Hall Environmental Analysis Laboratory, Inc.

Date: *21-Dec-07*

CLIENT:	Sandoval County	**Client Sample ID:**	EW6-1
Lab Order:	0711344	**Collection Date:**	11/20/2007 4:30:00 PM
Project:	Exp Well 6	**Date Received:**	11/21/2007
Lab ID:	0711344-01	**Matrix:**	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Methyl tert-butyl ether (MTBE)	ND	2.5		µg/L	1	11/29/2007 12:16:54 AM
Benzene	ND	1.0		µg/L	1	11/29/2007 12:16:54 AM
Toluene	ND	1.0		µg/L	1	11/29/2007 12:16:54 AM
Ethylbenzene	ND	1.0		µg/L	1	11/29/2007 12:16:54 AM
Xylenes, Total	ND	2.0		µg/L	1	11/29/2007 12:16:54 AM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	11/29/2007 12:16:54 AM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	11/29/2007 12:16:54 AM
Surr: 4-Bromofluorobenzene	80.0	70.2-105		%REC	1	11/29/2007 12:16:54 AM
DISSOLVED GAS BY HEADSPACE (RSK175)						Analyst: **LMM**
Methane	ND	1.0		µg/L	1	11/27/2007 9:05:11 AM
Ethene	ND	2.0		µg/L	1	11/27/2007 9:05:11 AM
Ethane	ND	2.0		µg/L	1	11/27/2007 9:05:11 AM
EPA METHOD 300.0: ANIONS						Analyst: **KS**
Fluoride	4.8	1.0		mg/L	10	11/21/2007 4:59:40 PM
Chloride	3100	10		mg/L	100	12/9/2007 1:01:53 PM
Nitrate (As N)+Nitrite (As N)	ND	2.0		mg/L	10	12/9/2007 6:32:41 PM
Sulfate	4400	50		mg/L	100	12/9/2007 1:01:53 PM
EPA 6010B: HARDNESS						Analyst: **TES**
Hardness (As CaCO3)	1500	1.0		mg/L	1	11/27/2007
EPA METHOD 7470: MERCURY						Analyst: **SLB**
Mercury	ND	0.00020		mg/L	1	11/28/2007 3:07:45 PM
EPA METHOD 6010B: DISSOLVED METALS						Analyst: **TES**
Aluminum	ND	0.020		mg/L	1	11/27/2007 12:48:59 PM
Barium	0.039	0.020		mg/L	1	11/27/2007 12:48:59 PM
Beryllium	0.0067	0.0030		mg/L	1	11/27/2007 12:48:59 PM
Boron	8.7	2.0		mg/L	50	11/27/2007 1:43:21 PM
Cadmium	ND	0.0020		mg/L	1	11/27/2007 12:48:59 PM
Calcium	450	5.0		mg/L	5	11/27/2007 12:55:59 PM
Chromium	ND	0.0060		mg/L	1	11/27/2007 12:48:59 PM
Cobalt	ND	0.0060		mg/L	1	11/27/2007 12:48:59 PM
Copper	ND	0.0060		mg/L	1	11/27/2007 12:48:59 PM
Iron	3.6	0.10		mg/L	5	11/27/2007 12:55:59 PM
Lead	0.0073	0.0050		mg/L	1	11/27/2007 12:48:59 PM
Magnesium	94	1.0		mg/L	1	11/27/2007 12:48:59 PM
Manganese	0.084	0.0020		mg/L	1	11/27/2007 12:48:59 PM
Potassium	140	5.0		mg/L	5	11/27/2007 12:55:59 PM
Silica	30	0.80		mg/L	5	11/27/2007 12:55:59 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	MCL	Maximum Contaminant Level
ND	Not Detected at the Reporting Limit	RL	Reporting Limit
S	Spike recovery outside accepted recovery limits		

Hall Environmental Analysis Laboratory, Inc.

