151	29	0.63	0.09	0.53	0.03	0.39	0.11	0	0.3	48	25	1.1	9.18	501	
166	159	22	0.86	0.118	0.17	0.03	0.02	0.01	0.02	0.6	55	25	5.4	8.9	421	
148	151	14	1.03	0.28	0.36	0.03	0	0.01	0	0.4	44	17	0.6	8.76	468	
160	137	29	0.82	0.11	0.18	0.01	0	0	0	0.5	51	10	0.9	8.84	411	
212	161	48	1.03	0.16	0.25	0.02	0.02	0	0.01	0.6	50	25	0.7	9.28	583	
202	163	41	0.96	0.152	0.36	0.03	0.02	0.01	0.02	0.6	51	25	1.5	9.23	564	
8	10	0	0.09	0.06	0	0.03	0.24	1.24	0.01	0.5	3	3	0.5	6.54	39	
452	551	0	1.02	0.05	0.01	1.59	0	0	0.05	1.3	46	3	0.3	7.88	1230	
364	376	34	0.59	0.06	0.07	0.02	0	0	0.01	0.6	43	7	0.03	8.97	260	
152	142	22	0.93	0.232	0.4	0.04	0.07	0	0.01	0.2	45	15	0.6	9.11	490	
158	144	24	0.85	0.15	0.48	0.02	0	0	0.01	0	48	12	0.3	9.21	499	
16	20	0	0.09	0.05	0.01	0	0	0	0	0.4	15	3	0	7.87	53	
476	581	0	1.47	0.07	0.12	0.03	0.01	0.02	0.03	2.3	41	12	0.8	8.16	2404	
204	190	29	0.98	0.148	0.3	0.02	0.01	0	0.01	0.6	48	25	0.2	9.26	570	
282	344	0	0.53	0.004	0	0.14	0	0.02	0.02	2.1	34	3	0.5	7.56	1558	
538	627	14	0.98	0.121	0.01	2.52	0.01	0	0.06	2	46	17	0.3	8.26	1992	1.07
104	98	14	0.43	0.05	0.15	0.01	0	0.01	0	0.3	37	3	0.3	8.77	311	
520	581	26	1.08	0.435	0.01	0	0.01	0	0.02	2.1	33	7	0.4	8.69	1763	
220	190	38	1.27	0.325	0.48	0.02	0.01	0.01	0.01	0.8	39	35	0.3	9.25	646	
148	132	24	0.94	0.196	1	0.04	0.01	0	0	0.4	46	25	2.5	8.95	476	
422	515	0	0.33	0.05	0	0.25	0.01	0.04	0.09	1.9	39	12	0.2	7.95	1692	
1048	1069	103	3.06	0.92	0.09	0.05	0.01	0	0.03	14.9	24	35	1.4	8.92	5720	

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
93162	7/8/91	19	29	13	Dom	80	6	No	1588	21	5	2	562	13	13	360	1.1
98953	9/6/92	19	29	13	Dom	80	6	No	1583	7	1	1	594	13	14	360	0.9
123427	9/11/95	19	29	13	Dom	110		No	425	0	0	0	150	3	70	21	0.1
77091	9/11/83	19	29	14	Dom	48	6	No	218	105	29	8	25	6	38	9	4.6
78918	3/29/88	19	29	14	Dom	48	6	No	259	129	35	10	26	6	65	11	5.7
81903	1/20/89	19	29	14	Dom	48	6	No	254	125	35	9	25	6	48	14	3.1
77050	9/14/87	19	29	15	Dom			Yes									
59265	4/27/82	19	29	16	Dom	28	6	No	939	126	39	7	276	31	188	143	0.3
60179	8/17/82	19	29	16	Dom	34	8	No	536	0	0	0	199	3	65	23	0.3
60840	10/18/82	19	29	16	Dom	100	6	No	354	0	0	0	115	3	63	18	0
64798	3/17/84	19	29	16	Dom	110	6	No	315	0	0	0	113	2	53	13	1.5
70366	1/6/86	19	29	16	Dom	110	8	Yes	23	0	0	0	10	1	0	0	0.2
72241	6/9/86	19	29	16	Dom	26	8	No	785	91	30	4	228	22	147	116	2.1
76310	6/23/87	19	29	16	Dom	115	8	No	338	0	0	0	116	2	59	14	2.8
76626	8/4/87	19	29	16	Dom	34		No	4660	216	60	16	1508	77	1201	1138	21.4
78516	2/23/88	19	29	16	Dom			No	309	0	0	0	102	2	61	11	0
78898	3/29/88	19	29	16	Dom			Yes									
80579	8/11/88	19	29	16	Dom			No	546	3	1	0	192	4	68	31	3.5
82249	3/6/89	19	29	16	Dom	100	6	No	536	0	0	0	196	4	69	22	0.9
83508	7/24/89	19	29	16	Dom	120	8	No	319	0	0	0	114	2	57	12	24.6
73754	8/21/89	19	29	16	Dom	120	8	Yes									
96635	4/24/92	19	29	16	Dom	25		No	613	309	89	21	85	33	81	35	2.4
103867	5/17/93	19	29	16	Dom	110	6	No	336	3	1	0	116	2	60	15	0.1
109192	12/9/93	19	29	16	Dom		6	No	150	14	4	1	49	0	15	5	0.5
111670	4/5/94	19	29	16	Dom		6	No	5895	169	51	10	2031	59	1690	1875	2
58890	3/8/82	19	29	17	Dom	30	6	No	636	226	56	21	108	39	113	45	0
59631	6/1/82	19	29	17	Dom	16	6	No	1991	411	120	27	555	23	412	420	9.3
60933	10/27/82	19	29	17	Dom	22	6	No	744	272	79	18	132	27	165	61	0.4
60936	11/9/82	19	29	17	Dom	58	8	No	4797	300	92	17	1455	84	1388	1375	14.4
62362	5/20/83	19	29	17	Dom	17	6	No	1574	270	75	20	418	18	438	233	0.1
62745	7/22/83	19	29	17	Dom	30	6	No	661	329	97	21	82	9	117	47	3.4
64018	10/26/83	19	29	17	Dom	30	8	No	808	290	83	20	156	20	165	72	8.7
63832	10/26/83	19	29	17	Dom	28	6	No	839	171	47	13	202	24	173	55	2.4
65777	7/31/84	19	29	17	Dom	28	6	Yes	573	51	14	4	186	11	82	24	2.4

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
93162	834	876	70	4.52	0.278	0.57	0.05	0.11	0.67	0.02	7.8	31	70	0.6	9.14	2546	
98953	802	852	62	4.72	0.26	0.11	0.02	0.14	0.1	0.03	7.4	32	70	0.4	8.98	2550	
123427	238	227	31	1.27	0.54	0.25	0.02	0.02	0	0.01	0.9	37	55	0.4	9.3	661	-0.19
77091	108	132	0	0.33	0.07	0.01	0	0.02	0.01	0.05	0.2	39	3	0.4	7.98	341	
78918	108	132	0	0.38	0.06	0	0	0.02	0.01	0.05	0.2	40	3	0.5	8.1	396	
81903	122	149	0	0.37	0.05	0.04	0	0.02	0.02	0.06			3	0.4	8.06	370	
77050					0.05								3		8.34		
59265	360	415	10	0.52	0.06	0.04	0.1	0	0.08	0			3	0.4	8.36		
60179	318	295	38	2.02	0.55	0.72	0.03	0	0.01	0.01	1.7	43	35	0.6	9.28		
60840	172	210	0	0.68	0.18	0.36	0.02	0	0.01	0.01	0.4	36	25	0.5	8.04		
64798	164	171	14	0.66	0.195	0.42	0.03	0.01	0.03	0.01	0.4	36	25	0.3	8.91		
70366	24	15	7	0.06	0.003	0	0	0	0.04	0	0.5	4	5	0.6	9.28		
72241	322	373	10	0.73	0.07	0.01	0.11	0	0	0.01	1.7	30	3	0.2	8.35	1218	
76310	168	176	14	0.81	0.19	0.43	0.02	0.01	0.07	0.01	0.5	41	25	0.5	8.74	526	
76626	770	939	0	6.6	1.78	0	0	0	0.07	0.03	13.5	35	7	0.3	8.05	7060	
78516	156	146	22	0.76	0.16	0.27	0.02	0.07	0.02	0.01	0.4	45	15	0.6	8.93	477	
78898					0.02										8.77		
80579	310	281	48	2.16	0.59	4.03	0.06	0.04	0.02	0.02	1.7	43	70	22	9.22	824	
82249	312	264	58	2.04	0.57	0.65	0.03	0	0	0.01	1.6	43	45	0.5	9.31	830	
83508	174	163	24	0.72	0.2	0.34	0.02	0	0	0.01	0.4	36	25	0.3	9.01	499	
73754					0.02								3		7.78		
96635	390	476	0	0.37	0.007	0.01	0	0.02	0.43	0.04	0.6	37	3	0.1	8	931	
103867	174	154	29	0.74	0.172	0.36	0.02	0.01	0	0.01	0.4	36	25	0.4	9.15	508	
109192	96	102	7	0.06	0.008	0	0.01	0	0.01	0	0.1	26	3	0.4	8.61	230	-0.31
111670	382	417	24	0.38	0.057	0.22	0.13	0	0.01	0.04	5.5	34	10	1.2	8.3	9124	0.91
58890	322	393	0	0.3	0.01	0.05	0.67	0.03	0.17	0.02	0.9	43	5	0.6	8.06		
59631	566	691	0	0.51	0.005	0.03	1.8	0	0.01	0.06	3.5	32	7	0.6	7.68		
60933	368	449	0	0.47	0.01	0.01	0.13	0	0.41	0.02	1.1	45	7	0.3	7.92		
60936	338	393	10	0.31	0.03	0.09	0.11	0	0.03	0.03	6.4	36	10	1.1	8.25		
62362	462	544	8	1.43	0.4	0.13	0.19	0	0.06	0.03	1.7	39	15	0.9	8.25		
62745	332	405	0	0.74	0.02	0.12	1.12	0	0.79	0.11	0.7	41	15	0.6	7.61		
64018	386	471	0	0.46	0.01	0	0.02	0	0	0.03	1.1	43	7	0.3	8.13		
63832	400	488	0	0.39	0.02	0	0.05	0.07	0.01	0.01	1.2	41	7	0.3	7.92		
65777	342	378	19	1.09	0.26	0.03	0.21	0	0.01	0.01	0.6	39	10	0.3	8.36		

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
65779	7/31/84	19	29	17	Dom			No	584	70	18	6	186	13	91	25	1.9
67953	3/15/85	19	29	17	Dom	30	6	No	234	98	26	8	42	5	37	9	3.4
67912	3/28/85	19	29	17	Dom	27	6	No	296	61	18	4	80	7	32	9	2.3
68946	7/26/85	19	29	17	Dom	24	6	No	520	201	54	16	99	15	56	16	8.3
70170	12/9/85	19	29	17	Dom	22	8	No	851	166	45	13	224	25	197	58	2
72571	7/10/86	19	29	17	Dom	28	8	No	244	107	33	6	38	8	35	7	2.4
75279	3/19/87	19	29	17	Dom	25	6	No	623	317	97	18	87	11	122	37	3.1
75281	3/19/87	19	29	17	Dom			No	737	275	82	17	134	25	162	60	1
75494	4/1/87	19	29	17	Dom			No	722	217	62	15	166	18	151	47	2.4
75515	4/8/87	19	29	17	Dom	20	4	No	1880	60	19	3	657	29	300	560	21.8
75513	4/9/87	19	29	17	Dom	50	6	No	345	76	19	7	76	30	60	20	3.8
81929	1/11/89	19	29	17	Dom	28	6	No	990	3	1	0	362	8	199	60	8.6
85510	1/29/90	19	29	17	Dom			No	316	3	1	0	104	3	53	10	0.6
85694	2/15/90	19	29	17	Dom	17	6	No	1619	286	78	22	456	18	466	230	3.4
86155	3/12/90	19	29	17	Dom	100	8	No	295	0	0	0	95	2	55	12	0
86757	4/10/90	19	29	17	Dom			No	313	0	0	0	106	2	57	12	0.7
111510	3/25/94	19	29	17	Dom			No	296	7	1	1	96	2	54	9	0.1
113557	6/13/94	19	29	17	Dom		8	No	1150	138	37	11	345	34	282	205	0.5
63275	9/8/83	19	29	18	Dom			No	601	53	13	5	190	18	91	33	3.4
65608	7/11/84	19	29	18	Dom	29	6	No	440	3	1	0	158	6	43	14	0.9
67582	2/22/85	19	29	18	Dom	72	8	No	357	3	1	0	129	4	64	15	0.4
70728	2/13/86	19	29	18	Dom	30	8	No	436	96	27	7	108	20	50	14	1.9
72577	7/11/86	19	29	18	Dom	29	6	No	462	5	2	0	167	7	44	14	0.8
73046	8/21/86	19	29	18	dom	204	6	No	268	3	1	0	93	3	30	7	0
77670	11/17/87	19	29	18	Dom	100	8	No	298	5	2	0	90	3	44	7	0.4
79065	4/8/88	19	29	18	Dom	26	6	No	782	3	1	0	294	9	74	91	17.8
80228	7/12/88	19	29	18	Dom		6	No	432	5	2	0	165	7	46	13	0
80426	8/4/88	19	29	18	Dom	119	6	No	229	0	0	0	75	2	40	6	0
81925	1/18/89	19	29	18	Dom	26	6	No	1021	9	2	1	377	15	92	213	21
84671	11/8/89	19	29	18	Dom	204	8	No	267	3	1	0	93	3	31	7	0.4
89606	9/19/90	19	29	18	Dom	87		No	246	0	0	0	85	2	48	8	0.5
94439	10/16/91	19	29	18	Dom	155	12	No	346	3	1	0	110	4	61	16	0.2
97186	5/26/92	19	29	18	Dom	80	12	No	4125	35	4	6	1545	23	201	1625	0.2
79185	5/26/92	19	29	18	Dom	80	12	No	2123	16	3	2	746	15	62	570	1.1

