Attachment B

Report

Meridian Metropolitan District Geochemistry

Submitted to

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1.0 Introduction

The following presents a geochemical screening analysis that addresses the potential for precipitation of inorganic compounds that may occur when water from four water treatment plants (i.e., Binney WTP, Griswold WTP, Quebec Street WTP, Wemlinger WTP) is injected into Arapahoe Formation Well A-4 or Denver Formation Well DE-1R. This report describes inputs, methods, results, and suggestions.

2.0 Inputs

Table 1 summarizes relevant water quality data for the four injection waters and the two well waters. This information was provided by Hemenway Groundwater Engineering, Inc. In addition, the following assumptions are employed:

- General Assumptions and Input Comments
  - Species not analyzed or below their respective detection limits were input as zero concentration.
  - Total (as opposed to dissolved) metal concentrations were provided and used.
  - Provided data for molybdenum, chlorite, and hypochlorite (quantified as free chlorine) were not considered due to lack of thermodynamic equilibrium data in the applied WATEQ4F database. Their concentrations were generally low. However, it is noted that the oxidized chlorine species may cause oxidation and thus precipitation of iron in the formation water.
  - Interactions with the formation matrix (e.g., dissolution) were not considered. This would require a (near-)exact chemical speciation of the heterogeneous solid phases. However, since the formation water is in contact with the aquifer matrix, the concentrations of dissolved species represent the properties of the solid phase *to some extent* through chemical equilibration processes.
  - Since the subsurface formation can store heat, the temperature of two mixed waters will likely not be determined by their respective individual temperatures alone. However, temperature differences between injection and formation waters are relatively low, and any impacts from the formation were thus neglected.

- Injection Waters
    - Based on data from previous projects, a temperature of 17 °C and a dissolved oxygen (DO) concentration of 2.5 mg/L were estimated. The absence of iron and nitrite suggests a positive oxidation-reduction potential (ORP). Here, a value of +400 mV was estimated.

- Formation Well Water
    - Based on data from previous projects, a DO concentration of 0.0 mg/L was estimated. The presence of iron and manganese suggests a relatively low oxidation-reduction potential (ORP). Here, a value of -100 mV was estimated.

Table 1: Summary of water quality data.

	Unit	Injection water				Well water	
		Binney	Griswold	Quebec St.	Wemlinger	Arapahoe A-4	Denver DE-1R
pH	-	8.10	8.20	8.20	8.10	7.30	7.05
ORP (vs. SHE)	V	*0.400*	*0.400*	*0.400*	*0.400*	*-0.100*	*-0.100*
Temperature	°C	*17.0*	*17.0*	*17.0*	*17.0*	25.3	17.7
Dissolved Oxygen	mg/L	*2.5*	*2.5*	*2.5*	*2.5*	*0.0*	*0.0*
Aluminum	mg/L	<0.02	0.066	<0.02	0.470	<0.02	<0.02
Ammonia-N	mg/L	0.32	0.32	NA	0.29	0.14	<0.05
Barium	mg/L	0.033	0.050	0.120	0.036	0.150	0.110
Bicarbonate	mg/L	120	92	130	76	100	130
Carbonate	mg/L	<2	<2	<2	<2	NA	NA
Boron	mg/L	0.080	<0.05	<0.05	<0.05	<0.05	0.060
Calcium	mg/L	34	45	23	30	21	17
Chloride	mg/L	66.0	43.0	3.4	27.0	<1	1.9
Copper	mg/L	<0.002	<0.002	<0.002	<0.002	0.0025	<0.002
Fluoride	mg/L	0.87	0.87	1.00	0.91	1.10	1.20
Iron	mg/L	<0.02	<0.02	<0.02	<0.02	0.130	0.050
Lead	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0008	<0.0005
Magnesium	mg/L	13.0	9.3	1.9	7.8	2.2	1.8
Manganese	mg/L	<0.002	<0.002	<0.002	<0.002	0.046	0.022
Nitrate-N	mg/L	1.10	0.31	<0.1	<0.1	<0.1	<0.1
Nitrite-N	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Potassium	mg/L	3.4	2.8	3.3	2.0	3.6	3.0
Silver	mg/L	0.0024	0.0009	<0.005	<0.005	<0.005	<0.005
Sodium	mg/L	30	31	27	19	30	52
Strontium	mg/L	0.30	0.33	0.40	0.24	0.31	0.30
Sulfate	mg/L	74	56	22	40	18	21
Uranium	mg/L	0.0024	0.0041	<0.001	0.0018	<0.001	<0.001

NA = not analyzed
italicized values are estimates

3.0 Methods

The aqueous geochemical modeling code used in this analysis was PHREEQC Interactive for Windows, Version 3.3.12.12704, release date May 10, 2017 in combination with the WATEQ4F database. The model was developed by David Parkhurst (USGS) and Tony Appelo. PHREEQC calculates chemical speciation based on thermodynamic equilibria. It has a batch reaction function that can be used to address mixtures resulting from two solutions and identify potential mineral precipitation based on saturation indices (SI). Note that thermodynamic equilibria contain no information on kinetics: For instance, if a positive saturation index indicates that a certain mineral *will* precipitate, it does not provide any information on *when* it will precipitate.

For each of the waters considered in this work, the modeling was conducted by

- speciating the individual waters,
- and comparing the saturation indices of the injection waters and the formation water at different mixing ratios. These ratios were applied to simulate mixing close to the injection well (injection:formation water ratio of 80:20), in mid-range (50:50), and far from the injection well (20:80). For the scenario of long-term injection, the water quality will likely be more similar to the 80:20 ratio.

4.0 Results

In the following results section, only positive saturation indices are presented, since these values indicate a potential for mineral precipitation. Negative saturation indices, which indicate mineral dissolution if the respective solid phases are present, are omitted in favor of brevity. A complete list of all potential phases and their respective saturation indices can be found in the Appendix.

While all of the oversaturated phases may form in the mixing zone, their impact may not be critical. Factors that may mitigate the impacts of the noted precipitates include:

- low concentrations of the parent compounds in water,
- rates at which the precipitates form (kinetic constraints are neglected by the thermodynamic equilibrium model),
- the fact that the mixing zone moves through the subsurface formation with time.

4.1 Speciation of the Injection and Formation Waters

Initially, the injection and formation waters were speciated to detect any existing oversaturation (Table 2). The Arapahoe Formation water showed slight oversaturation with iron (oxyhydr)oxides, metallic copper, copper minerals, and barite. The Denver Formation water was oversaturated with respect to iron (oxyhydr)oxides and barite. Binney, Griswold and Quebec St. WTPs were slightly oversaturated with carbonates, Griswold and Wemlinger WTPs with aluminum (oxyhydr)oxides. Furthermore, the waters from Griswold and Quebec St. WTPs were slightly oversaturated with respect to barite. The detected oversaturations may be due to slow precipitation kinetics and/or inaccuracies in the input parameters / assumptions. However, it is noted that the concentrations of precipitable cationic species are generally low, and only calcium (and in the case of Binney WTP magnesium) have concentrations >10 mg/L (Table 1).

Table 2: Positive saturation indices of the injection and formation waters.

Phase	Formula	Binney	Griswold	Quebec St.	Wemlinger	Arapahoe A-4	Denver DE-1R
Anilite	Cu0.25Cu1.5S		0.09			2.65	
Aragonite	CaCO3		0.09				
Barite	BaSO4		0.04	0.13		0.01	0.06
Basaluminite	Al4(OH)10SO4				0.08		
Boehmite	AlOOH		0.52		1.48		
Calcite	CaCO3	0.12	0.24	0.15			
Chalcocite	Cu2S					4.63	
Copper	Cu(0)					3.01	
Cuprite	Cu2O					1.28	
Cuprous ferrite	CuFeO2					10.19	
Diaspore	AlOOH		2.30		3.25		
Djurleite	Cu0.066Cu1.868S					4.13	
Dolomite	CaMg(CO3)2	0.07	0.04				
Fe(OH)2.7Cl0.3	Fe(OH)2.7Cl0.3						
Gibbsite	Al(OH)3		1.10		2.06		
Goethite	FeOOH					2.41	0.77
Hematite	Fe2O3					6.82	3.52
Magnetite	Fe3O4					7.89	3.29

4.2 Injection of Binney WTP Water

Table 3 shows positive saturation indices for the mixing of Binney WTP water with Arapahoe Formation Well A-4 water. In the vicinity of the well (ratio 80:20), 15 mineral phases are oversaturated. These phases comprise barite, manganese (oxyhydr)oxides, mixed copper/iron minerals, and iron (oxyhydr)oxides. Iron, copper and manganese are naturally occurring in the well water only, and their concentrations are low (0.130, 0.0025 and 0.046 mg/L, respectively, Table 1). Barium is present in all waters at concentrations ≤0.150 mg/L. Oversaturation with carbonates, as observed in the original Binney WTP water (Table 2), was not detected in the mixed water due to undersaturation with carbonates of the Arapahoe Formation water at lower pH (see the Appendix).

Table 3: Positive saturation indices for mixing of Binney WTP water with Arapahoe Formation Well A-4 water.

Phase	Formula	Injection:Formation Water Ratio		
		20:80	50:50	80:20
Barite	BaSO4	0.14	0.19	0.11
Birnessite	MnO2	2.60	5.82	6.46
Bixbyite	Mn2O3	3.89	6.72	6.87
Cupric Ferrite	CuFeO2	13.40	12.96	11.95
Cuprous Ferrite	CuFeO2	5.33	3.53	2.59
Fe(OH)2.7Cl.3	Fe(OH)2.7Cl.3	6.56	6.61	6.40
Ferric Hydroxide	$Fe(OH)3_{(am)}$	1.87	1.84	1.63
Goethite	FeOOH	7.71	7.59	7.29
Hausmannite	Mn3O4	1.48	4.12	3.99
Hematite	Fe2O3	17.43	17.18	16.55
Maghemite	Fe2O3	7.14	7.08	6.65
Magnetite	Fe3O4	10.50	8.55	7.29
Manganite	MnOOH	1.92	3.54	3.83
Nsutite	MnO2	3.64	6.86	7.50
Pyrolusite	MnO2	4.60	7.42	7.64

Moving away from the well towards mixing ratios of 50:50 and 20:80, the saturation indices of the iron-containing species generally increase, while the saturation indices of the manganese (oxyhydr)oxides generally decrease. These changes, however, are rather low. The barite saturation indices show no consistent trend and remain largely constant.

Mixing the Binney WTP water with Denver Formation water, 13 species with positive saturation indices were found (Table 4). These were barite as well as iron and manganese (oxyhydr)oxides. Again, the source of the iron and manganese is the well water, but their concentrations are low (0.050 and 0.022 mg/L, respectively, Table 1).

Table 4: Positive saturation indices for mixing of Binney WTP water with Denver Formation Well DE-1R water.

Phase	Formula	Injection:Formation Water Ratio		
		20:80	50:50	80:20
Barite	BaSO4	0.14	0.16	0.08
Birnessite	MnO2	5.68	6.02	6.21
Bixbyite	Mn2O3	5.19	5.59	5.81
Fe(OH)2.7Cl.3	Fe(OH)2.7Cl.3	6.49	6.42	6.09
Ferric Hydroxide	$Fe(OH)3_{(am)}$	1.72	1.59	1.28
Goethite	FeOOH	7.34	7.20	6.88
Hausmannite	Mn3O4	1.51	1.99	2.24
Hematite	Fe2O3	16.65	16.38	15.73
Maghemite	Fe2O3	6.84	6.58	5.95
Magnetite	Fe3O4	7.50	6.97	5.94
Manganite	MnOOH	3.09	3.30	3.43
Nsutite	MnO2	6.72	7.05	7.25
Pyrolusite	MnO2	6.68	6.98	7.14

Moving away from the well towards mixing ratios of 50:50 and 20:80, the same trends are observed as with Arapahoe formation water: saturation indices of the iron-containing species generally increase, saturation indices of the manganese (oxyhydr)oxides generally decrease, barite saturation indices remain largely constant.

4.3 Injection of Griswold WTP Water

Table 5 shows positive saturation indices for the mixing of Griswold WTP water with Arapahoe Formation Well A-4 water. In the vicinity of the well (ratio 80:20), 18 mineral phases are oversaturated. Besides oversaturation with barite, manganese (oxyhydr)oxides, mixed copper/iron minerals, and iron (oxyhydr)oxides as seen in the mixed Binney WTP water, the mix of Griswold WTP with Arapahoe Formation water is oversaturated with aluminum minerals. Aluminum is originally present only in the injection water, and its concentration is low (0.066 mg/L, Table 1). Oversaturation with carbonates, as observed in the original Griswold WTP water (Table 2), was not detected in the mixed water due to undersaturation with carbonates of the Arapahoe Formation water at lower pH (see the Appendix).

Table 5: Positive saturation indices for mixing of Griswold WTP water with Arapahoe Formation Well A-4 water.

Phase	Formula	Injection:Formation Water Ratio		
		20:80	50:50	80:20
Barite	BaSO4	0.10	0.14	0.11
Birnessite	MnO2	2.44	5.78	6.44
Bixbyite	Mn2O3	3.71	6.64	6.83
Boehmite	AlOOH	0.44	0.81	0.92
Cupric Ferrite	CuFeO2	13.39	12.95	11.96
Cuprous Ferrite	CuFeO2	5.39	3.53	2.61
Diaspore	AlOOH	2.16	2.55	2.68
Fe(OH)2.7Cl.3	Fe(OH)2.7Cl.3	6.51	6.56	6.35
Ferric Hydroxide	Fe(OH)3$_{(am)}$	1.87	1.83	1.62
Gibbsite	Al(OH)3	0.93	1.34	1.48
Goethite	FeOOH	7.71	7.59	7.28
Hausmannite	Mn3O4	1.27	4.00	3.93
Hematite	Fe2O3	17.42	17.16	16.54
Maghemite	Fe2O3	7.13	7.07	6.64
Magnetite	Fe3O4	10.55	8.53	7.28
Manganite	MnOOH	1.83	3.50	3.81
Nsutite	MnO2	3.48	6.82	7.48
Pyrolusite	MnO2	4.44	7.37	7.63

Moving away from the well towards mixing ratios of 50:50 and 20:80, the saturation indices of the iron-containing species generally increase, while the saturation indices of the manganese and aluminum (oxyhydr)oxides generally decrease. The barite saturation indices show no consistent trend and remain largely constant.

Table 6 shows positive saturation indices for the mixing of Griswold WTP water with Denver Formation Well DE-1R water. In the vicinity of the well (ratio 80:20), 16 mineral phases are oversaturated: barite as well as aluminum, iron, and manganese (oxyhydr)oxides.

With increasing distance from the well towards mixing ratios of 50:50 and 20:80, the saturation indices of the iron (oxyhydr)oxides generally increase, while the saturation indices of the manganese and aluminum (oxyhydr)oxides generally decrease. The barite saturation indices show no consistent trend and remain largely constant. At a ratio of 50:50 only, the mixed water exhibits oversaturation with basaluminite.

Table 6: Positive saturation indices for mixing of Griswold WTP water with Denver Formation Well DE-1R water.

Phase	Formula	Injection:Formation Water Ratio		
		20:80	50:50	80:20
Barite	BaSO4	0.11	0.13	0.09
Basaluminite	Al4(OH)10SO4		0.18	
Birnessite	MnO2	5.65	5.96	6.16
Bixbyite	Mn2O3	5.14	5.47	5.69
Boehmite	AlOOH	0.77	1.11	1.11
Diaspore	AlOOH	2.54	2.88	2.89
Fe(OH)2.7Cl.3	Fe(OH)2.7Cl.3	6.44	6.36	6.04
Ferric Hydroxide	$Fe(OH)3_{(am)}$	1.71	1.58	1.27
Gibbsite	Al(OH)3	1.35	1.69	1.69
Goethite	FeOOH	7.33	7.19	6.87
Hausmannite	Mn3O4	1.43	1.81	2.07
Hematite	Fe2O3	16.64	16.35	15.71
Maghemite	Fe2O3	6.82	6.55	5.93
Magnetite	Fe3O4	7.47	6.93	5.91
Manganite	MnOOH	3.06	3.24	3.37
Nsutite	MnO2	6.69	6.99	7.19
Pyrolusite	MnO2	6.65	6.92	7.08

4.4 Injection of Quebec Street WTP Water

Table 7 shows positive saturation indices for the mixing of Quebec St. WTP water with Arapahoe Formation Well A-4 water. In the vicinity of the well (ratio 80:20), 15 mineral phases are oversaturated. These phases comprise barite, mixed copper/iron minerals as well as manganese and iron (oxyhydr)oxides. An oversaturation with calcite, as observed in the original Quebec St. WTP water (Table 2), was not detected in the mixed water due to undersaturation with carbonates of the Arapahoe Formation water at lower pH (see the Appendix).

Table 7: Positive saturation indices for mixing of Quebec Street WTP water with Arapahoe Formation Well A-4 water.

Phase	Formula	Injection:Formation Water Ratio		
		20:80	50:50	80:20
Barite	BaSO4	0.03	0.07	0.10
Birnessite	MnO2	2.68	6.42	7.17
Bixbyite	Mn2O3	4.02	7.58	8.08
Cupric Ferrite	CuFeO2	13.42	13.05	12.08
Cuprous Ferrite	CuFeO2	5.32	3.43	2.58
Fe(OH)2.7Cl.3	Fe(OH)2.7Cl.3	6.18	6.21	5.97
Ferric Hydroxide	$Fe(OH)3_{(am)}$	1.88	1.87	1.66
Goethite	FeOOH	7.72	7.62	7.32
Hausmannite	Mn3O4	1.66	5.24	5.69
Hematite	Fe2O3	17.44	17.23	16.61
Maghemite	Fe2O3	7.15	7.13	6.71
Magnetite	Fe3O4	10.50	8.46	7.28
Manganite	MnOOH	1.99	3.98	4.44
Nsutite	MnO2	3.72	7.46	8.21
Pyrolusite	MnO2	4.68	8.02	8.36

Moving into the formation towards mixing ratios of 50:50 and 20:80, the saturation indices of the iron-containing species generally increase, while the saturation indices of barite and the manganese (oxyhydr)oxides generally decrease.

Mixing Quebec St. WTP water with Denver Formation water, 13 mineral phases are oversaturated: barite as well as iron and manganese (oxyhydr)oxides (Table 8). Again, with increasing distance from the well towards mixing ratios of 50:50 and 20:80, the saturation indices of the iron (oxyhydr)oxides generally increase, while the saturation indices of barite and the manganese (oxyhydr)oxides generally decrease.

Table 8: Positive saturation indices for mixing of Quebec Street WTP water with Denver Formation Well DE-1R water.

Phase	Formula	Injection:Formation Water Ratio		
		20:80	50:50	80:20
Barite	BaSO4	0.08	0.10	0.11
Birnessite	MnO2	5.94	6.39	6.80
Bixbyite	Mn2O3	5.51	6.14	6.80
Fe(OH)2.7Cl.3	Fe(OH)2.7Cl.3	6.25	6.09	5.70
Ferric Hydroxide	$Fe(OH)3_{(am)}$	1.73	1.62	1.32
Goethite	FeOOH	7.35	7.23	6.92
Hausmannite	Mn3O4	1.89	2.72	3.64
Hematite	Fe2O3	16.68	16.44	15.81
Maghemite	Fe2O3	6.86	6.64	6.03
Magnetite	Fe3O4	7.44	6.97	5.96
Manganite	MnOOH	3.25	3.58	3.93
Nsutite	MnO2	6.97	7.43	7.84
Pyrolusite	MnO2	6.93	7.35	7.73

4.5 Injection of Wemlinger WTP Water

Table 9 shows positive saturation indices for the mixing of Wemlinger WTP water with Arapahoe Formation Well A-4 water. In the vicinity of the well (ratio 80:20), 18 mineral phases are oversaturated: aluminum, iron and manganese (oxyhydr)oxides as well as mixed copper/iron minerals.

Moving away from the well towards mixing ratios of 50:50 and 20:80, the saturation indices of the iron-containing species generally increase, while the saturation indices of the manganese and aluminum (oxyhydr)oxides generally decrease. At a 20:80 mixing ratio of injection:formation water, the water is no longer oversaturated with basaluminite. However, at a mixing ratio of both 50:50 and 20:80, the water is slightly oversaturated with respect to barite.

Table 9: Positive saturation indices for mixing of Wemlinger WTP water with Arapahoe Formation Well A-4 water.

Phase	Formula	Injection:Formation Water Ratio		
		20:80	50:50	80:20
Barite	BaSO4	0.04	0.04	
Basaluminite	Al4(OH)10SO4		1.10	2.16
Birnessite	MnO2	2.32	5.77	6.35
Bixbyite	Mn2O3	3.56	6.56	6.61
Boehmite	AlOOH	1.31	1.71	1.86
Cupric Ferrite	CuFeO2	13.37	12.92	11.92
Cuprous Ferrite	CuFeO2	5.43	3.47	2.57
Diaspore	AlOOH	3.03	3.45	3.62
Fe(OH)2.7Cl.3	Fe(OH)2.7Cl.3	6.45	6.50	6.30
Ferric Hydroxide	$Fe(OH)3_{(am)}$	1.86	1.82	1.61
Gibbsite	Al(OH)3	1.80	2.24	2.42
Goethite	FeOOH	7.71	7.58	7.27
Hausmannite	Mn3O4	1.09	3.85	3.59
Hematite	Fe2O3	17.41	17.14	16.51
Maghemite	Fe2O3	7.12	7.04	6.61
Magnetite	Fe3O4	10.58	8.47	7.22
Manganite	MnOOH	1.76	3.46	3.70
Nsutite	MnO2	3.36	6.81	7.39
Pyrolusite	MnO2	4.32	7.37	7.53

Table 10 shows positive saturation indices for the mixing of Wemlinger WTP water with Denver Formation Well DE-1R water. In the vicinity of the well (ratio 80:20), 17 mineral phases are oversaturated, all aluminum, iron and manganese (oxyhydr)oxides.

Moving into the formation towards mixing ratios of 50:50 and 20:80, the saturation indices of the iron (oxyhydr)oxides generally increase, while the saturation indices of the manganese and aluminum (oxyhydr)oxides generally decrease. At a 20:80 mixing ratio of injection:formation water, the water is no longer oversaturated with alunite. However, at a mixing ratio of both 50:50 and 20:80, the water is slightly oversaturated with respect to barite.

Table 10: Positive saturation indices for mixing of Wemlinger WTP water with Denver Formation Well DE-1R water.

Phase	Formula	Injection:Formation Water Ratio		
		20:80	50:50	80:20
Alunite	KAl3(SO4)2(OH)6		0.60	0.22
Barite	BaSO4	0.06	0.02	
Basaluminite	Al4(OH)10SO4	2.33	3.68	3.59
Birnessite	MnO2	5.67	5.93	6.07
Bixbyite	Mn2O3	5.14	5.39	5.49
Boehmite	AlOOH	1.63	1.99	2.04
Diaspore	AlOOH	3.40	3.76	3.81
Fe(OH)2.7Cl.3	Fe(OH)2.7Cl.3	6.39	6.30	5.98
Ferric Hydroxide	$Fe(OH)3_{(am)}$	1.71	1.57	1.25
Gibbsite	Al(OH)3	2.21	2.57	2.62
Goethite	FeOOH	7.33	7.18	6.85
Hausmannite	Mn3O4	1.42	1.68	1.76
Hematite	Fe2O3	16.63	16.33	15.68
Maghemite	Fe2O3	6.81	6.53	5.89
Magnetite	Fe3O4	7.45	6.88	5.84
Manganite	MnOOH	3.06	3.21	3.27
Nsutite	MnO2	6.70	6.97	7.11
Pyrolusite	MnO2	6.67	6.90	7.00

5.0 Conclusions and Suggestions

The mixtures of the four WTP waters with Arapahoe Formation Well A-4 water are generally oversaturated with respect to iron and manganese (oxyhydr)oxides, mixed copper/iron minerals, barite, and in some cases with aluminum (oxyhydr)oxides. The mixtures of the four WTP waters with Denver Formation Well DE-1R water generally exhibit oversaturation with iron and manganese (oxyhydr)oxides as well as barite, and also in some cases with aluminum (oxyhydr)oxides. However, the concentrations of all respective precipitable cationic species are generally low (<0.5 mg/L). Furthermore, the simulations suggest that the mixtures are not oversaturated with carbonates. It is noted that no data regarding silica concentrations were available. Silica may in some cases have the potential to plug formations.

Simulating mixing close to the injection well (injection:formation water ratio of 80:20), in mid-range (50:50), and far from the injection well (20:80), only slight changes in saturation indices were observed.

As noted above, thermodynamic equilibria calculations only indicate the potential for a mineral phase to precipitate, but contain no information on kinetics. The results of this analysis are dependent upon the data provided and assumptions made. Bench-scale jar testing may be conducted to confirm the modeling.

Furthermore, it is noted that negative saturation indices indicate the potential for mineral dissolution and mobilization. However, rock-water interactions are not considered in this screening analysis.

Precipitation of mineral phases and their impact on aquifer or well screen clogging should be monitored on a regular basis. This may be achieved by (1) measuring injection pressures at steady injection flow rates, (2) measuring injection flow rates at steady injection pressures over time, and/or (3) well camera inspections.

Disclaimer

The intent of the screening analysis provided herein is to identify potential issues that might arise from mixing two waters. The analysis is constrained by the limitations of the data and the assumptions employed in the model. In no way should this analysis be viewed as providing certainty as to the issue that can arise or the impacts that they may have.

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Appendix - Complete List of Saturation Indices

Arapahoe A-4 Water

Phase	SI**	log IAP	log K(298 K, 1 atm)	
Anglesite	-5.90	-13.69	-7.79	PbSO4
Anhydrite	-2.90	-7.26	-4.36	CaSO4
Anilite	2.65	-29.20	-31.85	Cu0.25Cu1.5S
Antlerite	-18.48	-10.19	8.29	Cu3(OH)4SO4
Aragonite	-0.95	-9.28	-8.34	CaCO3
Artinite	-9.19	0.39	9.58	MgCO3:Mg(OH)2:3H2O
Azurite	-15.77	-12.05	3.73	Cu3(OH)2(CO3)2
BaF2	-8.87	-14.63	-5.76	BaF2
Barite	0.01	-9.96	-9.97	BaSO4
Birnessite	-24.04	19.56	43.60	MnO2
Bixbyite	-22.46	-23.08	-0.62	Mn2O3
BlaubleiI	-3.07	-27.23	-24.16	Cu0.9Cu0.2S
BlaubleiII	-0.86	-28.14	-27.28	Cu0.6Cu0.8S
Brochantite	-22.78	-7.44	15.34	Cu4(OH)6SO4
Brucite	-6.38	10.44	16.82	Mg(OH)2
Calcite	-0.80	-9.28	-8.48	CaCO3
Celestite	-2.80	-9.43	-6.63	SrSO4
Cerussite	-2.58	-15.71	-13.13	PbCO3
Chalcanthite	-13.07	-15.71	-2.64	CuSO4:5H2O
Chalcocite	4.63	-29.95	-34.58	Cu2S
Chalcopyrite	-12.57	-47.82	-35.24	CuFeS2
CO2(g)	-2.34	-3.81	-1.47	CO2
Covellite	-4.68	-26.93	-22.25	CuS
Cu(OH)2	-5.87	2.76	8.63	Cu(OH)2
Cu2SO4	-16.78	-18.73	-1.95	Cu2SO4
CuCO3	-8.10	-17.73	-9.63	CuCO3
CuF	-18.77	-11.70	7.07	CuF
CuF2	-19.75	-20.38	-0.63	CuF2
CuF2:2H2O	-15.83	-20.38	-4.55	CuF2:2H2O
CuMetal	3.01	-5.74	-8.75	Cu
CuOCuSO4	-24.46	-12.95	11.50	CuO:CuSO4
CupricFerrite	-0.30	5.55	5.85	CuFe2O4
Cuprite	1.28	-0.26	-1.55	Cu2O
CuprousFerrite	10.19	1.26	-8.92	CuFeO2
CuSO4	-18.70	-15.71	3.00	CuSO4
Djurleite	4.13	-29.75	-33.88	Cu0.066Cu1.868S
Dolomite	-2.23	-19.33	-17.10	CaMg(CO3)2
Dolomite(d)	-2.78	-19.33	-16.55	CaMg(CO3)2
Epsomite	-5.89	-8.03	-2.14	MgSO4:7H2O
Fe(OH)3(a)	-3.50	1.40	4.89	Fe(OH)3
Fe3(OH)8	-8.63	11.59	20.22	Fe3(OH)8
FeS(ppt)	-16.97	-20.89	-3.92	FeS
Fluorite	-1.34	-11.93	-10.60	CaF2
Galena	-12.14	-24.91	-12.77	PbS
Goethite	2.41	1.40	-1.01	FeOOH
Greigite	-62.12	-107.16	-45.03	Fe3S4
Gypsum	-2.68	-7.26	-4.58	CaSO4:2H2O
H2(g)	-11.22	-14.37	-3.15	H2
H2O(g)	-1.50	-0.00	1.50	H2O

H2S(g)	-21.75	-22.75	-1.00	H2S
Hausmannite	-24.71	36.24	60.96	Mn3O4
Hematite	6.82	2.79	-4.03	Fe2O3
Huntite	-9.44	-39.43	-29.99	CaMg3(CO3)4
Hydrocerussite	-9.18	-26.64	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-20.95	-29.75	-8.80	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-20.29	-30.12	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-20.27	-29.50	-9.23	KFe3(SO4)2(OH)6
Jarosite-Na	-23.05	-28.35	-5.31	NaFe3(SO4)2(OH)6
JarositeH	-27.31	-32.74	-5.43	(H3O)Fe3(SO4)2(OH)6
Langite	-24.20	-7.44	16.76	Cu4(OH)6SO4:H2O
Larnakite	-8.63	-8.91	-0.28	PbO:PbSO4
Litharge	-7.93	4.78	12.71	PbO
Mackinawite	-16.24	-20.89	-4.65	FeS
Maghemite	-3.59	2.79	6.39	Fe2O3
Magnesite	-2.01	-10.05	-8.03	MgCO3
Magnetite	7.89	11.59	3.70	Fe3O4
Malachite	-9.78	-4.64	5.14	Cu2(OH)2CO3
Manganite	-11.39	13.95	25.34	MnOOH
Massicot	-8.12	4.78	12.90	PbO
Melanterite	-7.46	-9.67	-2.21	FeSO4:7H2O
Minium	-48.06	25.55	73.61	Pb3O4
Mirabilite	-8.59	-9.69	-1.10	Na2SO4:10H2O
Mn2(SO4)3	-72.74	-78.47	-5.74	Mn2(SO4)3
MnS(Green)	-25.14	-21.35	3.80	MnS
MnSO4	-12.78	-10.12	2.66	MnSO4
Nahcolite	-5.22	-5.77	-0.55	NaHCO3
Natron	-10.41	-11.71	-1.30	Na2CO3:10H2O
Nesquehonite	-4.42	-10.05	-5.63	MgCO3:3H2O
NH3(g)	-8.73	-6.97	1.76	NH3
Nsutite	-23.00	19.56	42.56	MnO2
O2(g)	-60.65	-63.54	-2.89	O2
Pb(OH)2	-3.36	4.78	8.14	Pb(OH)2
Pb2O(OH)2	-16.65	9.55	26.20	PbO:Pb(OH)2
Pb2O3	-40.27	20.77	61.04	Pb2O3
Pb2OCO3	-10.42	-10.93	-0.51	PbO:PbCO3
Pb3O2CO3	-17.15	-6.15	11.00	PbCO3:2PbO
Pb3O2SO4	-14.52	-4.13	10.38	PbSO4:2PbO
Pb4(OH)6SO4	-20.46	0.64	21.10	Pb4(OH)6SO4
Pb4O3SO4	-21.43	0.64	22.07	PbSO4:3PbO
PbF2	-10.92	-18.36	-7.44	PbF2
PbMetal	-10.71	-6.44	4.27	Pb
PbO:0.3H2O	-8.20	4.78	12.98	PbO:0.33H2O
Plattnerite	-33.25	16.00	49.25	PbO2
Portlandite	-11.58	11.20	22.78	Ca(OH)2
Pyrite	-20.88	-39.35	-18.47	FeS2
Pyrochroite	-6.86	8.34	15.20	Mn(OH)2
Pyrolusite	-21.77	19.56	41.33	MnO2
Rhodochrosite	-1.01	-12.14	-11.13	MnCO3
Rhodochrosite(d)	-1.75	-12.14	-10.39	MnCO3
Siderite	-0.79	-11.69	-10.89	FeCO3
Siderite(d)(3)	-1.24	-11.69	-10.45	FeCO3
SrF2	-5.57	-14.10	-8.54	SrF2
Strontianite	-2.18	-11.45	-9.27	SrCO3
Sulfur	-16.36	-31.38	-15.02	S
Tenorite	-4.85	2.76	7.61	CuO
Thenardite	-9.51	-9.69	-0.18	Na2SO4

Thermonatrite	-11.83	-11.71	0.12	Na2CO3:H2O
Trona	-16.67	-17.48	-0.81	NaHCO3:Na2CO3:2H2O
Witherite	-3.42	-11.98	-8.56	BaCO3

Denver DE-1R Water

Phase	SI**	log IAP	log K(290 K, 1 atm)	
Anglesite	-5.58	-13.41	-7.83	PbSO4
Anhydrite	-2.95	-7.29	-4.34	CaSO4
Aragonite	-1.34	-9.63	-8.29	CaCO3
Artinite	-10.67	-0.54	10.13	MgCO3:Mg(OH)2:3H2O
BaF2	-8.92	-14.70	-5.78	BaF2
Barite	0.06	-10.03	-10.09	BaSO4
Birnessite	-25.36	18.24	43.60	MnO2
Bixbyite	-25.88	-26.21	-0.33	Mn2O3
Brucite	-7.49	9.84	17.34	Mg(OH)2
Calcite	-1.19	-9.63	-8.44	CaCO3
Celestite	-2.76	-9.39	-6.62	SrSO4
Cerussite	-2.53	-15.75	-13.22	PbCO3
CO2(g)	-2.06	-3.44	-1.38	CO2
Cotunnite	-13.34	-18.21	-4.87	PbCl2
Dolomite	-3.10	-20.02	-16.92	CaMg(CO3)2
Dolomite(d)	-3.68	-20.02	-16.34	CaMg(CO3)2
Epsomite	-5.86	-8.05	-2.19	MgSO4:7H2O
Fe(OH)2.7Cl.3	-0.33	-3.37	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	-4.85	0.04	4.89	Fe(OH)3
Fe3(OH)8	-12.27	7.95	20.22	Fe3(OH)8
FeS(ppt)	-14.18	-18.10	-3.92	FeS
Fluorite	-1.27	-11.96	-10.69	CaF2
Galena	-8.35	-21.48	-13.14	PbS
Goethite	0.77	0.04	-0.73	FeOOH
Greigite	-50.90	-95.93	-45.03	Fe3S4
Gypsum	-2.71	-7.29	-4.58	CaSO4:2H2O
H2(g)	-10.72	-13.84	-3.12	H2
H2O(g)	-1.70	-0.00	1.70	H2O
H2S(g)	-18.01	-18.93	-0.91	H2S
Halite	-8.54	-6.97	1.57	NaCl
Hausmannite	-29.60	33.28	62.88	Mn3O4
Hematite	3.52	0.08	-3.44	Fe2O3
Huntite	-11.30	-40.79	-29.49	CaMg3(CO3)4
Hydrocerussite	-9.54	-27.00	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-23.91	-31.71	-7.80	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-23.48	-33.31	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-24.14	-32.77	-8.63	KFe3(SO4)2(OH)6
Jarosite-Na	-26.69	-31.30	-4.61	NaFe3(SO4)2(OH)6
JarositeH	-31.30	-35.68	-4.38	(H3O)Fe3(SO4)2(OH)6
Larnakite	-8.76	-8.92	-0.16	PbO:PbSO4
Laurionite	-7.48	-6.86	0.62	PbOHCl
Litharge	-8.53	4.49	13.02	PbO
Mackinawite	-13.45	-18.10	-4.65	FeS
Maghemite	-6.31	0.08	6.39	Fe2O3
Magnesite	-2.47	-10.39	-7.92	MgCO3
Magnetite	3.29	7.95	4.67	Fe3O4
Manganite	-12.46	12.88	25.34	MnOOH

Massicot	-8.73	4.49	13.22	PbO
Matlockite	-8.57	-18.14	-9.58	PbClF
Melanterite	-7.72	-10.02	-2.30	FeSO4:7H2O
Minium	-51.40	24.18	75.58	Pb3O4
Mirabilite	-7.68	-9.14	-1.46	Na2SO4:10H2O
Mn2(SO4)3	-74.90	-79.89	-4.99	Mn2(SO4)3
MnCl2:4H2O	-17.57	-15.18	2.39	MnCl2:4H2O
MnS(Green)	-22.36	-18.45	3.91	MnS
MnSO4	-13.33	-10.37	2.95	MnSO4
Nahcolite	-4.84	-5.46	-0.62	NaHCO3
Natron	-9.88	-11.48	-1.60	Na2CO3:10H2O
Nesquehonite	-4.87	-10.39	-5.51	MgCO3:3H2O
Nsutite	-24.32	18.24	42.56	MnO2
O2(g)	-64.28	-67.12	-2.84	O2
Pb(BO2)2	-13.75	-6.03	7.72	Pb(BO2)2
Pb(OH)2	-3.92	4.49	8.41	Pb(OH)2
Pb2(OH)3Cl	-11.17	-2.38	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-17.23	8.97	26.20	PbO:Pb(OH)2
Pb2O3	-41.35	19.69	61.04	Pb2O3
Pb2OCO3	-10.97	-11.26	-0.29	PbO:PbCO3
Pb3O2CO3	-18.28	-6.77	11.51	PbCO3:2PbO
Pb3O2SO4	-15.22	-4.44	10.78	PbSO4:2PbO
Pb4(OH)6SO4	-21.05	0.05	21.10	Pb4(OH)6SO4
Pb4O3SO4	-22.69	0.05	22.75	PbSO4:3PbO
PbF2	-10.65	-18.07	-7.43	PbF2
PbMetal	-10.50	-6.23	4.26	Pb
PbO:0.3H2O	-8.49	4.49	12.98	PbO:0.33H2O
Phosgenite	-14.15	-33.96	-19.81	PbCl2:PbCO3
Plattnerite	-35.39	15.21	50.60	PbO2
Portlandite	-12.77	10.60	23.37	Ca(OH)2
Pyrite	-14.66	-33.35	-18.69	FeS2
Pyrochroite	-7.68	7.52	15.20	Mn(OH)2
Pyrolusite	-24.34	18.24	42.58	MnO2
Rhodochrosite	-1.61	-12.71	-11.10	MnCO3
Rhodochrosite(d)	-2.32	-12.71	-10.39	MnCO3
Siderite	-1.51	-12.36	-10.84	FeCO3
Siderite(d)(3)	-1.91	-12.36	-10.45	FeCO3
SrF2	-5.49	-14.05	-8.56	SrF2
Strontianite	-2.45	-11.72	-9.27	SrCO3
Sulfur	-13.22	-28.39	-15.17	S
Thenardite	-8.97	-9.14	-0.17	Na2SO4
Thermonatrite	-11.66	-11.48	0.18	Na2CO3:H2O
Trona	-16.47	-16.94	-0.46	NaHCO3:Na2CO3:2H2O
Witherite	-3.78	-12.37	-8.58	BaCO3

Binney WTP Injection Water

Phase	SI**	log IAP	log K(290 K,	1 atm)
Acanthite	-67.08	-104.21	-37.13	Ag2S
Ag2CO3	-10.57	-21.84	-11.26	Ag2CO3
Ag2O	-13.36	-0.57	12.79	Ag2O
Ag2SO4	-15.08	-20.08	-5.01	Ag2SO4
AgF:4H2O	-13.24	-12.77	0.46	AgF:4H2O

AgMetal	-1.15	-15.17	-14.02	Ag
Anhydrite	-2.22	-6.56	-4.34	CaSO4
Aragonite	-0.03	-8.32	-8.29	CaCO3
Artinite	-5.95	4.23	10.18	MgCO3:Mg(OH)2:3H2O
B-UO2(OH)2	-5.01	0.81	5.82	UO2(OH)2
BaF2	-9.83	-15.61	-5.78	BaF2
Barite	-0.04	-10.15	-10.11	BaSO4
Brucite	-4.64	12.75	17.39	Mg(OH)2
Calcite	0.12	-8.32	-8.44	CaCO3
Celestite	-2.33	-8.95	-6.62	SrSO4
Cerargyrite	-1.09	-11.15	-10.07	AgCl
CO2(g)	-3.09	-4.46	-1.37	CO2
Dolomite	0.07	-16.83	-16.90	CaMg(CO3)2
Dolomite(d)	-0.52	-16.83	-16.32	CaMg(CO3)2
Epsomite	-4.56	-6.76	-2.20	MgSO4:7H2O
Fluorite	-1.33	-12.03	-10.70	CaF2
Gummite	-10.06	0.81	10.87	UO3
Gypsum	-1.98	-6.56	-4.58	CaSO4:2H2O
H2(g)	-29.76	-32.87	-3.11	H2
H2O(g)	-1.72	-0.00	1.72	H2O
H2S(g)	-95.68	-96.58	-0.90	H2S
Halite	-7.25	-5.69	1.56	NaCl
Huntite	-4.42	-33.87	-29.45	CaMg3(CO3)4
Hydromagnesite	-13.61	-21.32	-7.71	Mg5(CO3)4(OH)2:4H2O
Magnesite	-0.61	-8.52	-7.90	MgCO3
Mirabilite	-7.66	-9.15	-1.50	Na2SO4:10H2O
Na4UO2(CO3)3	-25.98	-42.27	-16.29	Na4UO2(CO3)3
Nahcolite	-5.06	-5.68	-0.62	NaHCO3
Natron	-9.28	-10.91	-1.63	Na2CO3:10H2O
Nesquehonite	-3.01	-8.52	-5.50	MgCO3:3H2O
NH3(g)	-8.03	-6.09	1.94	NH3
O2(g)	-1.28	-4.11	-2.83	O2
Portlandite	-10.48	12.95	23.43	Ca(OH)2
Rutherfordine	-6.03	-20.45	-14.42	UO2CO3
Schoepite	-4.84	0.81	5.65	UO2(OH)2:H2O
SrF2	-5.85	-14.42	-8.57	SrF2
Strontianite	-1.44	-10.71	-9.27	SrCO3
Sulfur	-71.85	-87.04	-15.19	S
Thenardite	-8.99	-9.15	-0.17	Na2SO4
Thermonatrite	-11.09	-10.91	0.18	Na2CO3:H2O
Trona	-16.16	-16.59	-0.43	NaHCO3:Na2CO3:2H2O
U(OH)2SO4	-35.52	-38.72	-3.20	U(OH)2SO4
U3O8(c)	-20.99	1.88	22.87	U3O8
U4O9(c)	-45.75	-47.09	-1.34	U4O9
UF4(c)	-50.94	-69.16	-18.22	UF4
UF4:2.5H2O	-41.60	-69.16	-27.56	UF4:2.5H2O
UO2(a)	-19.31	-19.21	0.10	UO2
UO3(gamma)	-7.30	0.81	8.11	UO3
Uraninite(c)	-14.79	-19.21	-4.42	UO2
Witherite	-3.32	-11.90	-8.59	BaCO3