Date: *21-Dec-07*

CLIENT:	Sandoval County	**Client Sample ID:**	EW6-1
Lab Order:	0711344	**Collection Date:**	11/20/2007 4:30:00 PM
Project:	Exp Well 6	**Date Received:**	11/21/2007
Lab ID:	0711344-01	**Matrix:**	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 6010B: DISSOLVED METALS						Analyst: TES
Silicon	14	0.40		mg/L	5	11/27/2007 12:55:59 PM
Silver	ND	0.0050		mg/L	1	11/27/2007 12:48:59 PM
Sodium	3500	50		mg/L	50	11/27/2007 1:43:21 PM
Strontium	8.9	0.30		mg/L	50	11/29/2007 5:20:11 PM
Vanadium	ND	0.050		mg/L	1	11/27/2007 12:48:59 PM
Zinc	0.19	0.050		mg/L	1	11/27/2007 12:48:59 PM
EPA 6010B: TOTAL RECOVERABLE METALS						Analyst: TES
Aluminum	ND	0.020		mg/L	1	12/4/2007 2:49:35 PM
Barium	0.036	0.010		mg/L	1	12/4/2007 2:49:35 PM
Beryllium	0.0061	0.0030		mg/L	1	12/4/2007 2:49:35 PM
Boron	9.7	0.40		mg/L	10	12/13/2007 10:17:08 AM
Cadmium	ND	0.0020		mg/L	1	12/4/2007 2:49:35 PM
Calcium	450	10		mg/L	20	12/7/2007 2:12:01 PM
Chromium	ND	0.0060		mg/L	1	12/4/2007 2:49:35 PM
Cobalt	ND	0.0060		mg/L	1	12/4/2007 2:49:35 PM
Copper	ND	0.0060		mg/L	1	12/4/2007 2:49:35 PM
Iron	3.3	1.0		mg/L	20	12/7/2007 2:12:01 PM
Lead	ND	0.0050		mg/L	1	12/4/2007 2:49:35 PM
Magnesium	97	0.50		mg/L	1	12/4/2007 2:49:35 PM
Manganese	0.078	0.0020		mg/L	1	12/4/2007 2:49:35 PM
Potassium	130	20		mg/L	20	12/7/2007 2:12:01 PM
Silicon	15	5.0		mg/L	10	12/13/2007 10:17:08 AM
Silver	ND	0.0050		mg/L	1	12/4/2007 2:49:35 PM
Sodium	3600	25		mg/L	50	12/7/2007 2:15:10 PM
Strontium	8.8	0.50		mg/L	50	12/10/2007 3:00:59 PM
Vanadium	ND	0.050		mg/L	1	12/4/2007 2:49:35 PM
Zinc	0.12	0.020		mg/L	1	12/4/2007 2:49:35 PM
Silica	32	11		mg/L	10	12/13/2007 10:17:08 AM
5310C: TOC						Analyst: SLB
Organic Carbon, Total	1.2	1.0		mg/L	1	11/29/2007
SM 2320B: ALKALINITY						Analyst: LMM
Alkalinity, Total (As CaCO3)	1800	20		mg/L CaCO3	1	11/27/2007
Carbonate	ND	2.0		mg/L CaCO3	1	11/27/2007
Bicarbonate	1800	20		mg/L CaCO3	1	11/27/2007
TOTAL CARBON DIOXIDE CALCULATION						Analyst: LMM
Total Carbon Dioxide	1900	1.0		mg CO2/L	1	11/27/2007
SM 4500-NH3: AMMONIA						Analyst: KS

Qualifiers:

*	Value exceeds Maximum Contaminant Level
B	Analyte detected in the associated Method Blank
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits
MCL	Maximum Contaminant Level
ND	Not Detected at the Reporting Limit
RL	Reporting Limit
S	Spike recovery outside accepted recovery limits

Hall Environmental Analysis Laboratory, Inc.