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
65779	360	390	24	1.19	0.3	0	0.21	0	0	0.02	0.6	39	7	0.1	8.44		
67953	140	171	0	0.38	0.07	0	0	0	0.01	0.02	0.3	34	5	0.4	7.68		
67912	190	159	36	0.47	0.02	0.07	0	0	0.01	0.02	0.3	32	5	1.1	9.04		
68946	356	434	0	0.63	0.03	0	0.17	0.05	0.01	0.08	0.7	43	5	0.2	7.57		
70170	430	525	0	0.48	0.02	0	0.03	0	0.01	0.01	1.4	45	5	0.6	8.05		
72571	156	190	0	0.39	0.02	0.11	0	0.05	0.02	0.03	0.3	29	3	2	7.91	400	
75279	340	415	0	0.61	0.01	0	0.02	0.01	0.31	0.09	0.8	38	3	0.4	7.54	988	
75281	350	427	0	0.52	0.01	0.01	0.04	0.01	0.1	0.03	1.2	41	3	0.5	7.64	1172	
75494	374	456	0	0.48	0.02	0	0.01	0	0.02	0.02	1.2	42	3	0.3	7.93	1122	
75515	392	444	17	2.16	0.89	0	0.01	0	0.02	0.02	2.5	29	3	0.3	8.58	3165	
75513	184	220	2	0.31	0.01	0.02	0	0	0.05	0.01	0.4	39	3	0.3	8.25	580	
81929	490	598	0	0.36	0.02	0	0.02	0.01	0.14	0.02			5	0.6	7.92	1508	
85510	164	156	22	0.68	0.16	0.28	0.03	0.01	0	0.01	0.3	42	25	0.2	9.08	473	
85694	512	625	0	1.44	0.5	0.02	0.46	0.01	0.02	0.04	1.8	41	12	0.3	7.96	2438	
86155	150	149	17	0.64	0.18	0.26	0.02	0	0	0.01	0.3	37	17	0.2	9.04	465	
86757	168	161	22	0.72	0.19	0.38	0.02	0	0.02	0	0.3	37	25	0.5	9.01	494	
111510	144	142	17	0.68	0.156	1.69	0.04	0.01	0	0.01	0.4	49	35	7.7	8.97	427	-0.42
113557	338	373	0.9	0.66	0.03	0	0.22	0.01	0.01	0.01	1.6	34	10	0.2	8.58	1882	0.68
63275	338	412	0	0.76	0.2	0.01	0	0.01	0.04	0.01	0.7	41	7	0.7	8.06		
65608	288	234	58	2.12	1.01	0.26	0	0.01	0.01	0	0.6	34	25	3.6	9.28		
67582	192	181	26	1.11	0.26	0.28	0.02	0	0	0	0.6	45	70	0.8	8.92		
70728	294	349	5	0.59	0.04	0.04	0.01	0	0	0.02	0.5	41	5	0.3	8.28		
72577	302	285	41	2.92	1.23	0.14	0.02	0.01	0	0	1.1	34	7	0.9	9.12	744	
73046	168	132	36	62	0.018	0.37	0.01	0.01	0	0	0.5	43	7	2.4	9.39	425	
77670	146	134	22	0.82	0.34	0.24	0.05	0.06	0.02	0.01	0.4	39	55	14	9.13	409	
79065	430	368	77	1.88	0.62	0.05	0	0	0	0	1.6	33	7	0.8	9.31	1346	
80228	284	293	26	2.46	0.097	0.13	0.01	0.01	0.01	0	0.9	34	12	1.1	8.7	683	
80426	112	102	17	0.49	0.15	0.35	0.02	0	0	0	0.3	42	10	1	9.06	338	
81925	428	371	74	1.94	0.61	0.14	0	0	0.03	0.01			7	1.7	8.22	1675	
84671	162	129	34	0.62	0.02	0.04	0	0	0	0	0.4	39	3	0.2	9.38	407	
89606	126	124	14	0.57	0.15	0.39	0.01	0	0	0	0.2	40	10	1.2	8.83	386	
94439	172	151	29	0.8	0.18	0.15	0.02	0.04	0	0.01	0.6	46	35	0.6	8.92	534	
97186	1008	1147	41	3.16	0.68	0.22	0.03	0	0	0.02	17.2	23	55	5.9	8.54	7000	
79185	840	888	67	4.2	0.46	0.12	0.03	0	0	0.03	9.3	30	70	0.4	8.87	3368	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
127248	5/15/96	19	29	18	Dom	32	6	No	733	14	4	1	264	9	88	33	1.8
130549	11/20/96	19	29	18	Dom	34	8	No	556				203				
133989	7/8/97	19	29	18	Dom	114	6	No	228	0	0	0	74	2	39	5	0
58565	2/5/82	19	29	19	Dom	28	8	No	1454	8	3	0	507	19	254	176	10.8
59632	6/3/82	19	29	19	Dom	31	6	No	768	81	26	4	247	23	123	54	18.8
60934	11/2/82	19	29	19	Dom	30	6	No	207	91	30	4	34	4	24	5	0
61357	1/25/83	19	29	19	Dom	30	6	No	926	27	9	1	338	15	131	36	0.4
61625	3/7/83	19	29	19	Dom	30	6	No	477	42	15	1	160	9	65	20	10.3
64176	1/5/84	19	29	19	Dom			No	159	0	0	0	60	1	7	24	32
64509	2/24/84	19	29	19	Dom	25	6	No	542	274	85	15	73	7	102	55	28.5
65781	7/26/84	19	29	19	Dom	26	6	No	571	244	73	15	105	7	128	32	0
66171	8/29/84	19	29	19	Dom	32	6	No	272	136	43	7	37	6	31	7	1.1
66228	9/21/84	19	29	19	Dom	30	6	No	887	47	14	3	308	15	139	44	2.6
67550	2/21/85	19	29	19	Dom	330	8	No	359	5	2	0	127	4	52	32	1.4
67656	3/5/85	19	29	19	Dom	31	8	No	549	3	1	0	206	7	48	11	2.1
68313	5/6/85	19	29	19	Dom	132	6	No	234	0	0	0	78	2	40	6	0.2
70038	11/18/85	19	29	19	Dom			Yes	211	5	2	0	66	8	9	11	30.3
70292	12/30/85	19	29	19	Dom	30	8	No	521	5	2	0	188	9	48	15	2.1
70382	1/3/86	19	29	19	Dom			No	308	145	45	8	50	6	49	16	5
70935	3/6/86	19	29	19	Dom	38	8	No	39	0	0	0	7	1	1	2	4.2
72082	6/6/86	19	29	19	Dom		8	No	335	165	53	8	49	5	45	12	13.1
72573	7/11/86	19	29	19	Dom	105	6	No	259	0	0	0	84	2	43	6	0
72833	7/23/86	19	29	19	Dom	115	6	No	243	3	1	0	80	2	43	5	0.3
73440	9/15/86	19	29	19	Dom	175	8	No	249	0	0	0	83	2	51	6	0
74647	1/23/87	19	29	19	Dom			Yes	249	112	35	6	38	7	30	7	0.8
74650	1/26/87	19	29	19	Dom	115	6	No	235	0	0	0	78	2	43	5	0
74848	2/4/87	19	29	19	Dom	130	6	No	235	0	0	0	80	2	39	5	0
75812	5/5/87	19	29	19	Dom	115	6	Yes									
76030	5/26/87	19	29	19	Dom	30	8	No	230	132	43	6	29	3	34	10	2.9
77651	11/10/87	19	29	19	Dom	40	6	No	224	0	0	0	75	2	40	5	0
77913	12/14/87	19	29	19	Dom	30	8	No	320	149	48	7	53	5	47	19	1.4
77980	12/21/87	19	29	19	Dom			No	290	14	4	1	90	7	48	27	1
78154	1/4/88	19	29	19	Dom	35	6	No	419	247	74	15	42	9	73	19	0
79063	4/8/88	19	29	19	Dom		8	No	899	22	7	1	307	23	197	59	3.2

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
127248	446	300	120	1.53	0.63	0.03	0.01	0	0	0	1.3	33	10	0.3	9.94	1108	1.6
130549					0.36										9.35		
133989	112	112	12	0.66	0.21	1.03	0.03	0.02	0.01	0.01	0.3	40	25	7.2	8.28	330	-1.51
58565	592	639	34	2.16	0.59	0	0	0	0.01	0	2.7	28	3	0.4	8.77		
59632	398	393	38	1.19	0.33	0.01	0	0	0.01	0.03	1.3	28	3	0.4	8.79		
60934	136	166	0	0.32	0.01	0.04	0	0.28	0.08	0.03	0.2	28	5	0.4	7.89		
61357	578	647	29	1.06	0.09	0.13	0.01	0	0.02	0.04	1.2	32	7	2.3	8.65		
61625	300	288	38	1.66	0.93	0.01	0.01	0.02	0.02	0.02	1.8	30	7	0.7	8.99		
64176	64	59	10	0.27	0.04	0	0	0	0.02	0	7.5	2	5	0.6	8.49		
64509	228	278	0	0.45	0.01	0.02	0.12	0	1.36	0	0.5	39	5	1	7.97		
65781	298	364	0	0.5	0.015	0.24	0.64	0.01	0.28	0.12	0.5	34	5	0.3	8.11		
66171	170	207	0	0.6	0.02	0	0	0.01	0.01	0.04	0.1	34	7	0.4	7.91		
66228	536	556	48	1.18	0.14	0.09	0	0.02	0.02	0.03	1.2	36	17	0.6	8.71		
67550	186	154	36	0.6	0.09	0.14	0	0	0	0	0.3	36	10	0.7	9.16		
67656	382	227	118	1.7	0.71	0.18	0	0	0.01	0	1	39	10	1.8	9.66		
68313	120	102	22	0.48	0.15	0.41	0.02	0.05	0.07	0	0.3	41	10	3	9.02		
70038	108	132	0	0.27	0.009	0	0	0	0.01	0	0.9	24	5	0.2	8.06		
70292	364	224	108	1.28	0.39	0.11	0	0	0	0	0.8	34	7	1.4	9.64		
70382	192	234	0	0.27	0.01	0	0	0.01	0.01	0.04	0.4	26	7	0.1	7.46		
70935	14	17	0	0.03	0.003	0	0	0.02	0	0.02		21	3	0.1	7.4		
72082	216	264	0	0.3	0.01	0.01	0	0.01	0	0.03	0.3	28	3	0.2	8.19		
72573	132	137	12	0.79	0.107	0.76	0.02	0.03	0	0	0.4	41	25	2.4	8.94	383	
72833	122	110	19	0.53	0.16	0.38	0.09	0.01	0.02	0.01	0.3	41	35	8.5	9.07	356	
73440	122	120	14	0.56	0.19	0.38	0.02	0	0.05	0	0.3	43	15	0.6	8.7	377	
74647	170	207	0	0.35	0.03	0.01	0.01	0	0.02	0.01	0.3	28	3	0.4	8.14	410	
74650	122	115	17	0.52	0.15	0.34	0.01	0.01	0.01	0.01	0.3	42	7	0.9	9.09	354	
74848	126	110	22	0.51	0.14	0.24	0.01	0	0	0	0.3	43	5	0.5	9.1	365	
75812					0.003										8.06		
76030	144	176	0	0.24	0.02	0.01	0	0.02	0	0.04	0.2	25	3	0.2	8	396	
77651	114	115	12	0.51	0.14	0.19	0.01	0	0	0	0.2	42	5	1	8.95	340	
77913	198	242	0	0.38	0.04	0.01	0	0.12	0.01	0.02	0.3	25	3	0.4	7.78	532	
77980	132	132	14	0.44	0.04	0.04	0.01	0.02	0.02	0	0.4	41	3	0.4	8.78	465	
78154	264	322	0	0.63	0.03	0.31	0.31	0	0	0.03	0.4	33	3	0.9	8.02	691	
79063	430	427	18	1.43	0.75	0	0.01	0	0	0	1.3	32	5	0.3	8.95	1468	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
79189	4/19/88	19	29	19	Dom	36	6	No	395	58	15	5	102	8	118	8	2.5
80643	9/7/88	19	29	19	Dom			Yes	497	0	0	0	181	0	88	35	2.1
80648	9/7/88	19	29	19	Dom	110		No	216	0	0	0	70	3	43	6	0.3
81133	10/3/88	19	29	19	Dom	120	8	No	224	0	0	0	69	2	39	5	0
81711	11/15/88	19	29	19	Dom	85	6	No		4	0	1	79	2	41	4	0.9
82161	2/22/89	19	29	19	Dom	106	6	No	227	3	1	0	77	2	38	5	0.4
82835	5/8/89	19	29	19	Dom	112	6	No	260	0	0	0	77	2	43	7	1.6
84212	10/4/89	19	29	19	Dom			No	650	10	4	0	222	16	92	29	4.6
84447	10/23/89	19	29	19	Dom	113	6	No	230	0	0	0	76	3	42	5	0.4
85360	1/16/90	19	29	19	Dom	105		No	280	0	0	0	78	3	61	12	0.6
85621	2/13/90	19	29	19	Dom			No	262	3	1	0	80	2	45	7	0.6
87057	4/23/90	19	29	19	Dom	135	8	No	254	4	0	1	74	4	46	8	0.2
88619	7/16/90	19	29	19	Dom	110		No	242	0	0	0	79	2	44	6	0
91251	1/29/91	19	29	19	Dom			Yes		0							
91263	2/6/91	19	29	19	Dom	34	6	No	558	40	11	3	186	10	73	28	5.08
91246	2/6/91	19	29	19	Dom	34	6	Yes	49	0	0	0	17	1	0	2	2.7
92727	6/19/91	19	29	19	Dom			Yes	171	19	6	1	53	4	9	41	2.6
93121	7/9/91	19	29	19	Dom			No	237	0	0	0	78	2	46	7	0
94936	12/4/91	19	29	19	Dom	106	6	Yes	11	0	0	0	3	0	0	0	0
95665	1/29/92	19	29	19	Dom	96	6	Yes	17	0	0	0	6	0	0	0	2.3
97012	5/6/92	19	29	19	Dom			No	272	0	0	0	85	2	47	8	0
98357	8/11/92	19	29	19	Dom	37	8	No	322	12	3	1	109	7	46	19	0.5
99096	9/15/92	19	29	19	Dom			Yes	1125	40	11	3	387	26	233	71	2.4
107010	9/9/93	19	29	19	Dom	50	6	Yes	8	0	0	0	5	0	0	0	0.7
110073	1/6/94	19	29	19	Dom		6	Yes	12	0	0	0	6	0	1	0	0.4
124743	11/15/95	19	29	19	Dom	95		No	251	0	0	0	81	1	44	6	0
59449	5/28/82	19	29	20	Dom	28	6	No	892	133	40	8	264	23	204	148	0.1
64630	3/12/84	19	29	20	Dom	28	6	No	1242	507	145	35	216	11	322	174	18.2
67910	3/27/85	19	29	20	Dom	34	8	No	399	31	9	2	120	22	50	16	1.2
71080	3/18/86	19	29	20	Dom	34	8	Yes	771	23	6	2	260	8	127	54	45.6
73047	8/22/86	19	29	20	Dom	34	8	Yes									37.9
93459	7/26/91	19	29	20	Dom	185	8	Yes	413	3	1	0	167	6	68	66	0.3
90904	9/14/91	19	29	20	Dom	185	6	Yes	563	9	2	1	189	6	74	80	0
98216	7/28/92	19	29	20	Dom	96	6	No	724	305	81	25	133	20	118	30	3.3