Griswold WTP Injection Water

Phase	SI**	log IAP	log K(290 K, 1 atm)	
Acanthite	-68.54	-105.66	-37.13	Ag2S
Ag2CO3	-11.12	-22.39	-11.26	Ag2CO3
Ag2O	-13.70	-0.91	12.79	Ag2O
Ag2SO4	-15.73	-20.74	-5.01	Ag2SO4
AgF:4H2O	-13.50	-13.04	0.46	AgF:4H2O
AgMetal	-1.41	-15.43	-14.02	Ag
Al(OH)3(a)	-1.66	9.67	11.34	Al(OH)3
AlumK	-20.65	-25.97	-5.32	KAl(SO4)2:12H2O
Alunite	-6.24	-6.62	-0.38	KAl3(SO4)2(OH)6
Anhydrite	-2.21	-6.55	-4.34	CaSO4
Aragonite	0.09	-8.20	-8.29	CaCO3
Artinite	-6.03	4.16	10.18	MgCO3:Mg(OH)2:3H2O
B-UO2(OH)2	-4.52	1.30	5.82	UO2(OH)2
BaF2	-9.62	-15.40	-5.78	BaF2
Barite	0.04	-10.07	-10.11	BaSO4
Basaluminite	-3.83	18.87	22.70	Al4(OH)10SO4
Boehmite	0.52	9.67	9.15	AlOOH
Brucite	-4.57	12.82	17.39	Mg(OH)2
Calcite	0.24	-8.20	-8.44	CaCO3
Celestite	-2.40	-9.02	-6.62	SrSO4
Cerargyrite	-1.54	-11.60	-10.07	AgCl
CO2(g)	-3.30	-4.67	-1.37	CO2
Diaspore	2.30	9.67	7.38	AlOOH
Dolomite	0.04	-16.86	-16.90	CaMg(CO3)2
Dolomite(d)	-0.54	-16.86	-16.32	CaMg(CO3)2
Epsomite	-4.82	-7.01	-2.20	MgSO4:7H2O
Fluorite	-1.19	-11.88	-10.70	CaF2
Gibbsite	1.10	9.67	8.57	Al(OH)3
Gummite	-9.57	1.30	10.87	UO3
Gypsum	-1.96	-6.55	-4.58	CaSO4:2H2O
H2(g)	-29.96	-33.07	-3.11	H2
H2O(g)	-1.72	-0.00	1.72	H2O
H2S(g)	-96.80	-97.70	-0.90	H2S
Halite	-7.42	-5.86	1.56	NaCl
Huntite	-4.74	-34.18	-29.45	CaMg3(CO3)4
Hydromagnesite	-14.13	-21.83	-7.71	Mg5(CO3)4(OH)2:4H2O
Jurbanite	-6.93	-10.16	-3.23	AlOHSO4
Magnesite	-0.76	-8.66	-7.90	MgCO3
Mirabilite	-7.75	-9.24	-1.50	Na2SO4:10H2O
Na4UO2(CO3)3	-25.68	-41.97	-16.29	Na4UO2(CO3)3
Nahcolite	-5.16	-5.78	-0.62	NaHCO3
Natron	-9.26	-10.89	-1.63	Na2CO3:10H2O
Nesquehonite	-3.16	-8.66	-5.50	MgCO3:3H2O
NH3(g)	-7.93	-5.99	1.94	NH3
O2(g)	-1.28	-4.11	-2.83	O2
Portlandite	-10.14	13.28	23.43	Ca(OH)2
Rutherfordine	-5.76	-20.18	-14.42	UO2CO3
Schoepite	-4.35	1.30	5.65	UO2(OH)2:H2O
SrF2	-5.79	-14.35	-8.57	SrF2
Strontianite	-1.40	-10.67	-9.27	SrCO3
Sulfur	-72.78	-87.96	-15.19	S
Thenardite	-9.08	-9.24	-0.17	Na2SO4

Thermonatrite	-11.07	-10.89	0.18	Na2CO3:H2O
Trona	-16.24	-16.67	-0.43	NaHCO3:Na2CO3:2H2O
U(OH)2SO4	-35.56	-38.76	-3.20	U(OH)2SO4
U3O8(c)	-19.73	3.14	22.87	U3O8
U4O9(c)	-44.40	-45.74	-1.34	U4O9
UF4(c)	-51.04	-69.26	-18.22	UF4
UF4:2.5H2O	-41.70	-69.26	-27.56	UF4:2.5H2O
UO2(a)	-19.03	-18.93	0.10	UO2
UO3(gamma)	-6.81	1.30	8.11	UO3
Uraninite(c)	-14.50	-18.93	-4.42	UO2
Witherite	-3.13	-11.72	-8.59	BaCO3

Quebec Street WTP Injection Water

Phase	SI**	log IAP	log K(290 K,	1 atm)
Anhydrite	-2.81	-7.15	-4.34	CaSO4
Aragonite	-0.00	-8.29	-8.29	CaCO3
Artinite	-7.17	3.01	10.18	MgCO3:Mg(OH)2:3H2O
BaF2	-9.04	-14.82	-5.78	BaF2
Barite	0.13	-9.98	-10.11	BaSO4
Brucite	-5.22	12.16	17.39	Mg(OH)2
Calcite	0.15	-8.29	-8.44	CaCO3
Celestite	-2.63	-9.25	-6.62	SrSO4
CO2(g)	-3.14	-4.51	-1.37	CO2
Dolomite	-0.55	-17.44	-16.90	CaMg(CO3)2
Dolomite(d)	-1.13	-17.44	-16.32	CaMg(CO3)2
Epsomite	-5.82	-8.02	-2.20	MgSO4:7H2O
Fluorite	-1.29	-11.99	-10.70	CaF2
Gypsum	-2.57	-7.15	-4.58	CaSO4:2H2O
H2(g)	-29.96	-33.07	-3.11	H2
H2O(g)	-1.72	-0.00	1.72	H2O
H2S(g)	-97.15	-98.05	-0.90	H2S
Halite	-8.57	-7.00	1.56	NaCl
Huntite	-6.31	-35.75	-29.45	CaMg3(CO3)4
Hydromagnesite	-16.75	-24.45	-7.71	Mg5(CO3)4(OH)2:4H2O
Magnesite	-1.25	-9.15	-7.90	MgCO3
Mirabilite	-8.20	-9.70	-1.50	Na2SO4:10H2O
Nahcolite	-5.05	-5.67	-0.62	NaHCO3
Natron	-9.21	-10.84	-1.63	Na2CO3:10H2O
Nesquehonite	-3.65	-9.15	-5.50	MgCO3:3H2O
O2(g)	-1.28	-4.11	-2.83	O2
Portlandite	-10.40	13.03	23.43	Ca(OH)2
SrF2	-5.52	-14.09	-8.57	SrF2
Strontianite	-1.11	-10.39	-9.27	SrCO3
Sulfur	-73.12	-88.31	-15.19	S
Thenardite	-9.53	-9.70	-0.17	Na2SO4
Thermonatrite	-11.02	-10.83	0.18	Na2CO3:H2O
Trona	-16.07	-16.51	-0.43	NaHCO3:Na2CO3:2H2O
Witherite	-2.53	-11.12	-8.59	BaCO3

Wemlinger WTP Injection Water

Phase	SI**	log IAP	log K(290 K, 1 atm)	
Al(OH)3(a)	-0.70	10.63	11.34	Al(OH)3
AlumK	-19.77	-25.08	-5.32	KAl(SO4)2:12H2O
Alunite	-3.43	-3.82	-0.38	KAl3(SO4)2(OH)6
Anhydrite	-2.48	-6.81	-4.34	CaSO4
Aragonite	-0.24	-8.52	-8.29	CaCO3
Artinite	-6.51	3.67	10.18	MgCO3:Mg(OH)2:3H2O
B-UO2(OH)2	-4.58	1.25	5.82	UO2(OH)2
BaF2	-9.68	-15.46	-5.78	BaF2
Barite	-0.19	-10.29	-10.11	BaSO4
Basaluminite	0.08	22.78	22.70	Al4(OH)10SO4
Boehmite	1.48	10.63	9.15	AlOOH
Brucite	-4.82	12.57	17.39	Mg(OH)2
Calcite	-0.09	-8.52	-8.44	CaCO3
Celestite	-2.63	-9.25	-6.62	SrSO4
CO2(g)	-3.28	-4.65	-1.37	CO2
Diaspore	3.25	10.63	7.38	AlOOH
Dolomite	-0.52	-17.42	-16.90	CaMg(CO3)2
Dolomite(d)	-1.10	-17.42	-16.32	CaMg(CO3)2
Epsomite	-4.98	-7.18	-2.20	MgSO4:7H2O
Fluorite	-1.28	-11.98	-10.70	CaF2
Gibbsite	2.06	10.63	8.57	Al(OH)3
Gummite	-9.62	1.25	10.87	UO3
Gypsum	-2.23	-6.81	-4.58	CaSO4:2H2O
H2(g)	-29.76	-32.87	-3.11	H2
H2O(g)	-1.72	-0.00	1.72	H2O
H2S(g)	-95.91	-96.82	-0.90	H2S
Halite	-7.83	-6.26	1.56	NaCl
Huntite	-5.75	-35.20	-29.45	CaMg3(CO3)4
Hydromagnesite	-15.29	-23.00	-7.71	Mg5(CO3)4(OH)2:4H2O
Jurbanite	-5.88	-9.11	-3.23	AlOHSO4
Magnesite	-0.99	-8.89	-7.90	MgCO3
Mirabilite	-8.28	-9.77	-1.50	Na2SO4:10H2O
Na4UO2(CO3)3	-26.89	-43.18	-16.29	Na4UO2(CO3)3
Nahcolite	-5.44	-6.06	-0.62	NaHCO3
Natron	-9.86	-11.48	-1.63	Na2CO3:10H2O
Nesquehonite	-3.39	-8.89	-5.50	MgCO3:3H2O
NH3(g)	-8.06	-6.13	1.94	NH3
O2(g)	-1.28	-4.11	-2.83	O2
Portlandite	-10.49	12.93	23.43	Ca(OH)2
Rutherfordine	-5.79	-20.21	-14.42	UO2CO3
Schoepite	-4.40	1.25	5.65	UO2(OH)2:H2O
SrF2	-5.85	-14.42	-8.57	SrF2
Strontianite	-1.69	-10.96	-9.27	SrCO3
Sulfur	-72.09	-87.28	-15.19	S
Thenardite	-9.61	-9.77	-0.17	Na2SO4
Thermonatrite	-11.67	-11.48	0.18	Na2CO3:H2O
Trona	-17.12	-17.55	-0.43	NaHCO3:Na2CO3:2H2O
U(OH)2SO4	-35.32	-38.52	-3.20	U(OH)2SO4
U3O8(c)	-19.69	3.18	22.87	U3O8
U4O9(c)	-44.02	-45.36	-1.34	U4O9
UF4(c)	-50.39	-68.61	-18.22	UF4
UF4:2.5H2O	-41.05	-68.61	-27.56	UF4:2.5H2O

UO2(a)	-18.88	-18.78	0.10	UO2
UO3(gamma)	-6.86	1.25	8.11	UO3
Uraninite(c)	-14.36	-18.78	-4.42	UO2
Witherite	-3.42	-12.01	-8.59	BaCO3

20 : 80 Mix of Binney Injection Water : Arapahoe Formation Water

Phase	SI**	log IAP	log K(296 K, 1 atm)	
Acanthite	-102.24	-138.47	-36.23	Ag2S
Ag2CO3	-11.92	-23.03	-11.10	Ag2CO3
Ag2O	-15.11	-2.50	12.62	Ag2O
Ag2SO4	-15.93	-20.86	-4.93	Ag2SO4
AgF:4H2O	-13.42	-12.89	0.54	AgF:4H2O
AgMetal	-6.59	-20.19	-13.59	Ag
Anglesite	-5.84	-13.64	-7.80	PbSO4
Anhydrite	-2.68	-7.03	-4.36	CaSO4
Anilite	-117.99	-150.02	-32.02	Cu0.25Cu1.5S
Antlerite	-9.02	-0.73	8.29	Cu3(OH)4SO4
Aragonite	-0.87	-9.20	-8.33	CaCO3
Artinite	-8.59	1.10	9.70	MgCO3:Mg(OH)2:3H2O
Atacamite	-6.45	0.95	7.40	Cu2(OH)3Cl
Azurite	-6.59	-2.74	3.85	Cu3(OH)2(CO3)2
B-UO2(OH)2	-5.10	0.49	5.59	UO2(OH)2
BaF2	-9.00	-14.77	-5.76	BaF2
Barite	0.14	-9.86	-9.99	BaSO4
Birnessite	2.60	46.20	43.60	MnO2
Bixbyite	3.89	3.33	-0.56	Mn2O3
BlaubleiI	-108.59	-132.75	-24.16	Cu0.9Cu0.2S
BlaubleiII	-113.44	-140.72	-27.28	Cu0.6Cu0.8S
Brochantite	-10.19	5.15	15.34	Cu4(OH)6SO4
Brucite	-6.11	10.82	16.93	Mg(OH)2
Calcite	-0.72	-9.20	-8.47	CaCO3
Celestite	-2.63	-9.26	-6.63	SrSO4
Cerargyrite	-2.25	-12.05	-9.80	AgCl
Cerussite	-2.66	-15.80	-13.15	PbCO3
CH4(g)	-127.91	-130.76	-2.85	CH4
Chalcanthite	-9.84	-12.49	-2.64	CuSO4:5H2O
Chalcocite	-121.87	-156.66	-34.78	Cu2S
Chalcopyrite	-229.80	-265.19	-35.39	CuFeS2
CO2(g)	-2.38	-3.83	-1.45	CO2
Cotunnite	-12.10	-16.89	-4.79	PbCl2
Covellite	-107.74	-130.09	-22.35	CuS
Cu(OH)2	-2.81	5.88	8.69	Cu(OH)2
Cu2(OH)3NO3	-9.61	-0.31	9.30	Cu2(OH)3NO3
Cu2SO4	-37.12	-39.05	-1.93	Cu2SO4
CuCO3	-5.02	-14.65	-9.63	CuCO3
CuF	-29.10	-21.98	7.12	CuF
CuF2	-16.82	-17.40	-0.58	CuF2
CuF2:2H2O	-12.86	-17.40	-4.54	CuF2:2H2O
CuMetal	-20.47	-29.28	-8.82	Cu
CuOCuSO4	-18.26	-6.61	11.65	CuO:CuSO4
CupricFerrite	13.40	19.41	6.01	CuFe2O4
Cuprite	-19.12	-20.69	-1.57	Cu2O
CuprousFerrite	5.33	-3.58	-8.91	CuFeO2

CuSO4	-15.56	-12.49	3.07	CuSO4
Djurleite	-120.82	-154.91	-34.08	Cu0.066Cu1.868S
Dolomite	-1.85	-18.91	-17.06	CaMg(CO3)2
Dolomite(d)	-2.41	-18.91	-16.50	CaMg(CO3)2
Epsomite	-5.40	-7.55	-2.15	MgSO4:7H2O
Fe(OH)2.7Cl.3	6.56	3.52	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.87	6.76	4.89	Fe(OH)3
Fe3(OH)8	-5.82	14.40	20.22	Fe3(OH)8
FeS(ppt)	-131.18	-135.09	-3.92	FeS
Fluorite	-1.33	-11.94	-10.62	CaF2
Galena	-118.40	-131.24	-12.85	PbS
Goethite	7.71	6.76	-0.95	FeOOH
Greigite	-484.45	-529.48	-45.03	Fe3S4
Gummite	-9.99	0.49	10.48	UO3
Gypsum	-2.45	-7.03	-4.58	CaSO4:2H2O
H2(g)	-37.88	-41.02	-3.14	H2
H2O(g)	-1.55	-0.00	1.55	H2O
H2S(g)	-128.03	-129.01	-0.98	H2S
Halite	-7.95	-6.37	1.58	NaCl
Hausmannite	1.48	62.85	61.37	Mn3O4
Hematite	17.43	13.53	-3.90	Fe2O3
Huntite	-8.45	-38.34	-29.88	CaMg3(CO3)4
Hydrocerussite	-9.42	-26.88	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-19.45	-28.04	-8.59	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-3.96	-13.79	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-4.06	-13.17	-9.10	KFe3(SO4)2(OH)6
Jarosite-Na	-6.85	-12.01	-5.16	NaFe3(SO4)2(OH)6
JarositeH	-11.24	-16.44	-5.20	(H3O)Fe3(SO4)2(OH)6
Langite	-11.77	5.15	16.92	Cu4(OH)6SO4:H2O
Larnakite	-8.65	-8.91	-0.26	PbO:PbSO4
Laurionite	-6.70	-6.08	0.62	PbOHCl
Litharge	-8.05	4.73	12.78	PbO
Mackinawite	-130.45	-135.09	-4.65	FeS
Maghemite	7.14	13.53	6.39	Fe2O3
Magnesite	-1.71	-9.71	-8.01	MgCO3
Magnetite	10.50	14.40	3.91	Fe3O4
Malachite	-3.64	1.57	5.22	Cu2(OH)2CO3
Manganite	1.92	27.26	25.34	MnOOH
Massicot	-8.24	4.73	12.97	PbO
Matlockite	-8.26	-17.72	-9.46	PbClF
Melanothallite	-19.50	-15.73	3.77	CuCl2
Melanterite	-15.26	-17.49	-2.23	FeSO4:7H2O
Minium	-21.98	52.06	74.04	Pb3O4
Mirabilite	-8.32	-9.50	-1.18	Na2SO4:10H2O
Mn2(SO4)3	-46.19	-51.77	-5.58	Mn2(SO4)3
MnCl2:4H2O	-15.94	-13.29	2.65	MnCl2:4H2O
MnS(Green)	-131.47	-127.65	3.82	MnS
MnSO4	-12.76	-10.04	2.72	MnSO4
N2(g)	-2.14	-5.40	-3.26	N2
Na4UO2(CO3)3	-27.06	-43.35	-16.29	Na4UO2(CO3)3
Nahcolite	-5.19	-5.75	-0.56	NaHCO3
Nantokite	-14.36	-21.15	-6.79	CuCl
Natron	-10.30	-11.66	-1.36	Na2CO3:10H2O
Nesquehonite	-4.11	-9.71	-5.60	MgCO3:3H2O
NH3(g)	-54.96	-53.16	1.80	NH3
Nsutite	3.64	46.20	42.56	MnO2
O2(g)	-7.90	-10.78	-2.88	O2

Pb(BO2)2	-14.57	-6.94	7.63	Pb(BO2)2
Pb(OH)2	-3.47	4.73	8.20	Pb(OH)2
Pb2(OH)3Cl	-10.14	-1.35	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-16.74	9.46	26.20	PbO:Pb(OH)2
Pb2O3	-13.71	47.33	61.04	Pb2O3
Pb2OCO3	-10.61	-11.07	-0.46	PbO:PbCO3
Pb3O2CO3	-17.46	-6.35	11.11	PbCO3:2PbO
Pb3O2SO4	-14.65	-4.18	10.47	PbSO4:2PbO
Pb4(OH)6SO4	-20.56	0.54	21.10	Pb4(OH)6SO4
Pb4O3SO4	-21.67	0.54	22.22	PbSO4:3PbO
PbF2	-11.11	-18.55	-7.44	PbF2
PbMetal	-37.42	-33.15	4.27	Pb
PbO:0.3H2O	-8.25	4.73	12.98	PbO:0.33H2O
Phosgenite	-12.88	-32.69	-19.81	PbCl2:PbCO3
Plattnerite	-6.93	42.60	49.54	PbO2
Portlandite	-11.57	11.33	22.90	Ca(OH)2
Pyrite	-214.67	-233.19	-18.52	FeS2
Pyrochroite	-6.88	8.32	15.20	Mn(OH)2
Pyrolusite	4.60	46.20	41.60	MnO2
Rhodochrosite	-1.08	-12.21	-11.13	MnCO3
Rhodochrosite(d)	-1.82	-12.21	-10.39	MnCO3
Rutherfordine	-5.59	-20.03	-14.45	UO2CO3
Schoepite	-4.95	0.49	5.44	UO2(OH)2:H2O
Siderite	-8.77	-19.65	-10.88	FeCO3
Siderite(d)(3)	-9.20	-19.65	-10.45	FeCO3
SrF2	-5.62	-14.17	-8.54	SrF2
Strontianite	-2.15	-11.42	-9.27	SrCO3
Sulfur	-96.00	-111.05	-15.05	S
Tenorite	-1.79	5.88	7.67	CuO
Thenardite	-9.32	-9.50	-0.18	Na2SO4
Thermonatrite	-11.79	-11.66	0.13	Na2CO3:H2O
Trona	-16.68	-17.41	-0.73	NaHCO3:Na2CO3:2H2O
U(OH)2SO4	-43.39	-46.59	-3.20	U(OH)2SO4
U3O8(c)	-29.85	-8.93	20.92	U3O8
U4O9(c)	-71.99	-75.03	-3.04	U4O9
UF4(c)	-56.24	-74.78	-18.54	UF4
UF4:2.5H2O	-47.21	-74.78	-27.57	UF4:2.5H2O
UO2(a)	-28.33	-28.23	0.10	UO2
UO3(gamma)	-7.29	0.49	7.78	UO3
Uraninite(c)	-23.49	-28.23	-4.74	UO2
Witherite	-3.46	-12.02	-8.56	BaCO3

50 : 50 Mix of Binney Injection Water : Arapahoe Formation Water

Phase	SI**	log IAP	log K(294 K, 1 atm)	
Acanthite	-113.79	-150.35	-36.56	Ag2S
Ag2CO3	-11.38	-22.54	-11.16	Ag2CO3
Ag2O	-14.57	-1.89	12.68	Ag2O
Ag2SO4	-15.38	-20.34	-4.96	Ag2SO4
AgF:4H2O	-13.26	-12.75	0.51	AgF:4H2O
AgMetal	-7.73	-21.48	-13.75	Ag
Anglesite	-5.98	-13.79	-7.81	PbSO4
Anhydrite	-2.46	-6.81	-4.35	CaSO4
Anilite	-132.87	-165.16	-32.30	Cu0.25Cu1.5S
Antlerite	-9.51	-1.22	8.29	Cu3(OH)4SO4

Aragonite	-0.70	-9.01	-8.31	CaCO3
Artinite	-7.93	1.94	9.88	MgCO3:Mg(OH)2:3H2O
Atacamite	-6.58	0.94	7.52	Cu2(OH)3Cl
Azurite	-7.40	-3.35	4.05	Cu3(OH)2(CO3)2
B-UO2(OH)2	-4.82	0.85	5.68	UO2(OH)2
BaF2	-9.24	-15.01	-5.77	BaF2
Barite	0.19	-9.85	-10.03	BaSO4
Birnessite	5.82	49.42	43.60	MnO2
Bixbyite	6.72	6.25	-0.46	Mn2O3
BlaubleiI	-121.55	-145.71	-24.16	Cu0.9Cu0.2S
BlaubleiII	-127.41	-154.69	-27.28	Cu0.6Cu0.8S
Brochantite	-10.82	4.52	15.34	Cu4(OH)6SO4
Brucite	-5.80	11.30	17.10	Mg(OH)2
Calcite	-0.55	-9.01	-8.46	CaCO3
Celestite	-2.48	-9.10	-6.62	SrSO4
Cerargyrite	-1.59	-11.49	-9.90	AgCl
Cerussite	-2.82	-16.00	-13.18	PbCO3
CH4(g)	-140.46	-143.29	-2.83	CH4
Chalcanthite	-10.05	-12.71	-2.65	CuSO4:5H2O
Chalcocite	-137.55	-172.64	-35.09	Cu2S
Chalcopyrite	-256.26	-291.87	-35.61	CuFeS2
CO2(g)	-2.49	-3.91	-1.42	CO2
Cotunnite	-11.60	-16.43	-4.82	PbCl2
Covellite	-120.22	-142.72	-22.50	CuS
Cu(OH)2	-3.04	5.74	8.79	Cu(OH)2
Cu2(OH)3NO3	-9.69	-0.28	9.41	Cu2(OH)3NO3
Cu2SO4	-40.72	-42.63	-1.91	Cu2SO4
CuCO3	-5.28	-14.91	-9.63	CuCO3
CuF	-31.09	-23.89	7.20	CuF
CuF2	-17.37	-17.86	-0.49	CuF2
CuF2:2H2O	-13.35	-17.87	-4.52	CuF2:2H2O
CuMetal	-23.70	-32.63	-8.92	Cu
CuOCuSO4	-18.83	-6.96	11.87	CuO:CuSO4
CupricFerrite	12.96	19.21	6.25	CuFe2O4
Cuprite	-22.57	-24.18	-1.61	Cu2O
CuprousFerrite	3.53	-5.36	-8.88	CuFeO2
CuSO4	-15.89	-12.71	3.18	CuSO4
Djurleite	-136.29	-170.67	-34.38	Cu0.066Cu1.868S
Dolomite	-1.37	-18.37	-17.00	CaMg(CO3)2
Dolomite(d)	-1.93	-18.37	-16.43	CaMg(CO3)2
Epsomite	-4.98	-7.15	-2.17	MgSO4:7H2O
Fe(OH)2.7Cl.3	6.61	3.57	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.84	6.73	4.89	Fe(OH)3
Fe3(OH)8	-7.45	12.77	20.22	Fe3(OH)8
FeS(ppt)	-145.24	-149.15	-3.92	FeS
Fluorite	-1.32	-11.97	-10.65	CaF2
Galena	-130.84	-143.81	-12.97	PbS
Goethite	7.59	6.73	-0.86	FeOOH
Greigite	-536.04	-581.07	-45.03	Fe3S4
Gummite	-9.77	0.85	10.62	UO3
Gypsum	-2.23	-6.81	-4.58	CaSO4:2H2O
H2(g)	-41.07	-44.21	-3.13	H2
H2O(g)	-1.61	-0.00	1.61	H2O
H2S(g)	-140.51	-141.47	-0.95	H2S
Halite	-7.55	-5.98	1.57	NaCl
Hausmannite	4.12	66.12	62.00	Mn3O4
Hematite	17.18	13.46	-3.71	Fe2O3

Huntite	-7.36	-37.08	-29.72	CaMg3(CO3)4
Hydrocerussite	-9.88	-27.34	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-17.86	-26.12	-8.26	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-4.11	-13.94	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-4.39	-13.30	-8.91	KFe3(SO4)2(OH)6
Jarosite-Na	-7.20	-12.14	-4.93	NaFe3(SO4)2(OH)6
JarositeH	-11.84	-16.70	-4.86	(H3O)Fe3(SO4)2(OH)6
Langite	-12.65	4.52	17.17	Cu4(OH)6SO4:H2O
Larnakite	-8.92	-9.14	-0.22	PbO:PbSO4
Laurionite	-6.51	-5.89	0.62	PbOHCl
Litharge	-8.22	4.65	12.88	PbO
Mackinawite	-144.50	-149.15	-4.65	FeS
Maghemite	7.08	13.46	6.39	Fe2O3
Magnesite	-1.39	-9.36	-7.97	MgCO3
Magnetite	8.55	12.77	4.22	Fe3O4
Malachite	-4.14	1.19	5.34	Cu2(OH)2CO3
Manganite	3.54	28.88	25.34	MnOOH
Massicot	-8.42	4.65	13.07	PbO
Matlockite	-8.18	-17.69	-9.51	PbClF
Melanothallite	-19.19	-15.34	3.85	CuCl2
Melanterite	-16.88	-19.14	-2.26	FeSO4:7H2O
Minium	-19.64	55.04	74.68	Pb3O4
Mirabilite	-8.03	-9.33	-1.30	Na2SO4:10H2O
Mn2(SO4)3	-43.75	-49.09	-5.34	Mn2(SO4)3
MnCl2:4H2O	-15.28	-12.73	2.54	MnCl2:4H2O
MnS(Green)	-143.97	-140.11	3.86	MnS
MnSO4	-12.92	-10.10	2.82	MnSO4
N2(g)	-15.57	-18.82	-3.25	N2
Na4UO2(CO3)3	-26.57	-42.86	-16.29	Na4UO2(CO3)3
Nahcolite	-5.14	-5.73	-0.58	NaHCO3
Nantokite	-15.78	-22.63	-6.86	CuCl
Natron	-10.07	-11.53	-1.46	Na2CO3:10H2O
Nesquehonite	-3.79	-9.36	-5.57	MgCO3:3H2O
NH3(g)	-66.40	-64.55	1.85	NH3
Nsutite	6.86	49.42	42.56	MnO2
O2(g)	-2.36	-5.23	-2.86	O2
Pb(BO2)2	-13.89	-6.22	7.67	Pb(BO2)2
Pb(OH)2	-3.63	4.65	8.28	Pb(OH)2
Pb2(OH)3Cl	-10.03	-1.23	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-16.89	9.31	26.20	PbO:Pb(OH)2
Pb2O3	-10.66	50.38	61.04	Pb2O3
Pb2OCO3	-10.95	-11.34	-0.39	PbO:PbCO3
Pb3O2CO3	-17.96	-6.69	11.27	PbCO3:2PbO
Pb3O2SO4	-15.08	-4.48	10.60	PbSO4:2PbO
Pb4(OH)6SO4	-20.93	0.17	21.10	Pb4(OH)6SO4
Pb4O3SO4	-22.26	0.17	22.44	PbSO4:3PbO
PbF2	-11.52	-18.95	-7.43	PbF2
PbMetal	-40.68	-36.42	4.27	Pb
PbO:0.3H2O	-8.33	4.65	12.98	PbO:0.33H2O
Phosgenite	-12.62	-32.43	-19.81	PbCl2:PbCO3
Plattnerite	-4.25	45.73	49.98	PbO2
Portlandite	-11.46	11.64	23.10	Ca(OH)2
Pyrite	-237.95	-256.54	-18.59	FeS2
Pyrochroite	-6.85	8.35	15.20	Mn(OH)2
Pyrolusite	7.42	49.42	42.00	MnO2
Rhodochrosite	-1.19	-12.30	-11.12	MnCO3
Rhodochrosite(d)	-1.91	-12.30	-10.39	MnCO3

Rutherfordine	-5.36	-19.80	-14.44	UO2CO3
Schoepite	-4.67	0.85	5.52	UO2(OH)2:H2O
Siderite	-10.48	-21.34	-10.87	FeCO3
Siderite(d)(3)	-10.89	-21.34	-10.45	FeCO3
SrF2	-5.71	-14.26	-8.55	SrF2
Strontianite	-2.04	-11.31	-9.27	SrCO3
Sulfur	-105.32	-120.42	-15.10	S
Tenorite	-2.02	5.74	7.77	CuO
Thenardite	-9.15	-9.33	-0.17	Na2SO4
Thermonatrite	-11.68	-11.53	0.15	Na2CO3:H2O
Trona	-16.64	-17.26	-0.62	NaHCO3:Na2CO3:2H2O
U(OH)2SO4	-46.10	-49.30	-3.20	U(OH)2SO4
U3O8(c)	-32.05	-10.41	21.64	U3O8
U4O9(c)	-79.92	-82.33	-2.41	U4O9
UF4(c)	-59.64	-78.06	-18.42	UF4
UF4:2.5H2O	-50.50	-78.06	-27.56	UF4:2.5H2O
UO2(a)	-30.95	-30.85	0.10	UO2
UO3(gamma)	-7.05	0.85	7.90	UO3
Uraninite(c)	-26.23	-30.85	-4.62	UO2
Witherite	-3.48	-12.05	-8.57	BaCO3

80 : 20 Mix of Binney Injection Water : Arapahoe Formation Water

Phase	SI**	log IAP	log K(291 K,	1 atm)
Acanthite	-115.72	-152.62	-36.90	Ag2S
Ag2CO3	-11.07	-22.29	-11.22	Ag2CO3
Ag2O	-14.20	-1.46	12.75	Ag2O
Ag2SO4	-15.16	-20.15	-4.99	Ag2SO4
AgF:4H2O	-13.23	-12.75	0.48	AgF:4H2O
AgMetal	-7.71	-21.62	-13.91	Ag
Anglesite	-6.42	-14.25	-7.82	PbSO4
Anhydrite	-2.31	-6.65	-4.34	CaSO4
Anilite	-136.41	-168.99	-32.57	Cu0.25Cu1.5S
Antlerite	-10.73	-2.44	8.29	Cu3(OH)4SO4
Aragonite	-0.49	-8.79	-8.30	CaCO3
Artinite	-7.29	2.77	10.06	MgCO3:Mg(OH)2:3H2O
Atacamite	-7.33	0.31	7.64	Cu2(OH)3Cl
Azurite	-8.88	-4.63	4.24	Cu3(OH)2(CO3)2
B-UO2(OH)2	-4.78	0.98	5.76	UO2(OH)2
BaF2	-9.54	-15.31	-5.78	BaF2
Barite	0.11	-9.96	-10.08	BaSO4
Birnessite	6.46	50.06	43.60	MnO2
Bixbyite	6.87	6.50	-0.37	Mn2O3
BlaubleiI	-124.69	-148.85	-24.16	Cu0.9Cu0.2S
BlaubleiII	-130.86	-158.14	-27.28	Cu0.6Cu0.8S
Brochantite	-12.37	2.97	15.34	Cu4(OH)6SO4
Brucite	-5.47	11.80	17.27	Mg(OH)2
Calcite	-0.34	-8.79	-8.45	CaCO3
Celestite	-2.38	-9.00	-6.62	SrSO4
Cerargyrite	-1.25	-11.25	-10.00	AgCl
Cerussite	-3.18	-16.39	-13.21	PbCO3
CH4(g)	-143.11	-145.92	-2.81	CH4
Chalcanthite	-10.61	-13.28	-2.66	CuSO4:5H2O
Chalcocite	-141.33	-176.73	-35.40	Cu2S
Chalcopyrite	-262.28	-298.12	-35.84	CuFeS2

CO2(g)	-2.66	-4.05	-1.39	CO2
Cotunnite	-11.74	-16.60	-4.86	PbCl2
Covellite	-123.10	-145.75	-22.65	CuS
Cu(OH)2	-3.47	5.42	8.88	Cu(OH)2
Cu2(OH)3NO3	-10.46	-0.94	9.52	Cu2(OH)3NO3
Cu2SO4	-42.38	-44.26	-1.88	Cu2SO4
CuCO3	-5.78	-15.41	-9.63	CuCO3
CuF	-32.08	-24.80	7.28	CuF
CuF2	-18.22	-18.63	-0.41	CuF2
CuF2:2H2O	-14.14	-18.63	-4.49	CuF2:2H2O
CuMetal	-24.64	-33.67	-9.03	Cu
CuOCuSO4	-19.96	-7.86	12.10	CuO:CuSO4
CupricFerrite	11.95	18.45	6.50	CuFe2O4
Cuprite	-23.91	-25.56	-1.65	Cu2O
CuprousFerrite	2.59	-6.26	-8.86	CuFeO2
CuSO4	-16.57	-13.28	3.30	CuSO4
Djurleite	-140.00	-174.69	-34.68	Cu0.066Cu1.868S
Dolomite	-0.88	-17.82	-16.94	CaMg(CO3)2
Dolomite(d)	-1.45	-17.82	-16.36	CaMg(CO3)2
Epsomite	-4.71	-6.89	-2.18	MgSO4:7H2O
Fe(OH)2.7Cl.3	6.40	3.36	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.63	6.52	4.89	Fe(OH)3
Fe3(OH)8	-8.39	11.83	20.22	Fe3(OH)8
FeS(ppt)	-148.45	-152.37	-3.92	FeS
Fluorite	-1.32	-12.00	-10.68	CaF2
Galena	-133.64	-146.72	-13.09	PbS
Goethite	7.29	6.52	-0.77	FeOOH
Greigite	-547.80	-592.84	-45.03	Fe3S4
Gummite	-9.79	0.98	10.77	UO3
Gypsum	-2.06	-6.65	-4.58	CaSO4:2H2O
H2(g)	-41.78	-44.91	-3.12	H2
H2O(g)	-1.68	-0.00	1.68	H2O
H2S(g)	-143.21	-144.14	-0.92	H2S
Halite	-7.35	-5.78	1.57	NaCl
Hausmannite	3.99	66.62	62.63	Mn3O4
Hematite	16.55	13.03	-3.52	Fe2O3
Huntite	-6.32	-35.88	-29.56	CaMg3(CO3)4
Hydrocerussite	-10.87	-28.33	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-16.39	-24.32	-7.93	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-5.11	-14.94	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-5.55	-14.27	-8.71	KFe3(SO4)2(OH)6
Jarosite-Na	-8.39	-13.09	-4.70	NaFe3(SO4)2(OH)6
JarositeH	-13.32	-17.83	-4.51	(H3O)Fe3(SO4)2(OH)6
Langite	-14.45	2.97	17.42	Cu4(OH)6SO4:H2O
Larnakite	-9.63	-9.81	-0.18	PbO:PbSO4
Laurionite	-6.70	-6.08	0.62	PbOHCl
Litharge	-8.54	4.44	12.98	PbO
Mackinawite	-147.72	-152.37	-4.65	FeS
Maghemite	6.65	13.03	6.39	Fe2O3
Magnesite	-1.10	-9.03	-7.93	MgCO3
Magnetite	7.29	11.83	4.54	Fe3O4
Malachite	-5.07	0.39	5.46	Cu2(OH)2CO3
Manganite	3.83	29.17	25.34	MnOOH
Massicot	-8.73	4.44	13.18	PbO
Matlockite	-8.54	-18.10	-9.56	PbClF
Melanothallite	-19.55	-15.63	3.93	CuCl2
Melanterite	-17.60	-19.89	-2.29	FeSO4:7H2O

Minium	-20.21	55.11	75.33	Pb3O4
Mirabilite	-7.80	-9.21	-1.42	Na2SO4:10H2O
Mn2(SO4)3	-44.49	-49.58	-5.09	Mn2(SO4)3
MnCl2:4H2O	-15.20	-12.77	2.43	MnCl2:4H2O
MnS(Green)	-146.78	-142.89	3.89	MnS
MnSO4	-13.33	-10.41	2.92	MnSO4
N2(g)	-17.18	-20.42	-3.24	N2
Na4UO2(CO3)3	-26.27	-42.56	-16.29	Na4UO2(CO3)3
Nahcolite	-5.09	-5.70	-0.61	NaHCO3
Nantokite	-16.38	-23.30	-6.92	CuCl
Natron	-9.79	-11.35	-1.56	Na2CO3:10H2O
Nesquehonite	-3.50	-9.03	-5.53	MgCO3:3H2O
NH3(g)	-68.20	-66.30	1.90	NH3
Nsutite	7.50	50.06	42.56	MnO2
O2(g)	-1.82	-4.66	-2.84	O2
Pb(BO2)2	-13.73	-6.03	7.70	Pb(BO2)2
Pb(OH)2	-3.93	4.44	8.37	Pb(OH)2
Pb2(OH)3Cl	-10.43	-1.64	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-17.31	8.89	26.20	PbO:Pb(OH)2
Pb2O3	-10.37	50.67	61.04	Pb2O3
Pb2OCO3	-11.63	-11.94	-0.32	PbO:PbCO3
Pb3O2CO3	-18.94	-7.50	11.44	PbCO3:2PbO
Pb3O2SO4	-16.09	-5.36	10.73	PbSO4:2PbO
Pb4(OH)6SO4	-22.02	-0.92	21.10	Pb4(OH)6SO4
Pb4O3SO4	-23.58	-0.92	22.66	PbSO4:3PbO
PbF2	-12.17	-19.60	-7.43	PbF2
PbMetal	-41.60	-37.34	4.26	Pb
PbO:0.3H2O	-8.54	4.44	12.98	PbO:0.33H2O
Phosgenite	-13.18	-32.99	-19.81	PbCl2:PbCO3
Plattnerite	-4.20	46.23	50.43	PbO2
Portlandite	-11.25	12.05	23.29	Ca(OH)2
Pyrite	-243.09	-261.75	-18.66	FeS2
Pyrochroite	-6.92	8.28	15.20	Mn(OH)2
Pyrolusite	7.64	50.06	42.42	MnO2
Rhodochrosite	-1.45	-12.55	-11.11	MnCO3
Rhodochrosite(d)	-2.16	-12.55	-10.39	MnCO3
Rutherfordine	-5.42	-19.85	-14.43	UO2CO3
Schoepite	-4.62	0.98	5.60	UO2(OH)2:H2O
Siderite	-11.18	-22.03	-10.85	FeCO3
Siderite(d)(3)	-11.58	-22.03	-10.45	FeCO3
SrF2	-5.79	-14.35	-8.56	SrF2
Strontianite	-1.87	-11.14	-9.27	SrCO3
Sulfur	-107.34	-122.50	-15.15	S
Tenorite	-2.45	5.42	7.86	CuO
Thenardite	-9.04	-9.21	-0.17	Na2SO4
Thermonatrite	-11.52	-11.35	0.17	Na2CO3:H2O
Trona	-16.55	-17.05	-0.51	NaHCO3:Na2CO3:2H2O
U(OH)2SO4	-46.71	-49.91	-3.20	U(OH)2SO4
U3O8(c)	-32.46	-10.08	22.38	U3O8
U4O9(c)	-81.31	-83.08	-1.77	U4O9
UF4(c)	-61.00	-79.30	-18.31	UF4
UF4:2.5H2O	-51.74	-79.30	-27.56	UF4:2.5H2O
UO2(a)	-31.32	-31.22	0.10	UO2
UO3(gamma)	-7.05	0.98	8.03	UO3
Uraninite(c)	-26.71	-31.22	-4.50	UO2
Witherite	-3.52	-12.10	-8.58	BaCO3

20 : 80 Mix of Binney Injection Water : Denver Formation Water

Phase	SI**	log IAP	log K(290 K, 1 atm)	
Acanthite	-115.84	-152.89	-37.05	Ag2S
Ag2CO3	-12.07	-23.32	-11.25	Ag2CO3
Ag2O	-15.78	-3.00	12.78	Ag2O
Ag2SO4	-15.90	-20.90	-5.00	Ag2SO4
AgF:4H2O	-13.36	-12.89	0.47	AgF:4H2O
AgMetal	-8.37	-22.35	-13.98	Ag
Anglesite	-5.59	-13.42	-7.83	PbSO4
Anhydrite	-2.72	-7.06	-4.34	CaSO4
Aragonite	-1.19	-9.48	-8.29	CaCO3
Artinite	-9.75	0.38	10.14	MgCO3:Mg(OH)2:3H2O
B-UO2(OH)2	-5.25	0.55	5.80	UO2(OH)2
BaF2	-9.06	-14.84	-5.78	BaF2
Barite	0.14	-9.95	-10.10	BaSO4
Birnessite	5.68	49.28	43.60	MnO2
Bixbyite	5.19	4.87	-0.33	Mn2O3
Brucite	-7.00	10.35	17.35	Mg(OH)2
Calcite	-1.04	-9.48	-8.44	CaCO3
Celestite	-2.61	-9.23	-6.62	SrSO4
Cerargyrite	-2.00	-12.05	-10.04	AgCl
Cerussite	-2.61	-15.83	-13.22	PbCO3
CH4(g)	-142.12	-144.91	-2.80	CH4
CO2(g)	-2.14	-3.51	-1.38	CO2
Cotunnite	-11.73	-16.61	-4.88	PbCl2
Dolomite	-2.53	-19.44	-16.91	CaMg(CO3)2
Dolomite(d)	-3.11	-19.44	-16.33	CaMg(CO3)2
Epsomite	-5.36	-7.55	-2.19	MgSO4:7H2O
Fe(OH)2.7Cl.3	6.49	3.45	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.72	6.61	4.89	Fe(OH)3
Fe3(OH)8	-8.04	12.18	20.22	Fe3(OH)8
FeS(ppt)	-147.02	-150.93	-3.92	FeS
Fluorite	-1.26	-11.95	-10.69	CaF2
Galena	-132.26	-145.41	-13.14	PbS
Goethite	7.34	6.61	-0.73	FeOOH
Greigite	-542.35	-587.38	-45.03	Fe3S4
Gummite	-10.29	0.55	10.83	UO3
Gypsum	-2.48	-7.06	-4.58	CaSO4:2H2O
H2(g)	-41.70	-44.82	-3.12	H2
H2O(g)	-1.71	-0.00	1.71	H2O
H2S(g)	-141.93	-142.84	-0.91	H2S
Halite	-7.69	-6.13	1.56	NaCl
Hausmannite	1.51	64.43	62.92	Mn3O4
Hematite	16.65	13.22	-3.43	Fe2O3
Huntite	-9.88	-39.37	-29.48	CaMg3(CO3)4
Hydrocerussite	-9.72	-27.18	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-21.73	-29.51	-7.78	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-3.69	-13.52	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-4.34	-12.97	-8.62	KFe3(SO4)2(OH)6
Jarosite-Na	-6.95	-11.55	-4.60	NaFe3(SO4)2(OH)6
JarositeH	-11.61	-15.97	-4.36	(H3O)Fe3(SO4)2(OH)6
Larnakite	-8.78	-8.94	-0.16	PbO:PbSO4
Laurionite	-6.69	-6.06	0.62	PbOHCl
Litharge	-8.55	4.48	13.03	PbO
Mackinawite	-146.28	-150.93	-4.65	FeS