Date: *21-Dec-07*

CLIENT:	Sandoval County	**Client Sample ID:**	EW6-1
Lab Order:	0711344	**Collection Date:**	11/20/2007 4:30:00 PM
Project:	Exp Well 6	**Date Received:**	11/21/2007
Lab ID:	0711344-01	**Matrix:**	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SM 4500-NH3: AMMONIA						Analyst: **KS**
Ammonia	0.70	0.50		mg/L	1	12/12/2007
SM4500-P B: PHOSPHOROUS						Analyst: **TES**
Phosphorus, Total (As P)	0.29	0.050		mg/L	1	12/4/2007
SM 2540C: TDS						Analyst: **TAF**
Total Dissolved Solids	12000	20		mg/L	1	11/27/2007
SM 2540D: TSS						Analyst: **TAF**
Suspended Solids	ND	10		mg/L	1	11/26/2007
EPA METHOD 180.1: TURBIDITY						Analyst: **TAF**
Turbidity	13	0.50		NTU	1	11/21/2007

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	MCL	Maximum Contaminant Level
ND	Not Detected at the Reporting Limit	RL	Reporting Limit
S	Spike recovery outside accepted recovery limits		

LABORATORY ANALYTICAL REPORT

Client: Hall Environmental
Project: 0711344
Lab ID: C07111273-001
Client Sample ID: EW6-1

Report Date: 12/17/07
Collection Date: 11/20/07 16:30
DateReceived: 11/30/07
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Conductivity	17900	umhos/cm		1.0		A2510 B	12/03/07 10:39 / rw
Salinity	10.4	unitless		0.100		Calculation	12/14/07 16:48 / sec

Report Definitions: RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

Explanation of codes	
B	Analyte Detected In Method Blank
E	Result Is Estimated
H	Analyzed Out of Hold Time
N	Tentatively Identified Compound
S	Subcontracted
1-9	See Footnote

HALL ENVIRONMENTAL
attn ANDY FREEMAN
4901 HAWKINS NE, SUITE D
ALBUQUERQUE NM 87109-4372

STANDARD

Assalgal Analytical Laboratories, Inc.

Certificate of Analysis

All samples are reported on an "as received" basis, unless otherwise noted (i.e. - Dry Weight).

Client: HALL ENVIRONMENTAL
Project: 0711344
Order: 07110681 HAL03 Receipt: 11-21-07

William P. Blava: President of Assalgal Analytical Laboratories, Inc.

Sample: *0711344-01K EW6-1* Collected: *11-20-07 16:30:00* By:
Matrix: *AQUEOUS*

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
07110681-001A		SM 2120B						By: MJN		
WCOLOR-07-085	WC.2007.2997.4		Color	100	APHA	1	5		11-21-07	11-21-07

Unless otherwise noted, all samples were received in acceptable condition and all sampling was performed by client or client representative. Sample result of ND indicates Not Detected, ie result is less than the sample specific Detection Limit. Sample specific Detection Limit is determined by multiplying the sample Dilution Factor by the listed Reporting Detection Limit. All results relate only to the items tested. Any miscellaneous workorder information or footnotes will appear below.

Analytical results are not corrected for method blank or field blank contamination.

Report Date: 11/30/2007 2:39:56 PM

LABORATORY ANALYTICAL REPORT

Client: Hall Environmental
Project: 0711344
Lab ID: C07111060-001
Client Sample ID: EW6-1

Report Date: 12/21/07
Collection Date: 11/20/07 16:30
DateReceived: 11/27/07
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS - DISSOLVED							
Antimony	ND	mg/L		0.001		SW6020	12/19/07 23:23 / sml
Arsenic	0.640	mg/L		0.001		SW6020	12/19/07 23:23 / sml
Selenium	ND	mg/L		0.001		SW6020	12/19/07 23:23 / sml
Thallium	0.002	mg/L		0.001		SW6020	12/19/07 23:23 / sml
Uranium	0.002	mg/L		0.001		SW6020	12/19/07 23:23 / sml
METALS - TOTAL							
Antimony	ND	mg/L		0.001		SW6020	12/19/07 22:16 / sml
Arsenic	0.634	mg/L		0.001		SW6020	12/19/07 22:16 / sml
Selenium	ND	mg/L		0.001		SW6020	12/19/07 22:16 / sml
Thallium	0.007	mg/L		0.001		SW6020	12/19/07 22:16 / sml
Uranium	0.002	mg/L		0.001		SW6020	12/19/07 22:16 / sml
RADIONUCLIDES - TOTAL							
Gross Alpha	209	pCi/L		1.0		E900.0	12/13/07 20:36 / crw
Gross Alpha precision (±)	14.8	pCi/L				E900.0	12/13/07 20:36 / crw
Gross Beta	166	pCi/L		2.0		E900.0	12/13/07 20:36 / crw
Gross Beta precision (±)	30.0	pCi/L				E900.0	12/13/07 20:36 / crw
Radium 226	35.9	pCi/L		0.2		E903.0	12/11/07 14:43 / taj
Radium 226 precision (±)	2.2	pCi/L				E903.0	12/11/07 14:43 / taj
Radium 228	49.1	pCi/L		1.0		RA-05	12/05/07 09:44 / plj
Radium 228 precision (±)	1.9	pCi/L				RA-05	12/05/07 09:44 / plj