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
79189	152	185	0	0.77	0.16	0.07	0	0	0	0.02	1	42	3	0.5	8.17	594	
80643	244	298	0	0.55	0.02	0.01	0	0.05	0	0	0.5	36	3	0.3	7.77	774	
80648	102	95	14	0.36	0.09	0.13	0.01	0.02	0.01	0	0.2	42	3	0.3	8.72	320	
81133	108	88	22	0.51	0.16	0.36	0.02	0	0	0	0.3	41	12	0.5	8.78	330	
81711	128	117	19	0.66	0.194	1.23	0.03	0.02	0.02	0	0.3	41	35	5.5	8.88	357	
82161	120	112	17	0.63	0.225	0.59	0.04	0.03	0.02	0.01	0.4	38	35	4.2	9	345	
82835	122	129	10	0.7	0.24	1.86	0.06	0.03	0.01	0.02	0.4	47	55	11	8.74	361	
84212	388	376	48	1.57	0.79	0.1	0.02	0.02	0.01	0.01	1.3	32	5	0.7	9.15	1018	
84447	118	110	17	0.46	0.13	0.36	0.03	0.01	0.01	0	0.2	41	7	1.5	9.01	343	
85360	108	102	14	0.33	0.04	2.79	0.07	0	0.08	0.02	0.2	54	45	17	8.57	376	
85621	130	124	17	0.72	0.2	0.29	0.03	0.01	0	0.01	0.2	39	20	0.3	9.1	390	
87057	122	115	17	0.61	0.17	0.3	0.01	0	0.01	0.05	0.2	42	5	0.03	8.94	377	
88619	120	107	19	0.5	0.14	0.19	0.01	0.01	0	0	0.1	42	7	0.3	8.97	367	
91251	0	0	0		0.06										8.14		
91263	342	344	36	0.93	0.36	0.01	0.01	0	0	0.01	1.1	29	3	0.2	9.05	893	
91246	32	29	5	0.11	0.006	0	0	0	0	0	1.2	5	3	0.1	8.62	82	
92727	76	93	0	0.37	0.03	0	0	0	0.01	0.01	0.7	17	3	0.1	7.91	316	
93121	120	112	17	0.52	0.17	0.27	0.01	0.01	0	0	0.3	39	7	0.3	8.92	369	
94936	12	5	5	0.05	0.05	0.01	0	0	0	0.01	0.4	3	3	0.1	9.41	31	
95665	18	0	0	0.06	0.03	0	0	0	0	0.01	0.4	6	3	0.4	9.54	36	
97012	134	134	14	0.67	0.192	0.19	0.03	0.06	0	0.01	0.4	42	12	0.3	9.02	379	
98357	176	176	19	0.62	0.03	0.11	0	0	0	0.01	0.4	31	3	0.7	9.12	495	
99096	558	598	41	0.84	0.355	0.04	0.03	0.03	0	0.02	1.5	31	12	0.3	8.81	1736	
107010	12	5	5	0.04	0.05	0	0	0	0	0	0.3	3	3	0.4	9.35	26	
110073	12	15	0	0.06	0.006	0	0	0	0	0	1.2	4	3	0.4	7.96	31	
124743	126	115	19	0.48	0.08	0.41	0.01	0	0	0	0.3	39	20	1.4	9.13	367	-0.61
59449	300	366	0	0.36	0	0	0.1	0	0	0.18			3	0.4	7.68		
64630	416	508	0	0.61	0.03	0.01	0.98	0	0.15	0.13	1.5	51	5	0.4	8.11		
67910	232	244	19	0.74	0.14	0.08	0.03	0	0.01	0.01	0.5	28	5	1.1	8.44		
71080	382	466	0	0.42	0.03	0	0.02	0.05	0.01	0		34	10	0.2	7.86		
73047																	
93459	222	178	46	0.74	0.083	0.28	0.01	0.02	0	0	1	30	3	0.6	9.46	811	
90904	246	232	34	0.79	0.089	0.1	0	0.01	0.01	0	0.8	30	5	0.7	9.2	895	
98216	450	549	0	0.33	0.04	0.09	0.24	0	0	0.04	0.9	42	3	0.5	7.84	1147	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
69046	8/9/85	19	29	21	Dom	44	6	No	499	243	66	19	56	4	90	28	75.9
80825	9/19/88	19	29	21	Dom			No									
72039	5/29/86	19	29	22	Dom	40	8	No	362	147	44	9	60	8	46	13	17.8
81807	12/22/88	19	29	23	Dom	92	6	No	2919	5	2	0	1115	20	173	975	0.7
89005	8/10/90	19	29	23	Dom	22	6	No	1010	400	119	25	174	13	290	76	44.9
65146	5/14/84	19	29	24	Dom	24	8	No	3693	654	181	49	900	40	2026	160	11.6
76772	8/14/87	19	29	24	Dom			No	213	0	0	0	68	2	44	6	0
79777	5/26/88	19	29	24	Dom			No	1034	274	65	27	225	41	330	88	0.1
85701	2/16/90	19	29	24	Dom	27	8	No	2621	804	226	58	518	24	995	340	13.1
91918	4/15/91	19	29	24	Dom	80	5	No	2553	13	2	2	943	15	90	800	0.5
93800	8/23/91	19	29	24	Dom	102	8	No	3730	4	0	1	967	574	201	1250	0.2
94948	11/20/91	19	29	24	Dom	80	12	No	5013	47	4	9	1897	28	274	2100	0
94951	11/20/91	19	29	24	Dom	84	12	No	2843	17	2	3	1100	17	107	970	0.5
95986	2/25/92	19	29	24	Dom	80	12	No	2745	13	2	2	992	16	102	825	1
96219	3/9/92	19	29	24	Dom	21	6	No	999	340	98	23	197	10	302	110	22.6
96269	3/18/92	19	29	24	Dom	80	12	No	2561	16	3	2	1007	17	66	800	1.2
61045	11/19/82	19	29	25	Dom	14	6	No	2212	784	241	44	401	16	863	127	4.7
61105	11/30/82	19	29	25	Dom	25	8	No	1097	506	158	27	159	17	340	114	22.3
62187	4/28/83	19	29	25	Dom	17		No	922	404	119	26	123	9	261	50	44.6
62177	5/5/83	19	29	25	Dom			No									
62613	6/6/83	19	29	25	Dom	14	6	No	345	115	33	8	68	6	63	21	10.1
67443	2/1/85	19	29	25	Dom	14	6	No	2287	760	235	42	421	15	1006	162	10.8
67973	4/2/85	19	29	25	Dom	28	6	No	1302	353	87	33	280	37	481	94	36.7
72239	6/12/86	19	29	25	Dom	22	6	No	285	127	36	9	43	5	44	18	4.1
75984	5/12/87	19	29	25	Dom	20	8	No	503	188	52	14	92	9	143	39	15.2
76401	7/2/87	19	29	25	Dom	93	6	No	2458	5	2	0	888	12	243	445	0
79062	4/8/88	19	29	25	Dom		8	No	289	127	36	9	45	5	56	18	4
92352	5/22/91	19	29	25	Dom	20		No	408	154	45	10	75	7	80	34	14.1
96364	4/2/92	19	29	25	Dom	90		No	2717	17	2	3	851	14	244	420	0.1
97013	5/12/92	19	29	25	Dom	10	8	No	599	203	58	14	123	10	106	43	22.1
96994	5/12/92	19	29	25	Dom	10	12	No	819	391	122	21	112	11	203	96	19.3
75881	5/5/87	19	29	26	Dom	36	8	No	1946	675	186	51	314	24	962	56	0
94441	10/7/91	19	29	26	Dom	30	6	No	1030	569	188	24	102	8	364	95	4.7
94938	12/3/91	19	29	26	Dom	40	8	No	915	414	121	27	145	24	274	49	16.7

Shaded Parameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
176	215	0	0.31	0.004	0	1.23	0.01	0.01	0.16	0.4	34	3	0.1	7.1		
				0.55												
220	268	0	0.42	0.02	0	0	0	0.02	0.04	0.4	39	3	0	7.82		
892	976	55	3.32	0.6	0.05	0.03	0.01	0.01	0.03	12.5	33	55	0.4	8.56	4882	
342	417	0	0.69	0.035	0	0.62	0.01	0.01	0.08	1.2	48	7	0.2	7.8	1455	
458	559	0	0.52	0.03	1.32	1.89	0	0.07	0.11	5.8	32	30	10	7.86		
94	95	10	0.37	0.1	0.15	0.01	0.01	0.01	0	0.3	42	3	0.4	8.53	328	
362	442	0	0.79	0.05	0.03	0.07	0.02	0	0.03	2	42	3	0.4	8.14	1599	
462	564	0	0.22	0.004	0.18	0.54	0.03	0.04	0.03	3.9	49	5	1	7.48	3469	
946	1057	48	4.24	0.886	0.11	0.03	0	0	0.03	12.6	30	70	0.4	8.75	4253	
894	1003	43	3.18	0.528	0.06	0.01	0.18	0.01	0.01	14.4	33	45	0.1	8.55	6035	
966	1179	0	2.82	1.16	0.18	0.11	0.01	0.01	0.04	18.8	37	25	1.3	7.91	8407	
934	1100	19	4	0.924	0.38	0.04	0.01	0.16	0.04	13.9	27	70	0.5	8.32	4676	
928	1030	50	4	0.51	2.52	0.06	0	0.05	0.03	12.7	25	70	3	8.75	4262	
306	373	0	0.3	0.013	0.07	0.54	0.01	0	0.08	1.4	45	7	0.4	7.81	1468	
924	903	110	3.88	0.35	3.19	0.08	0.01	0.02	0.03	11.5	21	70	19	9.04	4137	
618	754	0	0.16	0.02	0.02	0.14	0.06	0.14	0.07	2.9	41	10	0.4	7.63		
374	456	0	0.47	0.03	0.31	0.07	0	0.03	0.17	1	36	7	1.3	7.66		
350	393	14	0.36	0.01	0	0.26	0	0.06	0.11	1	45	7	0.4	8.28		
170	207	0	0.58	0.005	0.01	0	0	1.48	0.04	0.4	32	5	0.1	7.83		
434	529	0	0.38	0.02	0.36	0.19	0.02	0.18	0.05	2.5	34	5	0.3	7.74		
370	451	0	0.51	0.075	0	0.19	0	0.1	0.02	2.2	30	10	0.5	7.92		
160	195	0	0.34	0.04	0	0	0.01	0.09	0.05	0.3	34	3	0.1	8.16	455	
182	222	0	0.47	0.03	0.02	0	0	0.11	0.05	1.2	34	5	0.3	8.03	803	
1060	1205	43	4.6	1.71	0.06	0.01	0	0	0.01	15.3	35	35	0.7	8.32	3819	
150	168	7	0.37	0.04	0	0	0	0.01	0.04	0.4	33	3	0.3	8.26	471	
180	220	0	0.65	0.01	0.02	0	0.01	0.02	0.04	0.6	37	3	0.1	7.55	656	
1060	1254	19	4.52	1.52	0.32	0.26	0.01	0	0.03	15	35	45	1	8.35	3581	
304	371	0	0.6	0.017	0.02	0	0.03	0.08	0.08	1.2	33	7	0.2	7.9	884	
280	342	0	0.49	0.003	0.01	0.05	0.02	2.07	0.15	1.1	35	5	0.2	7.17	1221	
312	381	0	0.67	0.044	0.02	0.35	0	0.14	0.04	3	56	3	0.3	7.72	2488	
266	325	0	1.55	0.038	0	1.07	0	0.04	0.06	0.9	54	3	0.4	7.7	1397	
392	478	0	0.46	0.015	0	0.11	0.01	0.15	0.16	1.2	37	3	0.2	7.62	1358	

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
119527	3/2/95	19	29	26	Dom			Yes									
59966	7/14/82	19	29	27	Dom	25	8	No	928	52	19	1	317	4	138	158	6.7
76773	8/13/87	19	29	27	Dom	35	6	No	1224	508	149	33	207	9	334	114	23.8
94508	4/25/91	19	29	27	Dom	35	6	No	758	269	63	27	146	19	210	61	21.9
65685	7/20/84	19	29	28	Dom	30	6	No	1061	563	161	39	120	5	346	112	24.4
61153	12/9/82	19	29	29	Dom			No									
65402	6/19/84	19	29	29	Dom	90	10	No	606	5	2	0	214	7	88	102	1.9
65628	7/9/84	19	29	29	Dom	90	10	No									
65629	7/17/84	19	29	29	Dom	90	10	No									
65694	7/23/84	19	29	29	Dom	90	10	Yes									
65695	7/27/84	19	29	29	Dom	90	10	Yes									
66322	9/26/84	19	29	29	Dom	90		No									
66608	11/4/84	19	29	29	Dom	90	10	Yes	15	0	0	0	7	0	0	4	2.7
67348	2/1/85	19	29	29	Dom	90		No									
67937	3/27/85	19	29	29	Dom	90		Yes									
68375	5/13/85	19	29	29	Dom	90		Yes									
68377	5/14/85	19	29	29	Dom	90		Yes									
68379	5/15/85	19	29	29	Dom	90		Yes									
68378	5/15/85	19	29	29	Dom	90		Yes									
72242	6/16/86	19	29	29	Dom		6	No	612	286	80	21	96	4	125	34	0
75691	4/27/87	19	29	29	Dom			No	247	0	0	0	86	1	46	8	0
76174	6/9/87	19	29	29	Dom	20	4	Yes									
79697	6/6/88	19	29	29	Dom	90		No									2.3
97640	6/23/92	19	29	29	Dom	125	8	No	473	3	1	0	166	4	101	52	0.1
109451	12/13/93	19	29	29	icipal	130	16	No	628	9	2	1	228	7	97	108	1.3
110595	2/17/94	19	29	29	Dom	90	16	No									
121481	6/16/95	19	29	29	Dom	100	10	No									
121493	6/16/95	19	29	29	Dom	100	10	No	608	9	2	1	222	8	98	108	0.3
124933	12/5/95	19	29	29	Dom	100	10	No									0.2
131786	2/10/97	19	29	29	Dom	90		No					472				0.1
131784	2/10/97	19	29	29	Dom	90		No					234				0.3
131785	2/10/97	19	29	29	Dom	90		No					240				0.2
131787	2/10/97	19	29	29	Dom	90		No					687				0.2
63659	10/24/83	19	29	30	Dom			No	241	72	19	6	48	8	39	10	0.2

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
119527					0.006												
59966	370	393	24	3.06	1.31	0.13	0.29	0	0.01	0.05	2	39	7	0.7	8.47		
76773	464	566	0	0.64	0.01	0.01	4.34	0	0.01	0.09	1.8	40	7	0.3	7.43	1809	
94508	298	364	0	0.44	0.134	0.02	0.09	0	0.01	0.05	1.3	39	10	0.5	7.89	1156	
65685	304	371	0	0.43	0.01	0.13	3.22	0	0.03	0.06	1	39	3	0.2	7.51		
61153				0.78													
65402	248	210	46	0.72	0.115	0.02	0	0.01	0	0	1.1	28	3	0	9.18		
65628				0.91	0.06												
65629				0.78	0.12												
65694				0.73	0.105												
65695				0.79	0.12												
66322				0.79	0.005												
66608	4	5	0	0.05	0	0	0	0	0	0	0.3	4	5	0.2	7.84		
67348				0.78	0.1												
67937				0.52	0.064	0.03											
68375				0.74	0.12												
68377				0.75	0.12												
68379				0.76	0.12												
68378				0.76	0.12												
72242	336	410	0	0.58	0.01	0	0.14	0	0.01	0.04	0.8	43	3	0.4	7.56	958	
75691	124	93	29	0.52	0.14	0.23	0.02	0	0	0	0.3	37	3	0.4	9.23	390	
76174					0.003										7.24		
79697				0.77	0.11					0							
97640	194	173	31	0.84	0.22	0.05	0.04	0.01	0	0.01	0.7	35	35	0.9	9.13	741	
109451	254	227	41	0.78	0.12	0.02	0	0.01	0	0	1.2	28	7	0.4	9.27	1050	0.39
110595																	
121481																	
121493	252	205	50	0.81	0.12	0.01	0	0	0	0	1.2	28	3	0.5	9.33	1055	0.45
124933																	
131786				0.3	0.004									0.2	5.26		
131784				0.78	0.124									0.2	8.4		
131785				0.38	0.026									1.4	8.31		
131787				0.37	0.011									1.5	5.05		
63659	134	163	0	0.48	0.05	0.03	0.14	0	0.01	0.01	0.3	34	5	0.4	8.15		