Maghemite	6.84	13.22	6.39	Fe2O3
Magnesite	-2.05	-9.96	-7.91	MgCO3
Magnetite	7.50	12.18	4.68	Fe3O4
Manganite	3.09	28.43	25.34	MnOOH
Massicot	-8.74	4.48	13.22	PbO
Matlockite	-7.88	-17.45	-9.58	PbClF
Melanterite	-16.64	-18.94	-2.30	FeSO4:7H2O
Minium	-20.47	55.15	75.62	Pb3O4
Mirabilite	-7.59	-9.06	-1.47	Na2SO4:10H2O
Mn2(SO4)3	-43.85	-48.83	-4.98	Mn2(SO4)3
MnCl2:4H2O	-15.90	-13.51	2.38	MnCl2:4H2O
MnS(Green)	-146.22	-142.32	3.91	MnS
MnSO4	-13.28	-10.32	2.96	MnSO4
N2(g)	-16.06	-19.30	-3.23	N2
Na4UO2(CO3)3	-26.42	-42.71	-16.29	Na4UO2(CO3)3
Nahcolite	-4.88	-5.49	-0.62	NaHCO3
Natron	-9.87	-11.48	-1.61	Na2CO3:10H2O
Nesquehonite	-4.45	-9.96	-5.51	MgCO3:3H2O
NH3(g)	-67.49	-65.57	1.92	NH3
Nsutite	6.72	49.28	42.56	MnO2
O2(g)	-2.37	-5.20	-2.83	O2
Pb(BO2)2	-13.70	-5.98	7.72	Pb(BO2)2
Pb(OH)2	-3.93	4.48	8.41	Pb(OH)2
Pb2(OH)3Cl	-10.37	-1.58	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-17.24	8.96	26.20	PbO:Pb(OH)2
Pb2O3	-10.37	50.67	61.04	Pb2O3
Pb2OCO3	-11.06	-11.35	-0.29	PbO:PbCO3
Pb3O2CO3	-18.38	-6.87	11.52	PbCO3:2PbO
Pb3O2SO4	-15.24	-4.45	10.79	PbSO4:2PbO
Pb4(OH)6SO4	-21.07	0.03	21.10	Pb4(OH)6SO4
Pb4O3SO4	-22.73	0.03	22.76	PbSO4:3PbO
PbF2	-10.87	-18.30	-7.43	PbF2
PbMetal	-41.49	-37.22	4.26	Pb
PbO:0.3H2O	-8.50	4.48	12.98	PbO:0.33H2O
Phosgenite	-12.63	-32.44	-19.81	PbCl2:PbCO3
Plattnerite	-4.44	46.19	50.63	PbO2
Portlandite	-12.55	10.83	23.38	Ca(OH)2
Pyrite	-240.43	-259.12	-18.69	FeS2
Pyrochroite	-7.62	7.58	15.20	Mn(OH)2
Pyrolusite	6.68	49.28	42.60	MnO2
Rhodochrosite	-1.63	-12.74	-11.10	MnCO3
Rhodochrosite(d)	-2.35	-12.74	-10.39	MnCO3
Rutherfordine	-5.34	-19.76	-14.42	UO2CO3
Schoepite	-5.08	0.55	5.63	UO2(OH)2:H2O
Siderite	-10.51	-21.35	-10.84	FeCO3
Siderite(d)(3)	-10.90	-21.35	-10.45	FeCO3
SrF2	-5.56	-14.12	-8.56	SrF2
Strontianite	-2.38	-11.65	-9.27	SrCO3
Sulfur	-106.16	-121.33	-15.17	S
Thenardite	-8.89	-9.06	-0.17	Na2SO4
Thermonatrite	-11.65	-11.48	0.18	Na2CO3:H2O
Trona	-16.51	-16.97	-0.46	NaHCO3:Na2CO3:2H2O
U(OH)2SO4	-46.17	-49.37	-3.20	U(OH)2SO4
U3O8(c)	-33.71	-11.00	22.71	U3O8
U4O9(c)	-82.69	-84.18	-1.48	U4O9
UF4(c)	-58.78	-77.04	-18.25	UF4
UF4:2.5H2O	-49.48	-77.04	-27.56	UF4:2.5H2O

UO2(a)	-31.57	-31.47	0.10	UO2
UO3(gamma)	-7.53	0.55	8.08	UO3
Uraninite(c)	-27.02	-31.47	-4.45	UO2
Witherite	-3.78	-12.37	-8.58	BaCO3

50 : 50 Mix of Binney Injection Water : Denver Formation Water

Phase	SI**	log IAP	log K(290 K, 1 atm)	
Acanthite	-116.22	-153.29	-37.08	Ag2S
Ag2CO3	-11.53	-22.78	-11.25	Ag2CO3
Ag2O	-15.09	-2.31	12.78	Ag2O
Ag2SO4	-15.37	-20.37	-5.00	Ag2SO4
AgF:4H2O	-13.22	-12.75	0.47	AgF:4H2O
AgMetal	-8.13	-22.13	-14.00	Ag
Anglesite	-5.78	-13.61	-7.83	PbSO4
Anhydrite	-2.49	-6.83	-4.34	CaSO4
Aragonite	-0.94	-9.23	-8.29	CaCO3
Artinite	-8.79	1.37	10.15	MgCO3:Mg(OH)2:3H2O
B-UO2(OH)2	-4.91	0.90	5.81	UO2(OH)2
BaF2	-9.30	-15.07	-5.78	BaF2
Barite	0.16	-9.94	-10.10	BaSO4
Birnessite	6.02	49.62	43.60	MnO2
Bixbyite	5.59	5.27	-0.32	Mn2O3
Brucite	-6.44	10.92	17.36	Mg(OH)2
Calcite	-0.79	-9.23	-8.44	CaCO3
Celestite	-2.47	-9.09	-6.62	SrSO4
Cerargyrite	-1.45	-11.50	-10.05	AgCl
Cerussite	-2.79	-16.02	-13.22	PbCO3
CH4(g)	-143.21	-146.00	-2.79	CH4
CO2(g)	-2.29	-3.67	-1.37	CO2
Cotunnite	-11.36	-16.24	-4.88	PbCl2
Dolomite	-1.87	-18.78	-16.91	CaMg(CO3)2
Dolomite(d)	-2.46	-18.78	-16.33	CaMg(CO3)2
Epsomite	-4.95	-7.15	-2.19	MgSO4:7H2O
Fe(OH)2.7Cl.3	6.42	3.38	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.59	6.48	4.89	Fe(OH)3
Fe3(OH)8	-8.54	11.68	20.22	Fe3(OH)8
FeS(ppt)	-148.35	-152.27	-3.92	FeS
Fluorite	-1.26	-11.96	-10.69	CaF2
Galena	-133.38	-146.53	-13.15	PbS
Goethite	7.20	6.48	-0.72	FeOOH
Greigite	-547.22	-592.26	-45.03	Fe3S4
Gummite	-9.95	0.90	10.85	UO3
Gypsum	-2.24	-6.83	-4.58	CaSO4:2H2O
H2(g)	-41.94	-45.06	-3.12	H2
H2O(g)	-1.71	-0.00	1.71	H2O
H2S(g)	-143.03	-143.94	-0.91	H2S
Halite	-7.40	-5.83	1.56	NaCl
Hausmannite	1.99	64.96	62.97	Mn3O4
Hematite	16.38	12.97	-3.41	Fe2O3
Huntite	-8.41	-37.88	-29.47	CaMg3(CO3)4
Hydrocerussite	-10.12	-27.58	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-19.53	-27.28	-7.75	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-4.27	-14.10	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-4.90	-13.51	-8.61	KFe3(SO4)2(OH)6

Jarosite-Na	-7.59	-12.17	-4.58	NaFe3(SO4)2(OH)6
JarositeH	-12.36	-16.68	-4.33	(H3O)Fe3(SO4)2(OH)6
Larnakite	-9.00	-9.16	-0.16	PbO:PbSO4
Laurionite	-6.52	-5.89	0.62	PbOHCl
Litharge	-8.58	4.45	13.04	PbO
Mackinawite	-147.62	-152.27	-4.65	FeS
Maghemite	6.58	12.97	6.39	Fe2O3
Magnesite	-1.64	-9.55	-7.91	MgCO3
Magnetite	6.97	11.68	4.71	Fe3O4
Manganite	3.30	28.64	25.34	MnOOH
Massicot	-8.78	4.45	13.23	PbO
Matlockite	-7.91	-17.49	-9.58	PbClF
Melanterite	-17.04	-19.35	-2.31	FeSO4:7H2O
Minium	-20.37	55.31	75.67	Pb3O4
Mirabilite	-7.56	-9.04	-1.48	Na2SO4:10H2O
Mn2(SO4)3	-43.97	-48.92	-4.96	Mn2(SO4)3
MnCl2:4H2O	-15.40	-13.02	2.37	MnCl2:4H2O
MnS(Green)	-147.23	-143.31	3.91	MnS
MnSO4	-13.36	-10.39	2.97	MnSO4
N2(g)	-16.63	-19.87	-3.23	N2
Na4UO2(CO3)3	-26.17	-42.46	-16.29	Na4UO2(CO3)3
Nahcolite	-4.93	-5.55	-0.62	NaHCO3
Natron	-9.83	-11.45	-1.61	Na2CO3:10H2O
Nesquehonite	-4.04	-9.55	-5.51	MgCO3:3H2O
NH3(g)	-68.13	-66.20	1.93	NH3
Nsutite	7.05	49.62	42.56	MnO2
O2(g)	-1.96	-4.79	-2.83	O2
Pb(BO2)2	-13.65	-5.93	7.72	Pb(BO2)2
Pb(OH)2	-3.97	4.45	8.42	Pb(OH)2
Pb2(OH)3Cl	-10.23	-1.44	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-17.29	8.91	26.20	PbO:Pb(OH)2
Pb2O3	-10.19	50.85	61.04	Pb2O3
Pb2OCO3	-11.28	-11.56	-0.28	PbO:PbCO3
Pb3O2CO3	-18.64	-7.11	11.53	PbCO3:2PbO
Pb3O2SO4	-15.50	-4.70	10.80	PbSO4:2PbO
Pb4(OH)6SO4	-21.35	-0.25	21.10	Pb4(OH)6SO4
Pb4O3SO4	-23.03	-0.25	22.78	PbSO4:3PbO
PbF2	-11.32	-18.74	-7.43	PbF2
PbMetal	-41.75	-37.49	4.26	Pb
PbO:0.3H2O	-8.53	4.45	12.98	PbO:0.33H2O
Phosgenite	-12.45	-32.26	-19.81	PbCl2:PbCO3
Plattnerite	-4.27	46.40	50.67	PbO2
Portlandite	-12.16	11.24	23.40	Ca(OH)2
Pyrite	-242.61	-261.31	-18.70	FeS2
Pyrochroite	-7.53	7.67	15.20	Mn(OH)2
Pyrolusite	6.98	49.62	42.64	MnO2
Rhodochrosite	-1.70	-12.80	-11.10	MnCO3
Rhodochrosite(d)	-2.41	-12.80	-10.39	MnCO3
Rutherfordine	-5.15	-19.57	-14.42	UO2CO3
Schoepite	-4.74	0.90	5.64	UO2(OH)2:H2O
Siderite	-10.91	-21.75	-10.84	FeCO3
Siderite(d)(3)	-11.30	-21.75	-10.45	FeCO3
SrF2	-5.66	-14.23	-8.56	SrF2
Strontianite	-2.23	-11.50	-9.27	SrCO3
Sulfur	-107.01	-122.19	-15.18	S
Thenardite	-8.87	-9.04	-0.17	Na2SO4
Thermonatrite	-11.62	-11.44	0.18	Na2CO3:H2O

Trona	-16.55	-17.00	-0.45	NaHCO3:Na2CO3:2H2O
U(OH)2SO4	-46.21	-49.41	-3.20	U(OH)2SO4
U3O8(c)	-32.90	-10.13	22.77	U3O8
U4O9(c)	-81.99	-83.42	-1.43	U4O9
UF4(c)	-59.49	-77.74	-18.24	UF4
UF4:2.5H2O	-50.18	-77.74	-27.56	UF4:2.5H2O
UO2(a)	-31.44	-31.34	0.10	UO2
UO3(gamma)	-7.19	0.90	8.09	UO3
Uraninite(c)	-26.90	-31.34	-4.44	UO2
Witherite	-3.76	-12.35	-8.59	BaCO3

80 : 20 Mix of Binney Injection Water : Denver Formation Water

Phase	SI**	log IAP	log K(290 K,	1 atm)
Acanthite	-116.50	-153.61	-37.11	Ag2S
Ag2CO3	-11.17	-22.43	-11.26	Ag2CO3
Ag2O	-14.51	-1.72	12.79	Ag2O
Ag2SO4	-15.16	-20.16	-5.00	Ag2SO4
AgF:4H2O	-13.22	-12.75	0.47	AgF:4H2O
AgMetal	-7.89	-21.90	-14.01	Ag
Anglesite	-6.30	-14.13	-7.83	PbSO4
Anhydrite	-2.31	-6.65	-4.34	CaSO4
Aragonite	-0.63	-8.92	-8.29	CaCO3
Artinite	-7.77	2.40	10.17	MgCO3:Mg(OH)2:3H2O
B-UO2(OH)2	-4.80	1.02	5.82	UO2(OH)2
BaF2	-9.58	-15.36	-5.78	BaF2
Barite	0.08	-10.03	-10.10	BaSO4
Birnessite	6.21	49.81	43.60	MnO2
Bixbyite	5.81	5.50	-0.31	Mn2O3
Brucite	-5.82	11.55	17.38	Mg(OH)2
Calcite	-0.48	-8.92	-8.44	CaCO3
Celestite	-2.38	-9.00	-6.62	SrSO4
Cerargyrite	-1.20	-11.26	-10.06	AgCl
Cerussite	-3.17	-16.39	-13.23	PbCO3
CH4(g)	-143.97	-146.77	-2.79	CH4
CO2(g)	-2.53	-3.90	-1.37	CO2
Cotunnite	-11.60	-16.48	-4.88	PbCl2
Dolomite	-1.17	-18.07	-16.90	CaMg(CO3)2
Dolomite(d)	-1.75	-18.07	-16.32	CaMg(CO3)2
Epsomite	-4.69	-6.89	-2.20	MgSO4:7H2O
Fe(OH)2.7Cl.3	6.09	3.05	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.28	6.17	4.89	Fe(OH)3
Fe3(OH)8	-9.55	10.68	20.22	Fe3(OH)8
FeS(ppt)	-149.64	-153.55	-3.92	FeS
Fluorite	-1.29	-11.99	-10.70	CaF2
Galena	-134.41	-147.58	-13.17	PbS
Goethite	6.88	6.17	-0.71	FeOOH
Greigite	-551.85	-596.89	-45.03	Fe3S4
Gummite	-9.84	1.02	10.86	UO3
Gypsum	-2.07	-6.65	-4.58	CaSO4:2H2O
H2(g)	-42.08	-45.20	-3.12	H2
H2O(g)	-1.72	-0.00	1.72	H2O
H2S(g)	-143.93	-144.84	-0.91	H2S
Halite	-7.28	-5.72	1.56	NaCl
Hausmannite	2.24	65.27	63.03	Mn3O4

Hematite	15.73	12.34	-3.40	Fe2O3
Huntite	-6.93	-36.39	-29.46	CaMg3(CO3)4
Hydrocerussite	-11.01	-28.47	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-17.34	-25.07	-7.73	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-5.77	-15.60	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-6.36	-14.95	-8.59	KFe3(SO4)2(OH)6
Jarosite-Na	-9.14	-13.70	-4.56	NaFe3(SO4)2(OH)6
JarositeH	-14.09	-18.38	-4.30	(H3O)Fe3(SO4)2(OH)6
Larnakite	-9.66	-9.81	-0.15	PbO:PbSO4
Laurionite	-6.71	-6.08	0.62	PbOHCl
Litharge	-8.73	4.32	13.05	PbO
Mackinawite	-148.90	-153.55	-4.65	FeS
Maghemite	5.95	12.34	6.39	Fe2O3
Magnesite	-1.25	-9.16	-7.91	MgCO3
Magnetite	5.94	10.68	4.74	Fe3O4
Manganite	3.43	28.77	25.34	MnOOH
Massicot	-8.93	4.32	13.24	PbO
Matlockite	-8.39	-17.97	-9.59	PbClF
Melanterite	-17.80	-20.11	-2.31	FeSO4:7H2O
Minium	-20.70	55.03	75.73	Pb3O4
Mirabilite	-7.60	-9.09	-1.49	Na2SO4:10H2O
Mn2(SO4)3	-44.90	-49.83	-4.94	Mn2(SO4)3
MnCl2:4H2O	-15.43	-13.07	2.37	MnCl2:4H2O
MnS(Green)	-148.08	-144.16	3.91	MnS
MnSO4	-13.69	-10.72	2.98	MnSO4
N2(g)	-17.25	-20.48	-3.23	N2
Na4UO2(CO3)3	-26.11	-42.40	-16.29	Na4UO2(CO3)3
Nahcolite	-5.01	-5.63	-0.62	NaHCO3
Natron	-9.73	-11.36	-1.62	Na2CO3:10H2O
Nesquehonite	-3.65	-9.16	-5.51	MgCO3:3H2O
NH3(g)	-68.64	-66.71	1.93	NH3
Nsutite	7.25	49.81	42.56	MnO2
O2(g)	-1.76	-4.59	-2.83	O2
Pb(BO2)2	-13.73	-6.00	7.73	Pb(BO2)2
Pb(OH)2	-4.11	4.32	8.43	Pb(OH)2
Pb2(OH)3Cl	-10.56	-1.77	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-17.57	8.63	26.20	PbO:Pb(OH)2
Pb2O3	-10.32	50.72	61.04	Pb2O3
Pb2OCO3	-11.81	-12.08	-0.27	PbO:PbCO3
Pb3O2CO3	-19.31	-7.76	11.54	PbCO3:2PbO
Pb3O2SO4	-16.31	-5.50	10.81	PbSO4:2PbO
Pb4(OH)6SO4	-22.28	-1.18	21.10	Pb4(OH)6SO4
Pb4O3SO4	-23.98	-1.18	22.80	PbSO4:3PbO
PbF2	-12.04	-19.47	-7.43	PbF2
PbMetal	-42.03	-37.77	4.26	Pb
PbO:0.3H2O	-8.66	4.32	12.98	PbO:0.33H2O
Phosgenite	-13.06	-32.87	-19.81	PbCl2:PbCO3
Plattnerite	-4.30	46.40	50.70	PbO2
Portlandite	-11.62	11.79	23.42	Ca(OH)2
Pyrite	-244.66	-263.36	-18.70	FeS2
Pyrochroite	-7.47	7.73	15.20	Mn(OH)2
Pyrolusite	7.14	49.81	42.67	MnO2
Rhodochrosite	-1.88	-12.98	-11.10	MnCO3
Rhodochrosite(d)	-2.59	-12.98	-10.39	MnCO3
Rutherfordine	-5.27	-19.69	-14.42	UO2CO3
Schoepite	-4.62	1.02	5.64	UO2(OH)2:H2O
Siderite	-11.53	-22.37	-10.84	FeCO3

Siderite(d)(3)	-11.92	-22.37	-10.45	FeCO3
SrF2	-5.77	-14.34	-8.56	SrF2
Strontianite	-1.99	-11.27	-9.27	SrCO3
Sulfur	-107.78	-122.96	-15.18	S
Thenardite	-8.92	-9.09	-0.17	Na2SO4
Thermonatrite	-11.54	-11.36	0.18	Na2CO3:H2O
Trona	-16.55	-16.98	-0.44	NaHCO3:Na2CO3:2H2O
U(OH)2SO4	-46.59	-49.79	-3.20	U(OH)2SO4
U3O8(c)	-32.69	-9.86	22.83	U3O8
U4O9(c)	-81.91	-83.29	-1.37	U4O9
UF4(c)	-60.67	-78.91	-18.23	UF4
UF4:2.5H2O	-51.35	-78.91	-27.56	UF4:2.5H2O
UO2(a)	-31.44	-31.34	0.10	UO2
UO3(gamma)	-7.08	1.02	8.10	UO3
Uraninite(c)	-26.91	-31.34	-4.43	UO2
Witherite	-3.70	-12.29	-8.59	BaCO3

20 : 80 Mix of Griswold Injection Water : Arapahoe Formation Water

Phase	SI**	log IAP	log K(296 K,	1 atm)
Acanthite	-102.48	-138.71	-36.23	Ag2S
Ag2CO3	-12.69	-23.79	-11.10	Ag2CO3
Ag2O	-15.86	-3.25	12.62	Ag2O
Ag2SO4	-16.71	-21.64	-4.93	Ag2SO4
AgF:4H2O	-13.78	-13.25	0.54	AgF:4H2O
AgMetal	-6.90	-20.50	-13.59	Ag
Al(OH)3(a)	-1.77	9.12	10.89	Al(OH)3
AlumK	-19.22	-24.42	-5.19	KAl(SO4)2:12H2O
Alunite	-4.95	-6.18	-1.23	KAl3(SO4)2(OH)6
Anglesite	-5.86	-13.66	-7.80	PbSO4
Anhydrite	-2.69	-7.05	-4.36	CaSO4
Anilite	-117.38	-149.40	-32.02	Cu0.25Cu1.5S
Antlerite	-9.04	-0.75	8.29	Cu3(OH)4SO4
Aragonite	-0.87	-9.19	-8.33	CaCO3
Artinite	-8.82	0.88	9.70	MgCO3:Mg(OH)2:3H2O
Atacamite	-6.62	0.79	7.40	Cu2(OH)3Cl
Azurite	-6.61	-2.75	3.85	Cu3(OH)2(CO3)2
B-UO2(OH)2	-4.81	0.78	5.59	UO2(OH)2
BaF2	-8.99	-14.75	-5.76	BaF2
Barite	0.10	-9.90	-9.99	BaSO4
Basaluminite	-4.61	18.09	22.70	Al4(OH)10SO4
Birnessite	2.44	46.04	43.60	MnO2
Bixbyite	3.71	3.15	-0.56	Mn2O3
BlaubleiI	-108.06	-132.22	-24.16	Cu0.9Cu0.2S
BlaubleiII	-112.87	-140.15	-27.28	Cu0.6Cu0.8S
Boehmite	0.44	9.12	8.68	AlOOH
Brochantite	-10.21	5.13	15.34	Cu4(OH)6SO4
Brucite	-6.22	10.71	16.93	Mg(OH)2
Calcite	-0.72	-9.19	-8.47	CaCO3
Celestite	-2.67	-9.30	-6.63	SrSO4
Cerargyrite	-2.80	-12.60	-9.80	AgCl
Cerussite	-2.66	-15.80	-13.15	PbCO3
CH4(g)	-127.38	-130.23	-2.85	CH4
Chalcanthite	-9.87	-12.51	-2.64	CuSO4:5H2O
Chalcocite	-121.22	-156.01	-34.78	Cu2S

Chalcopyrite	-228.71	-264.09	-35.39	CuFeS2
CO2(g)	-2.39	-3.84	-1.45	CO2
Cotunnite	-12.43	-17.22	-4.79	PbCl2
Covellite	-107.23	-129.58	-22.35	CuS
Cu(OH)2	-2.81	5.88	8.69	Cu(OH)2
Cu2(OH)3NO3	-9.94	-0.64	9.30	Cu2(OH)3NO3
Cu2SO4	-37.01	-38.94	-1.93	Cu2SO4
CuCO3	-5.03	-14.66	-9.63	CuCO3
CuF	-29.02	-21.90	7.12	CuF
CuF2	-16.79	-17.36	-0.58	CuF2
CuF2:2H2O	-12.83	-17.36	-4.54	CuF2:2H2O
CuMetal	-20.33	-29.15	-8.82	Cu
CuOCuSO4	-18.28	-6.63	11.65	CuO:CuSO4
CupricFerrite	13.39	19.40	6.01	CuFe2O4
Cuprite	-18.98	-20.55	-1.57	Cu2O
CuprousFerrite	5.39	-3.52	-8.91	CuFeO2
CuSO4	-15.58	-12.51	3.07	CuSO4
Diaspore	2.16	9.12	6.96	AlOOH
Djurleite	-120.18	-154.26	-34.08	Cu0.066Cu1.868S
Dolomite	-1.97	-19.03	-17.06	CaMg(CO3)2
Dolomite(d)	-2.52	-19.03	-16.50	CaMg(CO3)2
Epsomite	-5.53	-7.68	-2.15	MgSO4:7H2O
Fe(OH)2.7Cl.3	6.51	3.47	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.87	6.76	4.89	Fe(OH)3
Fe3(OH)8	-5.76	14.46	20.22	Fe3(OH)8
FeS(ppt)	-130.60	-134.52	-3.92	FeS
Fluorite	-1.28	-11.90	-10.62	CaF2
Galena	-117.88	-130.72	-12.85	PbS
Gibbsite	0.93	9.12	8.19	Al(OH)3
Goethite	7.71	6.76	-0.95	FeOOH
Greigite	-482.34	-527.37	-45.03	Fe3S4
Gummite	-9.70	0.78	10.48	UO3
Gypsum	-2.47	-7.05	-4.58	CaSO4:2H2O
H2(g)	-37.74	-40.89	-3.14	H2
H2O(g)	-1.55	-0.00	1.55	H2O
H2S(g)	-127.52	-128.50	-0.98	H2S
Halite	-8.13	-6.55	1.58	NaCl
Hausmannite	1.27	62.64	61.37	Mn3O4
Hematite	17.42	13.52	-3.90	Fe2O3
Huntite	-8.81	-38.69	-29.88	CaMg3(CO3)4
Hydrocerussite	-9.41	-26.87	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-20.03	-28.62	-8.59	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-4.04	-13.87	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-4.15	-13.26	-9.10	KFe3(SO4)2(OH)6
Jarosite-Na	-6.93	-12.08	-5.16	NaFe3(SO4)2(OH)6
JarositeH	-11.30	-16.51	-5.20	(H3O)Fe3(SO4)2(OH)6
Jurbanite	-6.04	-9.27	-3.23	AlOHSO4
Langite	-11.79	5.13	16.92	Cu4(OH)6SO4:H2O
Larnakite	-8.66	-8.92	-0.26	PbO:PbSO4
Laurionite	-6.86	-6.24	0.62	PbOHCl
Litharge	-8.04	4.73	12.78	PbO
Mackinawite	-129.87	-134.52	-4.65	FeS
Maghemite	7.13	13.52	6.39	Fe2O3
Magnesite	-1.82	-9.83	-8.01	MgCO3
Magnetite	10.55	14.46	3.91	Fe3O4
Malachite	-3.65	1.56	5.22	Cu2(OH)2CO3
Manganite	1.83	27.17	25.34	MnOOH

Massicot	-8.23	4.73	12.97	PbO
Matlockite	-8.41	-17.86	-9.46	PbClF
Melanothallite	-19.84	-16.07	3.77	CuCl2
Melanterite	-15.23	-17.45	-2.23	FeSO4:7H2O
Minium	-22.09	51.95	74.04	Pb3O4
Mirabilite	-8.37	-9.55	-1.18	Na2SO4:10H2O
Mn2(SO4)3	-46.45	-52.03	-5.58	Mn2(SO4)3
MnCl2:4H2O	-16.30	-13.65	2.65	MnCl2:4H2O
MnS(Green)	-130.98	-127.16	3.82	MnS
MnSO4	-12.81	-10.09	2.72	MnSO4
N2(g)	-2.14	-5.40	-3.26	N2
Na4UO2(CO3)3	-26.85	-43.14	-16.29	Na4UO2(CO3)3
Nahcolite	-5.21	-5.78	-0.56	NaHCO3
Nantokite	-14.46	-21.25	-6.79	CuCl
Natron	-10.33	-11.69	-1.36	Na2CO3:10H2O
Nesquehonite	-4.23	-9.83	-5.60	MgCO3:3H2O
NH3(g)	-54.76	-52.96	1.80	NH3
Nsutite	3.48	46.04	42.56	MnO2
O2(g)	-8.17	-11.05	-2.88	O2
Pb(OH)2	-3.46	4.73	8.20	Pb(OH)2
Pb2(OH)3Cl	-10.30	-1.51	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-16.73	9.47	26.20	PbO:Pb(OH)2
Pb2O3	-13.83	47.21	61.04	Pb2O3
Pb2OCO3	-10.61	-11.07	-0.46	PbO:PbCO3
Pb3O2CO3	-17.44	-6.34	11.11	PbCO3:2PbO
Pb3O2SO4	-14.66	-4.19	10.47	PbSO4:2PbO
Pb4(OH)6SO4	-20.55	0.55	21.10	Pb4(OH)6SO4
Pb4O3SO4	-21.67	0.55	22.22	PbSO4:3PbO
PbF2	-11.07	-18.51	-7.44	PbF2
PbMetal	-37.28	-33.01	4.27	Pb
PbO:0.3H2O	-8.25	4.73	12.98	PbO:0.33H2O
Phosgenite	-13.21	-33.02	-19.81	PbCl2:PbCO3
Plattnerite	-7.06	42.48	49.54	PbO2
Portlandite	-11.56	11.34	22.90	Ca(OH)2
Pyrite	-213.72	-232.23	-18.52	FeS2
Pyrochroite	-6.90	8.30	15.20	Mn(OH)2
Pyrolusite	4.44	46.04	41.60	MnO2
Rhodochrosite	-1.11	-12.24	-11.13	MnCO3
Rhodochrosite(d)	-1.85	-12.24	-10.39	MnCO3
Rutherfordine	-5.31	-19.75	-14.45	UO2CO3
Schoepite	-4.66	0.78	5.44	UO2(OH)2:H2O
Siderite	-8.72	-19.60	-10.88	FeCO3
Siderite(d)(3)	-9.15	-19.60	-10.45	FeCO3
SrF2	-5.61	-14.15	-8.54	SrF2
Strontianite	-2.18	-11.45	-9.27	SrCO3
Sulfur	-95.62	-110.67	-15.05	S
Tenorite	-1.79	5.88	7.67	CuO
Thenardite	-9.37	-9.55	-0.18	Na2SO4
Thermonatrite	-11.83	-11.69	0.13	Na2CO3:H2O
Trona	-16.73	-17.47	-0.73	NaHCO3:Na2CO3:2H2O
U(OH)2SO4	-42.99	-46.19	-3.20	U(OH)2SO4
U3O8(c)	-28.84	-7.92	20.92	U3O8
U4O9(c)	-70.42	-73.47	-3.04	U4O9
UF4(c)	-55.75	-74.29	-18.54	UF4
UF4:2.5H2O	-46.72	-74.29	-27.57	UF4:2.5H2O
UO2(a)	-27.90	-27.80	0.10	UO2
UO3(gamma)	-7.00	0.78	7.78	UO3

Uraninite(c)	-23.07	-27.80	-4.74	UO2
Witherite	-3.48	-12.04	-8.56	BaCO3

50 : 50 Mix of Griswold Injection Water : Arapahoe Formation Water

Phase	SI**	log IAP	log K(294 K,	1 atm)
Acanthite	-114.51	-151.07	-36.56	Ag2S
Ag2CO3	-12.10	-23.26	-11.16	Ag2CO3
Ag2O	-15.25	-2.57	12.68	Ag2O
Ag2SO4	-16.09	-21.05	-4.96	Ag2SO4
AgF:4H2O	-13.57	-13.06	0.51	AgF:4H2O
AgMetal	-8.07	-21.82	-13.75	Ag
Al(OH)3(a)	-1.39	9.67	11.05	Al(OH)3
AlumK	-18.72	-23.96	-5.24	KAl(SO4)2:12H2O
Alunite	-3.71	-4.63	-0.92	KAl3(SO4)2(OH)6
Anglesite	-5.99	-13.80	-7.81	PbSO4
Anhydrite	-2.47	-6.81	-4.35	CaSO4
Anilite	-132.89	-165.18	-32.30	Cu0.25Cu1.5S
Antlerite	-9.52	-1.23	8.29	Cu3(OH)4SO4
Aragonite	-0.70	-9.02	-8.31	CaCO3
Artinite	-8.31	1.56	9.88	MgCO3:Mg(OH)2:3H2O
Atacamite	-6.72	0.80	7.52	Cu2(OH)3Cl
Azurite	-7.44	-3.39	4.05	Cu3(OH)2(CO3)2
B-UO2(OH)2	-4.45	1.23	5.68	UO2(OH)2
BaF2	-9.18	-14.95	-5.77	BaF2
Barite	0.14	-9.89	-10.03	BaSO4
Basaluminite	-2.50	20.20	22.70	Al4(OH)10SO4
Birnessite	5.78	49.38	43.60	MnO2
Bixbyite	6.64	6.17	-0.46	Mn2O3
BlaubleiI	-121.57	-145.74	-24.16	Cu0.9Cu0.2S
BlaubleiII	-127.43	-154.71	-27.28	Cu0.6Cu0.8S
Boehmite	0.81	9.67	8.85	AlOOH
Brochantite	-10.83	4.51	15.34	Cu4(OH)6SO4
Brucite	-5.98	11.12	17.10	Mg(OH)2
Calcite	-0.56	-9.02	-8.46	CaCO3
Celestite	-2.54	-9.17	-6.62	SrSO4
Cerargyrite	-2.08	-11.98	-9.90	AgCl
Cerussite	-2.83	-16.00	-13.18	PbCO3
CH4(g)	-140.49	-143.32	-2.83	CH4
Chalcanthite	-10.08	-12.73	-2.65	CuSO4:5H2O
Chalcocite	-137.57	-172.66	-35.09	Cu2S
Chalcopyrite	-256.33	-291.94	-35.61	CuFeS2
CO2(g)	-2.52	-3.94	-1.42	CO2
Cotunnite	-11.89	-16.71	-4.82	PbCl2
Covellite	-120.24	-142.75	-22.50	CuS
Cu(OH)2	-3.04	5.75	8.79	Cu(OH)2
Cu2(OH)3NO3	-9.95	-0.54	9.41	Cu2(OH)3NO3
Cu2SO4	-40.74	-42.65	-1.91	Cu2SO4
CuCO3	-5.30	-14.93	-9.63	CuCO3
CuF	-31.05	-23.85	7.20	CuF
CuF2	-17.30	-17.79	-0.49	CuF2
CuF2:2H2O	-13.28	-17.79	-4.52	CuF2:2H2O
CuMetal	-23.70	-32.62	-8.92	Cu
CuOCuSO4	-18.85	-6.98	11.87	CuO:CuSO4
CupricFerrite	12.95	19.20	6.25	CuFe2O4

Cuprite	-22.56	-24.17	-1.61	Cu2O
CuprousFerrite	3.53	-5.36	-8.88	CuFeO2
CuSO4	-15.91	-12.73	3.18	CuSO4
Diaspore	2.55	9.67	7.12	AlOOH
Djurleite	-136.31	-170.69	-34.38	Cu0.066Cu1.868S
Dolomite	-1.58	-18.58	-17.00	CaMg(CO3)2
Dolomite(d)	-2.14	-18.58	-16.43	CaMg(CO3)2
Epsomite	-5.19	-7.36	-2.17	MgSO4:7H2O
Fe(OH)2.7Cl.3	6.56	3.52	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.83	6.73	4.89	Fe(OH)3
Fe3(OH)8	-7.47	12.75	20.22	Fe3(OH)8
FeS(ppt)	-145.28	-149.19	-3.92	FeS
Fluorite	-1.23	-11.88	-10.65	CaF2
Galena	-130.85	-143.81	-12.97	PbS
Gibbsite	1.34	9.67	8.33	Al(OH)3
Goethite	7.59	6.73	-0.86	FeOOH
Greigite	-536.19	-581.22	-45.03	Fe3S4
Gummite	-9.40	1.23	10.62	UO3
Gypsum	-2.23	-6.81	-4.58	CaSO4:2H2O
H2(g)	-41.07	-44.21	-3.13	H2
H2O(g)	-1.61	-0.00	1.61	H2O
H2S(g)	-140.55	-141.50	-0.95	H2S
Halite	-7.73	-6.16	1.57	NaCl
Hausmannite	4.00	65.99	62.00	Mn3O4
Hematite	17.16	13.45	-3.71	Fe2O3
Huntite	-7.97	-37.69	-29.72	CaMg3(CO3)4
Hydrocerussite	-9.87	-27.33	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-18.85	-27.11	-8.26	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-4.25	-14.08	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-4.54	-13.45	-8.91	KFe3(SO4)2(OH)6
Jarosite-Na	-7.31	-12.24	-4.93	NaFe3(SO4)2(OH)6
JarositeH	-11.92	-16.78	-4.86	(H3O)Fe3(SO4)2(OH)6
Jurbanite	-5.58	-8.81	-3.23	AlOHSO4
Langite	-12.66	4.51	17.17	Cu4(OH)6SO4:H2O
Larnakite	-8.90	-9.12	-0.22	PbO:PbSO4
Laurionite	-6.64	-6.02	0.62	PbOHCl
Litharge	-8.20	4.68	12.88	PbO
Mackinawite	-144.54	-149.19	-4.65	FeS
Maghemite	7.07	13.45	6.39	Fe2O3
Magnesite	-1.59	-9.56	-7.97	MgCO3
Magnetite	8.53	12.75	4.22	Fe3O4
Malachite	-4.16	1.18	5.34	Cu2(OH)2CO3
Manganite	3.50	28.84	25.34	MnOOH
Massicot	-8.39	4.68	13.07	PbO
Matlockite	-8.28	-17.79	-9.51	PbClF
Melanothallite	-19.49	-15.64	3.85	CuCl2
Melanterite	-16.92	-19.18	-2.26	FeSO4:7H2O
Minium	-19.56	55.11	74.68	Pb3O4
Mirabilite	-8.11	-9.40	-1.30	Na2SO4:10H2O
Mn2(SO4)3	-43.93	-49.27	-5.34	Mn2(SO4)3
MnCl2:4H2O	-15.63	-13.09	2.54	MnCl2:4H2O
MnS(Green)	-144.04	-140.19	3.86	MnS
MnSO4	-12.99	-10.17	2.82	MnSO4
N2(g)	-16.12	-19.37	-3.25	N2
Na4UO2(CO3)3	-26.38	-42.67	-16.29	Na4UO2(CO3)3
Nahcolite	-5.20	-5.78	-0.58	NaHCO3
Nantokite	-15.92	-22.78	-6.86	CuCl

Natron	-10.14	-11.61	-1.46	Na2CO3:10H2O
Nesquehonite	-3.99	-9.56	-5.57	MgCO3:3H2O
NH3(g)	-66.67	-64.82	1.85	NH3
Nsutite	6.82	49.38	42.56	MnO2
O2(g)	-2.36	-5.23	-2.86	O2
Pb(OH)2	-3.60	4.68	8.28	Pb(OH)2
Pb2(OH)3Cl	-10.13	-1.34	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-16.84	9.36	26.20	PbO:Pb(OH)2
Pb2O3	-10.61	50.43	61.04	Pb2O3
Pb2OCO3	-10.93	-11.32	-0.39	PbO:PbCO3
Pb3O2CO3	-17.92	-6.64	11.27	PbCO3:2PbO
Pb3O2SO4	-15.04	-4.44	10.60	PbSO4:2PbO
Pb4(OH)6SO4	-20.86	0.24	21.10	Pb4(OH)6SO4
Pb4O3SO4	-22.20	0.24	22.44	PbSO4:3PbO
PbF2	-11.43	-18.86	-7.43	PbF2
PbMetal	-40.66	-36.39	4.27	Pb
PbO:0.3H2O	-8.30	4.68	12.98	PbO:0.33H2O
Phosgenite	-12.90	-32.71	-19.81	PbCl2:PbCO3
Plattnerite	-4.23	45.75	49.98	PbO2
Portlandite	-11.43	11.67	23.10	Ca(OH)2
Pyrite	-238.03	-256.61	-18.59	FeS2
Pyrochroite	-6.89	8.31	15.20	Mn(OH)2
Pyrolusite	7.37	49.38	42.00	MnO2
Rhodochrosite	-1.26	-12.38	-11.12	MnCO3
Rhodochrosite(d)	-1.99	-12.38	-10.39	MnCO3
Rutherfordine	-5.02	-19.45	-14.44	UO2CO3
Schoepite	-4.29	1.23	5.52	UO2(OH)2:H2O
Siderite	-10.51	-21.38	-10.87	FeCO3
Siderite(d)(3)	-10.93	-21.38	-10.45	FeCO3
SrF2	-5.68	-14.23	-8.55	SrF2
Strontianite	-2.10	-11.37	-9.27	SrCO3
Sulfur	-105.35	-120.45	-15.10	S
Tenorite	-2.02	5.75	7.77	CuO
Thenardite	-9.23	-9.40	-0.17	Na2SO4
Thermonatrite	-11.76	-11.61	0.15	Na2CO3:H2O
Trona	-16.76	-17.39	-0.62	NaHCO3:Na2CO3:2H2O
U(OH)2SO4	-45.75	-48.95	-3.20	U(OH)2SO4
U3O8(c)	-30.92	-9.28	21.64	U3O8
U4O9(c)	-78.41	-80.82	-2.41	U4O9
UF4(c)	-59.13	-77.56	-18.42	UF4
UF4:2.5H2O	-49.99	-77.56	-27.56	UF4:2.5H2O
UO2(a)	-30.57	-30.47	0.10	UO2
UO3(gamma)	-6.68	1.23	7.90	UO3
Uraninite(c)	-25.85	-30.47	-4.62	UO2
Witherite	-3.52	-12.09	-8.57	BaCO3

80 : 20 Mix of Griswold Injection Water : Arapahoe Formation Water

Phase	SI**	log IAP	log K(291 K,	1 atm)
Acanthite	-116.40	-153.30	-36.90	Ag2S
Ag2CO3	-11.74	-22.97	-11.22	Ag2CO3
Ag2O	-14.81	-2.07	12.75	Ag2O
Ag2SO4	-15.84	-20.82	-4.99	Ag2SO4
AgF:4H2O	-13.51	-13.03	0.48	AgF:4H2O
AgMetal	-8.01	-21.92	-13.91	Ag