Report Definitions: RL - Analyte reporting limit. QCL - Quality control limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

Memorandum

To: File

From: Gary Lee, P.E., Universal Asset Management, in association with Greg Wetterau, CDM

Date: August 6, 2009

Subject: Sandoval County Groundwater Desalination Water Quality Evaluation

BACKGROUND

Many regulations apply to the design and operation of water treatment facilities. Examples of the applicable regulations are the Safe Drinking Water Act (SDWA), Clean Water Act (CWA), Resource Conservation and Recovery Act (RCRA), Occupational Safety and Health Act (OSHA), EPA issued Ground Water Rule (GWR),etc. The regulations discussed here are those that will have a significant impact on the operation of the Sandoval County Wholesale Water Utility Treatment facility. Achieving ongoing compliance with these regulations will require capital investments to build the facilities and establish reliable processes.

The most influential regulations are associated with federal drinking water regulations. The states typically adopt the federal rules, but have the authority to make them more restrictive. The 1974 Safe Drinking Water Act (SDWA) put water quality regulations and the regulatory framework into place on a national level. The Safe Drinking Water Act was amended by congress in 1986 and 1996. Since 1986, regulations concerning volatile organic chemicals, fluoride, surface water treatment, total coliform bacteria, synthetic and inorganic contaminants, and lead and copper have been promulgated by the USEPA. Regulations established in 1996 include arsenic, sulfate, ground water disinfection, radon, disinfectant and disinfection by-products, and enhanced ground water treatment. The trend of additional regulation is based on more intensive monitoring of raw and treated water supplies for inorganic, organic, and microbiological contaminants, new and improved analytical capabilities, and health effect studies.

The Ground Water Rule (GWR) issued by the Environmental Protection Agency (EPA) was designed and adopted to improve the quality of drinking water and to provide additional protection from disease-causing microorganisms. Water systems, such as that being designed and implemented by the Sandoval County Wholesale Water Utility, source their raw, unfinished water from groundwater. Consequently, compliance with the GWR is required for the safe and compliant performance of the Sandoval County Wholesale Water Utility according to EPA guidelines. The rule includes provisions for monitoring for systems with sources at risk, and actions to remove or inactivate contaminants, if found, to prevent them from reaching drinking water consumers.

In order for Sandoval County to make effective use of a previously untapped groundwater resource, a number of water quality concerns must first be addressed. Some of these concerns relate to specific water quality limits established by the New Mexico Environmental Department (NMED), or the Unites States Environmental Protection Agency (USEPA) as adopted by NMED, while others are related more to the efficient use of treatment processes, or the disposal of

residual streams. This memorandum includes a review of the existing water quality data from the test well to establish which parameters are of primary concern in the treatment of this water.

WATER QUALITY REGULATIONS

The NMED Drinking Water Bureau regulates drinking water quality for municipal and other public drinking water supplies throughout the state. NMED generally regulates compounds at the limits established by the United States Environmental Protection Agency (USEPA). Test well reports for the new Sandoval County supply indicate that the water is considerably lower than the regulated maximum contaminant levels (MCLs) for the majority of regulated parameters, however, the water exceeds drinking water limits for several important parameters as identified in Tables 2 and 3.

Generally Primary Standards set by the USEPA and NMED are directed at rendering drinking water potable or within the recognized guidelines for maintaining public health. Secondary standards are directed at rendering water palatable or pleasant to consume although some health issues may be addressed as well.