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
66030	8/7/84	19	29	30	Dom	35	6	No	645	357	110	20	70	16	101	46	36.8
74693	1/21/87	19	29	30	Dom	35	8	No	244	92	22	9	40	9	43	9	0
81320	10/18/88	19	29	30	Dom	90	8	No	280	114	34	7	34	14	67	20	0
86732	4/13/90	19	29	30	Dom			No				20	146			41	
88503	6/29/90	19	29	30	Dom	320	8	No	195	24	8	1	49	9	35	4	0
109884	12/29/93	19	29	30	Dom			No	192	24	8	1	47	9	36	5	0.2
119304	2/13/95	19	29	30	Dom			No	277	3	1	0	92	3	34	6	0
121047	5/11/95	19	29	30	Irr			No									
121042	5/11/95	19	29	30	Irr			No									
121043	5/11/95	19	29	30	Irr			No									
121044	5/11/95	19	29	30	Irr			No									
121046	5/11/95	19	29	30	Irr			No									
121040	5/11/95	19	29	30	Irr			No									
121045	5/11/95	19	29	30	Irr			No									
121041	5/11/95	19	29	30	Irr			No									
128027	7/2/96	19	29	30	Dom			No	197						35	9	0
129946	10/9/96	19	29	30	Dom			No	266	3	1	0	92	3	60	8	0
61969	4/18/82	19	29	31	Dom	23	8	No	446	220	65	14	71	8	65	20	30.7
59276	4/28/82	19	29	31	Dom		10	No	328	0	0	0	108	1	46	14	1.7
59634	6/1/82	19	29	31	Dom	28		No	400	171	52	10	65	11	67	24	52.2
60573	9/16/82	19	29	31	Dom			No	824	247	71	17	193	13	183	94	13
61106	12/2/82	19	29	31	Dom	22	6	No	344	122	34	9	65	10	55	16	2.6
61578	2/10/83	19	29	31	Dom	25	8	No	450	188	54	13	75	7	76	33	9
61737	3/8/83	19	29	31	Dom	20		No	2025	734	218	46	374	14	546	365	10.3
62612	6/17/83	19	29	31	Dom	30	6	No	376	188	52	14	52	11	54	14	6.5
62845	8/1/83	19	29	31	Dom	26	6	No	752	270	75	20	151	5	154	57	1.7
63223	9/8/83	19	29	31	Dom			No									
63319	9/9/83	19	29	31	Dom			No	463	151	44	10	59	39	81	25	13.9
64156	1/3/84	19	29	31	Dom	30		No	439	214	61	15	57	8	81	27	0.5
64431	2/1/84	19	29	31	Dom	38		No	423	212	60	15	53	8	76	25	0.1
65441	6/20/84	19	29	31	Dom			No	392	173	51	11	63	11	55	15	6.9
67242	1/23/85	19	29	31	Dom	25	8	No	796	259	79	15	157	24	182	45	15.4
67970	3/28/85	19	29	31	Dom	34	9	No	386	189	56	12	55	8	68	13	6.6
68787	7/1/85	19	29	31	Dom			No	419	155	44	11	88	2	75	21	4.6

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
66030	338	412	0	0.23	0.005	0	0.01	0.04	0.08	0.03	0.5	41	5	0.2	7.65		
74693	134	163	0	0.44	0.02	0.03	0.03	0.01	0.01	0.01	0.4	46	3	0.4	7.66	392	
81320	116	132	5	0.28	0.01	0.07	0.41	0	0				3	0.4	8.21	433	
86732					0.04												
88503	98	100	10	0.42	0.02	0.09	0.03	0.01	0	0.02	0.1	42	3	0.4	8.43	295	
109884	90	100	5	0.47	0.02	0.01	0.03	0	0	0.03	0.3	39	3	0.4	8.41	280	-0.26
119304	164	146	26	0.65	0.113	0.26	0.01	0.01	0	0.01	0.3	43	17	2.2	9.37	418	0.04
121047																	
121042																	
121043																	
121044																	
121046																	
121040																	
121045																	
121041																	
128027				0.03	0.02	0.02	0.04	0.01	0	0.03	0.2	38	12		8.4		
129946	122	115	17	0.4	0.06	0.08	0.01	0.01	0	0	0.3	42	12	1.5	8.6	421	-0.86
61969	258	315	0	0.33	0.015	0	0	0.02	0.32	0.1	0.5	32	7	0.8	7.26		
59276	158	193	0	0.44	0.005	0.02	0	0.01	0.05	0			3	0.2	7.22		
59634	156	190	0	0.41	0.02	0	0	0.02	0.12	0.08	0.4	34	3	0.4	7.38		
60573	360	439	0	0.53	0.06	0.04	0.04	0	0.01	0.02	1.2	47	7	0.4	7.61		
61106	210	256	0	0.78	0.055	0	0.04	0	0.18	0.01	0.4	47	5	1.8	7.81		
61578	226	276	0	0.67	0.02	0.02	0.01	0.02	0.03	0.02	0.4	47	5	0.6	7.53		
61737	542	661	0	0.74	0.015	0.09	1.57	0	0.15	0.1	2.3	47	3	0.4	7.31		
62612	234	285	0	0.5	0.02	0	0.02	0.03	0.01	0.02	0.4	41	3	0.1	8.08		
62845	362	442	0	0.9	0.04	0.05	0.05	0.26	0.04	0.03	1	51	7	0.6	8.14		
63223					0												
63319	202	246	0	0.43	0.02	0	1.99	0.01	0.1	0.16	0.6	32	10	0.6	7.34		
64156	228	278	0	0.4	0.02	0.08	0.07	0	0.07	0.03	0.1	45	5	0.8	7.98		
64431	222	271	0	0.35	0.02	0.11	0.08	0	0.08	0.03	0.4	49	3	1	7.81		
65441	234	285	0	0.39	0.03	0.03	0.1	0	0.04	0.01	0.5	43	5	0.3	7.94		
67242	378	461	0	0.41	0.01	0	1.02	0.01	0	0.14	1.1	36	15	0.3	7.47		
67970	224	273	0	0.51	0.05	0	0	0.05	0.09	0.1	0.4	45	5	0.4	7.81		
68787	244	298	0	0.47	0.02	0	0.23	0	0.01	0.02	0.6	43	5	0.1	7.82		

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
69824	10/18/85	19	29	31	Dom	22	6	No	379	141	40	10	66	16	62	20	0.2
70560	1/28/86	19	29	31	Dom	26	6	No	411	174	53	10	71	5	60	15	6.4
70815	2/3/86	19	29	31	Dom	30	8	No	1310	490	140	34	241	13	340	176	14.4
70708	2/5/86	19	29	31	Dom		8	No	1488	410	118	28	355	17	354	188	22.2
71164	3/24/86	19	29	31	Dom	27	8	Yes	670	241	65	19	129	12	141	43	0.4
71334	3/28/86	19	29	31	Dom			Yes	432	243	71	16	49	5	53	17	15.1
72132	6/5/86	19	29	31	Dom	116	8	No	273	0	0	0	90	2	41	8	0
72133	6/9/86	19	29	31	Dom	171	6	No	514	3	1	0	183	5	14	9	0.3
73826	10/21/86	19	29	31	Dom	25	8	No	670	259	79	15	110	27	119	55	8.5
73948	11/6/86	19	29	31	Dom			Yes	279	48	16	2	83	5	43	53	3.1
74082	11/18/86	19	29	31	Dom			No	645	259	79	15	108	27	114	55	7.1
75080	2/19/87	19	29	31	Dom		6	No	2391	930	270	62	418	19	697	400	21.3
75378	3/25/87	19	29	31	Dom	92	6	No	281	0	0	0	93	2	44	6	0.3
77976	12/21/87	19	29	31	Dom			No	317	144	41	10	48	10	42	14	0
77977	12/22/87	19	29	31	Dom			No	323	160	46	11	43	7	43	11	20.2
78537	2/23/88	19	29	31	Dom	30	8	No	650	424	127	26	48	7	94	47	34.7
80965	10/4/88	19	29	31	Dom	32	6	No	500	0	0	0	182	0	58	19	23.6
81242	11/3/88	19	29	31	Dom	30		No	381	179	55	10	50	8	64	23	23.8
82250	3/1/89	19	29	31	Dom		4	No	239	73	21	5	37	16	35	12	0.7
82577	4/7/89	19	29	31	Dom	30	10	No	338	170	50	11	44	5	82	27	0.3
83204	6/6/89	19	29	31	Dom	25	6	No	1109	409	121	26	223	14	248	138	22.8
83183	6/6/89	19	29	31	Dom	70		No	754	254	67	21	157	16	167	42	9.5
83353	6/28/89	19	29	31	Dom		8	No	314	155	44	11	41	4	51	17	2.4
85653	2/12/90	19	29	31	Dom	100		No	262	0	0	0	92	2	41	6	0.5
85623	2/13/90	19	29	31	Dom			No	385	190	53	14	48	11	68	29	3
85847	2/20/90	19	29	31	Dom	26	8	No	221	56	16	4	42	15	37	11	1.6
87781	5/17/90	19	29	31	Dom	35	6	No	593	326	94	22	71	6	113	43	3.6
88059	5/31/90	19	29	31	Dom	32	8	No	338	165	48	11	47	4	54	23	7
92400	5/20/91	19	29	31	Dom			No	2079	674	189	49	458	22	530	313	26.3
93658	8/6/91	19	29	31	Dom	22	6	No	345	131	36	10	58	15	58	22	5
93823	8/26/91	19	29	31	Dom	28	6	No	621	219	58	18	126	11	122	50	3.9
95213	12/11/91	19	29	31	Dom	16	4	No	931	381	108	27	172	16	195	120	8.8
96295	3/25/92	19	29	31	Dom	142	4	No	529	3	1	0	197	5	42	6	1.7
96365	4/7/92	19	29	31	Dom			No	255	3	1	0	90	2	55	10	0

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
69824	220	268	0	0.5	0.02	0.01	0.02	0	0.26	0.02	0.5	39	5	0.8	7.9		
70560	264	322	0	0.61	0.03	0	0	0.01	0.04	0.07	0.5	43	5	0.1	7.66		
70815	458	559	0	0.58	0.03	0	0.4	0.11	0.01	0.12	1.7	47	7	0.2	7.65		
70708	558	681	0	0.75	0.07	0.01	0.57	0	0.01	0.05	1.9	49	10	0.2	7.67		
71164	352	429	0	0.87	0.053	0	0.01	0.02	0.42	0.01		51	7	0.3	7.69		
71334	276	337	0	0.46	0.035	0	0	0.01	0.07	0.06		43	5	0.1	7.67		
72132	152	137	24	0.53	0.122	0.18	0.01	0.01	0.01	0	0.3	41	5	0.3	9.2		
72133	390	398	38	2.7	0.003	0.09	0.02	0	0	0.01	1.7	49	70	0.4	8.99		
73826	332	405	0	0.48	0.015	0	0.83	0.02	0.01	0.16	0.9	40	7	0.4	7.45	1021	
73948	122	149	0	0.19	0.004	0	0.08	0	0.22	0.01	1.6	10	3	0.3	6.94	519	
74082	336	410	0	0.47	0.015	0	0.8	0.01	0	0.16	0.8	40	17	0.4	7.34	1034	
75080	590	720	0	0.56	0.03	0	1.15	0.01	0.05	0.1	3	49	3	0.3	7.44	3399	
75378	154	129	29	0.61	0.18	1.64	0.05	0	0.01	0.01	0.4	47	25	14	9.18	412	
77976	204	249	0	0.43	0.02	0.23	0.17	0.01	0.04	0.03	0.4	46	3	1.3	7.93	519	
77977	188	229	0	0.35	0.02	0.02	0	0	0.01	0.01	0.3	43	3	0.4	7.67	521	
78537	374	456	0	0.19	0.013	0.04	0	0	0.36	0.11	0.4	34	3	0.3	7.62	1031	
80965	288	351	0	0.5	0.04	0	0	0.05	0	0			5	0.3	7.97	767	
81242	186	227	0	0.44	0.018	0	0	0.09	0.09	0.05			3	0.2	7.32	589	
82250	120	127	10	0.34	0.02	0	0.03	0	0.01	0.01	0.3	39	3	0.5	8.38	364	
82577	152	185	0	0.24	0.018	0.48	2.15	0	0.01	0.04	0.4	19	7	1.3	7.97	540	
83204	442	539	0	0.48	0.05	0.01	0.02	0.01	0.02	0.04	1.7	44	3	0.5	8.11	1712	
83183	400	488	0	0.46	0.03	0	0.01	0.01	0.01	0.05	1	46	3	0.4	7.8	1161	
83353	172	210	0	0.53	0.02	0.02	0.01	0	0.06	0.02	0.3	45	5	0.4	7.9	488	
85653	150	149	17	0.57	0.19	0.23	0.02	0	0	0.01	0.3	35	10	0.5	9.11	402	
85623	198	242	0	0.45	0.023	0.02	0.07	0	0	0.03	0.3	43	3	0.2	7.95	608	
85847	116	127	7	0.38	0.02	0.01	0.01	0.01	0.03	0.01	0.3	41	3	0.3	8.32	354	
87781	318	388	0	0.46	0.032	0	0.01	0	0.17	0.09	0.5	45	3	0	7.87	922	
88059	184	224	0	0.33	0.01	0.02	0	0	0.08	0.04	0.3	30	3	0.3	7.26	548	
92400	684	834	0	0.66	0.07	0.01	0.7	0.02	0.1	0.08	3.2	49	5	0.3	7.57	1064	
93658	170	188	10	0.51	0.025	0.01	0.02	0	0.21	0.02	0.4	40	3	0	8.25	551	
93823	308	376	0	0.89	0.045	0.01	0.07	0	0.01	0.02	1.1	51	3	0.3	7.84	974	
95213	406	495	0	0.58	0.05	0	0.03	0	0	0.05	1	47	3	0.2	7.78	1445	
96295	384	356	55	2.46	0.416	0.06	0	0.01	0	0.01	1.5	42	7	0.5	9.16	797	
96365	124	107	22	0.5	0.125	0.09	0.01	0	0	0.01	0.3	37	15	0.7	9.05	383	