Al(OH)3(a)	-1.27	9.96	11.22	Al(OH)3
AlumK	-18.79	-24.08	-5.28	KAl(SO4)2:12H2O
Alunite	-3.57	-4.17	-0.60	KAl3(SO4)2(OH)6
Anglesite	-6.42	-14.25	-7.82	PbSO4
Anhydrite	-2.30	-6.64	-4.34	CaSO4
Anilite	-136.45	-169.02	-32.57	Cu0.25Cu1.5S
Antlerite	-10.75	-2.46	8.29	Cu3(OH)4SO4
Aragonite	-0.49	-8.78	-8.30	CaCO3
Artinite	-7.71	2.35	10.06	MgCO3:Mg(OH)2:3H2O
Atacamite	-7.45	0.18	7.64	Cu2(OH)3Cl
Azurite	-8.97	-4.72	4.24	Cu3(OH)2(CO3)2
B-UO2(OH)2	-4.32	1.45	5.76	UO2(OH)2
BaF2	-9.42	-15.20	-5.78	BaF2
Barite	0.11	-9.96	-10.08	BaSO4
Basaluminite	-1.64	21.06	22.70	Al4(OH)10SO4
Birnessite	6.44	50.04	43.60	MnO2
Bixbyite	6.83	6.46	-0.37	Mn2O3
BlaubleiI	-124.73	-148.90	-24.16	Cu0.9Cu0.2S
BlaubleiII	-130.91	-158.18	-27.28	Cu0.6Cu0.8S
Boehmite	0.92	9.96	9.03	AlOOH
Brochantite	-12.36	2.98	15.34	Cu4(OH)6SO4
Brucite	-5.64	11.63	17.27	Mg(OH)2
Calcite	-0.34	-8.78	-8.45	CaCO3
Celestite	-2.45	-9.07	-6.62	SrSO4
Cerargyrite	-1.72	-11.72	-10.00	AgCl
Cerussite	-3.18	-16.39	-13.21	PbCO3
CH4(g)	-143.18	-145.99	-2.81	CH4
Chalcanthite	-10.66	-13.32	-2.66	CuSO4:5H2O
Chalcocite	-141.36	-176.76	-35.40	Cu2S
Chalcopyrite	-262.40	-298.24	-35.84	CuFeS2
CO2(g)	-2.73	-4.12	-1.39	CO2
Cotunnite	-12.00	-16.86	-4.86	PbCl2
Covellite	-123.15	-145.80	-22.65	CuS
Cu(OH)2	-3.45	5.43	8.88	Cu(OH)2
Cu2(OH)3NO3	-10.74	-1.22	9.52	Cu2(OH)3NO3
Cu2SO4	-42.41	-44.29	-1.88	Cu2SO4
CuCO3	-5.84	-15.47	-9.63	CuCO3
CuF	-32.04	-24.76	7.28	CuF
CuF2	-18.15	-18.56	-0.41	CuF2
CuF2:2H2O	-14.07	-18.56	-4.49	CuF2:2H2O
CuMetal	-24.62	-33.66	-9.03	Cu
CuOCuSO4	-19.99	-7.89	12.10	CuO:CuSO4
CupricFerrite	11.96	18.46	6.50	CuFe2O4
Cuprite	-23.88	-25.53	-1.65	Cu2O
CuprousFerrite	2.61	-6.25	-8.86	CuFeO2
CuSO4	-16.62	-13.32	3.30	CuSO4
Diaspore	2.68	9.96	7.27	AlOOH
Djurleite	-140.04	-174.72	-34.68	Cu0.066Cu1.868S
Dolomite	-1.12	-18.06	-16.94	CaMg(CO3)2
Dolomite(d)	-1.69	-18.06	-16.36	CaMg(CO3)2
Epsomite	-4.95	-7.13	-2.18	MgSO4:7H2O
Fe(OH)2.7Cl.3	6.35	3.31	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.62	6.51	4.89	Fe(OH)3
Fe3(OH)8	-8.40	11.82	20.22	Fe3(OH)8
FeS(ppt)	-148.52	-152.44	-3.92	FeS
Fluorite	-1.20	-11.87	-10.68	CaF2
Galena	-133.64	-146.72	-13.09	PbS

Gibbsite	1.48	9.96	8.47	Al(OH)3
Goethite	7.28	6.51	-0.77	FeOOH
Greigite	-548.08	-593.11	-45.03	Fe3S4
Gummite	-9.32	1.45	10.77	UO3
Gypsum	-2.06	-6.64	-4.58	CaSO4:2H2O
H2(g)	-41.78	-44.91	-3.12	H2
H2O(g)	-1.68	-0.00	1.68	H2O
H2S(g)	-143.28	-144.20	-0.92	H2S
Halite	-7.52	-5.95	1.57	NaCl
Hausmannite	3.93	66.57	62.63	Mn3O4
Hematite	16.54	13.03	-3.52	Fe2O3
Huntite	-7.05	-36.61	-29.56	CaMg3(CO3)4
Hydrocerussite	-10.82	-28.28	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-17.54	-25.47	-7.93	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-5.32	-15.15	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-5.78	-14.50	-8.71	KFe3(SO4)2(OH)6
Jarosite-Na	-8.54	-13.25	-4.70	NaFe3(SO4)2(OH)6
JarositeH	-13.46	-17.98	-4.51	(H3O)Fe3(SO4)2(OH)6
Jurbanite	-5.57	-8.80	-3.23	AlOHSO4
Langite	-14.45	2.98	17.42	Cu4(OH)6SO4:H2O
Larnakite	-9.56	-9.74	-0.18	PbO:PbSO4
Laurionite	-6.80	-6.17	0.62	PbOHCl
Litharge	-8.47	4.51	12.98	PbO
Mackinawite	-147.79	-152.44	-4.65	FeS
Maghemite	6.64	13.03	6.39	Fe2O3
Magnesite	-1.34	-9.27	-7.93	MgCO3
Magnetite	7.28	11.82	4.54	Fe3O4
Malachite	-5.11	0.35	5.46	Cu2(OH)2CO3
Manganite	3.81	29.15	25.34	MnOOH
Massicot	-8.67	4.51	13.18	PbO
Matlockite	-8.61	-18.17	-9.56	PbClF
Melanothallite	-19.86	-15.93	3.93	CuCl2
Melanterite	-17.67	-19.96	-2.29	FeSO4:7H2O
Minium	-20.02	55.31	75.33	Pb3O4
Mirabilite	-7.88	-9.30	-1.42	Na2SO4:10H2O
Mn2(SO4)3	-44.72	-49.81	-5.09	Mn2(SO4)3
MnCl2:4H2O	-15.54	-13.11	2.43	MnCl2:4H2O
MnS(Green)	-146.86	-142.97	3.89	MnS
MnSO4	-13.41	-10.50	2.92	MnSO4
N2(g)	-17.81	-21.05	-3.24	N2
Na4UO2(CO3)3	-26.05	-42.34	-16.29	Na4UO2(CO3)3
Nahcolite	-5.18	-5.78	-0.61	NaHCO3
Nantokite	-16.53	-23.45	-6.92	CuCl
Natron	-9.88	-11.44	-1.56	Na2CO3:10H2O
Nesquehonite	-3.75	-9.27	-5.53	MgCO3:3H2O
NH3(g)	-68.51	-66.61	1.90	NH3
Nsutite	7.48	50.04	42.56	MnO2
O2(g)	-1.82	-4.66	-2.84	O2
Pb(OH)2	-3.86	4.51	8.37	Pb(OH)2
Pb2(OH)3Cl	-10.46	-1.67	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-17.18	9.02	26.20	PbO:Pb(OH)2
Pb2O3	-10.24	50.80	61.04	Pb2O3
Pb2OCO3	-11.57	-11.88	-0.32	PbO:PbCO3
Pb3O2CO3	-18.82	-7.37	11.44	PbCO3:2PbO
Pb3O2SO4	-15.96	-5.23	10.73	PbSO4:2PbO
Pb4(OH)6SO4	-21.82	-0.72	21.10	Pb4(OH)6SO4
Pb4O3SO4	-23.38	-0.72	22.66	PbSO4:3PbO

PbF2	-12.05	-19.48	-7.43	PbF2
PbMetal	-41.54	-37.27	4.26	Pb
PbO:0.3H2O	-8.47	4.51	12.98	PbO:0.33H2O
Phosgenite	-13.44	-33.25	-19.81	PbCl2:PbCO3
Plattnerite	-4.13	46.29	50.43	PbO2
Portlandite	-11.18	12.12	23.29	Ca(OH)2
Pyrite	-243.23	-261.89	-18.66	FeS2
Pyrochroite	-6.94	8.26	15.20	Mn(OH)2
Pyrolusite	7.63	50.04	42.42	MnO2
Rhodochrosite	-1.53	-12.64	-11.11	MnCO3
Rhodochrosite(d)	-2.25	-12.64	-10.39	MnCO3
Rutherfordine	-5.03	-19.46	-14.43	UO2CO3
Schoepite	-4.15	1.45	5.60	UO2(OH)2:H2O
Siderite	-11.25	-22.11	-10.85	FeCO3
Siderite(d)(3)	-11.66	-22.11	-10.45	FeCO3
SrF2	-5.74	-14.30	-8.56	SrF2
Strontianite	-1.94	-11.21	-9.27	SrCO3
Sulfur	-107.41	-122.56	-15.15	S
Tenorite	-2.43	5.43	7.86	CuO
Thenardite	-9.13	-9.30	-0.17	Na2SO4
Thermonatrite	-11.61	-11.44	0.17	Na2CO3:H2O
Trona	-16.72	-17.23	-0.51	NaHCO3:Na2CO3:2H2O
U(OH)2SO4	-46.31	-49.51	-3.20	U(OH)2SO4
U3O8(c)	-31.06	-8.68	22.38	U3O8
U4O9(c)	-79.44	-81.21	-1.77	U4O9
UF4(c)	-60.43	-78.73	-18.31	UF4
UF4:2.5H2O	-51.17	-78.73	-27.56	UF4:2.5H2O
UO2(a)	-30.85	-30.75	0.10	UO2
UO3(gamma)	-6.58	1.45	8.03	UO3
Uraninite(c)	-26.25	-30.75	-4.50	UO2
Witherite	-3.53	-12.11	-8.58	BaCO3

20 : 80 Mix of Griswold Injection Water : Denver Formation Water

Phase	SI**	log IAP	log K(290 K, 1 atm)	
Acanthite	-116.62	-153.67	-37.05	Ag2S
Ag2CO3	-12.83	-24.07	-11.25	Ag2CO3
Ag2O	-16.53	-3.76	12.78	Ag2O
Ag2SO4	-16.67	-21.67	-5.00	Ag2SO4
AgF:4H2O	-13.72	-13.25	0.47	AgF:4H2O
AgMetal	-8.75	-22.73	-13.98	Ag
Al(OH)3(a)	-1.41	9.89	11.30	Al(OH)3
AlumK	-17.68	-22.98	-5.31	KAl(SO4)2:12H2O
Alunite	-2.76	-3.21	-0.46	KAl3(SO4)2(OH)6
Anglesite	-5.60	-13.43	-7.83	PbSO4
Anhydrite	-2.73	-7.07	-4.34	CaSO4
Aragonite	-1.18	-9.47	-8.29	CaCO3
Artinite	-10.00	0.14	10.14	MgCO3:Mg(OH)2:3H2O
B-UO2(OH)2	-4.97	0.83	5.80	UO2(OH)2
BaF2	-9.04	-14.82	-5.78	BaF2
Barite	0.11	-9.98	-10.10	BaSO4
Basaluminite	-1.08	21.62	22.70	Al4(OH)10SO4
Birnessite	5.65	49.25	43.60	MnO2
Bixbyite	5.14	4.81	-0.33	Mn2O3
Boehmite	0.77	9.89	9.11	AlOOH

Brucite	-7.12	10.23	17.35	Mg(OH)2
Calcite	-1.03	-9.47	-8.44	CaCO3
Celestite	-2.65	-9.27	-6.62	SrSO4
Cerargyrite	-2.52	-12.57	-10.04	AgCl
Cerussite	-2.61	-15.83	-13.22	PbCO3
CH4(g)	-142.12	-144.92	-2.80	CH4
CO2(g)	-2.14	-3.52	-1.38	CO2
Cotunnite	-12.02	-16.90	-4.88	PbCl2
Diaspore	2.54	9.89	7.34	AlOOH
Dolomite	-2.64	-19.55	-16.91	CaMg(CO3)2
Dolomite(d)	-3.22	-19.55	-16.33	CaMg(CO3)2
Epsomite	-5.49	-7.69	-2.19	MgSO4:7H2O
Fe(OH)2.7Cl.3	6.44	3.40	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.71	6.60	4.89	Fe(OH)3
Fe3(OH)8	-8.06	12.16	20.22	Fe3(OH)8
FeS(ppt)	-147.04	-150.96	-3.92	FeS
Fluorite	-1.21	-11.90	-10.69	CaF2
Galena	-132.28	-145.43	-13.14	PbS
Gibbsite	1.35	9.89	8.54	Al(OH)3
Goethite	7.33	6.60	-0.73	FeOOH
Greigite	-542.44	-587.48	-45.03	Fe3S4
Gummite	-10.00	0.83	10.83	UO3
Gypsum	-2.49	-7.07	-4.58	CaSO4:2H2O
H2(g)	-41.70	-44.82	-3.12	H2
H2O(g)	-1.71	-0.00	1.71	H2O
H2S(g)	-141.95	-142.86	-0.91	H2S
Halite	-7.85	-6.29	1.56	NaCl
Hausmannite	1.43	64.35	62.92	Mn3O4
Hematite	16.64	13.21	-3.43	Fe2O3
Huntite	-10.24	-39.73	-29.48	CaMg3(CO3)4
Hydrocerussite	-9.73	-27.19	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-22.33	-30.12	-7.78	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-3.78	-13.61	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-4.44	-13.06	-8.62	KFe3(SO4)2(OH)6
Jarosite-Na	-7.02	-11.62	-4.60	NaFe3(SO4)2(OH)6
JarositeH	-11.67	-16.03	-4.36	(H3O)Fe3(SO4)2(OH)6
Jurbanite	-4.80	-8.03	-3.23	AlOHSO4
Larnakite	-8.79	-8.95	-0.16	PbO:PbSO4
Laurionite	-6.83	-6.21	0.62	PbOHCl
Litharge	-8.54	4.48	13.03	PbO
Mackinawite	-146.31	-150.96	-4.65	FeS
Maghemite	6.82	13.21	6.39	Fe2O3
Magnesite	-2.17	-10.09	-7.91	MgCO3
Magnetite	7.47	12.16	4.68	Fe3O4
Manganite	3.06	28.40	25.34	MnOOH
Massicot	-8.74	4.48	13.22	PbO
Matlockite	-8.00	-17.58	-9.58	PbClF
Melanterite	-16.66	-18.96	-2.30	FeSO4:7H2O
Minium	-20.47	55.15	75.62	Pb3O4
Mirabilite	-7.64	-9.11	-1.47	Na2SO4:10H2O
Mn2(SO4)3	-43.96	-48.94	-4.98	Mn2(SO4)3
MnCl2:4H2O	-16.22	-13.83	2.38	MnCl2:4H2O
MnS(Green)	-146.27	-142.36	3.91	MnS
MnSO4	-13.33	-10.37	2.96	MnSO4
N2(g)	-16.74	-19.97	-3.23	N2
Na4UO2(CO3)3	-26.22	-42.51	-16.29	Na4UO2(CO3)3
Nahcolite	-4.89	-5.51	-0.62	NaHCO3

Natron	-9.90	-11.51	-1.61	Na2CO3:10H2O
Nesquehonite	-4.57	-10.09	-5.51	MgCO3:3H2O
NH3(g)	-67.83	-65.90	1.92	NH3
Nsutite	6.69	49.25	42.56	MnO2
O2(g)	-2.37	-5.20	-2.83	O2
Pb(BO2)2	-13.95	-6.23	7.72	Pb(BO2)2
Pb(OH)2	-3.93	4.48	8.41	Pb(OH)2
Pb2(OH)3Cl	-10.52	-1.73	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-17.24	8.96	26.20	PbO:Pb(OH)2
Pb2O3	-10.37	50.67	61.04	Pb2O3
Pb2OCO3	-11.07	-11.35	-0.29	PbO:PbCO3
Pb3O2CO3	-18.39	-6.87	11.52	PbCO3:2PbO
Pb3O2SO4	-15.26	-4.47	10.79	PbSO4:2PbO
Pb4(OH)6SO4	-21.09	0.01	21.10	Pb4(OH)6SO4
Pb4O3SO4	-22.75	0.01	22.76	PbSO4:3PbO
PbF2	-10.84	-18.27	-7.43	PbF2
PbMetal	-41.48	-37.22	4.26	Pb
PbO:0.3H2O	-8.50	4.48	12.98	PbO:0.33H2O
Phosgenite	-12.92	-32.73	-19.81	PbCl2:PbCO3
Plattnerite	-4.44	46.19	50.63	PbO2
Portlandite	-12.53	10.85	23.38	Ca(OH)2
Pyrite	-240.47	-259.16	-18.69	FeS2
Pyrochroite	-7.65	7.55	15.20	Mn(OH)2
Pyrolusite	6.65	49.25	42.60	MnO2
Rhodochrosite	-1.67	-12.77	-11.10	MnCO3
Rhodochrosite(d)	-2.38	-12.77	-10.39	MnCO3
Rutherfordine	-5.06	-19.49	-14.42	UO2CO3
Schoepite	-4.80	0.83	5.63	UO2(OH)2:H2O
Siderite	-10.52	-21.36	-10.84	FeCO3
Siderite(d)(3)	-10.91	-21.36	-10.45	FeCO3
SrF2	-5.55	-14.11	-8.56	SrF2
Strontianite	-2.40	-11.68	-9.27	SrCO3
Sulfur	-106.18	-121.35	-15.17	S
Thenardite	-8.94	-9.11	-0.17	Na2SO4
Thermonatrite	-11.69	-11.51	0.18	Na2CO3:H2O
Trona	-16.56	-17.02	-0.46	NaHCO3:Na2CO3:2H2O
U(OH)2SO4	-45.91	-49.11	-3.20	U(OH)2SO4
U3O8(c)	-32.86	-10.16	22.71	U3O8
U4O9(c)	-81.56	-83.05	-1.48	U4O9
UF4(c)	-58.44	-76.69	-18.25	UF4
UF4:2.5H2O	-49.13	-76.69	-27.56	UF4:2.5H2O
UO2(a)	-31.29	-31.19	0.10	UO2
UO3(gamma)	-7.25	0.83	8.08	UO3
Uraninite(c)	-26.74	-31.19	-4.45	UO2
Witherite	-3.80	-12.38	-8.58	BaCO3

50 : 50 Mix of Griswold Injection Water : Denver Formation Water

Phase	SI**	log IAP	log K(290 K,	1 atm)
Acanthite	-116.93	-154.00	-37.08	Ag2S
Ag2CO3	-12.24	-23.49	-11.25	Ag2CO3
Ag2O	-15.79	-3.01	12.78	Ag2O
Ag2SO4	-16.08	-21.08	-5.00	Ag2SO4
AgF:4H2O	-13.53	-13.06	0.47	AgF:4H2O
AgMetal	-8.48	-22.47	-14.00	Ag

Al(OH)3(a)	-1.07	10.24	11.31	Al(OH)3
AlumK	-17.52	-22.82	-5.31	KAl(SO4)2:12H2O
Alunite	-1.91	-2.34	-0.43	KAl3(SO4)2(OH)6
Anglesite	-5.78	-13.62	-7.83	PbSO4
Anhydrite	-2.49	-6.82	-4.34	CaSO4
Aragonite	-0.94	-9.23	-8.29	CaCO3
Artinite	-9.19	0.96	10.15	MgCO3:Mg(OH)2:3H2O
B-UO2(OH)2	-4.55	1.26	5.81	UO2(OH)2
BaF2	-9.23	-15.01	-5.78	BaF2
Barite	0.13	-9.97	-10.10	BaSO4
Basaluminite	0.18	22.88	22.70	Al4(OH)10SO4
Birnessite	5.96	49.56	43.60	MnO2
Bixbyite	5.47	5.15	-0.32	Mn2O3
Boehmite	1.11	10.24	9.13	AlOOH
Brucite	-6.64	10.73	17.36	Mg(OH)2
Calcite	-0.79	-9.23	-8.44	CaCO3
Celestite	-2.53	-9.16	-6.62	SrSO4
Cerargyrite	-1.94	-11.99	-10.05	AgCl
Cerussite	-2.80	-16.02	-13.22	PbCO3
CH4(g)	-143.22	-146.02	-2.79	CH4
CO2(g)	-2.31	-3.68	-1.37	CO2
Cotunnite	-11.63	-16.51	-4.88	PbCl2
Diaspore	2.88	10.24	7.36	AlOOH
Dolomite	-2.09	-18.99	-16.91	CaMg(CO3)2
Dolomite(d)	-2.67	-18.99	-16.33	CaMg(CO3)2
Epsomite	-5.16	-7.35	-2.19	MgSO4:7H2O
Fe(OH)2.7Cl.3	6.36	3.32	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.58	6.47	4.89	Fe(OH)3
Fe3(OH)8	-8.58	11.64	20.22	Fe3(OH)8
FeS(ppt)	-148.38	-152.30	-3.92	FeS
Fluorite	-1.17	-11.86	-10.69	CaF2
Galena	-133.38	-146.54	-13.15	PbS
Gibbsite	1.69	10.24	8.55	Al(OH)3
Goethite	7.19	6.47	-0.72	FeOOH
Greigite	-547.32	-592.36	-45.03	Fe3S4
Gummite	-9.58	1.26	10.85	UO3
Gypsum	-2.24	-6.82	-4.58	CaSO4:2H2O
H2(g)	-41.94	-45.06	-3.12	H2
H2O(g)	-1.71	-0.00	1.71	H2O
H2S(g)	-143.04	-143.95	-0.91	H2S
Halite	-7.57	-6.01	1.56	NaCl
Hausmannite	1.81	64.78	62.97	Mn3O4
Hematite	16.35	12.94	-3.41	Fe2O3
Huntite	-9.05	-38.52	-29.47	CaMg3(CO3)4
Hydrocerussite	-10.12	-27.58	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-20.57	-28.32	-7.75	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-4.40	-14.23	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-5.05	-13.66	-8.61	KFe3(SO4)2(OH)6
Jarosite-Na	-7.69	-12.27	-4.58	NaFe3(SO4)2(OH)6
JarositeH	-12.43	-16.75	-4.33	(H3O)Fe3(SO4)2(OH)6
Jurbanite	-4.61	-7.84	-3.23	AlOHSO4
Larnakite	-9.00	-9.15	-0.16	PbO:PbSO4
Laurionite	-6.65	-6.02	0.62	PbOHCl
Litharge	-8.57	4.46	13.04	PbO
Mackinawite	-147.65	-152.30	-4.65	FeS
Maghemite	6.55	12.94	6.39	Fe2O3
Magnesite	-1.85	-9.76	-7.91	MgCO3

Magnetite	6.93	11.64	4.71	Fe3O4
Manganite	3.24	28.58	25.34	MnOOH
Massicot	-8.77	4.46	13.23	PbO
Matlockite	-8.00	-17.58	-9.58	PbClF
Melanterite	-17.07	-19.38	-2.31	FeSO4:7H2O
Minium	-20.34	55.33	75.67	Pb3O4
Mirabilite	-7.64	-9.12	-1.48	Na2SO4:10H2O
Mn2(SO4)3	-44.13	-49.09	-4.96	Mn2(SO4)3
MnCl2:4H2O	-15.74	-13.36	2.37	MnCl2:4H2O
MnS(Green)	-147.30	-143.39	3.91	MnS
MnSO4	-13.44	-10.47	2.97	MnSO4
N2(g)	-17.26	-20.49	-3.23	N2
Na4UO2(CO3)3	-25.99	-42.28	-16.29	Na4UO2(CO3)3
Nahcolite	-4.98	-5.60	-0.62	NaHCO3
Natron	-9.91	-11.53	-1.61	Na2CO3:10H2O
Nesquehonite	-4.25	-9.76	-5.51	MgCO3:3H2O
NH3(g)	-68.44	-66.51	1.93	NH3
Nsutite	6.99	49.56	42.56	MnO2
O2(g)	-1.96	-4.79	-2.83	O2
Pb(BO2)2	-14.38	-6.66	7.72	Pb(BO2)2
Pb(OH)2	-3.96	4.46	8.42	Pb(OH)2
Pb2(OH)3Cl	-10.35	-1.56	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-17.27	8.93	26.20	PbO:Pb(OH)2
Pb2O3	-10.17	50.87	61.04	Pb2O3
Pb2OCO3	-11.28	-11.56	-0.28	PbO:PbCO3
Pb3O2CO3	-18.63	-7.10	11.53	PbCO3:2PbO
Pb3O2SO4	-15.49	-4.69	10.80	PbSO4:2PbO
Pb4(OH)6SO4	-21.33	-0.23	21.10	Pb4(OH)6SO4
Pb4O3SO4	-23.00	-0.23	22.78	PbSO4:3PbO
PbF2	-11.23	-18.66	-7.43	PbF2
PbMetal	-41.74	-37.48	4.26	Pb
PbO:0.3H2O	-8.52	4.46	12.98	PbO:0.33H2O
Phosgenite	-12.72	-32.53	-19.81	PbCl2:PbCO3
Plattnerite	-4.26	46.41	50.67	PbO2
Portlandite	-12.14	11.26	23.40	Ca(OH)2
Pyrite	-242.65	-261.35	-18.70	FeS2
Pyrochroite	-7.59	7.61	15.20	Mn(OH)2
Pyrolusite	6.92	49.56	42.64	MnO2
Rhodochrosite	-1.77	-12.88	-11.10	MnCO3
Rhodochrosite(d)	-2.49	-12.88	-10.39	MnCO3
Rutherfordine	-4.80	-19.22	-14.42	UO2CO3
Schoepite	-4.37	1.26	5.64	UO2(OH)2:H2O
Siderite	-10.94	-21.78	-10.84	FeCO3
Siderite(d)(3)	-11.33	-21.78	-10.45	FeCO3
SrF2	-5.63	-14.20	-8.56	SrF2
Strontianite	-2.29	-11.56	-9.27	SrCO3
Sulfur	-107.03	-122.21	-15.18	S
Thenardite	-8.95	-9.12	-0.17	Na2SO4
Thermonatrite	-11.70	-11.53	0.18	Na2CO3:H2O
Trona	-16.68	-17.13	-0.45	NaHCO3:Na2CO3:2H2O
U(OH)2SO4	-45.86	-49.06	-3.20	U(OH)2SO4
U3O8(c)	-31.81	-9.04	22.77	U3O8
U4O9(c)	-80.54	-81.97	-1.43	U4O9
UF4(c)	-58.97	-77.22	-18.24	UF4
UF4:2.5H2O	-49.66	-77.22	-27.56	UF4:2.5H2O
UO2(a)	-31.08	-30.98	0.10	UO2
UO3(gamma)	-6.83	1.26	8.09	UO3

Uraninite(c)	-26.54	-30.98	-4.44	UO2
Witherite	-3.79	-12.38	-8.59	BaCO3

80 : 20 Mix of Griswold Injection Water : Denver Formation Water

Phase	SI**	log IAP	log K(290 K,	1 atm)
Acanthite	-117.18	-154.29	-37.11	Ag2S
Ag2CO3	-11.87	-23.12	-11.26	Ag2CO3
Ag2O	-15.15	-2.37	12.79	Ag2O
Ag2SO4	-15.83	-20.84	-5.00	Ag2SO4
AgF:4H2O	-13.49	-13.03	0.47	AgF:4H2O
AgMetal	-8.21	-22.23	-14.01	Ag
Al(OH)3(a)	-1.07	10.26	11.33	Al(OH)3
AlumK	-18.05	-23.36	-5.31	KAl(SO4)2:12H2O
Alunite	-2.45	-2.85	-0.40	KAl3(SO4)2(OH)6
Anglesite	-6.28	-14.11	-7.83	PbSO4
Anhydrite	-2.31	-6.64	-4.34	CaSO4
Aragonite	-0.64	-8.93	-8.29	CaCO3
Artinite	-8.24	1.93	10.17	MgCO3:Mg(OH)2:3H2O
B-UO2(OH)2	-4.34	1.48	5.82	UO2(OH)2
BaF2	-9.45	-15.23	-5.78	BaF2
Barite	0.09	-10.01	-10.10	BaSO4
Basaluminite	-0.15	22.55	22.70	Al4(OH)10SO4
Birnessite	6.16	49.76	43.60	MnO2
Bixbyite	5.69	5.39	-0.31	Mn2O3
Boehmite	1.11	10.26	9.14	AlOOH
Brucite	-6.04	11.34	17.38	Mg(OH)2
Calcite	-0.49	-8.93	-8.44	CaCO3
Celestite	-2.45	-9.07	-6.62	SrSO4
Cerargyrite	-1.66	-11.72	-10.06	AgCl
Cerussite	-3.18	-16.40	-13.23	PbCO3
CH4(g)	-144.02	-146.81	-2.79	CH4
CO2(g)	-2.58	-3.95	-1.37	CO2
Cotunnite	-11.84	-16.72	-4.88	PbCl2
Diaspore	2.89	10.26	7.37	AlOOH
Dolomite	-1.44	-18.35	-16.90	CaMg(CO3)2
Dolomite(d)	-2.03	-18.35	-16.32	CaMg(CO3)2
Epsomite	-4.93	-7.13	-2.20	MgSO4:7H2O
Fe(OH)2.7Cl.3	6.04	3.00	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.27	6.16	4.89	Fe(OH)3
Fe3(OH)8	-9.58	10.65	20.22	Fe3(OH)8
FeS(ppt)	-149.67	-153.59	-3.92	FeS
Fluorite	-1.17	-11.86	-10.70	CaF2
Galena	-134.40	-147.56	-13.17	PbS
Gibbsite	1.69	10.26	8.56	Al(OH)3
Goethite	6.87	6.16	-0.71	FeOOH
Greigite	-551.99	-597.03	-45.03	Fe3S4
Gummite	-9.38	1.48	10.86	UO3
Gypsum	-2.06	-6.64	-4.58	CaSO4:2H2O
H2(g)	-42.08	-45.20	-3.12	H2
H2O(g)	-1.72	-0.00	1.72	H2O
H2S(g)	-143.96	-144.87	-0.91	H2S
Halite	-7.46	-5.89	1.56	NaCl
Hausmannite	2.07	65.10	63.03	Mn3O4
Hematite	15.71	12.32	-3.40	Fe2O3

Huntite	-7.72	-37.18	-29.46	CaMg3(CO3)4
Hydrocerussite	-10.99	-28.45	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-18.60	-26.32	-7.73	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-5.94	-15.77	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-6.55	-15.14	-8.59	KFe3(SO4)2(OH)6
Jarosite-Na	-9.26	-13.82	-4.56	NaFe3(SO4)2(OH)6
JarositeH	-14.17	-18.47	-4.30	(H3O)Fe3(SO4)2(OH)6
Jurbanite	-4.99	-8.22	-3.23	AlOHSO4
Larnakite	-9.61	-9.76	-0.15	PbO:PbSO4
Laurionite	-6.81	-6.18	0.62	PbOHCl
Litharge	-8.69	4.36	13.05	PbO
Mackinawite	-148.94	-153.59	-4.65	FeS
Maghemite	5.93	12.32	6.39	Fe2O3
Magnesite	-1.51	-9.42	-7.91	MgCO3
Magnetite	5.91	10.65	4.74	Fe3O4
Manganite	3.37	28.71	25.34	MnOOH
Massicot	-8.89	4.36	13.24	PbO
Matlockite	-8.44	-18.03	-9.59	PbClF
Melanterite	-17.83	-20.14	-2.31	FeSO4:7H2O
Minium	-20.57	55.15	75.73	Pb3O4
Mirabilite	-7.69	-9.18	-1.49	Na2SO4:10H2O
Mn2(SO4)3	-45.09	-50.03	-4.94	Mn2(SO4)3
MnCl2:4H2O	-15.77	-13.41	2.37	MnCl2:4H2O
MnS(Green)	-148.16	-144.25	3.91	MnS
MnSO4	-13.78	-10.80	2.98	MnSO4
N2(g)	-17.86	-21.10	-3.23	N2
Na4UO2(CO3)3	-25.92	-42.21	-16.29	Na4UO2(CO3)3
Nahcolite	-5.08	-5.71	-0.62	NaHCO3
Natron	-9.84	-11.46	-1.62	Na2CO3:10H2O
Nesquehonite	-3.91	-9.42	-5.51	MgCO3:3H2O
NH3(g)	-68.95	-67.02	1.93	NH3
Nsutite	7.19	49.76	42.56	MnO2
O2(g)	-1.76	-4.59	-2.83	O2
Pb(BO2)2	-15.29	-7.57	7.73	Pb(BO2)2
Pb(OH)2	-4.07	4.36	8.43	Pb(OH)2
Pb2(OH)3Cl	-10.62	-1.83	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-17.49	8.71	26.20	PbO:Pb(OH)2
Pb2O3	-10.24	50.80	61.04	Pb2O3
Pb2OCO3	-11.77	-12.04	-0.27	PbO:PbCO3
Pb3O2CO3	-19.23	-7.69	11.54	PbCO3:2PbO
Pb3O2SO4	-16.21	-5.40	10.81	PbSO4:2PbO
Pb4(OH)6SO4	-22.14	-1.04	21.10	Pb4(OH)6SO4
Pb4O3SO4	-23.84	-1.04	22.80	PbSO4:3PbO
PbF2	-11.91	-19.34	-7.43	PbF2
PbMetal	-41.99	-37.73	4.26	Pb
PbO:0.3H2O	-8.62	4.36	12.98	PbO:0.33H2O
Phosgenite	-13.31	-33.12	-19.81	PbCl2:PbCO3
Plattnerite	-4.26	46.44	50.70	PbO2
Portlandite	-11.59	11.83	23.42	Ca(OH)2
Pyrite	-244.72	-263.42	-18.70	FeS2
Pyrochroite	-7.53	7.67	15.20	Mn(OH)2
Pyrolusite	7.08	49.76	42.67	MnO2
Rhodochrosite	-1.98	-13.09	-11.10	MnCO3
Rhodochrosite(d)	-2.70	-13.09	-10.39	MnCO3
Rutherfordine	-4.86	-19.28	-14.42	UO2CO3
Schoepite	-4.17	1.48	5.64	UO2(OH)2:H2O
Siderite	-11.59	-22.43	-10.84	FeCO3

Siderite(d)(3)	-11.98	-22.43	-10.45	FeCO3
SrF2	-5.72	-14.29	-8.56	SrF2
Strontianite	-2.08	-11.35	-9.27	SrCO3
Sulfur	-107.81	-122.99	-15.18	S
Thenardite	-9.01	-9.18	-0.17	Na2SO4
Thermonatrite	-11.64	-11.46	0.18	Na2CO3:H2O
Trona	-16.73	-17.17	-0.44	NaHCO3:Na2CO3:2H2O
U(OH)2SO4	-46.16	-49.36	-3.20	U(OH)2SO4
U3O8(c)	-31.32	-8.48	22.83	U3O8
U4O9(c)	-80.08	-81.45	-1.37	U4O9
UF4(c)	-60.04	-78.27	-18.23	UF4
UF4:2.5H2O	-50.71	-78.27	-27.56	UF4:2.5H2O
UO2(a)	-30.98	-30.88	0.10	UO2
UO3(gamma)	-6.63	1.48	8.10	UO3
Uraninite(c)	-26.45	-30.88	-4.43	UO2
Witherite	-3.71	-12.30	-8.59	BaCO3

20 : 80 Mix of Quebec St. Injection Water : Arapahoe Formation Water

Phase	SI**	log IAP	log K(296 K,	1 atm)
Anglesite	-6.05	-13.84	-7.80	PbSO4
Anhydrite	-2.88	-7.24	-4.36	CaSO4
Anilite	-118.34	-150.37	-32.02	Cu0.25Cu1.5S
Antlerite	-9.21	-0.92	8.29	Cu3(OH)4SO4
Aragonite	-0.86	-9.19	-8.33	CaCO3
Artinite	-9.11	0.59	9.70	MgCO3:Mg(OH)2:3H2O
Atacamite	-7.74	-0.34	7.40	Cu2(OH)3Cl
Azurite	-6.58	-2.73	3.85	Cu3(OH)2(CO3)2
BaF2	-8.90	-14.66	-5.76	BaF2
Barite	0.03	-9.96	-9.99	BaSO4
Birnessite	2.68	46.28	43.60	MnO2
Bixbyite	4.02	3.46	-0.56	Mn2O3
BlaubleiI	-108.92	-133.08	-24.16	Cu0.9Cu0.2S
BlaubleiII	-113.78	-141.06	-27.28	Cu0.6Cu0.8S
Brochantite	-10.37	4.97	15.34	Cu4(OH)6SO4
Brucite	-6.37	10.56	16.93	Mg(OH)2
Calcite	-0.72	-9.19	-8.47	CaCO3
Celestite	-2.76	-9.39	-6.63	SrSO4
Cerussite	-2.65	-15.80	-13.15	PbCO3
CH4(g)	-128.04	-130.89	-2.85	CH4
Chalcanthite	-10.05	-12.70	-2.64	CuSO4:5H2O
Chalcocite	-122.23	-157.01	-34.78	Cu2S
Chalcopyrite	-230.48	-265.87	-35.39	CuFeS2
CO2(g)	-2.39	-3.84	-1.45	CO2
Cotunnite	-14.70	-19.49	-4.79	PbCl2
Covellite	-108.07	-130.42	-22.35	CuS
Cu(OH)2	-2.80	5.89	8.69	Cu(OH)2
Cu2(OH)3NO3	-10.05	-0.76	9.30	Cu2(OH)3NO3
Cu2SO4	-37.35	-39.29	-1.93	Cu2SO4
CuCO3	-5.02	-14.65	-9.63	CuCO3
CuF	-29.12	-22.00	7.12	CuF
CuF2	-16.83	-17.40	-0.58	CuF2
CuF2:2H2O	-12.86	-17.40	-4.54	CuF2:2H2O
CuMetal	-20.49	-29.31	-8.82	Cu
CuOCuSO4	-18.46	-6.81	11.65	CuO:CuSO4

CupricFerrite	13.42	19.43	6.01	CuFe2O4
Cuprite	-19.13	-20.70	-1.57	Cu2O
CuprousFerrite	5.32	-3.58	-8.91	CuFeO2
CuSO4	-15.77	-12.70	3.07	CuSO4
Djurleite	-121.18	-155.26	-34.08	Cu0.066Cu1.868S
Dolomite	-2.11	-19.17	-17.06	CaMg(CO3)2
Dolomite(d)	-2.66	-19.17	-16.50	CaMg(CO3)2
Epsomite	-5.87	-8.02	-2.15	MgSO4:7H2O
Fe(OH)2.7Cl.3	6.18	3.14	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.88	6.77	4.89	Fe(OH)3
Fe3(OH)8	-5.82	14.41	20.22	Fe3(OH)8
FeS(ppt)	-131.53	-135.44	-3.92	FeS
Fluorite	-1.33	-11.94	-10.62	CaF2
Galena	-118.73	-131.57	-12.85	PbS
Goethite	7.72	6.77	-0.95	FeOOH
Greigite	-485.81	-530.84	-45.03	Fe3S4
Gypsum	-2.66	-7.24	-4.58	CaSO4:2H2O
H2(g)	-37.91	-41.05	-3.14	H2
H2O(g)	-1.55	-0.00	1.55	H2O
H2S(g)	-128.37	-129.35	-0.98	H2S
Halite	-9.24	-7.66	1.58	NaCl
Hausmannite	1.66	63.02	61.37	Mn3O4
Hematite	17.44	13.54	-3.90	Fe2O3
Huntite	-9.24	-39.12	-29.88	CaMg3(CO3)4
Hydrocerussite	-9.40	-26.86	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-20.75	-29.34	-8.59	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-4.36	-14.19	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-4.46	-13.56	-9.10	KFe3(SO4)2(OH)6
Jarosite-Na	-7.25	-12.41	-5.16	NaFe3(SO4)2(OH)6
JarositeH	-11.66	-16.86	-5.20	(H3O)Fe3(SO4)2(OH)6
Langite	-11.96	4.97	16.92	Cu4(OH)6SO4:H2O
Larnakite	-8.85	-9.11	-0.26	PbO:PbSO4
Laurionite	-8.00	-7.37	0.62	PbOHCl
Litharge	-8.04	4.74	12.78	PbO
Mackinawite	-130.80	-135.44	-4.65	FeS
Maghemite	7.15	13.54	6.39	Fe2O3
Magnesite	-1.97	-9.98	-8.01	MgCO3
Magnetite	10.50	14.41	3.91	Fe3O4
Malachite	-3.64	1.58	5.22	Cu2(OH)2CO3
Manganite	1.99	27.33	25.34	MnOOH
Massicot	-8.23	4.74	12.97	PbO
Matlockite	-9.56	-19.02	-9.46	PbClF
Melanothallite	-22.11	-18.34	3.77	CuCl2
Melanterite	-15.49	-17.72	-2.23	FeSO4:7H2O
Minium	-21.91	52.13	74.04	Pb3O4
Mirabilite	-8.51	-9.69	-1.18	Na2SO4:10H2O
Mn2(SO4)3	-46.71	-52.29	-5.58	Mn2(SO4)3
MnCl2:4H2O	-18.51	-15.85	2.65	MnCl2:4H2O
MnS(Green)	-131.76	-127.94	3.82	MnS
MnSO4	-12.93	-10.21	2.72	MnSO4
N2(g)	-3.22	-6.47	-3.26	N2
Nahcolite	-5.19	-5.75	-0.56	NaHCO3
Nantokite	-15.67	-22.46	-6.79	CuCl
Natron	-10.28	-11.64	-1.36	Na2CO3:10H2O
Nesquehonite	-4.37	-9.98	-5.60	MgCO3:3H2O
NH3(g)	-55.54	-53.74	1.80	NH3
Nsutite	3.72	46.28	42.56	MnO2

O2(g)	-7.83	-10.72	-2.88	O2
Pb(OH)2	-3.46	4.74	8.20	Pb(OH)2
Pb2(OH)3Cl	-11.43	-2.63	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-16.72	9.48	26.20	PbO:Pb(OH)2
Pb2O3	-13.65	47.39	61.04	Pb2O3
Pb2OCO3	-10.60	-11.06	-0.46	PbO:PbCO3
Pb3O2CO3	-17.43	-6.32	11.11	PbCO3:2PbO
Pb3O2SO4	-14.84	-4.37	10.47	PbSO4:2PbO
Pb4(OH)6SO4	-20.73	0.37	21.10	Pb4(OH)6SO4
Pb4O3SO4	-21.84	0.37	22.22	PbSO4:3PbO
PbF2	-11.11	-18.55	-7.44	PbF2
PbMetal	-37.44	-33.17	4.27	Pb
PbO:0.3H2O	-8.24	4.74	12.98	PbO:0.33H2O
Phosgenite	-15.47	-35.28	-19.81	PbCl2:PbCO3
Plattnerite	-6.89	42.65	49.54	PbO2
Portlandite	-11.56	11.35	22.90	Ca(OH)2
Pyrite	-215.33	-233.85	-18.52	FeS2
Pyrochroite	-6.83	8.37	15.20	Mn(OH)2
Pyrolusite	4.68	46.28	41.60	MnO2
Rhodochrosite	-1.04	-12.17	-11.13	MnCO3
Rhodochrosite(d)	-1.78	-12.17	-10.39	MnCO3
Siderite	-8.79	-19.67	-10.88	FeCO3
Siderite(d)(3)	-9.22	-19.67	-10.45	FeCO3
SrF2	-5.55	-14.10	-8.54	SrF2
Strontianite	-2.08	-11.35	-9.27	SrCO3
Sulfur	-96.31	-111.36	-15.05	S
Tenorite	-1.78	5.89	7.67	CuO
Thenardite	-9.51	-9.69	-0.18	Na2SO4
Thermonatrite	-11.77	-11.64	0.13	Na2CO3:H2O
Trona	-16.65	-17.39	-0.73	NaHCO3:Na2CO3:2H2O
Witherite	-3.35	-11.91	-8.56	BaCO3