The U.S. Environmental Protection Agency (EPA) has established National Primary Drinking Water Regulations that set mandatory water quality standards for drinking water contaminants. These are enforceable standards called "maximum contaminant levels" or "MCLs", which are established to protect the public against consumption of drinking water contaminants that present a risk to human health. An MCL is the maximum allowable amount of a contaminant in drinking water which is delivered to the consumer.

In addition, EPA has established National Secondary Drinking Water Regulations that set non-mandatory water quality standards for 15 contaminants. EPA does not enforce these "secondary maximum contaminant levels" or "SMCLs." They are established only as guidelines to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color and odor. These contaminants are not considered to present a risk to human health at the SMCL.

Since these contaminants are not health threatening at the SMCL, and public water systems only need test for them on a voluntary basis. Why is it necessary to set secondary standards? EPA believes that if these contaminants are present in your water at levels above these standards, the contaminants may cause the water to appear cloudy or colored, or to taste or smell bad. This may cause a great number of people to stop using water from their public water system even though the water is actually safe to drink.

Secondary standards are set to give public water systems some guidance on removing these chemicals to levels that are below what most people will find to be noticeable.

There are a wide variety of problems related to secondary contaminants. These problems can be grouped into three categories: Aesthetic effects -- undesirable tastes or odors; Cosmetic effects -- effects which do not damage the body but are still undesirable; and Technical effects -- damage to water equipment or reduced effectiveness of treatment for other contaminants. The secondary MCLs related to each of these effects are given in Table 1.

Odor and Taste are useful indicators of water quality even though odor-free water is not necessarily safe to drink. Odor is also an indicator of the effectiveness of different kinds of

treatment. However, present methods of measuring taste and odor are still fairly subjective and the task of identifying an unacceptable level for each chemical in different waters requires more study. Also, some contaminant odors are noticeable even when present in extremely small amounts. It is usually very expensive and often impossible to identify, much less remove, the odor-producing substance.

Color may be indicative of dissolved organic material, inadequate treatment, high disinfectant demand and the potential for the production of excess amounts of disinfectant by-products. Inorganic contaminants such as metals are also common causes of color. In general, the point of consumer complaint is variable over a range from 5 to 30 color units, though most people find color objectionable over 15 color units. Rapid changes in color levels may provoke more citizen complaints than a relatively high, constant color level.

Foaming is usually caused by detergents and similar substances when water has been agitated or aerated as in many faucets. An off-taste described as oily, fishy, or perfume-like is commonly associated with foaming. However, these tastes and odors may be due to the breakdown of waste products rather than the detergents themselves.

Skin discoloration is a cosmetic effect related to silver ingestion. This effect, called argyria, does not impair body function, and has never been found to be caused by drinking water in the United States. A standard has been set, however, because silver is used as an antibacterial agent in many home water treatment devices, and so presents a potential problem which deserves attention.

Tooth discoloration and/or pitting is caused by excess fluoride exposures during the formative period prior to eruption of the teeth in children. The secondary standard of 2.0 mg/L is intended as a guideline for an upper boundary level in areas which have high levels of naturally occurring fluoride. It is not intended as a substitute for the lower concentrations (0.7 to 1.2 mg/L) which have been recommended for systems which add fluoride to their water. The level of the SMCL was set based upon a balancing of the beneficial effects of protection from tooth decay and the undesirable effects of excessive exposures leading to discoloration.

Corrosivity, and staining related to corrosion, not only affect the aesthetic quality of water, but may also have significant economic implications. Other effects of corrosive water, such as the corrosion of iron and copper, may stain household fixtures, and impart objectionable metallic taste and red or blue-green color to the water supply as well. Corrosion of distribution system pipes can reduce water flow.

Scaling and sedimentation are other processes which have economic impacts. Scale is a mineral deposit which builds up on the insides of hot water pipes, boilers, and heat exchangers, restricting or even blocking water flow. Sediments are loose deposits in the distribution system or home plumbing.