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
98030	7/27/92	19	29	31	Dom	32	6	No	479	240	63	20	65	11	70	34	5
98560	8/20/92	19	29	31	Dom			No	917	9	2	1	327	7	87	240	5.6
111872	4/13/94	19	29	31	Dom		6	No	502	237	65	18	84	8	68	29	1.6
112773	5/6/94	19	29	31	Dom		6	No	539	319	85	26	54	15	85	40	5.9
112585	5/19/94	19	29	31	Dom	50	6	No									
117856	12/8/94	19	29	31	Dom			No	286	0	0	0	101	1	35	13	0.1
127114	5/2/96	19	29	31	Dom		12	No	597	141	40	10	142	5	52	147	0.4
127113	5/2/96	19	29	31	Dom			No	380	183	52	13	50	5	65	35	0.5
132820	4/22/97	19	29	31	Dom	32		No	633	104	30	7	186	15	126	34	2.3
132839	4/29/97	19	29	31	Dom	120		No	331	9	2	1	116	1	39	7	0
64869	4/2/84	19	29	32	Dom	21	6	No	578	207	58	15	126	15	82	30	6.7
65312	5/29/84	19	29	32	Dom	20		No	702	191	55	13	178	3	154	63	9.2
76491	4/14/87	19	29	32	Dom	80	6	No	445	3	1	0	158	3	39	11	0.9
77509	10/26/87	19	29	32	Dom			Yes	46	5	2	0	12	2	3	1	0
82978	5/16/89	19	29	32	Dom			No	604	3	1	0	210	7	90	97	2.5
82981	5/30/89	19	29	32	Dom	35	8	No	318	158	45	11	38	5	68	32	5.7
83247	6/20/89	19	29	32	Dom	450	12	No	523	5	2	0	195	7	83	83	2.6
87319	5/8/90	19	29	32	Dom			No	511	158	45	11	101	12	70	28	8.2
89605	9/25/90	19	29	32	Dom			No	506	159	44	12	111	13	69	36	14.4
91917	4/16/91	19	29	32	Dom			No	702	233	62	19	151	15	143	41	9.6
94953	11/25/91	19	29	32	Dom	50	6	No	510	182	48	15	100	11	90	23	0.8
98356	7/22/92	19	29	32	Dom	106	6	No	280	0	0	0	97	2	39	6	0.1
109881	12/29/93	19	29	32	Dom			No	367	186	53	13	59	6	72	26	2.2
127116	5/2/96	19	29	32	Dom			No	520	3	1	0	198	4	41	6	0.2
59407	5/21/82	19	29	33	Dom	30	6	No	367	142	42	9	62	9	55	16	1.6
59950	7/20/82	19	29	33	Dom	30	8	No	2061	525	146	39	503	26	541	233	87.7
60089	8/9/82	19	29	33	Dom	33	6	No	2220	431	128	27	589	25	840	233	0.3
60183	8/15/82	19	29	33	Dom	32	6	No	1782	133	45	5	567	25	268	90	4.2
60182	8/17/82	19	29	33	Dom	34	8	No	545	289	91	15	63	5	80	41	30.4
60608	9/13/82	19	29	33	Dom	20	8	No	853	392	404	32	123	23	202	102	18.5
579	2/21/83	19	29	33	Dom	200	8	No	592	3	1	0	214	7	92	104	2.1
62185	5/13/83	19	29	33	Dom	32	8	No	369	150	42	11	62	4	80	23	11.7
62273	5/25/83	19	29	33	Dom	31	6	No	346	146	42	10	59	9	52	15	1.5
64506	2/28/84	19	29	33	Dom	33	6	No	2062	391	120	22	557	25	671	182	0.3

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
98030	266	325	0	0.29	0.03	0.02	0	0.01	0.04	0.03	0.4	45	3	0.4	7.85	734	
98560	286	203	72	0.66	0.09	0.6	0.01	0.01	0.19	0.01	1	31	7	2.2	9.65	1550	
111872	312	381	0	0.28	0.06	0.07	0.07	0.01	0.85	0.02	0.5	45	3	0.2	7.75	777	0.48
112773	284	332	7	0.22	0.024	0.02	0	0	0	0.03	0.4	46	5	0.2	8.22	815	1.03
112585																	
117856	160	127	34	0.54	0.14	0.18	0.01	0.03	0.1	0.01	0.3	39	20	0.6	9.24	440	-0.4
127114	244	293	2	0.42	0.02	0	0.04	0	0.01	0.02	0.3	44	10	0.9	8.43	927	0.84
127113	198	242	0	0.41	0.01	0.01	0.19	0.04	0.06	0.03	0.4	43	10	0.6	7.59	584	0.04
132820	338	412	0	1.12	0.24	0	0	0	0.01	0.04	1.8	30	3	0.2	8.08	1011	0.5
132839	192	171	31	0.74	0.16	2.96	0.13	0.02	0.06	0.03	0.5	34	70	80	9.12	497	0.15
64869	360	439	0	0.49	0.03	0	0.09	0.02	0.02	0.03	0.7	45	5	0.2	7.98		
65312	316	386	0	0.55	0.02	0.05	0.05	0.02	0.03	0.04	0.7	39	3	0.5	7.84		
76491	272	249	41	1.18	0.09	0.15	0.04	0	0.02	0.01	0.7	52	70	0.8	9.2	668	
77509	28	34	0	0.62	0.003	0	0	0	0.67	0	0.7	7	3	0.3	7.59	83	
82978	250	232	36	0.82	0.121	0	0	0	0	0	1.2	28	3	0.3	9.17	988	
82981	130	159	0	0.35	0.01	0.23	0.52	0	0.02	0.06	0.3	25	55	2.1	7.57	510	
83247	224	200	36	0.68	0.1	0	0	0.01	0	0	1.1	31	3	0.2	9.2	886	
87319	298	364	0	0.63	0.03	0	0.08	0	0	0.02	0.6	45	3	0.1	8.09	790	
89605	294	359	0	0.65	0.03	0.01	0.14	0	0	0.02	0.5	45	3	0.1	8.06	807	
91917	378	461	0	0.47	0.03	0.01	0.01	0	0.01	0.03	0.9	48	3	0.5	7.75	1097	
94953	286	349	0	0.69	0.224	1.93	0.15	0.02	0.09	0.04	0.6	49	12	2.4	7.77	775	
98356	162	139	29	0.68	0.2	0.36	0.01	0.02	0	0.01	0.4	37	25	1.1	8.17	411	
109881	206	251	0	0.64	0.02	0.04	0.1	0.01	0.01	0.11	0.5	40	3	0.4	7.53	607	0.01
127116	0.82	354	55	2.58	0.35	0.07	0	0	0	0.01	1.4	40	10	0.2	9.19	782	0.2
59407	204	249	0	0.42	0.07	0.06	0.04	0	0.04	0.04			3	0.9	7.77		
59950	704	859	0	0.43	0.03	0.35	0.2	0.02	0.11	0.07	3.4	45	25	1	7.91		
60089	574	700	0	0.7	0.11	0.03	0.64	0	0	0.02	5.7	43	6	0.5	7.8		
60183	1022	1169	32	4.24	2.06	0	0.35	0	0	0.03	7	34	35	0.5	8.4		
60182	262	320	0	0.39	0.02	0.02	0	0.04	0.51	0.08	0.5	43	5	0.4	7.96		
60608	356	434	0	0.27	0.06	0.01	0.75	0	0.47	0.15	0.7	45	12	0.4	8.1		
579	242	212	41	0.76	0.1	0.01	0	0.01	0	0	1.1	28	5	0.3	9.17		
62185	180	220	0	0.59	0.01	0.01	0.35	0.01	0.02	0.07	0.5	34	7	0.4	7.51		
62273	206	251	0	0.38	0.05	0.04	0.08	0	0.01	0.04	0.4	45	5	1.2	7.94		
64506	680	830	0	0.91	0.13	0.06	0.78	0	0.1	0	5.9	45	12	0.9	7.88		

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
64781	2/29/84	19	29	33	Dom	27	6	No	902	433	122	31	149	5	217	58	0.2
66033	8/10/84	19	29	33	Dom	32	6	No	1450	340	95	25	356	30	439	86	1
70269	12/19/85	19	29	33	Dom			No	1367	618	150	59	227	40	300	94	27
71136	3/19/86	19	29	33	Dom	25	8	No	1761	513	154	31	376	22	558	136	0
72199	6/16/86	19	29	33	Dom			Yes	557	0	0	0	195	1	128	43	8
73430	9/5/86	19	29	33	Dom	32	7	No	255	116	35	7	38	4	24	10	0
73863	10/24/86	19	29	33	Dom	28	7	No	335	72	19	6	74	13	55	14	10.9
79092	3/29/88	19	29	33	Dom	30	6	No	2150	887	266	54	332	20	697	280	4.9
80364	8/4/88	19	29	33	Dom	34	6	No	101	3	1	0	37	1	5	13	0
82982	5/18/89	19	29	33	Dom	20	8	No	906	360	98	28	173	4	224	65	13.9
83071	6/1/89	19	29	33	Dom	32	8	No	1745	292	84	20	512	22	408	104	21.4
83544	7/11/89	19	29	33	Dom	60	8	No	741	271	72	22	148	14	145	54	18.9
83520	7/21/89	19	29	33	Dom	28	6	No	3146	66	23	2	1009	10	1540	245	4.1
84669	11/8/89	19	29	33	Dom		8	No	431	174	50	12	73	6	60	23	11.5
93994	9/6/91	19	29	33	Dom	137	8	No	345	3	1	0	122	2	44	8	0
94443	10/9/91	19	29	33	Dom	130	6	No	496	3	1	0	187	3	50	10	0
95211	12/5/91	19	29	33	Dom	30		No	678	157	43	12	166	20	139	50	21
103833	5/17/93	19	29	33	Dom			No	748	241	70	16	162	12	127	29	3.4
103834	5/17/93	19	29	33	Dom		6	No	568	194	53	15	111	20	101	28	2.1
105386	7/19/93	19	29	33	Dom	28	6	No	398	129	35	10	76	16	59	24	5
58753	3/1/82	19	29	34	Dom	32		No	258	108	30	8	38	4	41	10	6.4
59730	6/25/82	19	29	34	Dom	30		No	2104	10	4	0	777	26	231	96	28.3
59858	6/25/82	19	29	34	Dom	32	6	No	1444	470	127	37	303	37	458	100	5.4
60315	8/27/82	19	29	34	Dom	24	6	No	426	172	49	12	81	4	103	23	3.9
60377	9/1/82	19	29	34	Dom	13	8	No	1159	486	145	30	197	17	286	90	1.4
61973	4/5/83	19	29	34	Dom		6	No	1905	211	68	10	560	20	663	133	40.1
63658	10/17/83	19	29	34	Dom	28	8	No	1143	384	111	26	201	38	361	99	0.1
65014	4/25/84	19	29	34	Dom	31	6	No	819	210	61	14	204	25	141	40	9
65179	5/16/84	19	29	34	Dom	31	6	No	924	439	136	24	122	8	269	55	14.1
71335	3/26/85	19	29	34	Dom	25	6	No	1525	311	93	19	380	26	510	87	0
68652	6/20/85	19	29	34	Dom		8	No	1763	312	87	23	463	21	608	150	54.9
75512	4/6/87	19	29	34	Dom	32	8	No	1341	194	61	10	382	17	432	85	19.5
76541	7/21/87	19	29	34	Dom	27		No	289	144	41	10	41	5	48	14	3.2
78737	3/8/88	19	29	34	Dom	30	8	No	1730	353	95	28	413	44	690	118	0.1