50 : 50 Mix of Quebec St. Injection Water : Arapahoe Formation Water

Phase	SI**	log IAP	log K(294 K,	1 atm)
Anglesite	-6.46	-14.27	-7.81	PbSO4
Anhydrite	-2.86	-7.20	-4.35	CaSO4
Anilite	-135.00	-167.30	-32.30	Cu0.25Cu1.5S
Antlerite	-9.96	-1.67	8.29	Cu3(OH)4SO4
Aragonite	-0.61	-8.92	-8.31	CaCO3
Artinite	-8.60	1.28	9.88	MgCO3:Mg(OH)2:3H2O
Atacamite	-7.90	-0.38	7.52	Cu2(OH)3Cl
Azurite	-7.45	-3.41	4.05	Cu3(OH)2(CO3)2
BaF2	-8.95	-14.72	-5.77	BaF2
Barite	0.07	-9.96	-10.03	BaSO4
Birnessite	6.42	50.02	43.60	MnO2
Bixbyite	7.58	7.12	-0.46	Mn2O3
BlaubleiI	-123.49	-147.65	-24.16	Cu0.9Cu0.2S
BlaubleiII	-129.44	-156.72	-27.28	Cu0.6Cu0.8S
Brochantite	-11.22	4.12	15.34	Cu4(OH)6SO4
Brucite	-6.09	11.01	17.10	Mg(OH)2
Calcite	-0.46	-8.92	-8.46	CaCO3
Celestite	-2.71	-9.33	-6.62	SrSO4
Cerussite	-2.81	-15.99	-13.18	PbCO3
CH4(g)	-141.93	-144.76	-2.83	CH4

Chalcanthite	-10.59	-13.24	-2.65	CuSO4:5H2O
Chalcocite	-139.76	-174.85	-35.09	Cu2S
Chalcopyrite	-260.27	-295.88	-35.61	CuFeS2
CO2(g)	-2.59	-4.01	-1.42	CO2
Cotunnite	-14.32	-19.14	-4.82	PbCl2
Covellite	-122.13	-144.63	-22.50	CuS
Cu(OH)2	-3.00	5.79	8.79	Cu(OH)2
Cu2(OH)3NO3	-10.77	-1.36	9.41	Cu2(OH)3NO3
Cu2SO4	-41.56	-43.46	-1.91	Cu2SO4
CuCO3	-5.33	-14.96	-9.63	CuCO3
CuF	-31.31	-24.11	7.20	CuF
CuF2	-17.51	-18.00	-0.49	CuF2
CuF2:2H2O	-13.49	-18.00	-4.52	CuF2:2H2O
CuMetal	-24.00	-32.92	-8.92	Cu
CuOCuSO4	-19.33	-7.46	11.87	CuO:CuSO4
CupricFerrite	13.05	19.30	6.25	CuFe2O4
Cuprite	-22.82	-24.43	-1.61	Cu2O
CuprousFerrite	3.43	-5.46	-8.88	CuFeO2
CuSO4	-16.43	-13.24	3.18	CuSO4
Djurleite	-138.48	-172.86	-34.38	Cu0.066Cu1.868S
Dolomite	-1.65	-18.65	-17.00	CaMg(CO3)2
Dolomite(d)	-2.22	-18.65	-16.43	CaMg(CO3)2
Epsomite	-5.85	-8.02	-2.17	MgSO4:7H2O
Fe(OH)2.7Cl.3	6.21	3.17	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.87	6.76	4.89	Fe(OH)3
Fe3(OH)8	-7.54	12.68	20.22	Fe3(OH)8
FeS(ppt)	-147.34	-151.25	-3.92	FeS
Fluorite	-1.31	-11.96	-10.65	CaF2
Galena	-132.69	-145.66	-12.97	PbS
Goethite	7.62	6.76	-0.86	FeOOH
Greigite	-543.95	-588.99	-45.03	Fe3S4
Gypsum	-2.62	-7.20	-4.58	CaSO4:2H2O
H2(g)	-41.42	-44.55	-3.13	H2
H2O(g)	-1.61	-0.00	1.61	H2O
H2S(g)	-142.47	-143.42	-0.95	H2S
Halite	-8.85	-7.28	1.57	NaCl
Hausmannite	5.24	67.24	62.00	Mn3O4
Hematite	17.23	13.52	-3.71	Fe2O3
Huntite	-8.40	-38.12	-29.72	CaMg3(CO3)4
Hydrocerussite	-9.76	-27.22	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-19.66	-27.92	-8.26	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-5.10	-14.93	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-5.35	-14.26	-8.91	KFe3(SO4)2(OH)6
Jarosite-Na	-8.18	-13.12	-4.93	NaFe3(SO4)2(OH)6
JarositeH	-12.93	-17.79	-4.86	(H3O)Fe3(SO4)2(OH)6
Langite	-13.05	4.12	17.17	Cu4(OH)6SO4:H2O
Larnakite	-9.29	-9.51	-0.22	PbO:PbSO4
Laurionite	-7.81	-7.19	0.62	PbOHCl
Litharge	-8.12	4.76	12.88	PbO
Mackinawite	-146.61	-151.25	-4.65	FeS
Maghemite	7.13	13.52	6.39	Fe2O3
Magnesite	-1.76	-9.73	-7.97	MgCO3
Magnetite	8.46	12.68	4.22	Fe3O4
Malachite	-4.15	1.19	5.34	Cu2(OH)2CO3
Manganite	3.98	29.32	25.34	MnOOH
Massicot	-8.31	4.76	13.07	PbO
Matlockite	-9.58	-19.09	-9.51	PbClF

Melanothallite	-21.96	-18.12	3.85	CuCl2
Melanterite	-17.61	-19.87	-2.26	FeSO4:7H2O
Minium	-18.98	55.70	74.68	Pb3O4
Mirabilite	-8.39	-9.69	-1.30	Na2SO4:10H2O
Mn2(SO4)3	-44.64	-49.98	-5.34	Mn2(SO4)3
MnCl2:4H2O	-17.84	-15.30	2.54	MnCl2:4H2O
MnS(Green)	-145.67	-141.81	3.86	MnS
MnSO4	-13.24	-10.42	2.82	MnSO4
N2(g)	-19.63	-22.88	-3.25	N2
Nahcolite	-5.13	-5.71	-0.58	NaHCO3
Nantokite	-17.31	-24.17	-6.86	CuCl
Natron	-9.94	-11.40	-1.46	Na2CO3:10H2O
Nesquehonite	-4.17	-9.73	-5.57	MgCO3:3H2O
NH3(g)	-68.94	-67.09	1.85	NH3
Nsutite	7.46	50.02	42.56	MnO2
O2(g)	-1.68	-4.54	-2.86	O2
Pb(OH)2	-3.52	4.76	8.28	Pb(OH)2
Pb2(OH)3Cl	-11.22	-2.43	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-16.68	9.52	26.20	PbO:Pb(OH)2
Pb2O3	-10.10	50.94	61.04	Pb2O3
Pb2OCO3	-10.84	-11.23	-0.39	PbO:PbCO3
Pb3O2CO3	-17.74	-6.47	11.27	PbCO3:2PbO
Pb3O2SO4	-15.35	-4.75	10.60	PbSO4:2PbO
Pb4(OH)6SO4	-21.09	0.01	21.10	Pb4(OH)6SO4
Pb4O3SO4	-22.43	0.01	22.44	PbSO4:3PbO
PbF2	-11.59	-19.03	-7.43	PbF2
PbMetal	-40.92	-36.66	4.27	Pb
PbO:0.3H2O	-8.22	4.76	12.98	PbO:0.33H2O
Phosgenite	-15.32	-35.13	-19.81	PbCl2:PbCO3
Plattnerite	-3.80	46.18	49.98	PbO2
Portlandite	-11.27	11.83	23.10	Ca(OH)2
Pyrite	-241.67	-260.26	-18.59	FeS2
Pyrochroite	-6.59	8.61	15.20	Mn(OH)2
Pyrolusite	8.02	50.02	42.00	MnO2
Rhodochrosite	-1.02	-12.14	-11.12	MnCO3
Rhodochrosite(d)	-1.75	-12.14	-10.39	MnCO3
Siderite	-10.72	-21.59	-10.87	FeCO3
Siderite(d)(3)	-11.14	-21.59	-10.45	FeCO3
SrF2	-5.54	-14.09	-8.55	SrF2
Strontianite	-1.78	-11.05	-9.27	SrCO3
Sulfur	-106.93	-122.04	-15.10	S
Tenorite	-1.98	5.79	7.77	CuO
Thenardite	-9.51	-9.69	-0.17	Na2SO4
Thermonatrite	-11.56	-11.40	0.15	Na2CO3:H2O
Trona	-16.49	-17.12	-0.62	NaHCO3:Na2CO3:2H2O
Witherite	-3.11	-11.68	-8.57	BaCO3

80 : 20 Mix of Quebec St. Injection Water : Arapahoe Formation Water

Phase	SI**	log IAP	log K(291 K,	1 atm)
Anglesite	-7.15	-14.98	-7.82	PbSO4
Anhydrite	-2.83	-7.17	-4.34	CaSO4
Anilite	-138.28	-170.85	-32.57	Cu0.25Cu1.5S
Antlerite	-11.50	-3.21	8.29	Cu3(OH)4SO4
Aragonite	-0.28	-8.57	-8.30	CaCO3

Artinite	-7.84	2.21	10.06	MgCO3:Mg(OH)2:3H2O
Atacamite	-8.75	-1.11	7.64	Cu2(OH)3Cl
Azurite	-9.13	-4.89	4.24	Cu3(OH)2(CO3)2
BaF2	-9.00	-14.78	-5.78	BaF2
Barite	0.10	-9.97	-10.08	BaSO4
Birnessite	7.17	50.77	43.60	MnO2
Bixbyite	8.08	7.71	-0.37	Mn2O3
BlaubleiI	-126.45	-150.61	-24.16	Cu0.9Cu0.2S
BlaubleiII	-132.67	-159.95	-27.28	Cu0.6Cu0.8S
Brochantite	-13.07	2.27	15.34	Cu4(OH)6SO4
Brucite	-5.64	11.63	17.27	Mg(OH)2
Calcite	-0.13	-8.57	-8.45	CaCO3
Celestite	-2.66	-9.28	-6.62	SrSO4
Cerussite	-3.17	-16.38	-13.21	PbCO3
CH4(g)	-144.19	-146.99	-2.81	CH4
Chalcanthite	-11.51	-14.17	-2.66	CuSO4:5H2O
Chalcocite	-143.22	-178.63	-35.40	Cu2S
Chalcopyrite	-265.92	-301.75	-35.84	CuFeS2
CO2(g)	-2.88	-4.27	-1.39	CO2
Cotunnite	-14.61	-19.46	-4.86	PbCl2
Covellite	-124.85	-147.50	-22.65	CuS
Cu(OH)2	-3.40	5.48	8.88	Cu(OH)2
Cu2(OH)3NO3	-12.21	-2.70	9.52	Cu2(OH)3NO3
Cu2SO4	-43.42	-45.30	-1.88	Cu2SO4
CuCO3	-5.94	-15.57	-9.63	CuCO3
CuF	-32.33	-25.05	7.28	CuF
CuF2	-18.57	-18.97	-0.41	CuF2
CuF2:2H2O	-14.48	-18.97	-4.49	CuF2:2H2O
CuMetal	-24.79	-33.82	-9.03	Cu
CuOCuSO4	-20.79	-8.69	12.10	CuO:CuSO4
CupricFerrite	12.08	18.57	6.50	CuFe2O4
Cuprite	-24.00	-25.65	-1.65	Cu2O
CuprousFerrite	2.58	-6.28	-8.86	CuFeO2
CuSO4	-17.47	-14.17	3.30	CuSO4
Djurleite	-141.89	-176.57	-34.68	Cu0.066Cu1.868S
Dolomite	-1.05	-17.99	-16.94	CaMg(CO3)2
Dolomite(d)	-1.63	-17.99	-16.36	CaMg(CO3)2
Epsomite	-5.83	-8.02	-2.18	MgSO4:7H2O
Fe(OH)2.7Cl.3	5.97	2.93	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.66	6.55	4.89	Fe(OH)3
Fe3(OH)8	-8.41	11.82	20.22	Fe3(OH)8
FeS(ppt)	-150.34	-154.25	-3.92	FeS
Fluorite	-1.30	-11.98	-10.68	CaF2
Galena	-135.22	-148.31	-13.09	PbS
Goethite	7.32	6.55	-0.77	FeOOH
Greigite	-555.06	-600.09	-45.03	Fe3S4
Gypsum	-2.59	-7.17	-4.58	CaSO4:2H2O
H2(g)	-42.00	-45.12	-3.12	H2
H2O(g)	-1.68	-0.00	1.68	H2O
H2S(g)	-145.02	-145.95	-0.92	H2S
Halite	-8.66	-7.09	1.57	NaCl
Hausmannite	5.69	68.33	62.63	Mn3O4
Hematite	16.61	13.09	-3.52	Fe2O3
Huntite	-7.27	-36.83	-29.56	CaMg3(CO3)4
Hydrocerussite	-10.63	-28.09	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-18.11	-26.04	-7.93	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-6.72	-16.55	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6

Jarosite-K	-7.11	-15.82	-8.71	KFe3(SO4)2(OH)6
Jarosite-Na	-9.97	-14.68	-4.70	NaFe3(SO4)2(OH)6
JarositeH	-15.14	-19.65	-4.51	(H3O)Fe3(SO4)2(OH)6
Langite	-15.15	2.27	17.42	Cu4(OH)6SO4:H2O
Larnakite	-10.13	-10.30	-0.18	PbO:PbSO4
Laurionite	-8.02	-7.40	0.62	PbOHCl
Litharge	-8.31	4.67	12.98	PbO
Mackinawite	-149.61	-154.25	-4.65	FeS
Maghemite	6.71	13.09	6.39	Fe2O3
Magnesite	-1.49	-9.42	-7.93	MgCO3
Magnetite	7.28	11.82	4.54	Fe3O4
Malachite	-5.17	0.30	5.46	Cu2(OH)2CO3
Manganite	4.44	29.78	25.34	MnOOH
Massicot	-8.51	4.67	13.18	PbO
Matlockite	-10.07	-19.62	-9.56	PbClF
Melanothallite	-22.58	-18.66	3.93	CuCl2
Melanterite	-18.64	-20.93	-2.29	FeSO4:7H2O
Minium	-19.31	56.01	75.33	Pb3O4
Mirabilite	-8.28	-9.69	-1.42	Na2SO4:10H2O
Mn2(SO4)3	-46.14	-51.23	-5.09	Mn2(SO4)3
MnCl2:4H2O	-17.79	-15.36	2.43	MnCl2:4H2O
MnS(Green)	-148.09	-144.20	3.89	MnS
MnSO4	-13.79	-10.87	2.92	MnSO4
N2(g)	-22.00	-25.24	-3.24	N2
Nahcolite	-5.08	-5.68	-0.61	NaHCO3
Nantokite	-17.98	-24.89	-6.92	CuCl
Natron	-9.53	-11.10	-1.56	Na2CO3:10H2O
Nesquehonite	-3.89	-9.42	-5.53	MgCO3:3H2O
NH3(g)	-70.93	-69.03	1.90	NH3
Nsutite	8.21	50.77	42.56	MnO2
O2(g)	-1.39	-4.23	-2.84	O2
Pb(OH)2	-3.70	4.67	8.37	Pb(OH)2
Pb2(OH)3Cl	-11.52	-2.72	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-16.86	9.34	26.20	PbO:Pb(OH)2
Pb2O3	-9.70	51.34	61.04	Pb2O3
Pb2OCO3	-11.39	-11.71	-0.32	PbO:PbCO3
Pb3O2CO3	-18.48	-7.03	11.44	PbCO3:2PbO
Pb3O2SO4	-16.36	-5.63	10.73	PbSO4:2PbO
Pb4(OH)6SO4	-22.06	-0.96	21.10	Pb4(OH)6SO4
Pb4O3SO4	-23.62	-0.96	22.66	PbSO4:3PbO
PbF2	-12.35	-19.78	-7.43	PbF2
PbMetal	-41.59	-37.32	4.26	Pb
PbO:0.3H2O	-8.31	4.67	12.98	PbO:0.33H2O
Phosgenite	-16.03	-35.84	-19.81	PbCl2:PbCO3
Plattnerite	-3.76	46.67	50.43	PbO2
Portlandite	-10.82	12.48	23.29	Ca(OH)2
Pyrite	-246.58	-265.23	-18.66	FeS2
Pyrochroite	-6.42	8.78	15.20	Mn(OH)2
Pyrolusite	8.36	50.77	42.42	MnO2
Rhodochrosite	-1.17	-12.27	-11.11	MnCO3
Rhodochrosite(d)	-1.88	-12.27	-10.39	MnCO3
Siderite	-11.48	-22.33	-10.85	FeCO3
Siderite(d)(3)	-11.88	-22.33	-10.45	FeCO3
SrF2	-5.53	-14.09	-8.56	SrF2
Strontianite	-1.41	-10.68	-9.27	SrCO3
Sulfur	-108.94	-124.09	-15.15	S
Tenorite	-2.38	5.48	7.86	CuO

Thenardite	-9.52	-9.69	-0.17	Na2SO4
Thermonatrite	-11.26	-11.10	0.17	Na2CO3:H2O
Trona	-16.27	-16.78	-0.51	NaHCO3:Na2CO3:2H2O
Witherite	-2.79	-11.37	-8.58	BaCO3

20 : 80 Mix of Quebec St. Injection Water : Denver Formation Water

Phase	SI**	log IAP	log K(290 K,	1 atm)
Anglesite	-5.78	-13.61	-7.83	PbSO4
Anhydrite	-2.92	-7.26	-4.34	CaSO4
Aragonite	-1.18	-9.47	-8.29	CaCO3
Artinite	-10.33	-0.19	10.14	MgCO3:Mg(OH)2:3H2O
BaF2	-8.94	-14.72	-5.78	BaF2
Barite	0.08	-10.02	-10.10	BaSO4
Birnessite	5.94	49.54	43.60	MnO2
Bixbyite	5.51	5.19	-0.33	Mn2O3
Brucite	-7.28	10.07	17.35	Mg(OH)2
Calcite	-1.03	-9.47	-8.44	CaCO3
Celestite	-2.73	-9.35	-6.62	SrSO4
Cerussite	-2.60	-15.82	-13.22	PbCO3
CH4(g)	-142.91	-145.71	-2.80	CH4
CO2(g)	-2.15	-3.53	-1.38	CO2
Cotunnite	-13.41	-18.29	-4.88	PbCl2
Dolomite	-2.82	-19.73	-16.91	CaMg(CO3)2
Dolomite(d)	-3.40	-19.73	-16.33	CaMg(CO3)2
Epsomite	-5.85	-8.04	-2.19	MgSO4:7H2O
Fe(OH)2.7Cl.3	6.25	3.21	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.73	6.62	4.89	Fe(OH)3
Fe3(OH)8	-8.10	12.12	20.22	Fe3(OH)8
FeS(ppt)	-148.09	-152.01	-3.92	FeS
Fluorite	-1.27	-11.96	-10.69	CaF2
Galena	-133.24	-146.38	-13.14	PbS
Goethite	7.35	6.62	-0.73	FeOOH
Greigite	-546.37	-591.41	-45.03	Fe3S4
Gypsum	-2.68	-7.26	-4.58	CaSO4:2H2O
H2(g)	-41.90	-45.02	-3.12	H2
H2O(g)	-1.71	-0.00	1.71	H2O
H2S(g)	-142.93	-143.84	-0.91	H2S
Halite	-8.52	-6.95	1.56	NaCl
Hausmannite	1.89	64.81	62.92	Mn3O4
Hematite	16.68	13.25	-3.43	Fe2O3
Huntite	-10.76	-40.25	-29.48	CaMg3(CO3)4
Hydrocerussite	-9.69	-27.15	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-23.18	-30.96	-7.78	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-4.06	-13.89	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-4.71	-13.33	-8.62	KFe3(SO4)2(OH)6
Jarosite-Na	-7.31	-11.91	-4.60	NaFe3(SO4)2(OH)6
JarositeH	-12.00	-16.35	-4.36	(H3O)Fe3(SO4)2(OH)6
Larnakite	-8.95	-9.11	-0.16	PbO:PbSO4
Laurionite	-7.52	-6.89	0.62	PbOHCl
Litharge	-8.52	4.50	13.03	PbO
Mackinawite	-147.36	-152.01	-4.65	FeS
Maghemite	6.86	13.25	6.39	Fe2O3
Magnesite	-2.34	-10.26	-7.91	MgCO3
Magnetite	7.44	12.12	4.68	Fe3O4

Manganite	3.25	28.59	25.34	MnOOH
Massicot	-8.72	4.50	13.22	PbO
Matlockite	-8.72	-18.30	-9.58	PbClF
Melanterite	-16.93	-19.24	-2.30	FeSO4:7H2O
Minium	-20.21	55.41	75.62	Pb3O4
Mirabilite	-7.76	-9.23	-1.47	Na2SO4:10H2O
Mn2(SO4)3	-44.17	-49.15	-4.98	Mn2(SO4)3
MnCl2:4H2O	-17.54	-15.15	2.38	MnCl2:4H2O
MnS(Green)	-147.15	-143.25	3.91	MnS
MnSO4	-13.43	-10.48	2.96	MnSO4
Nahcolite	-4.87	-5.48	-0.62	NaHCO3
Natron	-9.84	-11.44	-1.61	Na2CO3:10H2O
Nesquehonite	-4.75	-10.26	-5.51	MgCO3:3H2O
Nsutite	6.97	49.54	42.56	MnO2
O2(g)	-1.98	-4.81	-2.83	O2
Pb(BO2)2	-13.93	-6.21	7.72	Pb(BO2)2
Pb(OH)2	-3.91	4.50	8.41	Pb(OH)2
Pb2(OH)3Cl	-11.18	-2.39	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-17.19	9.01	26.20	PbO:Pb(OH)2
Pb2O3	-10.14	50.90	61.04	Pb2O3
Pb2OCO3	-11.04	-11.32	-0.29	PbO:PbCO3
Pb3O2CO3	-18.33	-6.82	11.52	PbCO3:2PbO
Pb3O2SO4	-15.39	-4.60	10.79	PbSO4:2PbO
Pb4(OH)6SO4	-21.20	-0.10	21.10	Pb4(OH)6SO4
Pb4O3SO4	-22.86	-0.10	22.76	PbSO4:3PbO
PbF2	-10.88	-18.31	-7.43	PbF2
PbMetal	-41.66	-37.40	4.26	Pb
PbO:0.3H2O	-8.48	4.50	12.98	PbO:0.33H2O
Phosgenite	-14.30	-34.11	-19.81	PbCl2:PbCO3
Plattnerite	-4.23	46.40	50.63	PbO2
Portlandite	-12.53	10.85	23.38	Ca(OH)2
Pyrite	-242.30	-260.99	-18.69	FeS2
Pyrochroite	-7.56	7.64	15.20	Mn(OH)2
Pyrolusite	6.93	49.54	42.60	MnO2
Rhodochrosite	-1.59	-12.69	-11.10	MnCO3
Rhodochrosite(d)	-2.30	-12.69	-10.39	MnCO3
Siderite	-10.61	-21.45	-10.84	FeCO3
Siderite(d)(3)	-11.00	-21.45	-10.45	FeCO3
SrF2	-5.49	-14.05	-8.56	SrF2
Strontianite	-2.30	-11.57	-9.27	SrCO3
Sulfur	-106.95	-122.13	-15.17	S
Thenardite	-9.06	-9.23	-0.17	Na2SO4
Thermonatrite	-11.62	-11.44	0.18	Na2CO3:H2O
Trona	-16.47	-16.93	-0.46	NaHCO3:Na2CO3:2H2O
Witherite	-3.65	-12.23	-8.58	BaCO3

50 : 50 Mix of Quebec St. Injection Water : Denver Formation Water

Phase	SI**	log IAP	log K(290 K,	1 atm)
Anglesite	-6.19	-14.03	-7.83	PbSO4
Anhydrite	-2.88	-7.22	-4.34	CaSO4
Aragonite	-0.90	-9.19	-8.29	CaCO3
Artinite	-9.65	0.50	10.15	MgCO3:Mg(OH)2:3H2O
BaF2	-8.97	-14.75	-5.78	BaF2
Barite	0.10	-10.00	-10.10	BaSO4

Birnessite	6.39	49.99	43.60	MnO2
Bixbyite	6.14	5.83	-0.32	Mn2O3
Brucite	-6.85	10.51	17.36	Mg(OH)2
Calcite	-0.75	-9.19	-8.44	CaCO3
Celestite	-2.69	-9.31	-6.62	SrSO4
Cerussite	-2.78	-16.00	-13.22	PbCO3
CH4(g)	-144.03	-146.82	-2.79	CH4
CO2(g)	-2.35	-3.72	-1.37	CO2
Cotunnite	-13.67	-18.55	-4.88	PbCl2
Dolomite	-2.30	-19.20	-16.91	CaMg(CO3)2
Dolomite(d)	-2.88	-19.20	-16.33	CaMg(CO3)2
Epsomite	-5.84	-8.03	-2.19	MgSO4:7H2O
Fe(OH)2.7Cl.3	6.09	3.05	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.62	6.51	4.89	Fe(OH)3
Fe3(OH)8	-8.54	11.68	20.22	Fe3(OH)8
FeS(ppt)	-149.67	-153.58	-3.92	FeS
Fluorite	-1.27	-11.96	-10.69	CaF2
Galena	-134.56	-147.71	-13.15	PbS
Goethite	7.23	6.51	-0.72	FeOOH
Greigite	-552.22	-597.25	-45.03	Fe3S4
Gypsum	-2.63	-7.22	-4.58	CaSO4:2H2O
H2(g)	-42.14	-45.25	-3.12	H2
H2O(g)	-1.71	-0.00	1.71	H2O
H2S(g)	-144.28	-145.18	-0.91	H2S
Halite	-8.51	-6.95	1.56	NaCl
Hausmannite	2.72	65.69	62.97	Mn3O4
Hematite	16.44	13.03	-3.41	Fe2O3
Huntite	-9.75	-39.22	-29.47	CaMg3(CO3)4
Hydrocerussite	-10.03	-27.49	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-21.77	-29.53	-7.75	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-5.08	-14.91	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-5.69	-14.30	-8.61	KFe3(SO4)2(OH)6
Jarosite-Na	-8.38	-12.97	-4.58	NaFe3(SO4)2(OH)6
JarositeH	-13.23	-17.55	-4.33	(H3O)Fe3(SO4)2(OH)6
Larnakite	-9.35	-9.50	-0.16	PbO:PbSO4
Laurionite	-7.64	-7.01	0.62	PbOHCl
Litharge	-8.52	4.52	13.04	PbO
Mackinawite	-148.93	-153.58	-4.65	FeS
Maghemite	6.64	13.03	6.39	Fe2O3
Magnesite	-2.10	-10.01	-7.91	MgCO3
Magnetite	6.97	11.68	4.71	Fe3O4
Manganite	3.58	28.92	25.34	MnOOH
Massicot	-8.71	4.52	13.23	PbO
Matlockite	-9.08	-18.66	-9.58	PbClF
Melanterite	-17.59	-19.89	-2.31	FeSO4:7H2O
Minium	-19.97	55.70	75.67	Pb3O4
Mirabilite	-7.89	-9.37	-1.48	Na2SO4:10H2O
Mn2(SO4)3	-44.86	-49.81	-4.96	Mn2(SO4)3
MnCl2:4H2O	-17.59	-15.21	2.37	MnCl2:4H2O
MnS(Green)	-148.29	-144.38	3.91	MnS
MnSO4	-13.66	-10.69	2.97	MnSO4
Nahcolite	-4.92	-5.53	-0.62	NaHCO3
Natron	-9.74	-11.35	-1.61	Na2CO3:10H2O
Nesquehonite	-4.50	-10.01	-5.51	MgCO3:3H2O
Nsutite	7.43	49.99	42.56	MnO2
O2(g)	-1.58	-4.41	-2.83	O2
Pb(BO2)2	-14.32	-6.60	7.72	Pb(BO2)2

Pb(OH)2	-3.90	4.52	8.42	Pb(OH)2
Pb2(OH)3Cl	-11.28	-2.49	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-17.16	9.04	26.20	PbO:Pb(OH)2
Pb2O3	-9.86	51.18	61.04	Pb2O3
Pb2OCO3	-11.20	-11.48	-0.28	PbO:PbCO3
Pb3O2CO3	-18.49	-6.96	11.53	PbCO3:2PbO
Pb3O2SO4	-15.78	-4.98	10.80	PbSO4:2PbO
Pb4(OH)6SO4	-21.56	-0.46	21.10	Pb4(OH)6SO4
Pb4O3SO4	-23.24	-0.46	22.78	PbSO4:3PbO
PbF2	-11.35	-18.77	-7.43	PbF2
PbMetal	-41.88	-37.62	4.26	Pb
PbO:0.3H2O	-8.46	4.52	12.98	PbO:0.33H2O
Phosgenite	-14.74	-34.55	-19.81	PbCl2:PbCO3
Plattnerite	-4.01	46.66	50.67	PbO2
Portlandite	-12.07	11.33	23.40	Ca(OH)2
Pyrite	-244.98	-263.68	-18.70	FeS2
Pyrochroite	-7.35	7.85	15.20	Mn(OH)2
Pyrolusite	7.35	49.99	42.64	MnO2
Rhodochrosite	-1.57	-12.67	-11.10	MnCO3
Rhodochrosite(d)	-2.28	-12.67	-10.39	MnCO3
Siderite	-11.03	-21.87	-10.84	FeCO3
Siderite(d)(3)	-11.42	-21.87	-10.45	FeCO3
SrF2	-5.50	-14.06	-8.56	SrF2
Strontianite	-2.02	-11.29	-9.27	SrCO3
Sulfur	-108.07	-123.25	-15.18	S
Thenardite	-9.21	-9.37	-0.17	Na2SO4
Thermonatrite	-11.53	-11.35	0.18	Na2CO3:H2O
Trona	-16.44	-16.89	-0.45	NaHCO3:Na2CO3:2H2O
Witherite	-3.40	-11.98	-8.59	BaCO3

80 : 20 Mix of Quebec St. Injection Water : Denver Formation Water

Phase	SI**	log IAP	log K(290 K,	1 atm)
Anglesite	-6.95	-14.78	-7.83	PbSO4
Anhydrite	-2.84	-7.17	-4.34	CaSO4
Aragonite	-0.48	-8.77	-8.29	CaCO3
Artinite	-8.55	1.62	10.17	MgCO3:Mg(OH)2:3H2O
BaF2	-9.01	-14.79	-5.78	BaF2
Barite	0.11	-9.99	-10.10	BaSO4
Birnessite	6.80	50.40	43.60	MnO2
Bixbyite	6.80	6.49	-0.31	Mn2O3
Brucite	-6.13	11.25	17.38	Mg(OH)2
Calcite	-0.34	-8.77	-8.44	CaCO3
Celestite	-2.65	-9.27	-6.62	SrSO4
Cerussite	-3.16	-16.38	-13.23	PbCO3
CH4(g)	-144.89	-147.69	-2.79	CH4
CO2(g)	-2.69	-4.06	-1.37	CO2
Cotunnite	-14.29	-19.17	-4.88	PbCl2
Dolomite	-1.49	-18.40	-16.90	CaMg(CO3)2
Dolomite(d)	-2.08	-18.40	-16.32	CaMg(CO3)2
Epsomite	-5.83	-8.02	-2.20	MgSO4:7H2O
Fe(OH)2.7Cl.3	5.70	2.66	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.32	6.21	4.89	Fe(OH)3
Fe3(OH)8	-9.52	10.70	20.22	Fe3(OH)8
FeS(ppt)	-151.28	-155.20	-3.92	FeS

Fluorite	-1.28	-11.98	-10.70	CaF2
Galena	-135.83	-148.99	-13.17	PbS
Goethite	6.92	6.21	-0.71	FeOOH
Greigite	-558.18	-603.22	-45.03	Fe3S4
Gypsum	-2.59	-7.17	-4.58	CaSO4:2H2O
H2(g)	-42.28	-45.39	-3.12	H2
H2O(g)	-1.72	-0.00	1.72	H2O
H2S(g)	-145.52	-146.43	-0.91	H2S
Halite	-8.53	-6.97	1.56	NaCl
Hausmannite	3.64	66.66	63.03	Mn3O4
Hematite	15.81	12.42	-3.40	Fe2O3
Huntite	-8.18	-37.64	-29.46	CaMg3(CO3)4
Hydrocerussite	-10.82	-28.28	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-19.52	-27.24	-7.73	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-7.14	-16.97	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-7.69	-16.28	-8.59	KFe3(SO4)2(OH)6
Jarosite-Na	-10.49	-15.05	-4.56	NaFe3(SO4)2(OH)6
JarositeH	-15.61	-19.91	-4.30	(H3O)Fe3(SO4)2(OH)6
Larnakite	-10.14	-10.30	-0.15	PbO:PbSO4
Laurionite	-7.97	-7.34	0.62	PbOHCl
Litharge	-8.56	4.49	13.05	PbO
Mackinawite	-150.55	-155.20	-4.65	FeS
Maghemite	6.03	12.42	6.39	Fe2O3
Magnesite	-1.72	-9.62	-7.91	MgCO3
Magnetite	5.96	10.70	4.74	Fe3O4
Manganite	3.93	29.27	25.34	MnOOH
Massicot	-8.76	4.49	13.24	PbO
Matlockite	-9.79	-19.38	-9.59	PbClF
Melanterite	-18.68	-20.99	-2.31	FeSO4:7H2O
Minium	-20.00	55.73	75.73	Pb3O4
Mirabilite	-8.06	-9.55	-1.49	Na2SO4:10H2O
Mn2(SO4)3	-46.38	-51.31	-4.94	Mn2(SO4)3
MnCl2:4H2O	-17.89	-15.53	2.37	MnCl2:4H2O
MnS(Green)	-149.26	-145.35	3.91	MnS
MnSO4	-14.11	-11.14	2.98	MnSO4
Nahcolite	-4.98	-5.60	-0.62	NaHCO3
Natron	-9.53	-11.15	-1.62	Na2CO3:10H2O
Nesquehonite	-4.12	-9.62	-5.51	MgCO3:3H2O
Nsutite	7.84	50.40	42.56	MnO2
O2(g)	-1.37	-4.20	-2.83	O2
Pb(BO2)2	-15.17	-7.45	7.73	Pb(BO2)2
Pb(OH)2	-3.94	4.49	8.43	Pb(OH)2
Pb2(OH)3Cl	-11.65	-2.86	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-17.23	8.97	26.20	PbO:Pb(OH)2
Pb2O3	-9.79	51.25	61.04	Pb2O3
Pb2OCO3	-11.62	-11.90	-0.27	PbO:PbCO3
Pb3O2CO3	-18.95	-7.41	11.54	PbCO3:2PbO
Pb3O2SO4	-16.62	-5.81	10.81	PbSO4:2PbO
Pb4(OH)6SO4	-22.42	-1.32	21.10	Pb4(OH)6SO4
Pb4O3SO4	-24.12	-1.32	22.80	PbSO4:3PbO
PbF2	-12.16	-19.58	-7.43	PbF2
PbMetal	-42.05	-37.79	4.26	Pb
PbO:0.3H2O	-8.49	4.49	12.98	PbO:0.33H2O
Phosgenite	-15.74	-35.55	-19.81	PbCl2:PbCO3
Plattnerite	-3.94	46.76	50.70	PbO2
Portlandite	-11.32	12.09	23.42	Ca(OH)2
Pyrite	-247.70	-266.40	-18.70	FeS2

Pyrochroite	-7.07	8.13	15.20	Mn(OH)2
Pyrolusite	7.73	50.40	42.67	MnO2
Rhodochrosite	-1.64	-12.74	-11.10	MnCO3
Rhodochrosite(d)	-2.35	-12.74	-10.39	MnCO3
Siderite	-11.74	-22.59	-10.84	FeCO3
Siderite(d)(3)	-12.14	-22.59	-10.45	FeCO3
SrF2	-5.51	-14.07	-8.56	SrF2
Strontianite	-1.60	-10.87	-9.27	SrCO3
Sulfur	-109.18	-124.36	-15.18	S
Thenardite	-9.38	-9.55	-0.17	Na2SO4
Thermonatrite	-11.33	-11.15	0.18	Na2CO3:H2O
Trona	-16.32	-16.76	-0.44	NaHCO3:Na2CO3:2H2O
Witherite	-3.00	-11.59	-8.59	BaCO3

20 : 80 Mix of Wemlinger Injection Water : Arapahoe Formation Water

Phase	SI**	log IAP	log K(296 K, 1 atm)	
Al(OH)3(a)	-0.90	9.99	10.89	Al(OH)3
AlumK	-18.41	-23.61	-5.19	KAl(SO4)2:12H2O
Alunite	-2.39	-3.62	-1.23	KAl3(SO4)2(OH)6
Anglesite	-5.88	-13.68	-7.80	PbSO4
Anhydrite	-2.79	-7.14	-4.36	CaSO4
Anilite	-116.96	-148.98	-32.02	Cu0.25Cu1.5S
Antlerite	-9.06	-0.77	8.29	Cu3(OH)4SO4
Aragonite	-0.95	-9.28	-8.33	CaCO3
Artinite	-8.95	0.74	9.70	MgCO3:Mg(OH)2:3H2O
Atacamite	-6.81	0.59	7.40	Cu2(OH)3Cl
Azurite	-6.61	-2.76	3.85	Cu3(OH)2(CO3)2
B-UO2(OH)2	-5.12	0.47	5.59	UO2(OH)2
BaF2	-8.98	-14.74	-5.76	BaF2
Barite	0.04	-9.95	-9.99	BaSO4
Basaluminite	-1.14	21.56	22.70	Al4(OH)10SO4
Birnessite	2.32	45.92	43.60	MnO2
Bixbyite	3.56	3.00	-0.56	Mn2O3
BlaubleiI	-107.70	-131.86	-24.16	Cu0.9Cu0.2S
BlaubleiII	-112.48	-139.76	-27.28	Cu0.6Cu0.8S
Boehmite	1.31	9.99	8.68	AlOOH
Brochantite	-10.24	5.10	15.34	Cu4(OH)6SO4
Brucite	-6.29	10.64	16.93	Mg(OH)2
Calcite	-0.80	-9.28	-8.47	CaCO3
Celestite	-2.74	-9.37	-6.63	SrSO4
Cerussite	-2.66	-15.81	-13.15	PbCO3
CH4(g)	-127.01	-129.86	-2.85	CH4
Chalcanthite	-9.88	-12.53	-2.64	CuSO4:5H2O
Chalcocite	-120.79	-155.57	-34.78	Cu2S
Chalcopyrite	-227.96	-263.35	-35.39	CuFeS2
CO2(g)	-2.38	-3.83	-1.45	CO2
Cotunnite	-12.80	-17.59	-4.79	PbCl2
Covellite	-106.87	-129.23	-22.35	CuS
Cu(OH)2	-2.81	5.88	8.69	Cu(OH)2
Cu2(OH)3NO3	-10.20	-0.90	9.30	Cu2(OH)3NO3
Cu2SO4	-36.94	-38.87	-1.93	Cu2SO4
CuCO3	-5.03	-14.66	-9.63	CuCO3
CuF	-28.95	-21.83	7.12	CuF
CuF2	-16.75	-17.32	-0.58	CuF2

CuF2:2H2O	-12.78	-17.32	-4.54	CuF2:2H2O
CuMetal	-20.24	-29.06	-8.82	Cu
CuOCuSO4	-18.30	-6.65	11.65	CuO:CuSO4
CupricFerrite	13.37	19.38	6.01	CuFe2O4
Cuprite	-18.90	-20.47	-1.57	Cu2O
CuprousFerrite	5.43	-3.48	-8.91	CuFeO2
CuSO4	-15.60	-12.53	3.07	CuSO4
Diaspore	3.03	9.99	6.96	AlOOH
Djurleite	-119.75	-153.83	-34.08	Cu0.066Cu1.868S
Dolomite	-2.11	-19.17	-17.06	CaMg(CO3)2
Dolomite(d)	-2.67	-19.17	-16.50	CaMg(CO3)2
Epsomite	-5.62	-7.77	-2.15	MgSO4:7H2O
Fe(OH)2.7Cl.3	6.45	3.41	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.86	6.75	4.89	Fe(OH)3
Fe3(OH)8	-5.73	14.49	20.22	Fe3(OH)8
FeS(ppt)	-130.21	-134.12	-3.92	FeS
Fluorite	-1.32	-11.94	-10.62	CaF2
Galena	-117.53	-130.37	-12.85	PbS
Gibbsite	1.80	9.99	8.19	Al(OH)3
Goethite	7.71	6.75	-0.95	FeOOH
Greigite	-480.88	-525.92	-45.03	Fe3S4
Gummite	-10.01	0.47	10.48	UO3
Gypsum	-2.56	-7.14	-4.58	CaSO4:2H2O
H2(g)	-37.65	-40.79	-3.14	H2
H2O(g)	-1.55	-0.00	1.55	H2O
H2S(g)	-127.16	-128.14	-0.98	H2S
Halite	-8.37	-6.79	1.58	NaCl
Hausmannite	1.09	62.46	61.37	Mn3O4
Hematite	17.41	13.51	-3.90	Fe2O3
Huntite	-9.08	-38.96	-29.88	CaMg3(CO3)4
Hydrocerussite	-9.43	-26.89	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-20.36	-28.95	-8.59	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-4.11	-13.94	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-4.23	-13.33	-9.10	KFe3(SO4)2(OH)6
Jarosite-Na	-7.02	-12.18	-5.16	NaFe3(SO4)2(OH)6
JarositeH	-11.34	-16.54	-5.20	(H3O)Fe3(SO4)2(OH)6
Jurbanite	-5.18	-8.41	-3.23	AlOHSO4
Langite	-11.82	5.10	16.92	Cu4(OH)6SO4:H2O
Larnakite	-8.69	-8.95	-0.26	PbO:PbSO4
Laurionite	-7.05	-6.43	0.62	PbOHCl
Litharge	-8.05	4.73	12.78	PbO
Mackinawite	-129.47	-134.12	-4.65	FeS
Maghemite	7.12	13.51	6.39	Fe2O3
Magnesite	-1.89	-9.90	-8.01	MgCO3
Magnetite	10.58	14.49	3.91	Fe3O4
Malachite	-3.66	1.56	5.22	Cu2(OH)2CO3
Manganite	1.76	27.10	25.34	MnOOH
Massicot	-8.24	4.73	12.97	PbO
Matlockite	-8.57	-18.03	-9.46	PbClF
Melanothallite	-20.21	-16.44	3.77	CuCl2
Melanterite	-15.20	-17.42	-2.23	FeSO4:7H2O
Minium	-22.20	51.83	74.04	Pb3O4
Mirabilite	-8.49	-9.67	-1.18	Na2SO4:10H2O
Mn2(SO4)3	-46.63	-52.21	-5.58	Mn2(SO4)3
MnCl2:4H2O	-16.70	-14.05	2.65	MnCl2:4H2O
MnS(Green)	-130.65	-126.83	3.82	MnS
MnSO4	-12.85	-10.13	2.72	MnSO4