Table 1. USEPA National Secondary Maximum Contaminant Levels

Contaminant	Secondary MCL	Noticeable Effects above the Secondary MCL
Aluminum	0.05 to 0.2 mg/L*	colored water
Chloride	250 mg/L	salty taste
Color	15 color units	visible tint
Copper	1.0 mg/L	metallic taste; blue-green staining
Corrosivity	Non-corrosive	metallic taste; corroded pipes/ fixtures staining
Fluoride	2.0 mg/L	tooth discoloration
Foaming agents	0.5 mg/L	frothy, cloudy; bitter taste; odor
Iron	0.3 mg/L	rusty color; sediment; metallic taste; reddish or orange staining
Manganese	0.05 mg/L	black to brown color; black staining; bitter metallic taste
Odor	3 TON (threshold odor number)	"rotten-egg", musty or chemical smell
pH	6.5 - 8.5	*low pH:* bitter metallic taste; corrosion *high pH:* slippery feel; soda taste; deposits
Silver	0.1 mg/L	skin discoloration; graying of the white part of the eye
Sulfate	250 mg/L	salty taste
Total Dissolved Solids (TDS)	500 mg/L	hardness; deposits; colored water; staining; salty taste
Zinc	5 mg/L	metallic taste
** mg/L is milligrams of substance per liter of water*		

TABLE 2 - PARAMETERS EXCEEDING EPA NATIONAL PRIMARY DRINKING WATER STANDARDS LIMITS

PARAMETER	EPA NATIONAL PRIMARY DRINKING WATER STANDARDS LIMIT MCLG[1] (mg/L)[2]	EPA NATIONAL PRIMARY DRINKING WATER STANDARDS LIMIT MCL OR TT[1] (mg/L)[2]	11/20/07 Well 6	9/23/08 Well 6-2	10/16/08 Well 6-3	10/28/08 Well 6-4	Potential health effects from exposure above the MCL	Common Sources of Contaminant in drinking water
Arsenic (mg/L)	0[3]	0.010	0.634	0.706	0.678	0.664	Skin damage or problems with circulatory systems, and may have increased risk of getting cancer	Erosion of natural deposits; runoff from orchards, runoff from glass & electronics production wastes

Gross Alpha (pCi/L)	None [3]	15	209	158	269	203	Increased risk of cancer	Erosion of natural deposits of certain minerals that are radioactive and may emit a form of radiation known as alpha radiation
Radium 226 + Radium 228 (pCi/L)	None [3]	5	85	25.9	64.3	42.6	Increased risk of cancer	Erosion of natural deposits

NOTES

1 Definitions

- Maximum Contaminant Level Goal (MCLG) - The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals, Maximunt Contaminant Level (MCL) - The highest level ofa contaminant that is allowed in drinking water, MCLs are set as close to MCLGs as feasible using the best available treatment technology and taking cost into consideration. MCLs are enforceable standards.
- Maximum Residual Disinfectant Level Goal (MRDLG) - The level ofa drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants,
- Maximum Residual Disinfectant Level (MRDL) - The highest level ofa disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants,
- Treatment Technique (Ti') - A required process intended to reduce the level of a contaminant in drinking water.

2 Units are in milligrams per liter (mg/L) unless otherwise noted, Milligrams per liter are equivalent to parts per million (ppm).

3 MCLGs were not established before the 1956 Amendments to the Safe Drinking Water Act. The standard for this contaminant was set prior to 1986. Therefore, there is no MCLG for this contaminant,

The feed water exceeds primary drinking water limits for arsenic, gross alpha, and radium. While a number of alternatives are available for addressing these constituents, the high levels of chloride, sulfate, and total dissolved solids (TDS) suggest that desalination through reverse osmosis (RO) will be required to meet all of the primary and secondary drinking water regulations. In addition, the presence of boron could complicate treatment since it is not well removed by most RO membranes, and could require additional treatment through a second RO pass or a post-RO ion exchange step.