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
64781	442	539	0	0.47	0.06	0	0.21	0	0.05	0.07	0.9	47	7	1.8	7.75		
66033	630	769	0	1.66	0.77	0.03	0.57	0	0	0.05	2.7	41	10	0.2	8.08		
70269	714	871	0	0.18	0.05	0	1.08	0	0.01	0.11	2.2	47	35	0.8	7.5		
71136	662	808	0	0.55	0.04	0.02	0.69	0	0	0.03		47	5	0.2	7.81		
72199	244	298	0	0.53	0.01	0.01	0	0.04	0.04	0	0.7	32	5	0.2	7.51		
73430	156	190	0	0.3	0.021	0.05	0.43	0	0.02	0.04	0.3	40	12	1.8	7.09	398	
73863	166	203	0	0.59	0.14	0	0.12	0	0.23	0.03	0.5	43	3	0.6	7.52	515	
79092	556	678	0	0.38	0.012	0.15	6.07	0	0.1	0.05	3.7	38	17	0.5	7.62	2965	
80364	60	73	0	0.08	0.003	0.01	0	0.01	0.09	0	3.1	3	3	0.1	6.98	174	
82982	398	186	0	0.9	0.007	0.01	3.72	0.01	0.04	0.1	1.2	35	5	0.2	7.44	1350	
83071	860	1049	0	0.93	0.07	0.01	0.21	0.31	0.01	0.03	4.4	44	3	0.5	7.69	2535	
83544	380	464	0	0.45	0.05	0	0.04	0	0	0.02	0.7	47	7	0.5	7.95	1144	
83520	366	447	0	0.84	0.106	0	0	0	0	0.02	5	34	3	0.3	8.18	4494	
84669	230	281	0	0.3	0.09	0.05	0.02	0.06	0.01	0.05	0.4	56	3	0.1	7.59	640	
93994	214	178	41	1.27	0.417	0.45	0.02	0.02	0	0.01	0.8	33	12	0.9	8.94	546	
94443	344	337	41	2.38	0.708	0.39	0.03	0.01	0	0.01	1.9	35	25	0.5	9.03	806	
95211	320	390	0	0.56	0.11	0.06	0.19	0	0.12	0.05	1	44	7	0.4	7.68	1048	
103833	442	539	0	1.01	0.19	0.01	0.37	0.01	0.07	0.06	1.1	43	5	0.2	7.7	1165	
103834	308	376	0	0.55	0.05	0	0.21	0	0	0.05	0.7	44	3	0.1	7.95	855	
105386	204	249	0	0.3	0.09	0.02	0.47	0.01	0.07	0.05	0.6	42	5	0.3	7.8	609	0.26
58753	126	154	0	0.48	0.005	0.01	0.05	0.01	0.02	0.02	0.2	43	3	0.2	7.58		
59730	1344	1352	118	4.76	1.2	0	0.01	0	0.01	0.01	5.2	24	25	0.7	9.11		
59858	554	676	0	0.7	0.2	0.46	0.48	0	1.17	0.07	2.3	45	3	1.1	8.16		
60315	204	249	0	0.53	0.005	0.05	0.01	0.02	0.04	0.07	0.6	34	7	0.4	7.42		
60377	522	637	0	0.53	0.02	0	2.62	0	0.01	0.11	2	36	15	0.5	7.47		
61973	596	727	0	2.6	0.47	0.02	0.06	0.01	0.05	0.03	9	43	17	0.5	8.17		
63658	378	461	0	0.92	0.055	0.14	0.27	0	0.01	0.09	1.5	43	5	0.6	8.08		
65014	480	586	0	0.6	0.14	0	0.02	0	0.28	0.06	2.2	43	3	0.3	7.95		
65179	352	429	0	0.23	0.015	0	0.36	0	0.03	0.08	1	43	5	0.6	7.8		
71335	578	705	0	2.45	0.98	0.01	0.49	0	0.47	0.03		41	10	0.2	7.96		
68652	520	634	0	0.92	0.15	0	0.08	0.01	0.01	0.02	6.5	43	7	0	7.94		
75512	452	551	0	1.98	0.37	0	0.04	0.01	0.02	0.03	6.1	43	5	0.4	8.12	1982	
76541	168	205	0	0.26	0.005	0.87	0.16	0	0.04	0.03	0.3	31	7	2.7	8	478	
78737	478	583	0	1.1	0.38	0.05	0.42	0.01	0.01	0.03	6.1	49	3	0.4	7.81	2527	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
79718	6/6/88	19	29	34	Dom	30	6	No	1266	195	60	11	343	17	418	79	14.7
80348	7/20/88	19	29	34	Dom			No	519	34	12	1	154	18	137	52	0
82098	2/21/89	19	29	34	Dom	110	6	No	1007	5	2	0	380	7	88	53	0.4
82252	2/28/89	19	29	34	Dom	112	6	No	502	0	0	0	187	4	52	9	0.5
82975	5/23/89	19	29	34	Dom	95	6	No	730	0	0	0	270	4	54	15	1.4
83201	6/6/89	19	29	34	Dom	110	6	No	619	5	2	0	232	5	70	13	1.7
83276	6/22/89	19	29	34	Dom	95	6	Yes									
89299	8/16/90	19	29	34	Dom	60	8	No	387	240	68	17	30	13	47	21	5.4
89485	9/12/90	19	29	34	Dom	36	8	No	836	323	83	28	159	20	135	41	17.6
90262	11/28/90	19	29	34	Dom	90		No	612	9	2	1	222	4	60	13	0.1
94565	10/26/91	19	29	34	Dom	120		Yes	63	0	0	0	2	0	1	0	0
98955	9/3/92	19	29	34	Dom	100	6	No	795	26	7	2	275	12	183	92	0.2
99097	9/9/92	19	29	34	Dom	113	6	No	439	7	1	1	159	3	50	8	0.4
104493	6/15/93	19	29	34	Dom	250	6	No	621	3	1	0	237	5	60	69	0
105400	7/21/93	19	29	34	Dom	120		No									
105399	7/21/93	19	29	34	Dom	120		Yes									
105652	7/27/93	19	29	34	Dom	27	8	No	1062	363	94	31	195	37	362	97	0.3
106235	8/16/93	19	29	34	Dom	250	6	Yes									
62947	8/21/83	19	29	35	Dom	25	6	No	790	8	3	0	285	14	188	35	0
65313	5/26/84	19	29	35	Dom			No	1406	153	43	11	463	10	253	112	19.7
79382	5/6/88	19	29	35	Dom			No	355	176	49	13	46	11	62	24	3.1
82481	4/4/89	19	29	35	Dom	25		No	452	128	38	8	108	10	72	47	1
84302	9/27/89	19	29	35	Dom			No	1920	432	130	26	486	26	492	106	1.7
84373	10/11/89	19	29	35	Dom	103	6	No	1815	3	1	0	666	8	157	273	0.5
88280	6/18/90	19	29	35	Dom	25		No	300	66	20	4	81	8	45	22	0
91561	2/28/91	19	29	35	Dom			No	1459	53	13	5	494	20	147	297	1.8
91560	3/1/91	19	29	35	Dom	20	8	No	1027	502	148	32	131	10	308	88	18.4
92084	4/24/91	19	29	35	Dom	30	8	No	3754	293	81	22	1135	46	1320	303	0
93127	7/2/91	19	29	35	Dom	25	8	No	3504	237	65	18	1089	42	1175	277	0
95455	1/16/92	19	29	35	Dom			No	376	95	28	6	90	10	63	28	0
97184	5/22/92	19	29	35	Dom			No	543	147	39	12	133	8	89	30	18.2
97139	6/4/92	19	29	35	Dom	75	8	No	338	158	42	13	52	5	50	18	9.1
58401	1/21/82	19	29	36	Dom	21	8	No	888	250	67	20	192	21	303	57	9.7
62609	6/13/83	19	29	36	Dom	11	6	No	645	286	88	16	100	10	94	26	4.8

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
79718	430	525	0	1.96	0.36	0.03	0.05	0	0	0.03	5.5	43	3	0.4	7.98	1907	
80348	172	210	0	0.72	0.057	0.01	0.12	0.06	0	0.01	0.5	51	3	1.1	7.77	817	
82098	662	730	38	3.56	0.44	0.1	0.02	0	0	0.01	5.6	34	12	0.4	8.7	1495	
82252	338	349	31	2.26	0.69	0.57	0.02	0.01	0.01	0.01	1.5	32	35	0.8	8.97	789	
82975	518	520	55	3.9	0.833	1.09	0.02	0.03	0.03	0	3.1	33	65	4.7	9.06	1105	
83201	412	444	29	2.66	0.576	0.88	0.03	0.03	0.01	0.01	2	33	45	2.8	8.9	960	
83276				0.08	0.011												
89299	248	303	0	0.69	0.065	0	0.85	0.02	0.01	0.03	0.2	49	5	0.2	7.67	630	
89485	498	608	0	1.05	0.112	0.01	0.51	0.04	0	0.06	1.3	49	3	0.4	7.74	1288	
90262	424	468	24	2.7	0.71	0.37	0.03	0.01	0.01	0.01	2.1	36	25	0.6	9.04	958	
94565	4	5	0	0.07	0.005	0.37	0.01	0.02	0	0.01	2.4	46	25	1.8	5.95	18	
98955	294	320	19	2.02	0.248	0.73	0.14	0.02	0.14	0.02	1.1	42	65	1.5	8.67	1264	
99097	278	266	36	1.74	0.686	2.35	0.08	0.02	0	0.03	1.3	48	55	8.3	9.23	637	
104493	366	320	62	1.78	0.228	0.04	0.01	0.01	0	0	2.5	28	7	0.4	9.25	992	0.23
105400					0.52												
105399					0.003												
105652	332	405	0	0.9	0.102	0.07	0.06	0	0.02	0.06	1.4	42	3	0.2	7.81	1568	0.89
106235				0.007													
62947	392	425	26	5.28	0.61	0.01	0	0	0.11	0.01	2.3	26	15	0.7	8.33		
65313	718	871	2	1.5	0.61	0.02	0.01	0.01	0.08	0.05	3	36	15	0.6	8.22		
79382	194	237	0	0.45	0.02	0.03	0.03	0	0.04	0.02	0.4	44	3	0.4	8.05	578	
82481	240	210	41	0.37	0.07	0.08	0.06	0.01	0.07	0.03	1	29	5	0.7	9.03	727	
84302	934	1139	0	1.72	1.12	0.09	0.55	0.01	0.01	0.07	11.2	43	12	0.9	7.52	2709	
84373	944	1010	70	4.32	0.77	0.09	0.01	0	0	0.01	9.9	28	35	0.6	8.7	2722	
88280	172	137	36	0.39	0.04	0.03	0.03	0	0	0.01	0.5	31	3	0.5	9.29	498	
91561	602	671	31	3.42	0.725	0.66	0.07	0	0	0.03	2.9	20	70	8.6	8.92	2281	
91560	356	434	0	0.51	0.01	0	0.63	0.16	0	0.11	1.1	39	3	0.5	7.46	1449	
92084	1132	1381	0	6.04	2.24	0.14	0.24	0.04	0	0.02	17.9	42	20	1.3	7.9	5067	
93127	1102	1344	1	7.3	2.78	0.8	0.27	0.01	0	0.02	17.3	40	25	2.8	8.15	4863	
95455	208	166	43	0.38	0.05	0.04	0.04	0	0.01	0.02	0.7	30	7	0.6	8.96	596	
97184	300	366	0	0.7	0.09	0	0.01	0	0.01	0.03	0.7	47	3	0.1	8.09	801	
97139	192	234	0	0.53	0.055	0	0	0	0.03	0.03	0.3	47	3	0.1	7.88	505	
58401	288	351	0	0.62	0.13	0.12	0.16	0	0.18	0.05	1.6	41	7	1.7	7.87		
62609	376	459	0	0.92	0.08	0.03	0.04	0.02	0.54	0.07	0.8	54	15	0.3	7.6		

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

Prepared by: Water Research and Development, Inc.

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
64142	12/27/83	19	29	36	Dom	28	8	No	304	82	23	6	75	7	49	35	1.9
65439	6/15/84	19	29	36	Dom	27	6	No	3721	264	58	29	1107	39	1755	345	0
66031	8/27/84	19	29	36	Dom	34	8	No	656	314	86	24	103	5	142	46	14.3
76903	8/28/87	19	29	36	Dom	20	8	No	413	129	40	7	83	7	73	27	7.1
79094	4/6/88	19	29	36	Dom	20	6	No	529	225	62	17	79	11	119	36	11.2
79779	5/25/88	19	29	36	Dom			No	544	249	65	21	84	16	107	42	15.2
80351	7/20/88	19	29	36	Dom	80	6	No	3639	651	175	52	845	50	1800	280	10.3
81326	10/20/88	19	29	36	Dom			No	424	238	74	13	45	8	66	17	12.3
83203	6/8/89	19	29	36	Dom	20	6	No	519	194	53	15	94	13	139	44	6.1
83181	6/8/89	19	29	36	Dom	20	6	No	618	262	72	20	95	15	143	52	10.3
83546	7/18/89	19	29	36	Dom	12		No	1279	458	129	33	234	24	463	63	37.2
85359	1/10/90	19	29	36	Dom	40	8	No	911	351	104	22	146	7	304	56	5.9
88289	6/22/90	19	29	36	Dom		6	No	609	238	54	25	111	18	146	41	23.6
91248	2/12/91	19	29	36	Dom	120	6	No	197	13	2	2	834	11	126	550	0.5
91664	3/25/91	19	29	36	Dom			No	4516	999	286	69	1029	49	2010	590	2.2
95768	1/30/92	19	29	36	Dom	21	6	No	4722	1568	443	112	812	44	2310	430	28.6
99012	9/16/92	19	29	36	Dom	11	12	No	634	261	78	16	101	15	137	56	0.9
99008	9/16/92	19	29	36	Dom	11	12	Yes	239	64	19	4	49	8	23	39	0.8
118164	12/20/94	19	29	36	Dom		14	No	715	249	60	24	139	19	181	53	3.8
85482	1/23/90	19	30	1	Dom	600	4	No	4165	198	79	0	1408	19	165	2250	0.4
132079	3/3/97	19	30	1	Irr			No									
84028	9/6/89	19	30	11	Dom	300		No	337	121	32	10	59	7	56	28	0.5
87547	5/9/90	19	30	12	Dom	34	8	No	345	119	31	10	61	7	54	32	0.2
99628	10/7/92	19	30	12	Dom	20		No	1587	328	67	39	435	21	262	520	0
104451	6/14/93	19	30	12	ation			No									0.1
125004	12/6/95	19	30	12	Dom	22	6	No	1508	292	56	37	392	22	367	413	0
66337	9/20/84	19	30	13	Dom	40	6	No	396	154	42	12	73	8	68	43	0.1
77771	11/25/87	19	30	13	Dom	600	4	No	4176	215	86	0	1405	33	175	2250	0
79761	6/13/88	19	30	13	Dom	30	8	Yes	0	3	1	0	0	0	0	0	0
88821	7/24/90	19	30	13	Dom	31	6	No	4000	1195	249	139	742	41	1387	888	0.3
100366	11/11/92	19	30	13	Dom	18		No	895	169	33	21	239	17	179	225	0
65652	7/19/84	19	30	14	Dom	17	8	No	327	145	40	11	53	6	61	40	4.3
116810	10/17/94	19	30	18	Dom	200		No	6940	218	69	11	2488	38	573	3550	0.1
79211	4/13/88	19	30	19	Dom	23	12	No	787	293	86	19	147	12	176	98	30.9

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
64142	150	173	5	0.34	0.055	0.14	0.01	0.08	0.03	0.03	0.5	28	5	1.5	8.23		
65439	322	393	0	1.22	0.3	0	0.02	0	0.27	0.02	12.7	24	15	0.4	8.08		
66031	326	398	0	0.33	0.01	0	0.25	0	0.02	0.05	0.6	49	5	0.2	7.61		
76903	202	246	0	0.98	0.053	0.01	0.78	0.01	0.06	0.02	0.8	41	7	0.4	7.71	661	
79094	246	300	0	0.53	0.055	0.13	0.03	0	0.13	0.1	0.8	41	5	0.4	8	824	
79779	274	334	0	0.5	0.049	0.05	0.1	0	0.03	0.1	0.7	41	3	0.4	8.18	871	
80351	330	403	0	0.79	0.126	0.25	1.91	0.02	0.19	0.05	6.6	38	7	0.7	7.94	4692	
81326	248	303	0	0.89	0.03	0	0.01	0.01	0.29				3	0.2	7.85	658	
83203	212	259	0	0.55	0.05	0.04	0.05	0	0.1	0.09	0.9	39	3	0.5	8	828	
83181	284	346	0	0.54	0.04	0.08	0.02	0	0.3	0.11	0.8	38	3	0.5	8.07	968	
83546	422	515	0	0.4	0.06	0.01	0.27	0.01	0.07	0.09	2.1	36	17	0.4	7.76	1789	
85359	294	359	0	0.58	0.02	0.08	0.1	0	0.07	0.08	1.3	48	3	0.4	7.18	1300	
88289	280	327	7	0.33	0.134	0.14	0.09	0	0.01	0.07	0.7	38	3	0.7	8.24	962	
91248	960	1039	65	3.42	0.47	0.12	0.01	0	0.01	0.03	11.6	30	25	0.2	8.7	3558	
91664	418	510	0	0.65	0.126	0.05	0.59	0.02	0.01	0.03	9.6	35	12	0.4	7.76	5813	
95768	384	468	0	0.5	0.09	0.04	1.71	0.01	0.11	0.03	5.9	36	13	0.5	7.18	5541	
99012	280	342	0	0.8	0.154	0.08	0.46	0.01	0.14	0.09	0.9	49	12	0.9	8.12	920	
99008	104	127	0	0.31	0.02	0	0.05	0	0.15	0.03	1	33	3	0.3	7.54	374	
118164	304	371	0	0.38	0.13	0.01	0.03	0.03	0	0.05	1.1	38	15	0.4	8.07	1139	0.74
85482	90	110	0	3.98	0.003	0.05	0.09	0.01	0.01	0.16	14.8	92	3	0.1	7.85	7153	
132079																	
84028	158	193	0	0.92	0.05	0	0.01	0	0.03	0.05	0.4	46	3	0.4	7.75	516	
87547	154	188	0	0.88	0.046	0.01	0.02	0	0.01	0.05	0.4	49	3	0.1	8.18	520	
99628	316	386	0	2.56	0.29	0.07	0.07	0.01	0.22	0.05	3.6	65	3	0.6	7.98	2637	
104451																	
125004	252	307	0	1.29	1.8	0.04	0.11	0	0.01	0.13	2	58	10	1.2	8	2292	0.53
66337	192	237	0	0.84	0.05	0	0.02	0	0.02	0.07	0.4	47	3	0.2	8.1		
77771	108	132	0	6.04	0.003	0.15	0.04	0.01	0	0.15	15.6	121	3	0.2	7.64	7346	
79761	2	2	0	0.04	0.003	0	0	0	0	0.01	0	0	3	0.4	6.25	33	
88821	252	307	0	0.99	0.071	0.4	0.27	0	0.02	0.02	5.3	66	5	2.8	7.81	5267	
100366	212	259	0	1.36	0.15	0.01	0.07	0.01	0.01	0.11	1.3	55	3	0.2	8.15	1484	
65652	136	166	0	0.27	0.01	0.18	0	0.1	0.04	0.07	0.2	24	5	0.2	7.74		
116810	206	251	0	0.47	0.04	3.85	0.41	0	0.01	0.04	4.2	36	701	14	8.15	11726	0.62
79211	296	361	0	0.57	0.052	0	1.79	0	0.02	0.09	1	44	5	0.5	7.77	1225	

Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
88556	7/10/90	19	30	19	Dom	22		No	808	272	79	18	164	13	161	90	40.2
93124	7/1/91	19	30	19	Dom	25	6	No	462	193	54	14	78	6	94	45	11.8
101171	12/29/92	19	30	19	Dom	25	6	No	781	311	88	22	158	8	163	71	2.1
79866	6/20/88	19	30	23	Dom			No	3784	396	58	61	1189	35	835	1138	0.2
83840	8/28/89	19	30	23	Dom			No	336	117	32	9	61	7	56	28	3.2
93796	8/26/91	19	30	23	Dom	27	6	Yes	101	0	0	0	38	2	1	6	0.3
114953	8/17/94	19	30	23	Dom	30	6	No	1635	14	4	1	569	3	446	170	0.1
70268	12/13/85	19	30	24	Dom	21	8	No	3755	533	131	50	996	50	1870	155	5.7
77803	11/25/87	19	30	24	Dom	1017	4	No	4131	148	59	0	1432	17	154	2225	0
80841	9/2/88	19	30	24	Dom	20	6	No	2575	488	136	36	624	32	1213	110	14.3
95988	2/28/92	19	30	24	Dom	200		No	4233	233	90	2	1395	43	188	2250	0
97386	6/12/92	19	30	26	Dom	10	6	No	2692	721	175	69	630	27	640	670	0.5
68807	7/15/85	19	30	27	Dom	48	8	No	33740	5550	485	1054	9164	240	7715	12000	0.2
69958	11/4/85	19	30	27	Dom	10		No	15860	4722	832	642	3280	65	1682	7100	2
72011	5/18/86	19	30	27	Dom	10	8	No	10953	2455	628	215	2674	78	1286	4900	6.4
75686	4/24/87	19	30	27	Dom			No	9485	1924	404	222	2368	14	3554	1725	6.5
83330	6/23/89	19	30	27	Dom	22	23	No	697	229	67	15	143	12	145	68	33.1
94571	10/25/91	19	30	27	ıking	37	6	No	5794	1586	200	264	1336	60	835	2275	0.2
75926	5/11/87	19	30	28	Dom	30	7	No	4115	443	100	47	1290	23	735	1625	5.7
83641	8/2/89	19	30	28	Dom	30	6	No	1109	170	45	14	325	13	167	130	0.7
105849	8/5/93	19	30	28	Dom		6	No	4920	329	69	38	1694	32	975	1975	0.3
59971	6/28/82	19	30	29	Dom	10	6	No	3918	475	124	40	1182	26	608	1550	23.6
62844	7/28/83	19	30	29	Dom	21	8	No	1086	223	66	14	283	10	185	345	1.8
66587	11/1/84	19	30	29	Dom	40	8	No	4823	852	215	82	1332	40	850	1875	18.2
68918	7/24/85	19	30	29	Dom	125	6	No	6715	18	7	0	2612	31	135	3400	0.2
75637	4/14/87	19	30	29	Dom	27	8	No	386	114	34	7	94	3	54	45	0.1
76034	5/26/87	19	30	29	Dom	27	6	No	659	124	33	10	183	7	125	164	0
77073	9/9/87	19	30	29	Dom	16	6	No	1420	87	25	6	473	10	255	440	0
77648	11/2/87	19	30	29	Dom	18	8	No	293	116	35	7	49	5	45	14	0
87671	5/15/90	19	30	29	Dom	125	6	No	7379	23	9	0	2656	20	197	3650	0.3
87849	5/24/90	19	30	29	Dom	12	6	No	7822	916	261	64	2376	54	1480	3050	3.3
107361	9/15/93	19	30	29	earch			No	504				136		94	106	
112700	5/13/94	19	30	29	Dom			No	777	106	26	10	244	11	135	230	0
112699	5/13/94	19	30	29	Dom			Yes	23	0	0	0	9	0	0	11	0.1

ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
328	400	0	0.68	0.056	0	1.5	0	0	0.08	0.9	46	3	0.3	7.54	1261	
198	242	0	0.33	0.017	0.1	0.09	0	0	0.06	0.7	41	3	0.4	7.75	738	
362	442	0	0.35	0.01	0.06	0.38	0.04	0.02	0.17	1.3	41	7	0.6	7.39	1201	
626	764	0	1.5	0.27	0.07	0.1	0	0.02	0.02	6.8	48	7	1	8	6087	
160	195	0	0.92	0.053	0	0.01	0	0.02	0.05	0.4	46	3	0.4	8.09	513	
74	90	0	0.13	0.075	0	0	0	0.05	0.05	1.9	11	3	0.1	6.99	178	
566	691	0	1.08	0.03	0.09	0	0	0.3	0	2.4	46	12	0.5	7.58	2476	-0.69
510	622	0	0.83	0.03	0.23	0.52	0.01	0.04	0.03	8.2	34	15	1.6	7.8		
92	93	10	4.08	0.003	0.89	0.07	0	0	0.11	15.3	70	3	1.4	8.26	7305	
432	527	0	0.67	0.03	0.02	1.31	0	0.1	0.06	5	37	12	0.2	8.03	3391	
98	120	0	5.96	0.021	0.38	0.05	0	0	0.26	15.7	128	12	1.9	7.92	7318	
562	686	0	1.15	0.072	0	0.01	0.01	0	0.06	3.3	42	35	0.3	8.06	4019	
622	759	0	1.47	0.3	1.36	2.06	0.02	0.05	0	36.2	41	30	6.2	7.59		
446	442	50	0.99	0.153	0.04	2.95	0	0.02	0.16	8.2	62	15	0.6	8.34		
468	571	0	0.9	0.09	0.05	0.12	0.01	0.02	0.09	13.2	32	70	0.7	7.84		
1020	1244	0	0.87	0.06	0.2	1.49	0	0.14	0	18.7	49	35	1.4	7.55	11323	
306	373	0	0.68	0.057	0	1.34	0	0.02	0.07	1	43	3	0.3	7.56	1089	
612	747	0	1.01	0.04	3.15	0.43	0.01	0.14	0.06	8.6	54	25	12	7.48	8756	
230	281	0	0.45	0.013	0.07	0.03	0	1.09	0.09	6.5	31	3	0.4	8.07	6797	
552	673	0	0.8	0.2	0.62	0.27	0	0.07	0.05	2.3	54	35	0.8	7.93	1682	
228	278	0	0.93	0.06	0.16	0.17	0.01	0.16	0.05	10.5	33	7	0.9	8	8004	0.81
326	398	0	0.37	0.015	0.01	0.03	0	0.01	0.2	6.4	30	5	0.5	8.04		
202	246	0	0.4	0.045	0.12	0.12	0	0	0.12	1.5	34	5	0.5	8.03		
322	393	0	0.27	0.035	0.01	0.1	0.01	0.09	0.15	5.9	43	10	0.6	7.64		
810	905	41	2.52	0.18	0.3	0.16	0.02	0.02	0.06	14.4	30	35	1.5	8.27		
198	242	0	0.39	0.03	0.16	0.11	0	0	0.06	0.5	39	3	0.8	8.04	648	
178	207	5	0.44	0.05	0.01	0.03	0	0	0.06	1	34	3	0.2	8.24	1164	
272	332	0	0.67	0.06	0.03	0	0	0.01	0.06	2.6	36	3	0.7	8.06	2394	
174	207	2	0.4	0.03	0.19	1.35	0	0.01	0.08	0.4	43	3	0.5	8.21	471	
854	954	43	2.52	0.328	0.79	0.11	0	0.03	0.08	15.7	30	17	0.9	8.34	12174	
504	615	0	0.43	0.012	0.29	0.23	0.05	0.59	0.04	11	32	7	2.5	7.71	11653	
				0.03												
160	195	0	0.43	0.015	0.18	0.06	0.03	0.3	0.05	1.6	33	10	1.1	8.13	1335	0.16
6	7	0	0.03	0.003	0	0	0	0.13	0	1.1	1	5	0.2	7.5	56	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
62749	7/26/83	19	30	30	Dom	20	8	No	1957	677	215	34	366	12	527	277	118.1
80057	6/23/88	19	30	30	Dom	20	8	No	1066	271	87	13	264	7	264	102	6.6
86433	3/21/90	19	30	31	Dom	18	8	No	291	125	35	9	47	5	58	27	3.3
64241	1/10/84	19	31	4	Dom			No	1641	480	136	34	366	16	126	630	0.2
59019	3/21/82	19	31	6	Dom	15	8	No	415	154	37	15	64	16	60	43	1.3
78938	3/28/88	19	31	6	rmal	20	4	No	42160	10525	1746	1497	9268	187	3670	19800	12.8
78941	3/28/88	19	31	6	rmal	20	4	No	13800	5747	1479	498	2399	123	2393	5600	11.9
78939	3/28/88	19	31	6	rmal	20	4	No	25370	7446	1645	810	5268	134	2824	11200	162.5
78940	3/28/88	19	31	6	rmal	20	4	No	30210	9288	1837	1141	6133	255	2814	14600	12.3
79363	5/5/88	19	31	6	rmal	20	4	No	30190	8450	1645	1054	6597	166	2863	14200	4.8
79362	5/5/88	19	31	6	rmal	20	4	No	22970	6908	1438	805	4740	99	2644	10500	14
79361	5/5/88	19	31	6	rmal	20	4	No	13340	4715	1132	458	2385	74	2405	5250	1.2
79364	5/5/88	19	31	6	rmal	20	4	No	13170	4746	1141	460	2366	74	2405	5300	0.3
79460	5/16/88	19	31	6	rmal	20	4	No	29280	8513	1649	1067	6613	152	2789	14400	3.3
79461	5/16/88	19	31	6	rmal	20	4	No	13350	4705	1105	472	2496	72	2518	5350	8.3
79458	5/16/88	19	31	6	rmal	20	4	No	6720	1450	455	76	1716	22	806	3150	9.8
79459	5/16/88	19	31	6	rmal	20	4	No	22000	6871	1430	901	4678	87	2590	10300	5.2
79673	6/3/88	19	31	6	rmal	20	4	No	29490	8656	1678	1084	6568	153	2811	14200	3.8
79672	6/3/88	19	31	6	rmal	20	4	No	22780	7040	1476	814	4840	91	2588	10400	7.3
79671	6/3/88	19	31	6	rmal	20	4	No	5870	941	276	61	1812	18	308	3050	0.1
79674	6/3/88	19	31	6	rmal	20	4	No	14630	5044	1178	510	2790	75	2588	5900	10.9
81444	11/18/88	19	31	6	rmal	20	3	No	15400	4021	983	380	3460	74	1984	6900	58.3
81447	11/18/88	19	31	6	rmal	20	4	No	16327	5713	1304	596	3020	109	2344	7100	2.8
81446	11/18/88	19	31	6	rmal	20		No	25350	7854	1680	888	5170	148	2696	11600	2.6
81445	11/18/88	19	31	6	rmal	20	4	No	23440	6143	1193	768	5550	180	3872	10200	1.5
81448	11/18/88	19	31	6	rmal			No	6365	1580	339	178	1464	49	1201	2475	6.9
71874	5/14/86	19	31	7	Dom	20	4	No	605	333	84	30	75	14	9	55	0.9
99625	10/7/92	19	31	7	Dom			No	1060	239	48	29	269	19	258	220	0.1
96576	4/21/92	19	31	18	Dom	300		No	4189	215	81	3	1424	31	171	2125	3.4
51294	9/15/79	19	31	27	Dom			No	1271	456	120	38	288	11	260	145	7.5
51293	9/15/79	19	31	27	Dom			No	1274	456	120	38	286	11	263	148	9.6
72497	7/7/86	19	36	17	Dom			No	163	65	21	3	24	1	35	15	5.6
72834	7/31/86	19	36	31	Dom	220		No	152	45	13	3	21	2	14	11	0
68460	5/22/85	20	24	10		125	8	No	246	108	25	11	40	4	26	12	10

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
62749	468	571	0	0.78	0.02	0	0.06	0.02	0.28	0.13	2.9	47	20	0.4	7.54		
80057	448	547	0	0.87	0.04	0	0	0	0	0.07	1.7	43	3	0.2	7.88	1614	
86433	142	173	0	0.34	0.014	0.49	0.12	0	0.11	0.06	0.2	22	7	2.8	7.49	487	
64241	330	403	0	0.81	0.075	3	2.07	0	0.02	0.33	4.4	77	25	22	7.74		
59019	200	244	0	0.81	0.095	0.05	0.01	0	0.02	0.07			5	0.5	8.02		
78938	188	229	0	0.6	0.055	4.03	2.38	0.05	0.05	0.18	53	59	12	0.8	7.53	48215	
78941	158	193	0	0.74	0.09	0.09	4.2	0.03	0.02	0.43	15.3	78	25	0.6	7.81	16874	
78939	166	203	0	0.69	0.047	1.9	4.48	0.07	0.07	0.32	24.9	90	70	0.8	7.63	30153	
78940	188	229	0	0.81	0.116	2.86	2.59	0.08	0.04	0.2	36.7	77	17	0.8	7.68	36504	
79363	196	239	0	0.75	0.11	0.29	0.79	0.02	0.02	0.06	39.3	67	7	0.5	7.18	38914	
79362	180	220	0	0.71	0.06	0.96	1.95	0.01	0.02	0.07	26.1	64	17	0.5	7.3	30060	
79361	190	232	0	0.62	0.071	1.52	0.68	0.02	0.03	0.09	16.8	82	5	1.1	7.38	17277	
79364	186	227	0	0.63	0.07	0.97	0.69	0.02	0.03	0.08	16.9	83	5	1.2	7.14	17277	
79460	200	244	0	0.75	0.112	0.12	0.76	0.02	0.03	0.06	40.7	69	5	0.9	7.23	38610	
79461	184	224	0	0.62	0.07	0.15	0.32	0.01	0.01	0.05	18.2	80	5	1.5	7.32	17843	
79458	72	88	0	0.53	0.024	0.52	0.15	0	0.02	0.09	21.1	64	15	1.5	7.69	10108	
79459	186	227	0	0.66	0.06	0.07	1.61	0.02	0.01	0.04	26.6	63	10	1	7.33	29651	
79673	208	254	0	0.77	0.107	0.23	0.71	0	0.02	0.05	41.5	72	3	0.5	7.53	38713	
79672	190	232	0	0.68	0.06	0.13	1.41	0	0	0.04	26.9	63	7	0.9	7.46	30328	
79671	70	85	0	0.89	0.017	0.45	0.03	0	0.01	0.07	18.3	61	17	3.5	7.77	10262	
79674	190	232	0	0.63	0.072	0.32	0.41	0	0.01	0.04	19	81	3	1.4	7.43	19458	
81444	286	349	0	1.06	0.025	0.74	0.74	0.05	0.64		28.9	80	25	0.8	7.5	20815	
81447	182	222	0	0.63	0.08	0.12	0.57	0.04	0.03		19	91	3	1	7.5	21150	
81446	202	246	0	0.68	0.082	0.15	0.18	0.05	0.04		28.6	79	25	0.9	7.44	31782	
81445	200	244	0	1.01	0.144	0.14	1.05	0.05	0.05		41.1	92	17	0.9	7.46	23375	
81448	262	320	0	1.77	0.048	0.08	0.89	0.02	0.02		12.2	73	7	0.6	7.75	9508	
71874	454	554	0	0.38	0.033	1.38	0.22	0	4.1	0.36	0.8	66	35	0.9	7.63		
99625	284	346	0	1.25	0.202	0.23	0.3	0.07	0.22	0.11	1.9	62	5	0.5	8.02	1693	
96576	88	107	0	4.96	0.003	0.1	0.11	0.02	0.01	0.18	16.8	112	3	0.4	7.37	7251	
51294	580	708	0	0.82	0.025	0.07	0.14						7	0.7	8.03		
51293	578	705	0	0.83	0.025	0.08	0.01						15	0.3	7.47		
72497	60	73	0	0.13	0.003	0.03	0	0	0	0.03	0.1	29	3	0.4	7.06	265	
72834	64	73	2	0.15	0.003	0.14	0	0.01	0.04	0.03	0.1	60	3	1.5	8.24	204	
68460	146	168	5	0.29	0.1	0.02	0	0	0.05	0.08	0.3	51	5	0.2	8.23		