N2(g)	-2.18	-5.44	-3.26	N2
Na4UO2(CO3)3	-27.37	-43.66	-16.29	Na4UO2(CO3)3
Nahcolite	-5.26	-5.82	-0.56	NaHCO3
Nantokite	-14.60	-21.39	-6.79	CuCl
Natron	-10.43	-11.80	-1.36	Na2CO3:10H2O
Nesquehonite	-4.29	-9.90	-5.60	MgCO3:3H2O
NH3(g)	-54.64	-52.84	1.80	NH3
Nsutite	3.36	45.92	42.56	MnO2
O2(g)	-8.35	-11.23	-2.88	O2
Pb(OH)2	-3.47	4.73	8.20	Pb(OH)2
Pb2(OH)3Cl	-10.50	-1.70	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-16.74	9.46	26.20	PbO:Pb(OH)2
Pb2O3	-13.93	47.11	61.04	Pb2O3
Pb2OCO3	-10.62	-11.08	-0.46	PbO:PbCO3
Pb3O2CO3	-17.46	-6.35	11.11	PbCO3:2PbO
Pb3O2SO4	-14.69	-4.22	10.47	PbSO4:2PbO
Pb4(OH)6SO4	-20.59	0.51	21.10	Pb4(OH)6SO4
Pb4O3SO4	-21.71	0.51	22.22	PbSO4:3PbO
PbF2	-11.03	-18.47	-7.44	PbF2
PbMetal	-37.19	-32.92	4.27	Pb
PbO:0.3H2O	-8.25	4.73	12.98	PbO:0.33H2O
Phosgenite	-13.59	-33.40	-19.81	PbCl2:PbCO3
Plattnerite	-7.16	42.38	49.54	PbO2
Portlandite	-11.65	11.26	22.90	Ca(OH)2
Pyrite	-213.05	-231.57	-18.52	FeS2
Pyrochroite	-6.93	8.27	15.20	Mn(OH)2
Pyrolusite	4.32	45.92	41.60	MnO2
Rhodochrosite	-1.14	-12.26	-11.13	MnCO3
Rhodochrosite(d)	-1.87	-12.26	-10.39	MnCO3
Rutherfordine	-5.62	-20.07	-14.45	UO2CO3
Schoepite	-4.98	0.47	5.44	UO2(OH)2:H2O
Siderite	-8.67	-19.55	-10.88	FeCO3
Siderite(d)(3)	-9.10	-19.55	-10.45	FeCO3
SrF2	-5.62	-14.16	-8.54	SrF2
Strontianite	-2.23	-11.50	-9.27	SrCO3
Sulfur	-95.36	-110.41	-15.05	S
Tenorite	-1.79	5.88	7.67	CuO
Thenardite	-9.49	-9.67	-0.18	Na2SO4
Thermonatrite	-11.93	-11.80	0.13	Na2CO3:H2O
Trona	-16.89	-17.62	-0.73	NaHCO3:Na2CO3:2H2O
U(OH)2SO4	-43.23	-46.43	-3.20	U(OH)2SO4
U3O8(c)	-29.71	-8.79	20.92	U3O8
U4O9(c)	-71.42	-74.47	-3.04	U4O9
UF4(c)	-55.88	-74.42	-18.54	UF4
UF4:2.5H2O	-46.86	-74.42	-27.57	UF4:2.5H2O
UO2(a)	-28.13	-28.03	0.10	UO2
UO3(gamma)	-7.32	0.47	7.78	UO3
Uraninite(c)	-23.29	-28.03	-4.74	UO2
Witherite	-3.51	-12.08	-8.56	BaCO3

50 : 50 Mix of Wemlinger Injection Water : Arapahoe Formation Water

Phase	SI**	log IAP	log K(294 K, 1 atm)	
Al(OH)3(a)	-0.49	10.57	11.05	Al(OH)3
AlumK	-17.92	-23.16	-5.24	KAl(SO4)2:12H2O
Alunite	-1.10	-2.02	-0.92	KAl3(SO4)2(OH)6
Anglesite	-6.00	-13.81	-7.81	PbSO4
Anhydrite	-2.65	-7.00	-4.35	CaSO4
Anilite	-133.21	-165.51	-32.30	Cu0.25Cu1.5S
Antlerite	-9.55	-1.26	8.29	Cu3(OH)4SO4
Aragonite	-0.89	-9.20	-8.31	CaCO3
Artinite	-8.58	1.29	9.88	MgCO3:Mg(OH)2:3H2O
Atacamite	-6.89	0.63	7.52	Cu2(OH)3Cl
Azurite	-7.45	-3.40	4.05	Cu3(OH)2(CO3)2
B-UO2(OH)2	-4.70	0.97	5.68	UO2(OH)2
BaF2	-9.17	-14.94	-5.77	BaF2
Barite	0.04	-9.99	-10.03	BaSO4
Basaluminite	1.10	23.80	22.70	Al4(OH)10SO4
Birnessite	5.77	49.37	43.60	MnO2
Bixbyite	6.56	6.09	-0.46	Mn2O3
BlaubleiI	-121.85	-146.02	-24.16	Cu0.9Cu0.2S
BlaubleiII	-127.73	-155.01	-27.28	Cu0.6Cu0.8S
Boehmite	1.71	10.57	8.85	AlOOH
Brochantite	-10.86	4.48	15.34	Cu4(OH)6SO4
Brucite	-6.12	10.98	17.10	Mg(OH)2
Calcite	-0.74	-9.20	-8.46	CaCO3
Celestite	-2.68	-9.31	-6.62	SrSO4
Cerussite	-2.83	-16.01	-13.18	PbCO3
CH4(g)	-140.75	-143.58	-2.83	CH4
Chalcanthite	-10.08	-12.74	-2.65	CuSO4:5H2O
Chalcocite	-137.92	-173.01	-35.09	Cu2S
Chalcopyrite	-256.91	-292.52	-35.61	CuFeS2
CO2(g)	-2.51	-3.94	-1.42	CO2
Cotunnite	-12.21	-17.03	-4.82	PbCl2
Covellite	-120.52	-143.02	-22.50	CuS
Cu(OH)2	-3.05	5.74	8.79	Cu(OH)2
Cu2(OH)3NO3	-10.17	-0.76	9.41	Cu2(OH)3NO3
Cu2SO4	-40.82	-42.73	-1.91	Cu2SO4
CuCO3	-5.30	-14.93	-9.63	CuCO3
CuF	-31.04	-23.84	7.20	CuF
CuF2	-17.19	-17.69	-0.49	CuF2
CuF2:2H2O	-13.17	-17.69	-4.52	CuF2:2H2O
CuMetal	-23.77	-32.70	-8.92	Cu
CuOCuSO4	-18.87	-7.00	11.87	CuO:CuSO4
CupricFerrite	12.92	19.17	6.25	CuFe2O4
Cuprite	-22.64	-24.25	-1.61	Cu2O
CuprousFerrite	3.47	-5.41	-8.88	CuFeO2
CuSO4	-15.92	-12.74	3.18	CuSO4
Diaspore	3.45	10.57	7.12	AlOOH
Djurleite	-136.65	-171.03	-34.38	Cu0.066Cu1.868S
Dolomite	-1.89	-18.89	-17.00	CaMg(CO3)2
Dolomite(d)	-2.45	-18.89	-16.43	CaMg(CO3)2
Epsomite	-5.32	-7.49	-2.17	MgSO4:7H2O
Fe(OH)2.7Cl.3	6.50	3.46	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.82	6.71	4.89	Fe(OH)3
Fe3(OH)8	-7.53	12.69	20.22	Fe3(OH)8

FeS(ppt)	-145.58	-149.50	-3.92	FeS
Fluorite	-1.30	-11.95	-10.65	CaF2
Galena	-131.12	-144.09	-12.97	PbS
Gibbsite	2.24	10.57	8.33	Al(OH)3
Goethite	7.58	6.71	-0.86	FeOOH
Greigite	-537.30	-582.34	-45.03	Fe3S4
Gummite	-9.65	0.97	10.62	UO3
Gypsum	-2.42	-7.00	-4.58	CaSO4:2H2O
H2(g)	-41.14	-44.27	-3.13	H2
H2O(g)	-1.61	-0.00	1.61	H2O
H2S(g)	-140.81	-141.76	-0.95	H2S
Halite	-8.02	-6.45	1.57	NaCl
Hausmannite	3.85	65.84	62.00	Mn3O4
Hematite	17.14	13.43	-3.71	Fe2O3
Huntite	-8.55	-38.27	-29.72	CaMg3(CO3)4
Hydrocerussite	-9.89	-27.35	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-19.51	-27.77	-8.26	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-4.36	-14.19	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-4.67	-13.58	-8.91	KFe3(SO4)2(OH)6
Jarosite-Na	-7.47	-12.41	-4.93	NaFe3(SO4)2(OH)6
JarositeH	-11.94	-16.81	-4.86	(H3O)Fe3(SO4)2(OH)6
Jurbanite	-4.68	-7.91	-3.23	AlOHSO4
Langite	-12.69	4.48	17.17	Cu4(OH)6SO4:H2O
Larnakite	-8.92	-9.14	-0.22	PbO:PbSO4
Laurionite	-6.81	-6.18	0.62	PbOHCl
Litharge	-8.21	4.67	12.88	PbO
Mackinawite	-144.85	-149.50	-4.65	FeS
Maghemite	7.04	13.43	6.39	Fe2O3
Magnesite	-1.72	-9.69	-7.97	MgCO3
Magnetite	8.47	12.69	4.22	Fe3O4
Malachite	-4.17	1.17	5.34	Cu2(OH)2CO3
Manganite	3.46	28.80	25.34	MnOOH
Massicot	-8.40	4.67	13.07	PbO
Matlockite	-8.39	-17.90	-9.51	PbClF
Melanothallite	-19.81	-15.96	3.85	CuCl2
Melanterite	-16.96	-19.22	-2.26	FeSO4:7H2O
Minium	-19.54	55.14	74.68	Pb3O4
Mirabilite	-8.38	-9.68	-1.30	Na2SO4:10H2O
Mn2(SO4)3	-43.99	-49.33	-5.34	Mn2(SO4)3
MnCl2:4H2O	-16.01	-13.46	2.54	MnCl2:4H2O
MnS(Green)	-144.38	-140.52	3.86	MnS
MnSO4	-13.06	-10.24	2.82	MnSO4
N2(g)	-16.87	-20.11	-3.25	N2
Na4UO2(CO3)3	-27.16	-43.45	-16.29	Na4UO2(CO3)3
Nahcolite	-5.33	-5.91	-0.58	NaHCO3
Nantokite	-16.12	-22.97	-6.86	CuCl
Natron	-10.41	-11.87	-1.46	Na2CO3:10H2O
Nesquehonite	-4.12	-9.69	-5.57	MgCO3:3H2O
NH3(g)	-67.14	-65.30	1.85	NH3
Nsutite	6.81	49.37	42.56	MnO2
O2(g)	-2.23	-5.09	-2.86	O2
Pb(OH)2	-3.62	4.67	8.28	Pb(OH)2
Pb2(OH)3Cl	-10.31	-1.52	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-16.87	9.33	26.20	PbO:Pb(OH)2
Pb2O3	-10.57	50.47	61.04	Pb2O3
Pb2OCO3	-10.95	-11.34	-0.39	PbO:PbCO3
Pb3O2CO3	-17.95	-6.68	11.27	PbCO3:2PbO

Pb3O2SO4	-15.07	-4.48	10.60	PbSO4:2PbO
Pb4(OH)6SO4	-20.91	0.19	21.10	Pb4(OH)6SO4
Pb4O3SO4	-22.25	0.19	22.44	PbSO4:3PbO
PbF2	-11.33	-18.76	-7.43	PbF2
PbMetal	-40.74	-36.47	4.27	Pb
PbO:0.3H2O	-8.31	4.67	12.98	PbO:0.33H2O
Phosgenite	-13.23	-33.04	-19.81	PbCl2:PbCO3
Plattnerite	-4.17	45.81	49.98	PbO2
Portlandite	-11.62	11.48	23.10	Ca(OH)2
Pyrite	-238.53	-257.12	-18.59	FeS2
Pyrochroite	-6.97	8.23	15.20	Mn(OH)2
Pyrolusite	7.37	49.37	42.00	MnO2
Rhodochrosite	-1.32	-12.44	-11.12	MnCO3
Rhodochrosite(d)	-2.05	-12.44	-10.39	MnCO3
Rutherfordine	-5.26	-19.70	-14.44	UO2CO3
Schoepite	-4.54	0.97	5.52	UO2(OH)2:H2O
Siderite	-10.55	-21.42	-10.87	FeCO3
Siderite(d)(3)	-10.97	-21.42	-10.45	FeCO3
SrF2	-5.70	-14.26	-8.55	SrF2
Strontianite	-2.24	-11.50	-9.27	SrCO3
Sulfur	-105.55	-120.65	-15.10	S
Tenorite	-2.03	5.74	7.77	CuO
Thenardite	-9.50	-9.67	-0.17	Na2SO4
Thermonatrite	-12.03	-11.87	0.15	Na2CO3:H2O
Trona	-17.16	-17.78	-0.62	NaHCO3:Na2CO3:2H2O
U(OH)2SO4	-46.07	-49.27	-3.20	U(OH)2SO4
U3O8(c)	-31.75	-10.10	21.64	U3O8
U4O9(c)	-79.63	-82.04	-2.41	U4O9
UF4(c)	-59.22	-77.65	-18.42	UF4
UF4:2.5H2O	-50.08	-77.65	-27.56	UF4:2.5H2O
UO2(a)	-30.89	-30.79	0.10	UO2
UO3(gamma)	-6.93	0.97	7.90	UO3
Uraninite(c)	-26.17	-30.79	-4.62	UO2
Witherite	-3.62	-12.19	-8.57	BaCO3

80 : 20 Mix of Wemlinger Injection Water : Arapahoe Formation Water

Phase	SI**	log IAP	log K(291 K,	1 atm)
Al(OH)3(a)	-0.33	10.89	11.22	Al(OH)3
AlumK	-17.93	-23.22	-5.28	KAl(SO4)2:12H2O
Alunite	-0.84	-1.44	-0.60	KAl3(SO4)2(OH)6
Anglesite	-6.40	-14.22	-7.82	PbSO4
Anhydrite	-2.54	-6.88	-4.34	CaSO4
Anilite	-136.57	-169.14	-32.57	Cu0.25Cu1.5S
Antlerite	-10.73	-2.44	8.29	Cu3(OH)4SO4
Aragonite	-0.76	-9.06	-8.30	CaCO3
Artinite	-8.11	1.95	10.06	MgCO3:Mg(OH)2:3H2O
Atacamite	-7.59	0.04	7.64	Cu2(OH)3Cl
Azurite	-8.96	-4.72	4.24	Cu3(OH)2(CO3)2
B-UO2(OH)2	-4.49	1.28	5.76	UO2(OH)2
BaF2	-9.43	-15.21	-5.78	BaF2
Barite	-0.04	-10.12	-10.08	BaSO4
Basaluminite	2.16	24.86	22.70	Al4(OH)10SO4
Birnessite	6.35	49.95	43.60	MnO2
Bixbyite	6.61	6.24	-0.37	Mn2O3

BlaubleiI	-124.82	-148.98	-24.16	Cu0.9Cu0.2S
BlaubleiII	-131.01	-158.28	-27.28	Cu0.6Cu0.8S
Boehmite	1.86	10.89	9.03	AlOOH
Brochantite	-12.35	2.99	15.34	Cu4(OH)6SO4
Brucite	-5.86	11.41	17.27	Mg(OH)2
Calcite	-0.61	-9.06	-8.45	CaCO3
Celestite	-2.64	-9.26	-6.62	SrSO4
Cerussite	-3.19	-16.40	-13.21	PbCO3
CH4(g)	-143.29	-146.10	-2.81	CH4
Chalcanthite	-10.62	-13.28	-2.66	CuSO4:5H2O
Chalcocite	-141.48	-176.89	-35.40	Cu2S
Chalcopyrite	-262.59	-298.42	-35.84	CuFeS2
CO2(g)	-2.71	-4.10	-1.39	CO2
Cotunnite	-12.26	-17.12	-4.86	PbCl2
Covellite	-123.23	-145.88	-22.65	CuS
Cu(OH)2	-3.46	5.42	8.88	Cu(OH)2
Cu2(OH)3NO3	-10.99	-1.47	9.52	Cu2(OH)3NO3
Cu2SO4	-42.41	-44.29	-1.88	Cu2SO4
CuCO3	-5.83	-15.46	-9.63	CuCO3
CuF	-31.96	-24.69	7.28	CuF
CuF2	-17.96	-18.37	-0.41	CuF2
CuF2:2H2O	-13.88	-18.37	-4.49	CuF2:2H2O
CuMetal	-24.67	-33.70	-9.03	Cu
CuOCuSO4	-19.95	-7.86	12.10	CuO:CuSO4
CupricFerrite	11.92	18.42	6.50	CuFe2O4
Cuprite	-23.93	-25.58	-1.65	Cu2O
CuprousFerrite	2.57	-6.29	-8.86	CuFeO2
CuSO4	-16.58	-13.28	3.30	CuSO4
Diaspore	3.62	10.89	7.27	AlOOH
Djurleite	-140.16	-174.84	-34.68	Cu0.066Cu1.868S
Dolomite	-1.59	-18.53	-16.94	CaMg(CO3)2
Dolomite(d)	-2.17	-18.53	-16.36	CaMg(CO3)2
Epsomite	-5.10	-7.29	-2.18	MgSO4:7H2O
Fe(OH)2.7Cl.3	6.30	3.26	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.61	6.50	4.89	Fe(OH)3
Fe3(OH)8	-8.46	11.76	20.22	Fe3(OH)8
FeS(ppt)	-148.63	-152.54	-3.92	FeS
Fluorite	-1.29	-11.97	-10.68	CaF2
Galena	-133.73	-146.82	-13.09	PbS
Gibbsite	2.42	10.89	8.47	Al(OH)3
Goethite	7.27	6.50	-0.77	FeOOH
Greigite	-548.43	-593.46	-45.03	Fe3S4
Gummite	-9.49	1.28	10.77	UO3
Gypsum	-2.30	-6.88	-4.58	CaSO4:2H2O
H2(g)	-41.81	-44.94	-3.12	H2
H2O(g)	-1.68	-0.00	1.68	H2O
H2S(g)	-143.35	-144.28	-0.92	H2S
Halite	-7.88	-6.31	1.57	NaCl
Hausmannite	3.59	66.22	62.63	Mn3O4
Hematite	16.51	13.00	-3.52	Fe2O3
Huntite	-7.91	-37.47	-29.56	CaMg3(CO3)4
Hydrocerussite	-10.85	-28.31	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-18.53	-26.46	-7.93	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-5.41	-15.24	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-5.90	-14.61	-8.71	KFe3(SO4)2(OH)6
Jarosite-Na	-8.72	-13.42	-4.70	NaFe3(SO4)2(OH)6
JarositeH	-13.40	-17.91	-4.51	(H3O)Fe3(SO4)2(OH)6

Jurbanite	-4.58	-7.81	-3.23	AlOHSO4
Langite	-14.43	2.99	17.42	Cu4(OH)6SO4:H2O
Larnakite	-9.56	-9.73	-0.18	PbO:PbSO4
Laurionite	-6.94	-6.32	0.62	PbOHCl
Litharge	-8.50	4.48	12.98	PbO
Mackinawite	-147.89	-152.54	-4.65	FeS
Maghemite	6.61	13.00	6.39	Fe2O3
Magnesite	-1.54	-9.47	-7.93	MgCO3
Magnetite	7.22	11.76	4.54	Fe3O4
Malachite	-5.11	0.35	5.46	Cu2(OH)2CO3
Manganite	3.70	29.04	25.34	MnOOH
Massicot	-8.69	4.48	13.18	PbO
Matlockite	-8.65	-18.21	-9.56	PbClF
Melanothallite	-20.11	-16.18	3.93	CuCl2
Melanterite	-17.65	-19.94	-2.29	FeSO4:7H2O
Minium	-20.06	55.27	75.33	Pb3O4
Mirabilite	-8.31	-9.72	-1.42	Na2SO4:10H2O
Mn2(SO4)3	-44.78	-49.87	-5.09	Mn2(SO4)3
MnCl2:4H2O	-15.90	-13.47	2.43	MnCl2:4H2O
MnS(Green)	-147.06	-143.17	3.89	MnS
MnSO4	-13.48	-10.57	2.92	MnSO4
N2(g)	-18.42	-21.66	-3.24	N2
Na4UO2(CO3)3	-27.12	-43.41	-16.29	Na4UO2(CO3)3
Nahcolite	-5.40	-6.00	-0.61	NaHCO3
Nantokite	-16.67	-23.59	-6.92	CuCl
Natron	-10.34	-11.90	-1.56	Na2CO3:10H2O
Nesquehonite	-3.94	-9.47	-5.53	MgCO3:3H2O
NH3(g)	-68.86	-66.96	1.90	NH3
Nsutite	7.39	49.95	42.56	MnO2
O2(g)	-1.75	-4.60	-2.84	O2
Pb(OH)2	-3.89	4.48	8.37	Pb(OH)2
Pb2(OH)3Cl	-10.62	-1.83	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-17.23	8.97	26.20	PbO:Pb(OH)2
Pb2O3	-10.26	50.78	61.04	Pb2O3
Pb2OCO3	-11.60	-11.91	-0.32	PbO:PbCO3
Pb3O2CO3	-18.87	-7.43	11.44	PbCO3:2PbO
Pb3O2SO4	-15.98	-5.25	10.73	PbSO4:2PbO
Pb4(OH)6SO4	-21.87	-0.77	21.10	Pb4(OH)6SO4
Pb4O3SO4	-23.42	-0.77	22.66	PbSO4:3PbO
PbF2	-11.88	-19.31	-7.43	PbF2
PbMetal	-41.59	-37.33	4.26	Pb
PbO:0.3H2O	-8.50	4.48	12.98	PbO:0.33H2O
Phosgenite	-13.71	-33.52	-19.81	PbCl2:PbCO3
Plattnerite	-4.13	46.30	50.43	PbO2
Portlandite	-11.47	11.82	23.29	Ca(OH)2
Pyrite	-243.37	-262.03	-18.66	FeS2
Pyrochroite	-7.06	8.14	15.20	Mn(OH)2
Pyrolusite	7.53	49.95	42.42	MnO2
Rhodochrosite	-1.64	-12.75	-11.11	MnCO3
Rhodochrosite(d)	-2.36	-12.75	-10.39	MnCO3
Rutherfordine	-5.18	-19.61	-14.43	UO2CO3
Schoepite	-4.32	1.28	5.60	UO2(OH)2:H2O
Siderite	-11.27	-22.12	-10.85	FeCO3
Siderite(d)(3)	-11.67	-22.12	-10.45	FeCO3
SrF2	-5.79	-14.35	-8.56	SrF2
Strontianite	-2.17	-11.44	-9.27	SrCO3
Sulfur	-107.45	-122.60	-15.15	S

Tenorite	-2.44	5.42	7.86	CuO
Thenardite	-9.55	-9.72	-0.17	Na2SO4
Thermonatrite	-12.07	-11.90	0.17	Na2CO3:H2O
Trona	-17.40	-17.91	-0.51	NaHCO3:Na2CO3:2H2O
U(OH)2SO4	-46.45	-49.65	-3.20	U(OH)2SO4
U3O8(c)	-31.60	-9.22	22.38	U3O8
U4O9(c)	-80.22	-81.99	-1.77	U4O9
UF4(c)	-60.23	-78.53	-18.31	UF4
UF4:2.5H2O	-50.97	-78.53	-27.56	UF4:2.5H2O
UO2(a)	-31.05	-30.95	0.10	UO2
UO3(gamma)	-6.75	1.28	8.03	UO3
Uraninite(c)	-26.45	-30.95	-4.50	UO2
Witherite	-3.72	-12.30	-8.58	BaCO3

20 : 80 Mix of Wemlinger Injection Water : Denver Formation Water

Phase	SI**	log IAP	log K(290 K, 1 atm)	
Al(OH)3(a)	-0.55	10.74	11.30	Al(OH)3
AlumK	-16.90	-22.21	-5.31	KAl(SO4)2:12H2O
Alunite	-0.27	-0.72	-0.46	KAl3(SO4)2(OH)6
Anglesite	-5.63	-13.46	-7.83	PbSO4
Anhydrite	-2.83	-7.17	-4.34	CaSO4
Aragonite	-1.25	-9.55	-8.29	CaCO3
Artinite	-10.11	0.03	10.14	MgCO3:Mg(OH)2:3H2O
B-UO2(OH)2	-5.30	0.50	5.80	UO2(OH)2
BaF2	-9.05	-14.83	-5.78	BaF2
Barite	0.06	-10.03	-10.10	BaSO4
Basaluminite	2.33	25.03	22.70	Al4(OH)10SO4
Birnessite	5.67	49.27	43.60	MnO2
Bixbyite	5.14	4.81	-0.33	Mn2O3
Boehmite	1.63	10.74	9.11	AlOOH
Brucite	-7.17	10.18	17.35	Mg(OH)2
Calcite	-1.10	-9.55	-8.44	CaCO3
Celestite	-2.72	-9.34	-6.62	SrSO4
Cerussite	-2.62	-15.84	-13.22	PbCO3
CH4(g)	-142.23	-145.03	-2.80	CH4
CO2(g)	-2.14	-3.52	-1.38	CO2
Cotunnite	-12.33	-17.21	-4.88	PbCl2
Diaspore	3.40	10.74	7.34	AlOOH
Dolomite	-2.78	-19.69	-16.91	CaMg(CO3)2
Dolomite(d)	-3.36	-19.69	-16.33	CaMg(CO3)2
Epsomite	-5.57	-7.77	-2.19	MgSO4:7H2O
Fe(OH)2.7Cl.3	6.39	3.35	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.71	6.60	4.89	Fe(OH)3
Fe3(OH)8	-8.09	12.13	20.22	Fe3(OH)8
FeS(ppt)	-147.19	-151.11	-3.92	FeS
Fluorite	-1.28	-11.97	-10.69	CaF2
Galena	-132.42	-145.56	-13.14	PbS
Gibbsite	2.21	10.74	8.54	Al(OH)3
Goethite	7.33	6.60	-0.73	FeOOH
Greigite	-543.01	-588.05	-45.03	Fe3S4
Gummite	-10.33	0.50	10.83	UO3
Gypsum	-2.59	-7.17	-4.58	CaSO4:2H2O
H2(g)	-41.73	-44.85	-3.12	H2
H2O(g)	-1.71	-0.00	1.71	H2O

H2S(g)	-142.09	-143.00	-0.91	H2S
Halite	-8.04	-6.47	1.56	NaCl
Hausmannite	1.42	64.34	62.92	Mn3O4
Hematite	16.63	13.20	-3.43	Fe2O3
Huntite	-10.49	-39.98	-29.48	CaMg3(CO3)4
Hydrocerussite	-9.73	-27.19	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-22.62	-30.40	-7.78	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-3.87	-13.70	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-4.53	-13.16	-8.62	KFe3(SO4)2(OH)6
Jarosite-Na	-7.11	-11.71	-4.60	NaFe3(SO4)2(OH)6
JarositeH	-11.73	-16.09	-4.36	(H3O)Fe3(SO4)2(OH)6
Jurbanite	-3.97	-7.20	-3.23	AlOHSO4
Larnakite	-8.82	-8.98	-0.16	PbO:PbSO4
Laurionite	-6.98	-6.36	0.62	PbOHCl
Litharge	-8.54	4.48	13.03	PbO
Mackinawite	-146.46	-151.11	-4.65	FeS
Maghemite	6.81	13.20	6.39	Fe2O3
Magnesite	-2.23	-10.14	-7.91	MgCO3
Magnetite	7.45	12.13	4.68	Fe3O4
Manganite	3.06	28.40	25.34	MnOOH
Massicot	-8.74	4.48	13.22	PbO
Matlockite	-8.15	-17.73	-9.58	PbClF
Melanterite	-16.70	-19.01	-2.30	FeSO4:7H2O
Minium	-20.44	55.18	75.62	Pb3O4
Mirabilite	-7.73	-9.20	-1.47	Na2SO4:10H2O
Mn2(SO4)3	-44.03	-49.01	-4.98	Mn2(SO4)3
MnCl2:4H2O	-16.54	-14.15	2.38	MnCl2:4H2O
MnS(Green)	-146.42	-142.51	3.91	MnS
MnSO4	-13.37	-10.41	2.96	MnSO4
N2(g)	-17.53	-20.76	-3.23	N2
Na4UO2(CO3)3	-26.67	-42.96	-16.29	Na4UO2(CO3)3
Nahcolite	-4.93	-5.55	-0.62	NaHCO3
Natron	-9.97	-11.57	-1.61	Na2CO3:10H2O
Nesquehonite	-4.63	-10.14	-5.51	MgCO3:3H2O
NH3(g)	-68.26	-66.34	1.92	NH3
Nsutite	6.70	49.27	42.56	MnO2
O2(g)	-2.31	-5.14	-2.83	O2
Pb(BO2)2	-13.95	-6.23	7.72	Pb(BO2)2
Pb(OH)2	-3.93	4.48	8.41	Pb(OH)2
Pb2(OH)3Cl	-10.67	-1.88	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-17.24	8.96	26.20	PbO:Pb(OH)2
Pb2O3	-10.34	50.70	61.04	Pb2O3
Pb2OCO3	-11.07	-11.35	-0.29	PbO:PbCO3
Pb3O2CO3	-18.39	-6.87	11.52	PbCO3:2PbO
Pb3O2SO4	-15.28	-4.50	10.79	PbSO4:2PbO
Pb4(OH)6SO4	-21.11	-0.01	21.10	Pb4(OH)6SO4
Pb4O3SO4	-22.77	-0.01	22.76	PbSO4:3PbO
PbF2	-10.83	-18.26	-7.43	PbF2
PbMetal	-41.51	-37.25	4.26	Pb
PbO:0.3H2O	-8.50	4.48	12.98	PbO:0.33H2O
Phosgenite	-13.23	-33.04	-19.81	PbCl2:PbCO3
Plattnerite	-4.41	46.21	50.63	PbO2
Portlandite	-12.61	10.77	23.38	Ca(OH)2
Pyrite	-240.73	-259.42	-18.69	FeS2
Pyrochroite	-7.66	7.54	15.20	Mn(OH)2
Pyrolusite	6.67	49.27	42.60	MnO2
Rhodochrosite	-1.68	-12.78	-11.10	MnCO3

Rhodochrosite(d)	-2.39	-12.78	-10.39	MnCO3
Rutherfordine	-5.39	-19.82	-14.42	UO2CO3
Schoepite	-5.13	0.50	5.63	UO2(OH)2:H2O
Siderite	-10.54	-21.38	-10.84	FeCO3
Siderite(d)(3)	-10.93	-21.38	-10.45	FeCO3
SrF2	-5.58	-14.14	-8.56	SrF2
Strontianite	-2.45	-11.72	-9.27	SrCO3
Sulfur	-106.28	-121.46	-15.17	S
Thenardite	-9.03	-9.20	-0.17	Na2SO4
Thermonatrite	-11.75	-11.57	0.18	Na2CO3:H2O
Trona	-16.66	-17.12	-0.46	NaHCO3:Na2CO3:2H2O
U(OH)2SO4	-46.28	-49.48	-3.20	U(OH)2SO4
U3O8(c)	-33.87	-11.16	22.71	U3O8
U4O9(c)	-82.95	-84.44	-1.48	U4O9
UF4(c)	-58.77	-77.02	-18.25	UF4
UF4:2.5H2O	-49.47	-77.03	-27.56	UF4:2.5H2O
UO2(a)	-31.64	-31.54	0.10	UO2
UO3(gamma)	-7.58	0.50	8.08	UO3
Uraninite(c)	-27.09	-31.54	-4.45	UO2
Witherite	-3.83	-12.41	-8.58	BaCO3

50 : 50 Mix of Wemlinger Injection Water : Denver Formation Water

Phase	SI**	log IAP	log K(290 K,	1 atm)
Al(OH)3(a)	-0.19	11.12	11.31	Al(OH)3
AlumK	-16.76	-22.07	-5.31	KAl(SO4)2:12H2O
Alunite	0.60	0.17	-0.43	KAl3(SO4)2(OH)6
Anglesite	-5.81	-13.64	-7.83	PbSO4
Anhydrite	-2.68	-7.01	-4.34	CaSO4
Aragonite	-1.12	-9.41	-8.29	CaCO3
Artinite	-9.43	0.73	10.15	MgCO3:Mg(OH)2:3H2O
B-UO2(OH)2	-4.81	1.00	5.81	UO2(OH)2
BaF2	-9.25	-15.03	-5.78	BaF2
Barite	0.02	-10.08	-10.10	BaSO4
Basaluminite	3.68	26.38	22.70	Al4(OH)10SO4
Birnessite	5.93	49.53	43.60	MnO2
Bixbyite	5.39	5.08	-0.32	Mn2O3
Boehmite	1.99	11.12	9.13	AlOOH
Brucite	-6.76	10.61	17.36	Mg(OH)2
Calcite	-0.97	-9.41	-8.44	CaCO3
Celestite	-2.67	-9.29	-6.62	SrSO4
Cerussite	-2.81	-16.03	-13.22	PbCO3
CH4(g)	-143.33	-146.12	-2.79	CH4
CO2(g)	-2.31	-3.68	-1.37	CO2
Cotunnite	-11.95	-16.83	-4.88	PbCl2
Diaspore	3.76	11.12	7.36	AlOOH
Dolomite	-2.38	-19.29	-16.91	CaMg(CO3)2
Dolomite(d)	-2.96	-19.29	-16.33	CaMg(CO3)2
Epsomite	-5.29	-7.49	-2.19	MgSO4:7H2O
Fe(OH)2.7Cl.3	6.30	3.26	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.57	6.46	4.89	Fe(OH)3
Fe3(OH)8	-8.63	11.59	20.22	Fe3(OH)8
FeS(ppt)	-148.53	-152.44	-3.92	FeS
Fluorite	-1.27	-11.97	-10.69	CaF2
Galena	-133.51	-146.67	-13.15	PbS

Gibbsite	2.57	11.12	8.55	Al(OH)3
Goethite	7.18	6.46	-0.72	FeOOH
Greigite	-547.86	-592.90	-45.03	Fe3S4
Gummite	-9.85	1.00	10.85	UO3
Gypsum	-2.43	-7.01	-4.58	CaSO4:2H2O
H2(g)	-41.97	-45.09	-3.12	H2
H2O(g)	-1.71	-0.00	1.71	H2O
H2S(g)	-143.16	-144.07	-0.91	H2S
Halite	-7.82	-6.26	1.56	NaCl
Hausmannite	1.68	64.65	62.97	Mn3O4
Hematite	16.33	12.91	-3.41	Fe2O3
Huntite	-9.57	-39.04	-29.47	CaMg3(CO3)4
Hydrocerussite	-10.14	-27.60	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-21.16	-28.91	-7.75	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-4.55	-14.38	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-5.21	-13.82	-8.61	KFe3(SO4)2(OH)6
Jarosite-Na	-7.85	-12.44	-4.58	NaFe3(SO4)2(OH)6
JarositeH	-12.49	-16.82	-4.33	(H3O)Fe3(SO4)2(OH)6
Jurbanite	-3.74	-6.97	-3.23	AlOHSO4
Larnakite	-9.02	-9.18	-0.16	PbO:PbSO4
Laurionite	-6.81	-6.18	0.62	PbOHCl
Litharge	-8.58	4.46	13.04	PbO
Mackinawite	-147.80	-152.44	-4.65	FeS
Maghemite	6.53	12.91	6.39	Fe2O3
Magnesite	-1.97	-9.88	-7.91	MgCO3
Magnetite	6.88	11.59	4.71	Fe3O4
Manganite	3.21	28.55	25.34	MnOOH
Massicot	-8.78	4.46	13.23	PbO
Matlockite	-8.12	-17.71	-9.58	PbClF
Melanterite	-17.11	-19.42	-2.31	FeSO4:7H2O
Minium	-20.33	55.34	75.67	Pb3O4
Mirabilite	-7.85	-9.33	-1.48	Na2SO4:10H2O
Mn2(SO4)3	-44.25	-49.20	-4.96	Mn2(SO4)3
MnCl2:4H2O	-16.10	-13.72	2.37	MnCl2:4H2O
MnS(Green)	-147.47	-143.56	3.91	MnS
MnSO4	-13.50	-10.53	2.97	MnSO4
N2(g)	-17.99	-21.23	-3.23	N2
Na4UO2(CO3)3	-26.65	-42.94	-16.29	Na4UO2(CO3)3
Nahcolite	-5.08	-5.70	-0.62	NaHCO3
Natron	-10.11	-11.72	-1.61	Na2CO3:10H2O
Nesquehonite	-4.37	-9.88	-5.51	MgCO3:3H2O
NH3(g)	-68.85	-66.92	1.93	NH3
Nsutite	6.97	49.53	42.56	MnO2
O2(g)	-1.91	-4.74	-2.83	O2
Pb(BO2)2	-14.39	-6.66	7.72	Pb(BO2)2
Pb(OH)2	-3.96	4.46	8.42	Pb(OH)2
Pb2(OH)3Cl	-10.52	-1.73	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-17.29	8.91	26.20	PbO:Pb(OH)2
Pb2O3	-10.16	50.88	61.04	Pb2O3
Pb2OCO3	-11.29	-11.57	-0.28	PbO:PbCO3
Pb3O2CO3	-18.65	-7.12	11.53	PbCO3:2PbO
Pb3O2SO4	-15.52	-4.72	10.80	PbSO4:2PbO
Pb4(OH)6SO4	-21.37	-0.27	21.10	Pb4(OH)6SO4
Pb4O3SO4	-23.04	-0.27	22.78	PbSO4:3PbO
PbF2	-11.16	-18.59	-7.43	PbF2
PbMetal	-41.78	-37.52	4.26	Pb
PbO:0.3H2O	-8.52	4.46	12.98	PbO:0.33H2O

Phosgenite	-13.05	-32.86	-19.81	PbCl2:PbCO3
Plattnerite	-4.24	46.43	50.67	PbO2
Portlandite	-12.32	11.08	23.40	Ca(OH)2
Pyrite	-242.90	-261.59	-18.70	FeS2
Pyrochroite	-7.64	7.56	15.20	Mn(OH)2
Pyrolusite	6.90	49.53	42.64	MnO2
Rhodochrosite	-1.82	-12.93	-11.10	MnCO3
Rhodochrosite(d)	-2.54	-12.93	-10.39	MnCO3
Rutherfordine	-5.07	-19.49	-14.42	UO2CO3
Schoepite	-4.64	1.00	5.64	UO2(OH)2:H2O
Siderite	-10.97	-21.81	-10.84	FeCO3
Siderite(d)(3)	-11.36	-21.81	-10.45	FeCO3
SrF2	-5.68	-14.24	-8.56	SrF2
Strontianite	-2.41	-11.68	-9.27	SrCO3
Sulfur	-107.12	-122.30	-15.18	S
Thenardite	-9.16	-9.33	-0.17	Na2SO4
Thermonatrite	-11.90	-11.72	0.18	Na2CO3:H2O
Trona	-16.98	-17.43	-0.45	NaHCO3:Na2CO3:2H2O
U(OH)2SO4	-46.17	-49.37	-3.20	U(OH)2SO4
U3O8(c)	-32.64	-9.87	22.77	U3O8
U4O9(c)	-81.69	-83.12	-1.43	U4O9
UF4(c)	-59.12	-77.36	-18.24	UF4
UF4:2.5H2O	-49.80	-77.36	-27.56	UF4:2.5H2O
UO2(a)	-31.37	-31.27	0.10	UO2
UO3(gamma)	-7.10	1.00	8.09	UO3
Uraninite(c)	-26.83	-31.27	-4.44	UO2
Witherite	-3.88	-12.47	-8.59	BaCO3

80 : 20 Mix of Wemlinger Injection Water : Denver Formation Water

Phase	SI**	log IAP	log K(290 K,	1 atm)
Al(OH)3(a)	-0.15	11.18	11.33	Al(OH)3
AlumK	-17.23	-22.54	-5.31	KAl(SO4)2:12H2O
Alunite	0.22	-0.18	-0.40	KAl3(SO4)2(OH)6
Anglesite	-6.26	-14.10	-7.83	PbSO4
Anhydrite	-2.55	-6.89	-4.34	CaSO4
Aragonite	-0.91	-9.20	-8.29	CaCO3
Artinite	-8.63	1.54	10.17	MgCO3:Mg(OH)2:3H2O
B-UO2(OH)2	-4.52	1.29	5.82	UO2(OH)2
BaF2	-9.48	-15.26	-5.78	BaF2
Barite	-0.07	-10.18	-10.10	BaSO4
Basaluminite	3.59	26.29	22.70	Al4(OH)10SO4
Birnessite	6.07	49.67	43.60	MnO2
Bixbyite	5.49	5.18	-0.31	Mn2O3
Boehmite	2.04	11.18	9.14	AlOOH
Brucite	-6.23	11.14	17.38	Mg(OH)2
Calcite	-0.76	-9.20	-8.44	CaCO3
Celestite	-2.64	-9.26	-6.62	SrSO4
Cerussite	-3.18	-16.41	-13.23	PbCO3
CH4(g)	-144.12	-146.91	-2.79	CH4
CO2(g)	-2.57	-3.94	-1.37	CO2
Cotunnite	-12.11	-16.99	-4.88	PbCl2
Diaspore	3.81	11.18	7.37	AlOOH
Dolomite	-1.90	-18.80	-16.90	CaMg(CO3)2
Dolomite(d)	-2.48	-18.80	-16.32	CaMg(CO3)2