Test well reports for the new Sandoval County supply indicate that the water exceeds the secondary maximum contaminant levels for drinking water limits for several important parameters as identified in Table 3. Secondary maximum contaminant levels (SMCLs), as established by the USEPA and adopted without change by NMED, are those levels that represent reasonable goals for drinking water quality

USEPA has established National Secondary Drinking Water Regulations that set non-mandatory water quality standards for 15 contaminants. USEPA, and consequently NMED, does not enforce these "secondary maximum contaminant levels" or "SMCLs." They are established only as guidelines to assist public water systems in managing their drinking water for aesthetic

considerations, such as taste, color and odor. These contaminants are not considered to present a risk to human health at the SMCL level.

TABLE 3 - PARAMETERS EXCEEDING EPA NATIONAL SECONDARY DRINKING WATER STANDARDS LIMITS

PARAMETER	EPA NATIONAL SECONDARY DRINKING WATER STANDARDS LIMIT MCLG[1] (mg / L)[2]	EPA NATIONAL SECONDARY DRINKING WATER STANDARDS LIMIT MCL OR TT[1](mg / L)[2]	11/20/07 Well 6	9/23/08 Well 6-2	10/16/08 Well 6-3	10/28/08 Well 6-4	Potential health effects from exposure above the MCL
Iron (mg/L)	0.3		3.3	2.1	2.21	1.94	These contaminants are not considered by the EPA to present a risk to human health at the SMCL but can cause red deposits in pipelines and fixtures. Also can promote iron bacteria growth in pipelines..
Manganese (mg/L)	0.05		0.078	0.09	0.03	0.03	These contaminants are not considered by the EPA to present a risk to human health at the SMCL but can cause gray scum and deposits in toilet fixtures and can be associated with odor complaints.
Fluoride (mg/L)	2.0		4.8	4.4	4.7	2.8	These contaminants are not considered by the EPA to present a risk to human health at the SMCL in proper dosages can be beneficial to dental hygiene. Excessive fluorides in drinking water supplies may produce fluorosis (mottling) of teeth, which increases as the optimum fluoride level is exceeded. Additionally, high dosages in water can render water unpalatable.
Chloride (mg/L)	250		3,100	2,800	2,800	2,900	These contaminants are not considered by the EPA to present a risk to human health at the SMCL. High dosages in water can render water unpalatable.
Sulfate (mg/L)	250		4,400	4,100	3,900	4,100	These contaminants are not considered by the EPA to present a risk to human health at the SMCL. In high dosages in water can render water unpalatable and cause digestive complaints.
Total Dissolved Solids (mg/L)	500		12,000	12,000	12,000	12,000	These contaminants are not considered by the EPA to present a risk to human health at the SMCL
Boron (mg/L)			9.7	9.3	8.4	8.9	These contaminants are not considered by the EPA to present a risk to human health at the SMCL

NOTES

1 Definitions

- Maximum Contaminant Level Goal (MCLG) - The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals, Maximunt Contaminant Level (MCL) - The highest level ofa contaminant that is allowed in drinking water, MCLs are set as close to MCLGs as feasible using the best available treatment technology and taking cost into consideration. MCLs are enforceable standards.

- Maximum Residual Disinfectant Level Goal (MRDLG) - The level ofa drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants,
- Maximum Residual Disinfectant Level (MRDL) - The highest level ofa disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants,
- Treatment Technique (Ti') - A required process intended to reduce the level of a contaminant in drinking water.

2 Units are in milligrams per liter (mg/L) unless otherwise noted, Milligrams per liter are equivalent to parts per million (ppm).

IMPACT ON TREATMENT PROCESSES

While the constituents listed previously must be removed to comply with public drinking water standards, additional constituents must also be addressed to facilitate efficient operation of the reverse osmosis process. These constituents including sparingly soluble salts, such as calcium carbonate and silicon dioxide, which can scale RO membranes, impeding their performance, and reducing the hydraulic recovery of the RO process. Table 4 lists the constituents of primary concern for reverse osmosis.