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL-FATE	CHLOR-IDE	NI-TRATE
69960	10/28/85	20	24	11				No	377	179	27	27	52	16	92	15	3.9
68646	6/14/85	20	24	15		64	6	Yes	186	9	2	1	56	0	96	14	0.3
65017	5/1/84	20	25	21			6	No	457	52	11	6	140	14	24	11	10.8
70255	12/17/85	20	25	24				No	214	43	14	2	45	7	15	12	2.7
71548	4/24/86	20	25	24		85	8	No	230	14	4	1	63	5	20	14	2.2
106368	8/13/93	20	25	24			6	No	237	40	11	3	57	4	16	12	0.1
58754	3/1/82	20	26	27	dom	25	8	No	1719	112	25	12	550	39	418	340	2.3
125961	2/19/96	20	26	27		38		No	3323	185	41	20	1080	60	964	972	0
64456	1/21/84	20	26	28		110	6	No	1197	243	56	25	289	32	251	197	0
79288	5/3/88	20	26	33		42	6	No	348	129	40	7	73	6	32	20	1.2
65005	4/26/84	20	26	34		45	6	No	1302	17	5	1	463	19	343	228	2.7
94417	10/18/91	20	26	35		120	8	No	647	30	7	3	200	18	92	79	2.8
100371	11/10/92	20	28	1				No	966	12	3	1	232	12	106	146	1
73063	8/22/86	20	28	5		54	6	No	443	141	40	10	101	6	54	17	4.6
76554	7/20/87	20	28	8		60	6	No	689	3	1	0	257	9	120	52	0.2
71896	5/15/86	20	28	18		28	8	No	3930	715	220	40	927	32	1942	360	3.1
65602	7/3/84	20	28	28		80	8	No	5756	305	61	37	1860	65	2171	1350	6
88131	6/10/90	20	28	28	geo	4000	9.625	No	5945	183	73	0	1744	45	62	2750	0.1
120013	3/27/95	20	28	31		250	6.625	No	189	42	12	3	32	9	34	5	0
79678	5/26/88	20	28	33				No									
79676	5/26/88	20	28	33				No									
79679	5/26/88	20	28	33				No									
79677	5/26/88	20	28	33				No									
81051	9/28/88	20	28	33	geo		13.375	No							68		
81052	9/28/88	20	28	33	geo		13.375	No							69		
81053	9/28/88	20	28	33	geo		13.375	No							60		
81054	9/28/88	20	28	33	geo		13.375	No							60		
81055	9/28/88	20	28	33	geo		13.375	No							58		
81059	9/28/88	20	28	33	geo		13.375	No							60		
81069	9/28/88	20	28	33	geo		13.375	No									
81057	9/28/88	20	28	33	geo		13.375	No							66		
81071	9/28/88	20	28	33	geo		13.375	No									
81070	9/28/88	20	28	33	geo		13.375	No									
81058	9/28/88	20	28	33	geo		13.375	No							81		

Lab No	ALKA-LINITY	BICARB-ONATE	CARB-ONATE	FLOURIDE	ARSENIC	IRON	MANGA-NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR-BIDITY	pH	EC	SI@20C
69960	194	227	5	0.11	0.012	0.28	0.01	0.04	0.01	0.11	0.5	47	5	0.4	8.3		
68646	12	15	0	0.07	0.002	0	0.01	0	0	0.06	0.2	13	3	0	7.45		
65017	328	356	22	0.68	0.735	0	0	0	0.04	0.05	0.8	45	3	0.4	8.53		
70255	122	149	0	0.15	0.03	0.07	0.01	0	0.03	0.03	0.3	56	5	0.6	8.18		
71548	118	124	10	0.14	0.036	0.04	0	0	0.02	0.01	0.4	58	5	0.1	8.52		
106368	138	154	7	0.57	0.136	0.29	0.01	0	0.03	0.03	0.3	63	5	1.6	8.2	326	0
58754	452	551	0	1.6	0.42	0.22	0.03	0	1.37	0.01	3.4	43	3	0.9	8.12		
125961	308	376	0	66	0.036	0.21	0.08	0	0.01	0.02	5.7	36	40	9.6	7.89	5361	0.34
64456	272	332	0	0.73	0.315	0.8	0.29	0	0.05	0.02	2	81	25	9.7	7.65		
79288	236	288	0	0.53	0.11	0.1	0	0.06	1.52	0.01	0.4	30	3	0.8	7.85	577	
65005	388	400	36	1.32	0.61	0.03	0	0	0	0.02	2	36	3	0.5	8.66		
94417	292	356	0	1.22	0.182	0	0	0	0.01	0.02	1.4	68	3	0.3	7.83	1002	
100371	370	403	24	1.4	0.14	6.2	0.07	0.07	0.9	0.01	2	48	70	9.6	8.68	1470	
73063	292	356	0	0.63	0.11	0	0.1	0	0.04	0.03	0.05	43	3	0.3	7.95	702	
76554	356	386	24	4.24	2.024	0.23	0.01	0.01	0.01	0.01	2.3	33	7	0.8	8.82	1109	
71896	320	390	0	1.33	0.072	0.01	0.03	0.01	0.04	0.02	5.1	39	3	0.2	7.88		
65602	270	329	0	0.61	0.085	0.13	0.13	0.06	0	0.06	8	47	20	0.9	7.87		
88131	92	63	24	2.28	0.043	0.9	0.09	0.25	0	0.66	13.5	151	12	2.3	8.65	8967	
120013	82	100	0	0.028	0.014	0.1	0.15	0	0.02	0.05	0.2	61	7	0.3	8.15	252	-0.38
79678						0.11											
79676						0.78											
79679						0.14											
79677						0.78											
81051						0.09											
81052						0.21											
81053						0.01											
81054						1.06											
81055						0.72											
81059						0.59											
81069						0.46											
81057						0.08											
81071						0.53											
81070						0.44											
81058						0.18											

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
81056	9/28/88	20	28	33	geo		13.375	No							56		
81067	9/28/88	20	28	33	geo		13.375	No							56		
81064	9/28/88	20	28	33	geo		13.375	No							69		
81073	9/28/88	20	28	33	geo		13.375	No									
81063	9/28/88	20	28	33	geo		13.375	No							65		
81061	9/28/88	20	28	33	geo		13.375	No							56		
81065	9/28/88	20	28	33	geo		13.375	No							79		
81060	9/28/88	20	28	33	geo		13.375	No							63		
81068	9/28/88	20	28	33	geo		13.375	No							56		
81072	9/28/88	20	28	33	geo		13.375	No									
81074	9/28/88	20	28	33	geo		13.375	No									
81075	9/28/88	20	28	33	geo		13.375	No									
81076	9/28/88	20	28	33	geo		13.375	No									
81062	9/28/88	20	28	33	geo		13.375	No							53		
81066	9/28/88	20	28	33	geo		13.375	No							64		
128543	7/15/96	20	28	33	geo			No	1376								
132465	3/26/97	20	28	33	geo			No	816	98	31	5	240	20	53	299	0.3
133564	6/17/97	20	28	33	geo			No	812	98	31	5	240	20	54	299	0.3
137290	3/13/98	20	28	33	geo			No	5330	300	115	3	1600	160	60	3120	
137291	3/13/98	20	28	33	geo			No	6920	575	202	17	1700	184	50	4250	
137292	3/13/98	20	28	33	geo			No	5090	252	99	1	1700	160	70	2940	
137289	3/14/98	20	28	33	geo			No	6910	557	198	15	1700	179	50	4270	
90680	12/31/90	20	29	25				No	1391	237	57	23	387	14	422	188	0.2
99778	9/30/92	20	29	35				No	533	0	0	0	204	4	69	23	0.2
68347	5/13/85	20	30	18		31	4	No	1916	333	92	25	550	18	468	500	12.4
80821	9/2/88	20	31	18		21	6	No	633	168	46	13	158	16	154	63	1.1
64240	1/10/84	20	31	28				No	4190	48	19	0	1570	32	4	2350	0.3
52866	3/14/80	21	34	24	Dom	70		No	355	140	46	6	51	4	57	32	2.2
62361	6/5/83	21	34	24	Dom	300	6	No	324	87	20	3	57	4	75	29	4.2
62763	6/20/83	21	34	27	Dom	69	16	No	324	111	41	2	56	3	56	47	7.3
62618	6/15/83	21	35		Dom	100	4	No	307	49	18	1	70	4	70	22	1.6
76882	8/26/87	21	35	8	Dom	300	6	No	283	245	29	42	10	1	0	10	4.6
65604	7/17/84	21	35	11	Dom	200	4	No	236	10	4	0	73	1	49	17	0.5
50662	7/23/79	21	35	17	Dom	100	4	No	292	47	17	1	70	4	66	21	1.7

Lab No	ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
81056						0.79											
81067						0.2											
81064						0.15											
81073						0.46											
81063						0.07											
81061						0.13											
81065						0											
81060						0.58											
81068						0.62											
81072						0.5											
81074						0.9											
81075						0.91											
81076						0.92											
81062						0.54											
81066						0.66											
128543				0.83	0.049						3.2				8.85	2205	
132465	164	171	14	0.51	0.028	1.6	0.04	0.01	0.03	0.12	1.9	83	7	10.8	8.43	1398	0.54
133564	164	176	12	0.54	0.025	1.05	0.03	0.02	0.05	0.13	2	82	13	2.3	8.37	1392	0.48
137290	10	12	0	29		54.3	1.1					270			5.74		-2.87
137291	0	0	0	116		462	7.32					164			3.83		-5.55
137292	78	95	0	1.22		0.78	0.08					218			6.04		-1.75
137289	0	0	0	164		618	9					184			3.33		-6.06
90680	418	510	0	0.78	0.042	0.84	0.66	0.05	0.06	0.05	1.9	39	15	2.4	8.05	2165	
99778	318	276	55	2.02	0.6	0.63	0.03	0.02	0	0.02	1.8	45	45	0.3	9.3	802	
68347	354	432	0	1.4	0.115	0	0.02	0	0.02	0.03	4.2	73	5	0.3	7.6		
80821	272	298	17	0.67	0.059	0.15	0.12	0	0.03	0.03	1	45	7	7	8.32	1005	
64240	360	439	0	0.79	0.01	0.24	0.11	0.13	0.15	0.24	16.6	58	30	1	8.06		
52866	138	168	0	1.18	0.02	0.07	0.02						7	0.5	7.98		
62361	92	112	0	1.99	0.01	0.78	0.03	0	0.37	0.02	0.2	62	13	4.7	8.16		
62763	98	120	0	1.21	0.005	0.09	0	0	0.05	0.02	0.2	51	5	0.4	7.93		
62618	76	83	4	7.64	0.01	0.01	0	0.01	0.02	0.01	0.3	71	5	0.1	8.21		
76882	246	300	0	0.3	0.003	0.09	0	0.09	1.1	0.09	0	59	3	0.6	8.14	492	
65604	74	46	22	9.12	0.02	0.02	0	0	0	0	0.2	71	5	0.4	8.73		
50662	80	98	0	7.5	0.02	0.04							3	0.2	8.04		

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

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Lab No	SAMPLE DATE	T	R	SEC	USE	WELL DEPTH	CASING DIAMETER	FILTER	TDS	HARD NESS	CALCIUM	MAGNE SIUM	SODIUM	POSTASSI UM	SUL- FATE	CHLOR- IDE	NI- TRATE
56403	4/20/81	21	35	22	Dom	148	6	No	309	57	21	1	65	5	78	24	0.6
70890	2/24/86	23	35	27	Dom			No	1885	543	168	30	356	17	543	445	0
123973	10/2/95	24	29	29	Dom			No									0.4
124321	10/6/95	24	29	29	Dom			No	309	153	53	5	42	2	53	57	0.5
75753	4/29/87	24	37	7	Dom	420	13	No	802	277	55	34	154	16	153	166	0
69406	9/11/85	25	37	5	Dom	180	16	No	892	288	51	39	181	8	209	200	11.3
95077	12/4/91	29	18	5	Dom	32	8	No	569	241	70	16	103	11	97	36	4.3

ALKA- LINITY	BICARB- ONATE	CARB- ONATE	FLOURIDE	ARSENIC	IRON	MANGA- NESE	COP PER	ZINC	BARIUM	BORON	SILICA	COLOR	TUR- BIDITY	pH	EC	SI@20C
74	90	0	6.16	0.01	0.61	0.03	0	0.02				5	2.6	8.02		
172	210	0	4.36	0.04	0.03	0.12	0	1.21	0.03	4	96	5	0.3	7.43		
106	120	5	0.11	0.003	0.06	0	0.02	0.12	0.1	0.1	25	3	0.2	8.37	504	59
258	315	0	0.79	0.04	0.09	0.17	0.01	0.1	0.05	1.8	75	3	0.3	8.08	1318	
198	229	0	0.66	0.01	0.05	0	0	0.19	0.04	0.9	51	5	0.4	7.93		
334	407	0	0.31	0.02	0.01	0	0.01	0.09	0.06	0.8	35	3	0.2	7.58	916	

Shaded Perameters Exceed the Nevada Bureau of Health and Protection Services MCL's

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