Epsomite	-5.09	-7.29	-2.20	MgSO4:7H2O
Fe(OH)2.7Cl.3	5.98	2.94	-3.04	Fe(OH)2.7Cl0.3
Fe(OH)3(a)	1.25	6.14	4.89	Fe(OH)3
Fe3(OH)8	-9.64	10.58	20.22	Fe3(OH)8
FeS(ppt)	-149.77	-153.69	-3.92	FeS
Fluorite	-1.27	-11.97	-10.70	CaF2
Galena	-134.49	-147.65	-13.17	PbS
Gibbsite	2.62	11.18	8.56	Al(OH)3
Goethite	6.85	6.14	-0.71	FeOOH
Greigite	-552.33	-597.37	-45.03	Fe3S4
Gummite	-9.57	1.29	10.86	UO3
Gypsum	-2.30	-6.89	-4.58	CaSO4:2H2O
H2(g)	-42.11	-45.23	-3.12	H2
H2O(g)	-1.72	-0.00	1.72	H2O
H2S(g)	-144.03	-144.93	-0.91	H2S
Halite	-7.78	-6.22	1.56	NaCl
Hausmannite	1.76	64.79	63.03	Mn3O4
Hematite	15.68	12.28	-3.40	Fe2O3
Huntite	-8.55	-38.00	-29.46	CaMg3(CO3)4
Hydrocerussite	-11.02	-28.48	-17.46	Pb(OH)2:2PbCO3
Hydromagnesite	-19.54	-27.26	-7.73	Mg5(CO3)4(OH)2:4H2O
Jarosite(ss)	-6.06	-15.89	-9.83	(K0.77Na0.03H0.2)Fe3(SO4)2(OH)6
Jarosite-K	-6.71	-15.30	-8.59	KFe3(SO4)2(OH)6
Jarosite-Na	-9.44	-14.00	-4.56	NaFe3(SO4)2(OH)6
JarositeH	-14.15	-18.44	-4.30	(H3O)Fe3(SO4)2(OH)6
Jurbanite	-4.02	-7.25	-3.23	AlOHSO4
Larnakite	-9.61	-9.76	-0.15	PbO:PbSO4
Laurionite	-6.95	-6.33	0.62	PbOHCl
Litharge	-8.71	4.34	13.05	PbO
Mackinawite	-149.04	-153.69	-4.65	FeS
Maghemite	5.89	12.28	6.39	Fe2O3
Magnesite	-1.69	-9.60	-7.91	MgCO3
Magnetite	5.84	10.58	4.74	Fe3O4
Manganite	3.27	28.61	25.34	MnOOH
Massicot	-8.91	4.34	13.24	PbO
Matlockite	-8.49	-18.08	-9.59	PbClF
Melanterite	-17.83	-20.13	-2.31	FeSO4:7H2O
Minium	-20.61	55.12	75.73	Pb3O4
Mirabilite	-8.06	-9.55	-1.49	Na2SO4:10H2O
Mn2(SO4)3	-45.17	-50.11	-4.94	Mn2(SO4)3
MnCl2:4H2O	-16.13	-13.76	2.37	MnCl2:4H2O
MnS(Green)	-148.34	-144.43	3.91	MnS
MnSO4	-13.85	-10.87	2.98	MnSO4
N2(g)	-18.52	-21.75	-3.23	N2
Na4UO2(CO3)3	-26.89	-43.18	-16.29	Na4UO2(CO3)3
Nahcolite	-5.28	-5.90	-0.62	NaHCO3
Natron	-10.24	-11.87	-1.62	Na2CO3:10H2O
Nesquehonite	-4.10	-9.60	-5.51	MgCO3:3H2O
NH3(g)	-69.32	-67.38	1.93	NH3
Nsutite	7.11	49.67	42.56	MnO2
O2(g)	-1.70	-4.53	-2.83	O2
Pb(BO2)2	-15.31	-7.58	7.73	Pb(BO2)2
Pb(OH)2	-4.09	4.34	8.43	Pb(OH)2
Pb2(OH)3Cl	-10.78	-1.99	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-17.53	8.67	26.20	PbO:Pb(OH)2
Pb2O3	-10.26	50.78	61.04	Pb2O3
Pb2OCO3	-11.80	-12.07	-0.27	PbO:PbCO3

Pb3O2CO3	-19.28	-7.74	11.54	PbCO3:2PbO
Pb3O2SO4	-16.24	-5.42	10.81	PbSO4:2PbO
Pb4(OH)6SO4	-22.19	-1.09	21.10	Pb4(OH)6SO4
Pb4O3SO4	-23.88	-1.09	22.80	PbSO4:3PbO
PbF2	-11.75	-19.18	-7.43	PbF2
PbMetal	-42.04	-37.78	4.26	Pb
PbO:0.3H2O	-8.64	4.34	12.98	PbO:0.33H2O
Phosgenite	-13.59	-33.40	-19.81	PbCl2:PbCO3
Plattnerite	-4.26	46.45	50.70	PbO2
Portlandite	-11.87	11.55	23.42	Ca(OH)2
Pyrite	-244.86	-263.56	-18.70	FeS2
Pyrochroite	-7.64	7.56	15.20	Mn(OH)2
Pyrolusite	7.00	49.67	42.67	MnO2
Rhodochrosite	-2.09	-13.19	-11.10	MnCO3
Rhodochrosite(d)	-2.80	-13.19	-10.39	MnCO3
Rutherfordine	-5.03	-19.45	-14.42	UO2CO3
Schoepite	-4.35	1.29	5.64	UO2(OH)2:H2O
Siderite	-11.61	-22.45	-10.84	FeCO3
Siderite(d)(3)	-12.00	-22.45	-10.45	FeCO3
SrF2	-5.78	-14.34	-8.56	SrF2
Strontianite	-2.30	-11.57	-9.27	SrCO3
Sulfur	-107.85	-123.03	-15.18	S
Thenardite	-9.38	-9.55	-0.17	Na2SO4
Thermonatrite	-12.05	-11.87	0.18	Na2CO3:H2O
Trona	-17.33	-17.77	-0.44	NaHCO3:Na2CO3:2H2O
U(OH)2SO4	-46.33	-49.53	-3.20	U(OH)2SO4
U3O8(c)	-31.90	-9.06	22.83	U3O8
U4O9(c)	-80.90	-82.27	-1.37	U4O9
UF4(c)	-59.89	-78.12	-18.23	UF4
UF4:2.5H2O	-50.56	-78.12	-27.56	UF4:2.5H2O
UO2(a)	-31.20	-31.10	0.10	UO2
UO3(gamma)	-6.81	1.29	8.10	UO3
Uraninite(c)	-26.66	-31.10	-4.43	UO2
Witherite	-3.90	-12.49	-8.59	BaCO3

COLORADO
Water Quality
Control Commission
Department of Public Health & Environment

DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

Water Quality Control Commission

REGULATION NO. 41 - THE BASIC STANDARDS FOR GROUND WATER

5 CCR 1002-41

ADOPTED: January 5, 1987
EFFECTIVE: March 2, 1987
AMENDED: August 7, 1989
EFFECTIVE: September 30, 1989
AMENDED: September 11, 1990
EFFECTIVE: October 30, 1990
AMENDED: October 8, 1991
EFFECTIVE: November 30, 1991
AMENDED: December 6, 1993
EFFECTIVE: January 31, 1994
AMENDED: February 8, 1994
EFFECTIVE: March 30, 1994
AMENDED: January 10, 1995
EFFECTIVE: March 2, 1995
AMENDED: March 13, 1996
EFFECTIVE: April 30, 1996
AMENDED: January 13, 1997
EFFECTIVE: March 3, 1997
AMENDED: July 14, 1997
EFFECTIVE: August 30, 1997
AMENDED: January 11, 1999
EFFECTIVE: March 2, 1999
TRIENNIAL REVIEW: October 10, 2000
AMENDED: November 13, 2001
EFFECTIVE: December 30, 2001
AMENDED: November 8, 2004
EFFECTIVE: March 22, 2005
AMENDED: January 14, 2008
EFFECTIVE: May 31, 2008
AMENDED: October 13, 2009
EFFECTIVE: November 30, 2009
AMENDED: September 11, 2012
EFFECTIVE: January 31, 2013
AMENDED: May 9, 2016
EFFECTIVE: June 30, 2016
AMENDED: November 14, 2016
EFFECTIVE: December 30, 2016

4300 Cherry Creek Drive S, Denver, CO 80246-1530 P 303-692-3463 F 303.691.7702 www.colorado.gov/wqcc
John W. Hickenlooper, Governor | Larry Wolk, MD, MSPH, Executive Director and Chief Medical Officer

TABLE A

GROUND WATER ORGANIC CHEMICAL STANDARDS

(in micrograms per liter)

Parameter	CAS No.	STANDARD[1]
Hydrazine/Hydrazine sulfate[C]	302-01-2	0.012
Indeno (1,2,3-cd) pyrene (PAH)[C]	193-39-5	0.0048
Isophorone[3]	78-59-1	140
Malathion	121-75-5	140
Methanol	67-56-1	14,000
Methoxychlor[6]	72-43-5	35 to 40[M]
Methylene bis(N,N'-dimethyl)aniline 4,4'[C]	101-61-1	0.76
Metribuzin	21087-64-9	180
Mirex	2385-85-5	1.4
Naphthalene (PAH)	91-20-3	140
Nitrobenzene	98-95-3	14
Nitrophenol 4	100-02-7	56
Nitrosodimethylamine N[C](NDMA)	62-75-9	0.00069
Nitrosodiphenylamine N[C]	86-30-6	7.1
N-Nitrosodiethanolamine[C]	1116-54-7	0.013
N-Nitrosodi-n-propylamine[C]	621-64-7	0.005
N-Nitroso-N-Methylethylamine[C]	10595-95-6	0.0016
Oxamyl (vydate)[6]	23135-22-0	175 to 200[M]
PCBs[C, 5, 6]	1336-36-3	0.0175 to 0.5[M]
Pentachlorobenzene	608-93-5	5.6
Pentachlorophenol[C, 6]	87-86-5	0.088 to 1.0[M]
Perchlorate	7790-98-9	4.9

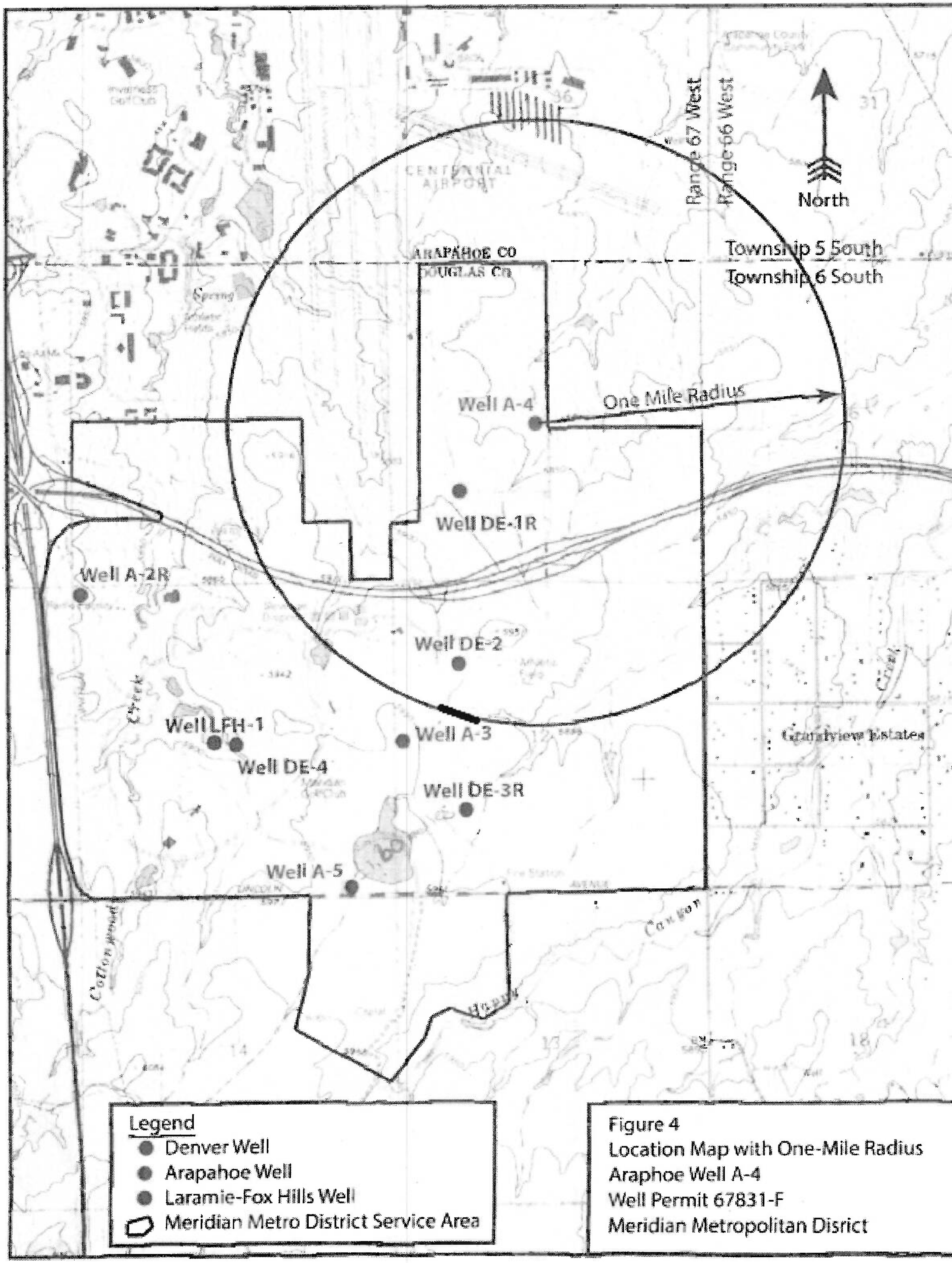

Figure 4
Location Map with One-Mile Radius
Araphoe Well A-4
Well Permit 67831-F
Meridian Metropolitan Disrict

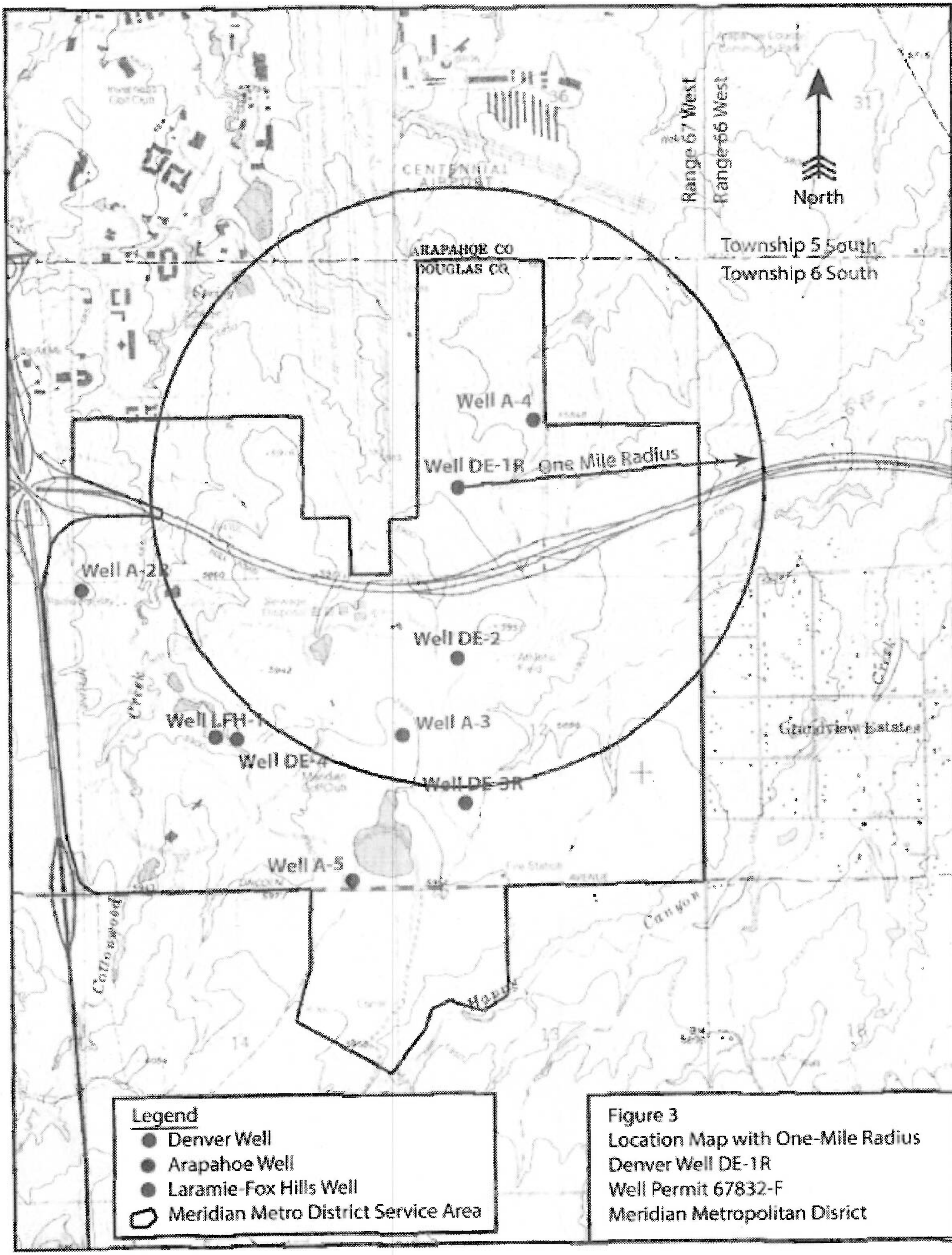

Figure 3
Location Map with One-Mile Radius
Denver Well DE-1R
Well Permit 67832-F
Meridian Metropolitan Disrict

April 12, 2017

CO-0002-16

Linda Bowling
U.S. Environmental Protection Agency, Region 8
MAIL CODE 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202

Hemenway Groundwater Engineering, Inc.

Dear Linda:

Subject: Supplemental Data Request for the Rule Authorization for Underground Injection at Meridian Metropolitan District Denver Well DE-1R and Arapahoe Well A-4

As you requested in our telephone conversation yesterday, I am submitting the proposed Aquifer Storage and Recovery (ASR) Pilot Test Program for Meridian Metropolitan District (MMD). This is a supplemental data request for the pending Rule Authorization for ASR injection operations for two wells for MMD. One well is completed in the Denver formation (Well DE-1R) and one in the Arapahoe formation (Well A-4). MMD is currently proposing testing in Well A-4.

<u>The following ASR pilot test program is for Well A-4:</u>

Prior to any testing, coordination with MMD staff will be required regarding use of the ASR pilot test well during normal water supply operations. Continued communication with MMD staff will be maintained throughout the testing program to identify any changes in the operation or discharge from the well. Criteria for discharges of recovered water from the wells during the testing will be coordinated with MMD staff and Colorado Department of Public Health and Environment (CDPHE). MMD will be the responsible team member to hold the permit and maintain the discharge requirements. MMD staff will conduct reviews of the permit requirements and site facilities throughout the ASR testing program. In addition, all injection and discharge volumes will be metered by Hemenway Groundwater Engineering (HGE) for water rights considerations by MMD. Depending on MMD criteria and direction, recovered water during the three cycle tests may be pumped into MMD's raw water system and subsequently treated for potable uses or discharged to the sanitary sewer system for disposal.

Three injection/storage/recovery cycle tests will be completed during the pilot testing. The first of the three cycle tests will be of a short duration. Typically, the first injection is continuous for three days and then the water is immediately recovered with little storage time in the Arapahoe aquifer. This test provides for a simple confirmation of the water quality compatibility assessments made prior to the testing. The second cycle test will run with seven days of injection followed by seven days of storage in the aquifer prior to recovery. This test is used to further confirm the water compatibility issues related to ASR operations,

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as well as to identify the effects of storing the injected water in the Arapahoe aquifer. If the first two tests indicate that ASR operations are feasible at the site, an extended-duration test will be conducted to determine the actual operating criteria for long-term ASR operations in the wells. This test usually runs injection up to 45 days continuously with storage in the aquifer for 30 to 60 days prior to recovery. All of the proposed testing is predicated on the availability and delivery schedule for the WISE water to be used in the ASR testing.

HGE will be responsible for coordinating and/or collecting the water quality information and samples during ASR testing phases. Field water quality data sheets will be prepared and posted in the existing well vault at Well A-4. Field sampling protocols will be communicated to all personnel participating in the collection of field data from the ASR tests. Daily flow rates (injection and pumping), flow totalizer meter readings, and well water levels will be collected on a daily basis. Water level data for each of the tests will be automatically recorded by a surface data logger and pressure transducers installed in the well. Field water parameters of temperature, pH, and specific conductance will be collected by HGE staff on a frequent basis throughout the ASR test phases (injection and pumping). Additional field tests for chlorine, iron, manganese, and arsenic may be measured and recorded by HGE as the tests require. In addition to the field water quality data collection, sand content measurements will be recorded on a daily basis during all recovery (pumping) phases of the testing. All field data sheets will be posted in the well vault for inspection by MMD, CDPHE, EPA, or other regulatory agency personnel.

During all injection phases, bypass filter information will be recorded by HGE. Bypass filter data will be used to identify plugging issues and sediment loading during injection. The bypass filter equipment will be located in the well vault. Total flow and instantaneous flow rates through the bypass filter pipeline, line pressure, and visual observation of the filter element will be recorded by HGE during all injection phases of the ASR testing.

Two comprehensive laboratory water quality samples will be collected during the three ASR test cycles to identify the quality of the recovered water prior to incorporation into the potable water supply system. The recovered water will be discharged to the raw water transmission pipeline and treated at the MMD treatment facility. The two comprehensive water quality samples will be collected during the first and third recovery cycles to provide geochemical information and to verify the quality of the water being discharged to the raw water system prior to treatment. HGE will notify MMD staff prior to each sampling event to coordinate any split sample requirements during the ASR testing. The preliminary list of water quality constituents required for analysis during the testing is shown in Table 1. Additional samples for analyses of major cations and anions will be collected on a variable basis if the preliminary test results indicate additional test data are required. Samples collected by HGE will be analyzed by Eurofins Eaton Analytical Laboratories in Lakewood, Colorado.

During the first ASR cycle test, one water quality sample will be collected for analysis by Eurofins Eaton Analytical Laboratories during the recovery pumping. For the second ASR cycle test, field water quality samples will be recorded during the recovery phase at approximately 50 and 90 percent of the injected volume recovered. During the third and final ASR cycle test, one laboratory water quality sample will be collected during the recovery pumping at 50 percent of the injected volume recovered. Field water quality samples will be collected at the wellhead during the injection phase of the cycle test to evaluate any changes to the injection water quality throughout the three injection cycles.

TABLE 1
Water Quality Sample Parameters

Total Alkalinity	Oil and Grease
Total Organic Carbon (TOC)	Total Plate Count
Total Coliform	PH
Fecal Coliform	Orthophosphate
Chloride	Total Phosphorus
Chemical Oxygen Demand (COD)	Total Dissolved Solids (TDS)
Color	Sulfate
Cyanide	Sulfide
Fluoride	Surfactants
Fecal Streptococcus	Turbidity
Total Organic Halide (TOX)	Dissolved and Total Metals
Calcium Hardness	Regulated Volatile Organic Compounds (VOCs)
Total Hardness	Nonregulated VOCs
Langelier Saturation Index	Pesticides
Ammonia, Nitrogen	Herbicides
Total Kjeldahl Nitrogen	Gross Alpha and Beta
Nitrate, Nitrogen	Radium 226
Nitrite, Nitrogen	Radium 228
Odor	Radon
N-nitroso-dimethylamine (NDMA)	N-nitroso-di-n-butylamine (NDBA)

Please do not hesitate to contact me if you have any questions regarding the information presented in this letter or regarding the proposed injection operations. If everything is in order for the proposed injection program, please notify Randy Gabriel at MMD and me as soon as possible of your issuing a Rule Authorization for these wells.

Sincerely,
Hemenway Groundwater Engineering, Inc.

Courtney Hemenway
President
HGE/MMDEPAPILOTASRPROG
c: Randy Gabriel/Meridian Metropolitan District
Mason H. Brown/Carlson, Hammond & Paddock, LLC

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
Denver, CO 80202-1129
Phone 800-227-8917
www.epa.gov/region8

Ref: 8WP-SUI

NOV 09 2017

Courtney Hemenway
17011 Lincoln Avenue
PMB 416
Parker, Colorado 80134

Re: U.S. Environmental Protection Agency Region 8 November 2017 Questions Regarding Meridian Metropolitan Water District and Rangeview Metropolitan District Individual Requests to Operate an Aquifer Storage and Recovery System (ASR).

Dear Mr. Hemenway:

The U.S. Environmental Protection Agency has reviewed your letter, dated September 19, 2017, which is a response to our questions submitted in an email dated June 26, 2017. The EPA is interested in collecting any available data regarding the detection of N-Nitrosodimethylamine (NDMA) at any of the water treatment plants (WTP). Sample data is needed to evaluate changes in the concentration of the injectate which may occur in the distribution line. The EPA understands that you are awaiting our decision on the Meridian Metropolitan Water District application prior to providing information requested in our June 2017 email specific to the Rangeview facility. A decision will be provided regarding Rangeview ASR proposal once we review your response to all information requested including your responses to the list of questions noted below.

Information Needed for Meridian Metropolitan Water District and Rangeview Metropolitan District ASR Proposals

- Please verify the sample locations for previously submitted water quality data from each of the four treatment plants.
- If available, please provide any NDMA testing data collected during treatment or at the completion of treatment in addition to the UCMR data. Include data from finished water for NDMA precursors/indicators: ammonia; total phosphorus; natural organic matter, purgeable Total Organic Carbon (TOC) analyzable by Ion Chromatography; ranitidine (RNTD); Trimethylamine; Minocycline (MNCL); and SMTR (Sumatription); nitrate and nitrite. This request refers to any data not previously considered in your September 2017 letter for any of the four WTPs (Binney, Wimbledon, Griswold or the East Cherry Creek Valley Plants).
- Please obtain a representative sample of the injectate at a point near the wellhead prior to injection into Meridian wells, A-4 and DE-1R and Rangeview well, A-5. This data will give us a better understanding of any changes to the water quality of the injectate which may occur in the distribution line. See the enclosed parameter list for the types of data to collect.

Information Needed to Complete the Rangeview Metropolitan District (RMD) Application

- Identify contact persons who represent any state or local agencies with regulatory responsibility for the site; include a physical and mailing address and phone number.

- Discuss the potential for any overlying and underlying aquifers to be impacted from injection activities. This includes whether injected fluids would remain in the Arapahoe Formation.
- Discuss any anticipated impacts which may occur from injection into the Arapahoe Formation.
- Identify all outcrops of the Arapahoe Formation to receive injectate and any potential to create artificial springs. Identify mechanisms which will increase the volume of ground water infiltration into nearby surface water bodies. Identify all erosional intersections between the Arapahoe Formation and potentially affected surface water drainage systems.
- Identify the following Arapahoe Formation characteristics: transmissivity, storage coefficient and hydraulic conductivity.
- Briefly describe the monitoring program including whether injectate volume is documented.
- Confirm whether the recovered water will be regulated and treated as groundwater under the direct influence of surface water.

Please contact Linda Bowling of my staff with any questions or comments that you may have regarding this matter at (303) 312-6254.

Sincerely,

Sarah Bahrman
Director
Safe Drinking Water Program

Enclosure

cc: Eric Hecox
Meridian Metropolitan Water District

Randy Gabriel
Rangeview Metropolitan Water District

Lisa Darling
South Metro Water Supply Authority

AQUIFER STORAGE AND RECOVERY PROJECTS

List of constituents to be analyzed for baseline evaluations

Note: All analytical testing must be done in a state certified laboratory to ensure that permit limits can be met.

General

Parameter Name	Regulatory Limit (mg/l) or specified unit	Standard Type	Analytical Methods
pH	6.5 – 8.5	secondary	150.1
Electricity Conductivity			SM 2510B, 120.1
Total Dissolved Solids	500	secondary	
Total Organic Carbon			
Alkalinity, Total	Mg/l as $CaCO_3$	0.006	

Anions

Parameter Name	Regulatory Limit (mg/l) or specified unit	Standard Type	Analytical Methods
Aluminum	200 ug/l		
Carbonate			SM 2330B
Chloride	250	secondary	
Cyanide	0.2	MCL	EPA 335.4
Nitrate (as N)	10	MCL	353.2
Nitrite (as N)	1	MCL	353.2
Nitrate-Nitrite (both as N)			
Bicarbonate			SM2330B
Sulfate	250	secondary	
Fluoride	4	MCL	SM4500-F C

Cations

Parameter Name	Regulatory Limit (mg/l) or specified unit	Standard Type	Analytical Methods
Ammonia	30 mg/l	HA - Lifetime	EPA 350.1, 350.2, 350.3
Calcium			
Magnesium			
Potassium			
Sodium			

Metals

Parameter Name	Regulatory Limit (mg/L)	Standard Type	Analytical Methods
Asbestos (fibers/1>10 um in length)	7 million fibers/L	MCL	EPA 100.1, 100.2
Antimony	0.006	MCL	EPA 200.8, 200.9
Arsenic	0.01	MCL	EPA 200.7, 200.8, 200.9

Parameter Name	Regulatory Limit (mg/L)	Standard Type	Analytical Methods
Barium	2	MCL	EPA 200.7, 200.8
Beryllium	0.004	MCL	EPA 200.7, 200.8, 200.9
Boron	6	HA-Lifetime	EPA 200.7, 212.3
Cadmium	0.005	MCL	EPA 200.7, 200.8, 200.9
Chromium (total)	0.1	MCL	EPA 200.7, 200.8, 200.9
Copper	1.3	MCL-TT	EPA 200.7, 200.8, 200.9
Iron	5	Region 8 Permit Limit	EPA 200.7, 200.9
Lead	0.015	MCL-TT	EPA 200.8, 200.9
Manganese	0.3	HA-Lifetime	EPA 200.7, 200.8, 200.9
Mercury (inorganic)	0.002	MCL	EPA 245.1, 245.2, 200.8
Molybdenum	0.04	HA-Lifetime	EPA 200.7, 246.1, 246.2
Nickel	0.1	HA-Lifetime	EPA 200.7, 200.8, 200.9
Selenium	0.05	MCL	EPA 200.8, 200.9
Silver	0.1	HA-Lifetime	EPA 200.7, 200.8, 200.9
Strontium	4	HA-Lifetime	EPA 272.1, 272.2, 200.7
Thallium	0.002	MCL	EPA 200.8, 200.9
Zinc	2	HA-Lifetime	EPA 200.7, 200.8

Inorganics

Parameter Name	Regulatory Limit (mg/l) or specified unit	Standard Type	Analytical Methods
Ammonia	30 mg/L	HA-Lifetime	EPA 350.1, 350.2, 350.3
Asbestos (fibers/1>10µm in length)	7 million fibers/L	MCL	EPA 100.1,100.2
Cyanide	0. 2 mg/L	MCL	EPA 335.4
Fluoride	4 mg/L	MCL	EPA 300.0
Nitrate (as N)	10 mg/L	MCL	EPA 300.0
Nitrate-Nitrite (both as N)	10 mg/L	MCL	EPA 300.0
Nitrite (as N)	1 mg/L	MCL	EPA 300.0

Radionuclides

Parameter Name	*Regulatory Limit (mg/l) or specified unit*	Standard Type	Analytical Methods
Radium 226 & 228 combined	5 pCi/L	MCL	Standard Method 304
Gross alpha particle activity (excluding Ra-226, radon, and uranium)	15 pCi/L	MCL	EPA 900.0
Uranium	0.03 mg/L	MCL	EPA 908.0, 908.1

Volatile Organics using EPA Method 524.2 or 8260

Parameter Name	CAS No	Regulatory Limit (mg/l) or specified unit	Standard Type
1,1,1,2-Tetrachloroethane	630-20-6	0.07	HA-Lifetime
1,1,1-Trichloroethane	71-55-6	0.2	MCL
1,1,2,2-Tetrachloroethane	79-34-5	0.04	Region 8 Permit Limit 10^{-4} Cancer Risk
1,1,2-Trichloroethane	79-00-5	0.005	MCL
1,1-Dichloroethylene	75-35-4	0.007	MCL
1,2-(cis)Dichloroethylene	156-59-2	0.07	MCL
1,2-(trans)Dichloroethylene	156-60-5	0.1	MCL
1,2,3-Trichloropropane	96-18-4	0.02	Region 8 Permit Limit
1,2,4-Trichlorobenzene	120-82-1	0.07	MCL
1,2-Dibromomethane (Ethylene Dibromide EDB)	106-93-4	0.00005	MCL
1,2-Dichlorobenzene o-	95-50-1	0.6	MCL
1,2-Dichloroethane	107-06-2	0.005	MCL
1,2-Dichloropropane	78-87-5	0.005	MCL
1,3-Dichlorobenzene m-	541-73-1	0.6	HA-Lifetime
1,4-Dichlorobenzene p-	106-46-7	0.075	MCL
2-Chlorotoluene (o-)	95-49-8	0.1	HA-Lifetime
4-Chlorotoluene (p-)	106-43-4	0.1	HA-Lifetime
Acetone	67-64-1	6	Region 8 Permit Limit
Acrylonitrile	107-13-1	0.006	Region 8 Permit Limit 10^{-4} Cancer Risk
Benzene	71-43-2	0.005	MCL
Bromobenzene	108-86-1	0.06	HA-Lifetime
Bromochloromethane	74-97-5	0.09	HA-Lifetime
Bromodichloromethane (THM)	75-27-4	0.02	Region 8 Permit Limit
Bromoform (THM)	75-25-2	0.2	Region 8 Permit Limit
Bromomethane	74-83-9	0.01	HA-Lifetime
Carbon tetrachloride	56-23-5	0.005	MCL

Parameter Name	CAS No	Regulatory Limit (mg/l) or specified unit	Standard Type
Chlorobenzene (Monochlorobenzene)	108-90-7	0.1	MCL
Chlorodibromomethane (Dibromochloromethane) (THM)	124-48-1	0.06	HA-Lifetime
Chloroform (THM)	67-66-3	0.07	HA-Lifetime
Chloromethane	74-87-3	0.4	10-day HA for a 10 kg child
Cyanogen Chloride (testing not needed if cyanide is present in source water and alkaline chlorination is used, pH 8.5)	506-77-4	0.4	Region 8 Permit Limit
Dichlorodifluoromethane	75-71-8	1	HA-Lifetime
Dichloromethane (Methylene chloride)	75-09-2	0.005	MCL
Ethylbenzene	100-41-4	0.7	MCL
Hexachlorobutadiene	87-68-3	0.002	Region 8 Permit Limit
Hexachloroethane	67-72-1	0.001	HA-Lifetime
Isopropylbenzene (cumene)	98-82-8	0.8	Region 8 Permit Limit
Methyl Ethyl Ketone	78-93-3	4	HA-Lifetime
Naphthalene	91-20-3	0.1	HA-Lifetime
Perchloroethylene (PCE) (Tetrachloroethylene)	127-18-4	0.005	MCL
Styrene	100-42-5	0.1	MCL
Toluene	108-88-3	1	MCL
Total Trihalomethanes		0.08	MCL
Trichloroethylene (TCE)	79-01-6	0.005	MCL
Trichlorofluoromethane	75-69-4	2	HA-Lifetime
Vinyl chloride	75-01-4	0.002	MCL
Total Xylenes	1330-20-7	10	MCL

Semi-volatile Organics using EPA Method 525.2

Parameter Name	CAS No	Regulatory Limit (mg/l) or specified unit	Standard Type
1,2,4-Trichlorobenzene	120-82-1	0.07	MCL
1,2-Dichlorobenzene	95-50-1	0.6	MCL
1,3-Dichlorobenzene	541-73-1	0.6	HAL
1,4-Dichlorobenzene	106-46-7	0.075	MCL
2,4,6-Trichlorophenol	88-06-2	0.002	Region 8 Permit Limit
2,4-Dichlorophenol	120-83-2	0.02	HA-Lifetime
2,4-Dinitrotoluene	121-14-2	0.005	Region 8 Permit Limit 10^{-4} Cancer Risk
2,6-Dinitrotoluene	606-20-2	0.005	Region 8 Permit Limit

Parameter Name	CAS No	Regulatory Limit (mg/l) or specified unit	Standard Type
			10^{-4} Cancer Risk
2-Chlorophenol	95-57-8	0.04	HA-Lifetime
4-Nitrophenol	100-02-7	0.06	HA-Lifetime
Acenaphthene	83-32-9	0.4	Region 8 Permit Limit
Aldrin	309-00-2	0.0002	Region 8 Permit Limit 10^{-4} Cancer Risk
Anthracene	120-12-7	2	Region 8 Permit Limit
Benzo(a)pyrene	50-32-8	0.0002	MCL
bis(2-Ethylhexyl) phthalate	117-81-7	0.006	MCL
Butyl benzyl phthalate	85-68-7	1	Region 8 Permit Limit
Chlordane	57-74-9	0.002	MCL
Dieldrin	60-57-1	0.0002	Region 8 Permit Limit 10^{-4} Cancer Risk
Diethyl phthalate	84-66-2	6	Region 8 Permit Limit
Di-n-butyl phthalate	84-74-2	0.8	Region 8 Permit Limit
Endrin	72-20-8	0.002	MCL
Fluorene	86-73-7	0.2	Region 8 Permit Limit
Heptachlor	76-44-8	0.0004	MCL
Heptachlor epoxide	1024-57-3	0.0002	MCL
Hexachlorobenzene	118-74-1	0.001	MCL
Hexachlorobutadiene	87-68-3	0.002	Region 8 Permit Limit
Hexachlorocyclopentadiene	77-47-4	0.05	MCL
Hexachloroethane	67-72-1	0.001	HA-Lifetime
Isophorone	78-59-1	0.1	HA-Lifetime
Lindane	58-89-9	0.0002	MCL
Naphthalene	91-20-3	0.1	HA-Lifetime
Pentachlorophenol	87-86-5	0.001	MCL
Phenol	108-95-2	2	HA-Lifetime
Pyrene	129-00-0	0.2	Region 8 Permit Limit
Toxaphene	8001-35-2	0.003	MCL

Pesticides and Herbicides

Parameter Name	CAS No	Regulatory Limit (mg/l) or specified unit	Standard Type	Analytical Methods
Alachlor	15972-60-8	0.002	MCL	EPA 505, 507, 525
Aldicarb	116-06-03	0.003	MCL	EPA 531.1
Aldicarb sulfone	1646-87-4	0.002	MCL	EPA 531.1
Aldicarb sulfoxide	1646-87-3	0.004	MCL	EPA 531.1
Aldrin	309-00-2	0.0002	Region 8 Permit Limit 10^{-4} Cancer Risk	EPA 505, 508
Ametryn	834-12-8	0.06	HA-Lifetime	EPA 507
Atrazine	1912-24-9	0.003	MCL	EPA 505, 507
Bromacil	314-40-9	0.07	HA-Lifetime	EPA 507
Butylate	2008-41-5	0.4	HA-Lifetime	EPA 507
Carbaryl	63-25-2	0.08	Region 8 Permit Limit	EPA 531.1
Carbofuran	1563-66-2	0.04	MCL	EPA 531.1
Carboxin	5234-68-4	0.7	HA-Lifetime	EPA 507
Chlordane	57-74-9	0.002	MCL	EPA 505, 508, 525
Chlorothalonil	1897-45-6	0.1	Region 8 Permit Limit	EPA 508
DCPA (Dactyl)	1861-32-1	0.07	HA-Lifetime	EPA 508
Diazinon	333-41-5	0.001	HA-Lifetime	EPA 507
Dieldrin	60-57-1	0.0002	Region 8 Permit Limit 10^{-4} Cancer Risk	EPA 505, 508
Diphenamid	957-51-7	0.2	HA-Lifetime	EPA 507
Disulfoton	298-04-4	0.0007	HA-Lifetime	EPA 507
Endrin	72-20-8	0.002	MCL	EPA 505, 508, 525.1
Fenamiphos	22224-92-6	0.0007	HA-Lifetime	EPA 507
Heptachlor	76-44-8	0.0004	MCL	EPA 505, 508
Heptachlor epoxide	1024-57-3	0.0002	MCL	EPA 505, 508
Hexachlorobenzene	118-74-1	0.001	MCL	EPA 505, 508, 525.1
Hexachlorocyclopentadiene	77-47-4	0.05	MCL	EPA 505, 525.1
Hexazinone	51235-04-2	0.4	HA-Lifetime	EPA 507
Lindane	58-89-9	0.0002	MCL	EPA 505, 508
Methomyl	16752-77-5	0.2	HA-Lifetime	EPA 531.1
Methoxychlor	72-43-5	0.04	MCL	EPA 505, 508, 525
Metolachlor	51218-45-2	0.7	HA-Lifetime	EPA 507
Metribuzin	21087-64-9	0.07	HA-Lifetime	EPA 507
Oxamyl (Vydate)	23135-22-0	0.007	MCL	EPA 531.1
Prometon	1610-18-0	0.4	HA-Lifetime	EPA 507
Pronamide	23950-58-5	0.1	Region 8 Permit Limit 10^{-4} Cancer Risk	EPA 507
Propachlor	1918-16-7	0.1	Region 8 Permit Limit 10^{-4} Cancer Risk	EPA 508

Parameter Name	CAS No	Regulatory Limit (mg/l) or specified unit	Standard Type	Analytical Methods
Propazine	139-40-2	0.01	HA-Lifetime	EPA 507
Simazine	122-34-9	0.004	MCL	EPA 505, 507, 525.1
Tebuthiuron	34014-18-1	0.5	HA-Lifetime	EPA 507
Terbacil	5902-51-2	0.09	HA-Lifetime	EPA 507
Terbufos	13071-79-9	0.0004	HA-Lifetime	EPA 507
Trifluralin	1582-09-8	0.01	HA-Lifetime	EPA 508

Disinfectants and Disinfection Byproducts

Parameter Name	Regulatory Limit (mg/l) or specified unit	Standard Type	Analytical Method
Bromate	0.01	MCL	EPA 317.0, Revision 2 321.8, 326.0
Chloramine (as free chlorine)	4	MCL	
Chlorine (free chlorine, combined)	4	MCL	Standard Methods 20th edition: 4500-Cl D 4500-Cl F 4500-Cl G 4500-Cl H
Chlorine dioxide	0.8	MCL	EPA 327, Revision 1 Standard Method 20th edition: 4500-ClO_2 D 4500-CLO_2 E
Chlorite	1.0	MCL	EPA 300.0, 300.1
Total Haloacetic Acids (HAA5s) Bromoacetic acid Dibromoacetic acid Dichloroacetic acid Monochloroacetic acid Trichloroacetic acid	0.06	MCL	EPA 552.3
Total Trihalomethanes (TTHMs) Chloroform Bromodichloromethane Dibromocloromethane Bromoform	0.08	MCL	EPA 502.2, 524.2
N-nitroso-dimethylamine (NDMA)	NA		EPA 521
N-nitroso-diethylamine (NDEA)	NA		EPA 521
N-nitroso-di-n-butylamine (NDBA)	NA		EPA 521
N-nitroso-di-n-propylamine (NDPA)	NA		EPA 521
N-nitroso-methylethylamine (NMEA)	NA		EPA 521
N-nitroso-pyrrolidine (NPYR)	NA		EPA 521

MCL: Maximum Contaminant Level. The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLG as feasible using the best available analytical and treatment technologies and taking cost into consideration. MCLs are enforceable standards.

MCLG: Maximum Contaminant Level Goal. A non-enforceable health goal which is set at a level at which no known or anticipated adverse effect on the health of persons occurs and which allows an adequate margin of safety.

TT: Treatment Technique. A required process intended to reduce the level of a contaminant in drinking water.

HA: Health Advisory. An estimate of acceptable drinking water levels for a chemical substance based on health effects information; a Health Advisory is not a legally enforceable Federal standard, but serves as technical guidance to assist Federal, State, and local officials.

HA-Lifetime: The concentration of a chemical in drinking water that is not expected to cause any adverse non-carcinogenic effects for a lifetime of exposure. The Lifetime HA is based on exposure of a 70-kg adult consuming 2 liters of water per day. The Lifetime HA for Group C carcinogens includes an adjustment for possible carcinogenicity.

Region 8 Permit Limit: Permit limit calculated by Region 8 Drinking Water Toxicologist based on human health criteria.

10^{-4} Cancer Risk: The concentration of a chemical in drinking water corresponding to an excess estimated lifetime cancer risk of 1 in 10,000

HA-Ten Day: The concentration of a chemical in drinking water that is not expected to cause any adverse non-carcinogenic effects for up to ten days of exposure for a 10 kg child consuming 1 liter per day.