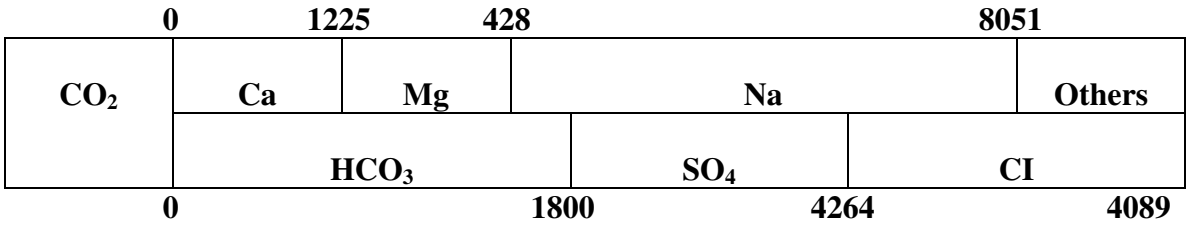
A number of different methods are used in desalination facilities to address membrane fouling concerns caused by the constituents listed in Table 4. Antiscalant polymers and pH adjustment can be used to allow higher levels of calcium, magnesium, and silica, however, the extremely high levels of these constituents in the feed water will likely require partial removal ahead of the membranes. It should therefore be considered that a chemical softening process be used to reduce the concentrations of these compounds ahead of the desalination process.

TABLE 4 - PARAMETERS IMPACTING PERFORMANCE OF REVERSE OSMOSIS

PARAMETER	TREATMENT CONCERN	11/20/07 Well 6	9/23/08 Well 6-2	10/16/08 Well 6-3	10/28/08 Well 6-4
Calcium (mg/L)	Reacts with alkalinity, sulfate, and fluoride to form scale	0.634	0.706	0.678	0.664
Magnesium (mg/L)	Forms scale at high pH, reacts with sulfate	209	158	269	203
Iron (mg/L)	Fouls membranes when oxidized	3.3	2.1	2.21	1.94
Manganese (mg/L)	Fouls membranes when oxidized	0.078	0.09	0.03	0.03
Silica (mg/L)	Forms scale at pH < 8	4.8	4.4	4.7	2.8
Fluoride (mg/L)	Reacts with calcium to form scale	3,100	2,800	2,800	2,900
Sulfate (mg/L)	Reacts with calcium and magnesium to form scale	4,400	4,100	3,900	4,100
Alkalinity (mg/L as $CaCO_3$))	Reacts with calcium to form scale	12,000	12,000	12,000	12,000

Table 5 presents the projected dose and resulting effluent quality for chemical softening done with lime or caustic soda at a pH of 10.5. Bench testing will be conducted to confirm the required dose, optimal pH, and resulting water quality from the chemical softening process.

FIGURE 1 – GRAPHICAL DEPICTION OF CHEMICAL COMPOSITION OF CALCIUM CARBONATE ($CaCO_3$)



Graphically the chemical analysis can be viewed as illustrated above where all elements are expressed as $CaCO_3$.

TABLE 5 – CHEMICAL SOFTENING WATER QUALITY CALCULATIONS

OPERATING CONDITION	LIME ONLY	LIME WITH DECARBONATION	CAUSTIC ONLY	CAUSTIC WITH DECARBONATION
Lime Dose (mg/L)	5,915	887	5,872	876
CO_2 Removed (%)	0	95	0	95
pH	10.5	10.5	10.5	10.5
Effluent Water Quality				
Alkalinity (mg/L)	75	186	7,474	1,169
Calcium (mg/L)	9.1	3.4	0.4	0.9
Magnesium (mg/L)	13	11	19	15
Silica (mg/L)	0.014	0.014	0.014	0.014
Sludge Production (mg/L)	8,697	2,378	1,301	1,310
Sludge Production @ 5MGD (Tons/day)	181.33	49.58	27.13	27.31

DISPOSAL OF RESIDUAL STREAMS

The final water quality concern relates to disposal or reuse of the residual streams from the various treatment processes. Concentration of relatively pure quantities of high value salts, such as calcium sulfate or sodium chloride, could result in an additional revenue stream for the County and a beneficial use of what would otherwise be a waste product. Contamination of these residual products with hazardous or controlled constituents could make both disposal and reuse much more complicated. The primary constituents of concern in the residual streams include arsenic, uranium, radium 226, and radium 228. As a result, careful consideration of arsenic and radio nuclides removal ahead of softening and RO membrane units should be considered. This will isolate these difficult waste streams and minimize the value of waste requiring disposal.