General Information

System Name: Meridian Metropoitan District *PWSID:* 218015

Contact Information

Revision? ■ Actual date of changes described: 6/15/2016

Signature: Jan R d Date: 6/15/2016

System Physical Address (Not Mailing): 9694 Meridian Blvd

City: Englewood County: Douglas State: CO Zip: 80112

System Phone: 303-790-0345 Ext: Fax: 303-790-1754

System E-mail:

Administrative Contact (AC) Name: Robert Gabriel

(The administrative contact is the primary contact person for all Department mail or other communications regarding drinking water compliance)

Mailing Address: 12111 East Belford Avenue

City: Englewood State: CO Zip: 80112

Phone: 303-790-0345 Ext: Fax: 303-790-1754

E-mail: Randy.Gabriel@Sheaproperties.com

Legally Responsible Water System Owner Name: Meridian Metropolitan District

(The legal owner is an individual, corporation, partnership, association, state or political subdivision thereof, municipality, or other legal entity)

Mailing Address: 12111 E. Belford Ave

City: Englewood State: CO Zip: 80112

Phone: 303-790-0345 Ext: Fax: 303-790-1754

E-mail: Randy.Gabriel@Sheaproperties.com

Emergency Contact Name: James Adamsson

(The emergency contact should be someone the Department can contact in an emergency if the administrative contact is unavailable)

Mailing Address: 12111 E. Belford Ave

City: Englewood State: CO Zip: 80112

Phone: 303-790-0345 Ext: Fax: 303-790-1754

E-mail: Jim.Adamsson@Sheaproperties.com

Distribution System (DS) Operator Name: James Adamsson

(A certified operator designated by the owner to have ultimate responsibility for decisions regarding operational activities)

Operator ID#: 45 (not the certificate number)

Mailing Address: 12111 E. Belford Ave

City: Englewood State: CO Zip: 80112

Phone: 303-790-0345 Ext: Fax: 303-790-1754

E-mail: Jim.Adamsson@Sheaproperties.com

DS Operator Signature: Jan R d

Treatment Operator Name: Same as DS? ☐ Mitchell Sears

(A certified operator designated by the owner to have ultimate responsibility for decisions regarding operational activities)

Operator ID#: 10795 (not the certificate number)

Mailing Address: 12111 E. Belford Ave

City: Englewood State: CO Zip: 80112

Phone: 303-790-0345 Ext: Fax: 303-790-1754

E-mail: Mitch.Sears@Sheaproperties.com

Treatment Operator Signature: Mitch S

Figures

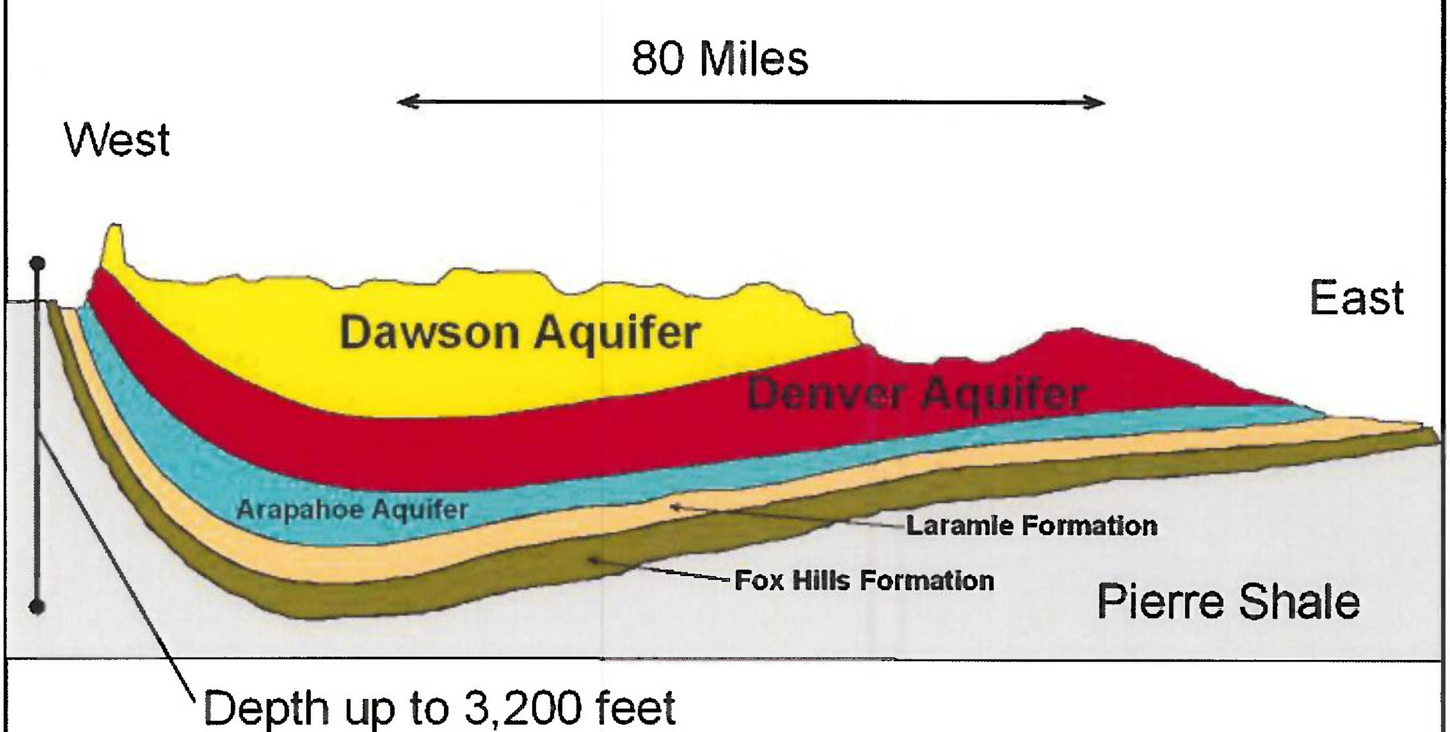


Figure 2

General Schematic Denver Basin Aquifers

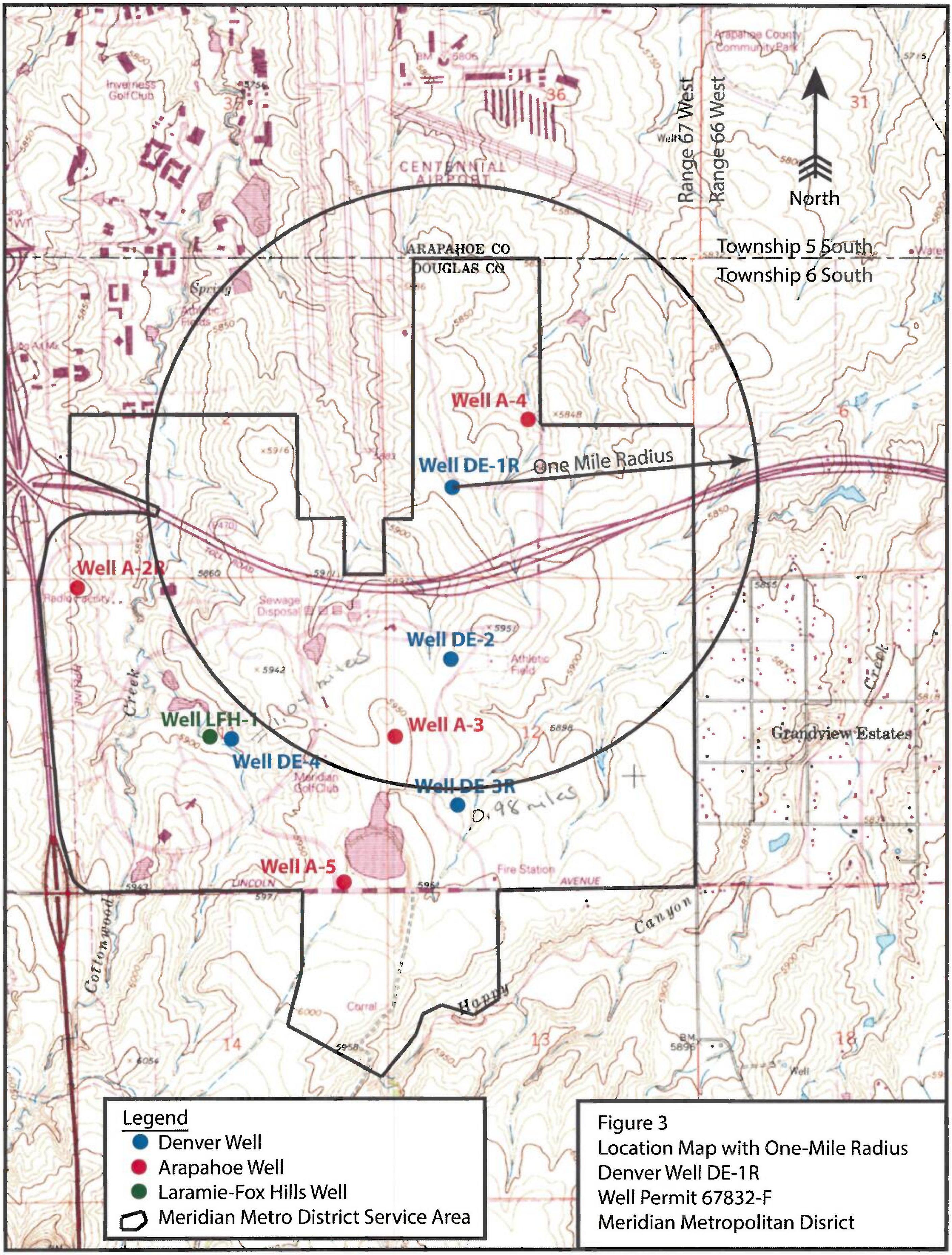


Figure 3
Location Map with One-Mile Radius
Denver Well DE-1R
Well Permit 67832-F
Meridian Metropolitan Disrict

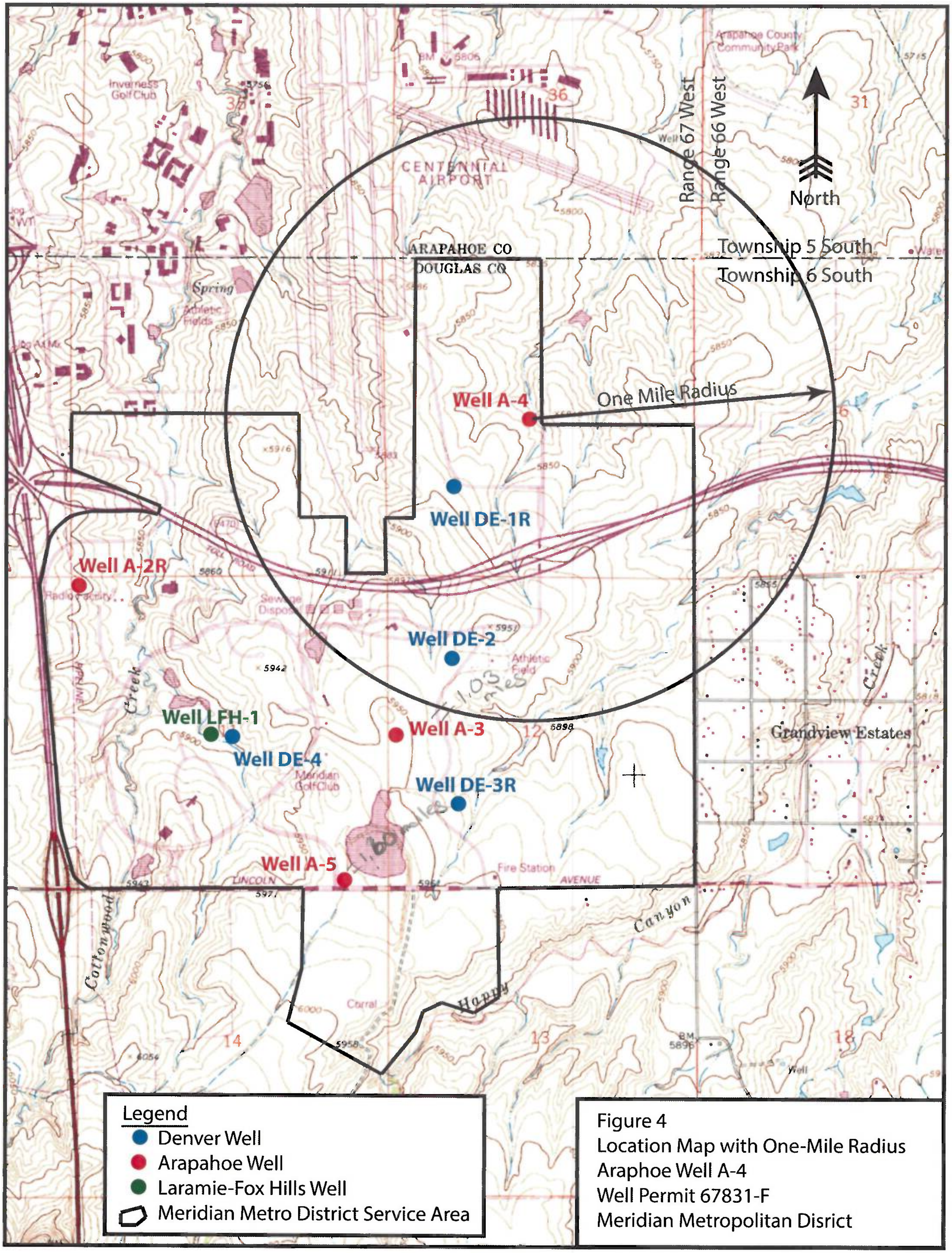
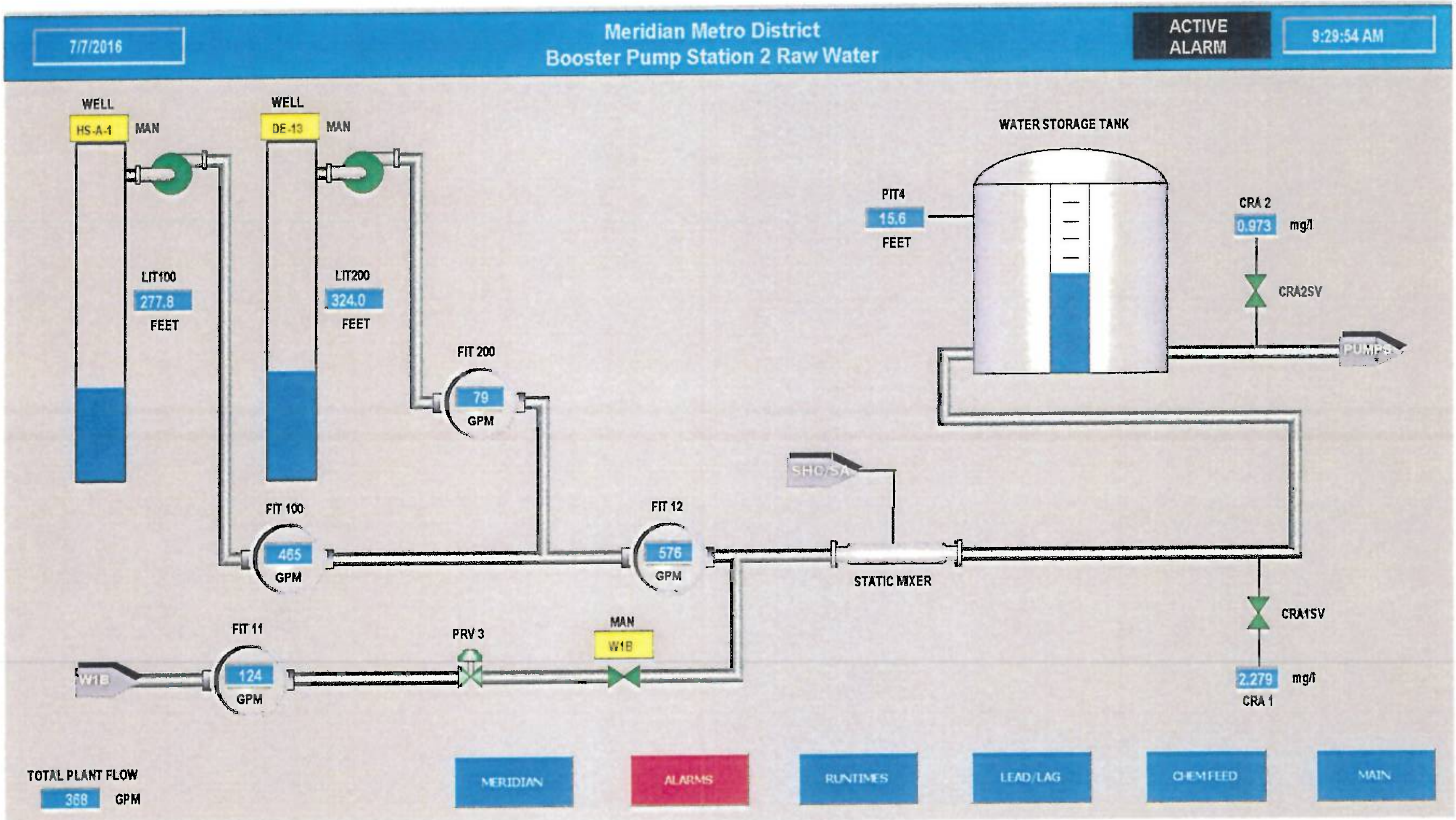


Figure 4
Location Map with One-Mile Radius
Araphoe Well A-4
Well Permit 67831-F
Meridian Metropolitan Disrict


7/7/2016
Meridian Metro District
Booster Pump Station 2 Raw Water
ACTIVE ALARM
9:29:54 AM
WELL
HS-A-1
MAN
WELL
DE-13
MAN
LIT100
277.8
FEET
LIT200
324.0
FEET
FIT 200
79
GPM
FIT 100
465
GPM
FIT 12
576
GPM
WATER STORAGE TANK
PIT4
15.6
FEET
CRA 2
0.973
mg/l
CRA2SV
PUMPS
SHC/SA
STATIC MIXER
CRA1SV
2.279
mg/l
CRA 1
FIT 11
124
GPM
W1B
PRV 3
MAN
W1B
TOTAL PLANT FLOW
368
GPM
MERIDIAN
ALARMS
RUNTIMES
LEAD/LAG
CHEMFEED
MAIN

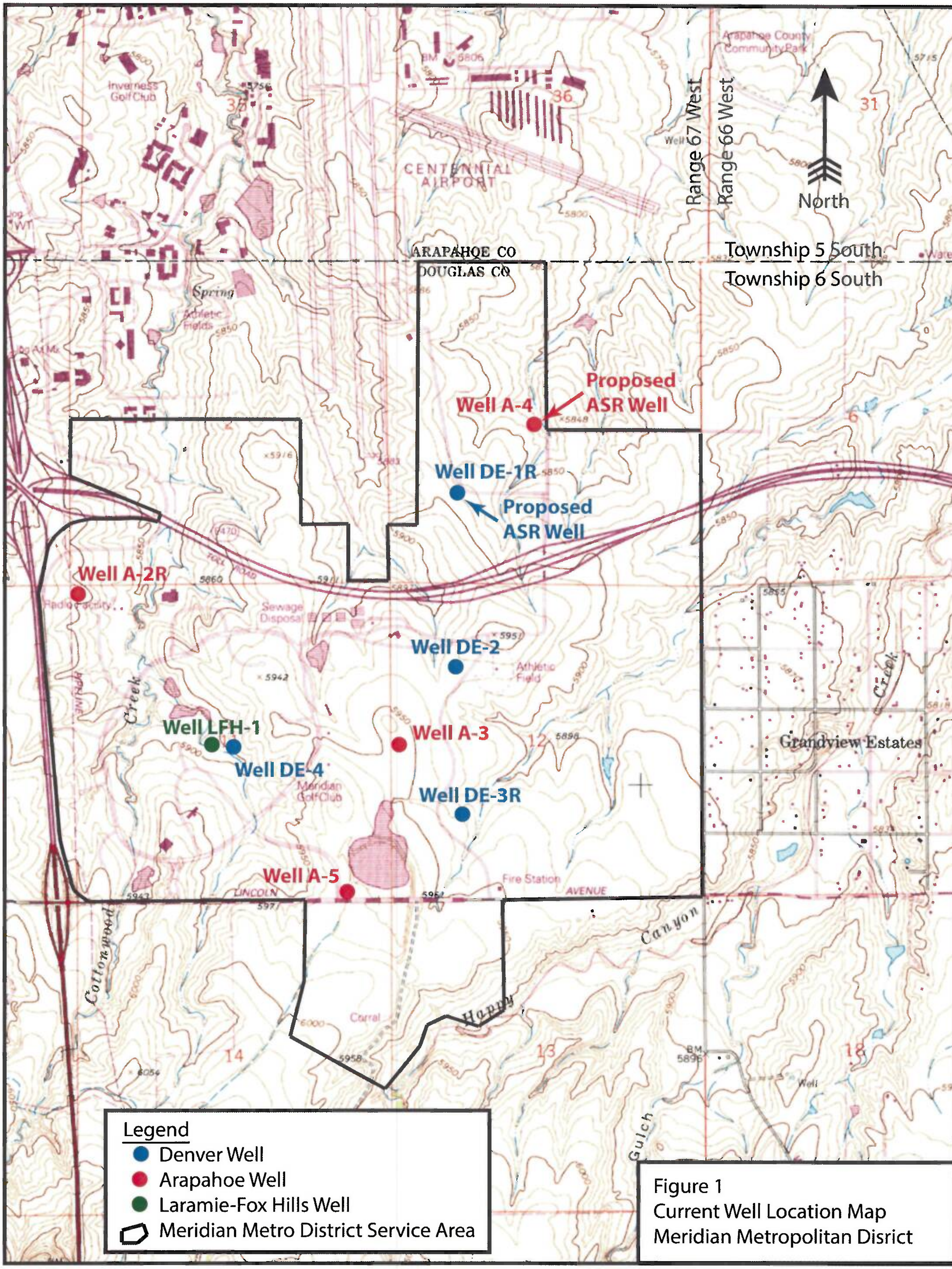
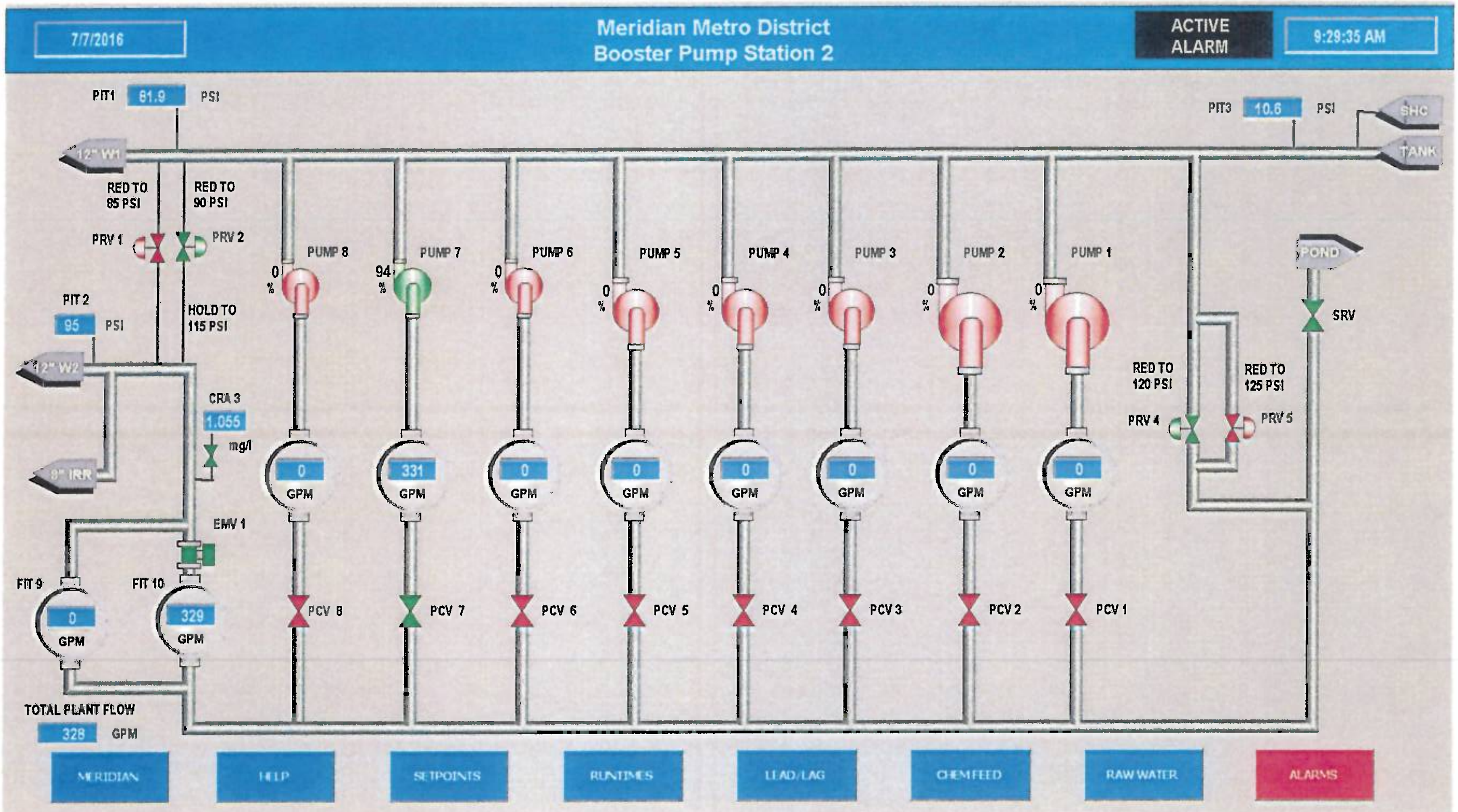
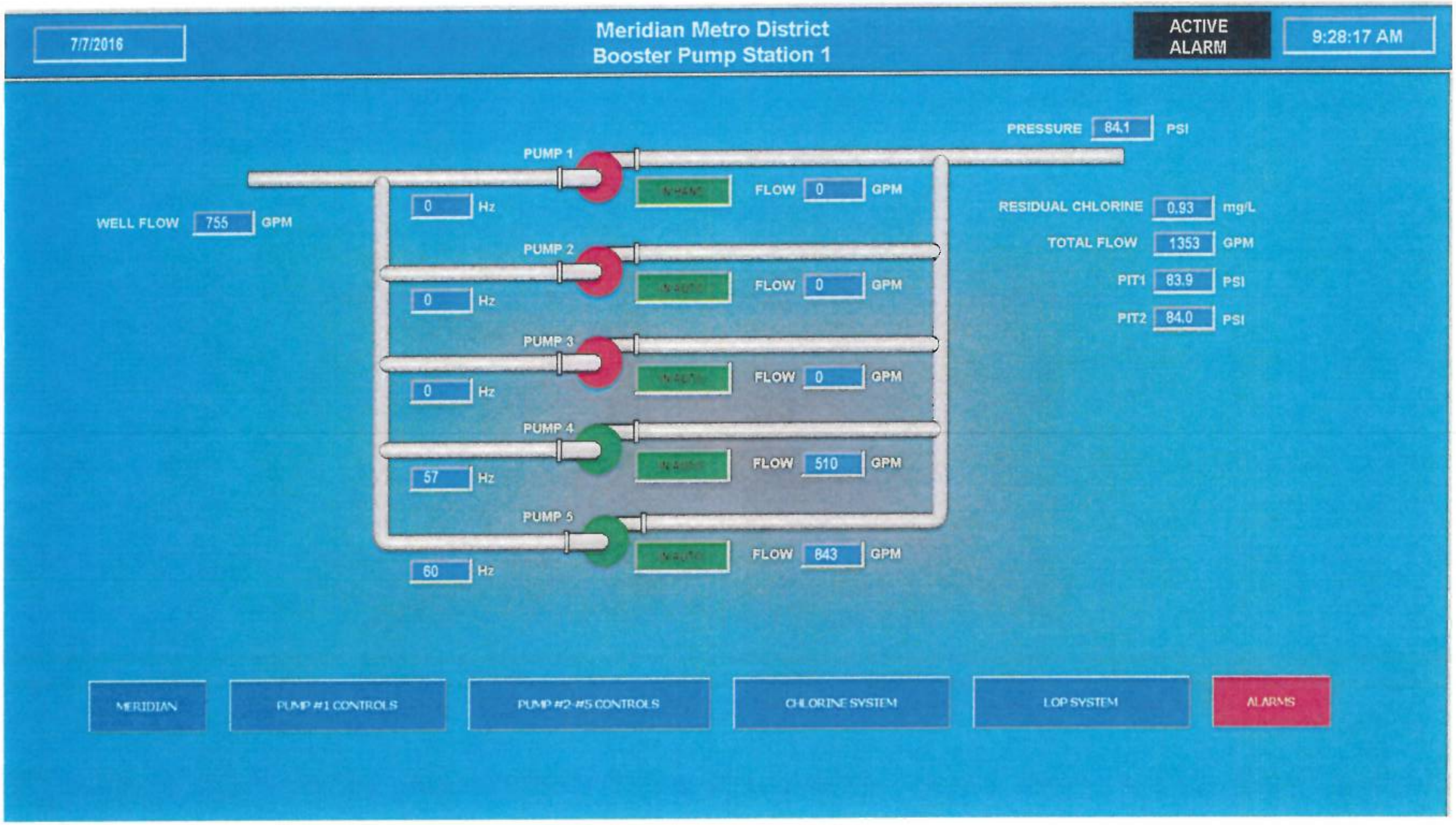


Figure 1
Current Well Location Map
Meridian Metropolitan Disrict



7/7/2016
Meridian Metro District
Booster Pump Station 2
ACTIVE ALARM
9:29:35 AM
PIT1 61.9 PSI
PIT3 10.6 PSI
SHC
TANK
12" W1
RED TO 85 PSI
RED TO 90 PSI
PRV 1
PRV 2
HOLD TO 115 PSI
PIT 2 95 PSI
12" W2
8" IRR
CRA 3 1.055 mg/l
EMV 1
FIT 9 0 GPM
FIT 10 329 GPM
TOTAL PLANT FLOW 328 GPM
PUMP 8 0 %
PUMP 7 94 %
PUMP 6 0 %
PUMP 5 0 %
PUMP 4 0 %
PUMP 3 0 %
PUMP 2 0 %
PUMP 1 0 %
0 GPM
331 GPM
0 GPM
0 GPM
0 GPM
0 GPM
0 GPM
0 GPM
PCV 8
PCV 7
PCV 6
PCV 5
PCV 4
PCV 3
PCV 2
PCV 1
RED TO 120 PSI
RED TO 125 PSI
PRV 4
PRV 5
POND
SRV
MERIDIAN
HELP
SETPOINTS
RUNTIMES
LEAD/LAG
CHEMFEED
RAW WATER
ALARMS



7/7/2016
Meridian Metro District
Booster Pump Station 1
ACTIVE ALARM
9:28:17 AM
PRESSURE 84.1 PSI
PUMP 1
PUMP 2
PUMP 3
PUMP 4
PUMP 5
WELL FLOW 755 GPM
0 Hz
0 Hz
0 Hz
57 Hz
60 Hz
FLOW 0 GPM
FLOW 0 GPM
FLOW 0 GPM
FLOW 510 GPM
FLOW 843 GPM
RESIDUAL CHLORINE 0.93 mg/L
TOTAL FLOW 1353 GPM
PIT1 83.9 PSI
PIT2 84.0 PSI
MERIDIAN
PUMP #1 CONTROLS
PUMP #2-#5 CONTROLS
CHLORINE SYSTEM
LOP SYSTEM
ALARMS

DISTRICT COURT, WATER DIVISION 1 STATE OF COLORADO 901 9th Street P.O. Box 2038 Greeley, Colorado 80632	DATE FILED: December 5, 2016 11:56 AM CASE NUMBER: 2013CW3129 ▲ **COURT USE ONLY** ▲
CONCERNING THE APPLICATION FOR WATER RIGHTS OF MERIDIAN METROPOLITAN DISTRICT **IN DOUGLAS COUNTY**	Case No. 13CW3129 Div: 1 Ctrm:

FINDINGS OF FACT, CONCLUSIONS OF LAW, AND JUDGMENT AND DECREE OF THE WATER COURT

This matter comes before the Court upon the Application of Meridian Metropolitan District ("Meridian" or "Applicant"), seeking approval of a plan for augmentation and change of water rights for its conjunctive use program whereby it will inject and store fully consumable water in Denver Basin Aquifers for later extraction.[1] Having reviewed the files and otherwise being fully advised in the premises, the Water Judge hereby enters the following Findings of Fact, Conclusions of Law, and Judgment and Decree of the Water Court.

FINDINGS OF FACT

1. **Procedural Background.**

1.1. Name, address, and telephone number of the Applicant.

Meridian Metropolitan District
c/o General Manager → Eric Hecox
6380 South Fiddlers Green Cir., Ste. 400
Greenwood Village, Colorado 80111
(303) 779-4550

1.2. Filing and Jurisdiction. Meridian filed its Application in this matter on October 31, 2013. Proper and adequate notice of the filing and contents of the Application having been given in the manner required by law, the Court has jurisdiction over the subject matter of the Application, and over all persons who have standing to appear as parties whether they have appeared or not.

[1] No change of water right is granted by this decree. See *infra* Paragraphs 6 and 18.

1.3. Statements of Opposition. Statements of Opposition were timely filed by: Denver Southeast Suburban Water & Sanitation District d/b/a The Pinery Water & Wastewater District; the City of Aurora, acting by and through its Utility Enterprise ("Aurora"); Hauppauge, LLC; Windsor at Meridian Limited Partnership, f/k/a/ Windsor at Rockborough Limited Partnership; Windsor at Woodgate Limited Partnership; Windsor at Hunters Woods Limited Partnership; State Engineer and Division Engineer for Water Division One; Inverness Water and Sanitation District; Stonegate Village Metropolitan District ("Stonegate"); and Parker Water and Sanitation District. The time for filing Statements of Opposition has expired.

1.4. Summary of Consultation. The Division Engineer filed a Report of the Division Engineer on January 31, 2014. The Applicant filed a Response to the Report of the Division Engineer on August 1, 2014. The Court has considered the Report of the Division Engineer and Applicant's response thereto in entering this Decree.

1.5. Stipulations. Meridian entered into stipulations with the following Opposers pursuant to which the Opposers consented to entry of a decree in the case:

1.5.1. Denver Southeast Suburban Water & Sanitation District d/b/a The Pinery Water & Wastewater District, approved December 19, 2014.

1.5.2. Aurora, approved June 7, 2016.

1.5.3. State Engineer and Division Engineer for Water Division One, approved March 11, 2016.

1.5.4. Inverness Water and Sanitation District, approved November 3, 2016.

1.5.5. Parker Water and Sanitation District, approved December 18, 2015.

1.5.6. Stonegate Village Metropolitan District, approved June 28, 2016.

1.6. Withdrawn Statements of Opposition: the following Opposers withdrew their Statement of Opposition:

1.6.1. Hauppauge, LLC; Windsor at Meridian Limited Partnership, f/k/a/ Windsor at Rockborough Limited Partnership; Windsor at Woodgate Limited Partnership; Windsor at Hunters Woods Limited Partnership; and Flagstone Investors Limited Partnership, withdrew its Statement of Opposition on July 19, 2016.

2. **Plan Background.**

Applicant Meridian Metropolitan District is a Title 32 Metropolitan District providing water and sanitation services for approximately 1,331 acres within the District and, pursuant to service agreements, to approximately 2,196 acres adjacent to the District. The lands currently served by the District ("District Service Area") are located in Sections 1, 2, 3, 10, 11, 12, 13 and 14 of Township 6 South, Range 67 West of the 6^{th} P.M. and Sections 18 and 19 of Township 6 South, Range 66 West of the 6^{th} P.M., Douglas County, Colorado, and depicted on the attached **Exhibit 1**. Applicant is working to maximize its water supply and the ability of its water supply system to serve its municipal water supply customers as a member of the South Metro Water Supply Authority ("SMWSA") and participant in the Water, Infrastructure, and Supply Efficiency ("WISE") water supply arrangement among SMWSA and its members. Applicant is developing a conjunctive groundwater/surface water program involving artificial injection (or recharge) and storage of fully consumable and/or reusable water attributable to decreed Denver Basin groundwater rights and WISE water deliveries. The water will be artificially injected into, stored in, and extracted from the Lower Dawson, Denver, Arapahoe and Laramie-Fox Hills Aquifers underlying two "contiguous extraction parcels" ("Meridian North CEP" and "Meridian South CEP"), which comprise the District Service Area.

Accordingly, this Decree adjudicates a Plan for Augmentation for such program and confirms the availability of Meridian's water rights and WISE water deliveries for use by artificial recharge, storage, and extraction as contemplated by the conjunctive use program from the Denver Basin Aquifers. The Plan for Augmentation herein will increase the supply of water available for Applicant to place to beneficial use; it does not provide for replacement of out-of-priority depletions.

3. **Structures (Injection and Extraction Wells) and Water Rights Involved in Plan.**

The Injection and Extraction Wells described below are depicted on **Exhibit 2**.

3.1. **Meridian North CEP (see Exhibit 1 for a depiction of the CEP)**

3.1.1. <u>Meridian North Lower Dawson Aquifer Well Field</u>

3.1.1.1. Well Names: LDA-1; LDA-2; LDA-3; LDA-4; LDA-5; LDA-6

3.1.1.2. Legal Descriptions (as described in most recent Decree – 01CW257): See Table 1 below.

3.1.1.3. Source:

3.1.1.3.1. Not-nontributary (NNT) Lower Dawson Aquifer; see Table 1 below.

3.1.1.3.2. Nontributary (NT) Lower Dawson Aquifer; see Table 1 below.

3.1.1.4. Appropriation Date: N/A (*see* C.R.S. §37-92-305(11)).

3.1.1.5. Amounts Decreed to be Withdrawn through Structures: See Table 1 below.

3.1.1.6. Decreed Uses:

3.1.1.6.1. Pursuant to the decree in Case No. 83CW359: All beneficial uses including municipal, domestic, commercial, industrial, irrigation, recreation including fishery and wildlife, fire protection, stock watering, and the maintenance of adequate storage systems. The water is developed and non-tributary, and the right to apply such water to beneficial use shall include the rights to use, reuse, and successively use all such water to extinction (except for the four percent of such water that is subject to paragraphs 12 and 25 of the decree in Case No. 83CW359) and to dispose of such water free of any limitation, restriction, or requirement as to place of use, amount of discharge, or location of discharge after such use, reuse, successive use of disposition, except as to appropriate carriage losses. The water may be used for immediate application to beneficial use, for storage and subsequent application to beneficial use, for exchange purposes, for augmentation for the replacement of depletions resulting from the use of water from other sources, and for all other beneficial purposes.

3.1.1.6.2. Pursuant to the decree in Case No. 84CW620: The water withdrawn may be used, reused, and successively used and after use, leased, sold, or otherwise disposed of for municipal, domestic, industrial, commercial, irrigation, recreation, stock watering, recreational, fish and wildlife, and any other beneficial purpose, to be used on or off the land described in the decree in Case No. 84CW620. Water may be produced for immediate application, for storage and subsequent application, for exchange purposes, for replacement of depletions resulting from the use of water from other sources, and for augmentation purposes.

3.1.1.6.3. Pursuant to the decree in Consolidated Case Nos. 84CW239 and 84CW242 ("84CW239\242"): All municipal purposes including domestic, agricultural, industrial, commercial, irrigation, stock watering, recreation, fish and wildlife, and fire protection. Water may be produced for immediate use, for storage and subsequent use, for exchange purposes, for replacement of depletions resulting from the use of water from other sources, for relinquishment to the stream pursuant to C.R.S. §37-90-137(9)(b), and for all other augmentation purposes including augmentation of not-nontributary groundwater diversions. The rights approved include the right to reuse, successive use and disposition by sale, exchange or otherwise to extinction, of all such water in accordance with C.R.S. §37-82-106(2).

3.1.1.6.4. Pursuant to the decree in Case No. 85CW389A: The water withdrawn may be used, reused, and successively used, and after use, leased, sold, or otherwise disposed of on or off the land described in the decree in Case No. 85CW389A for all beneficial uses including: municipal, domestic, industrial, agricultural, commercial, irrigation, stock watering, recreational, fish and wildlife, fire protection, augmentation and exchange. Water may be withdrawn for immediate application to beneficial use, for storage and subsequent use, to replace depletions resulting from the use of water from other sources, and for all other

Form No. GWS-25

OFFICE OF THE STATE ENGINEER
COLORADO DIVISION OF WATER RESOURCES

818 Centennial Bldg., 1313 Sherman St., Denver, Colorado 80203
(303) 866-3581

EXST

WELL PERMIT NUMBER 67831 -F -
DIV. 1 WD 8 DES. BASIN MD

APPLICANT

MERIDIAN METROPOLITAN DISTRICT
5750 DTC PARKWAY SUITE 200
GREENWOOD VILLAGE, CO 80111-

(303) 486-1384

CHANGE/EXPANSION OF USE OF AN EXISTING WELL

APPROVED WELL LOCATION
DOUGLAS COUNTY
NE 1/4 SW 1/4 Section 1
Township 6 S Range 67 W Sixth P.M.

DISTANCES FROM SECTION LINES
2780 Ft. from North Section Line
2450 Ft. from West Section Line

UTM COORDINATES (Meters,Zone:13,NAD83)
Easting: Northing:

ISSUANCE OF THIS PERMIT DOES NOT CONFER A WATER RIGHT

CONDITIONS OF APPROVAL

1) This well shall be used in such a way as to cause no material injury to existing water rights. The issuance of this permit does not ensure that no injury will occur to another vested water right or preclude another owner of a vested water right from seeking relief in a civil court action.
2) The construction of this well shall be in compliance with the Water Well Construction Rules 2 CCR 402-2, unless approval of a variance has been granted by the State Board of Examiners of Water Well Construction and Pump Installation Contractors in accordance with Rule 18.
3) Approved pursuant to CRS 37-90-137(4) and the decree granted for well no. A-4 in case no. 2001CW145 Division 1 Water Court. The operation of this well is subject to the terms and conditions of said decree.
4) Approved for the expansion of use of an existing well constructed under permit no. 56744-F (originally decreed in case nos. W-7609 and 84CW620 as well A-1). The issuance of this permit hereby cancels permit no. 56744-F.
5) The use of ground water from this well is limited to municipal, domestic, industrial, commercial, irrigation, stock watering, recreational, fish and wildlife, replacement, and augmentation. The water from this well may be stored, substituted, or exchanged pursuant to decree in case no. 2001CW145.
6) The pumping rate of this well shall not exceed 600 GPM.
7) The average annual amount of ground water to be withdrawn shall not exceed 500 acre-feet
8) The average annual amount of ground water to be withdrawn by this well in combination with well no. A-2R shall not exceed 800 acre-feet.
9) The average annual amount of ground water to be withdrawn by this well in combination with wells A3, A-2R, A5 and A6 shall not exceed 1,370.1 acre-feet.
10) Production is limited to the Arapahoe aquifer.
11) The owner shall mark the well in a conspicuous place with well permit number(s), name of the aquifer, and court case number(s) as appropriate. The owner shall take necessary means and precautions to preserve these markings.
12) A totalizing flow meter must be installed on this well and maintained in good working order. Permanent records of all diversions must be maintained by the well owner (recorded at least annually) and submitted to the Division Engineer upon request.
13) This well shall be located at least 600 feet from any existing well, completed in the same aquifer, that is not owned by the applicant.
14) This well shall be located not more than 200 feet from the location specified on this permit and no more than 200 feet from the location decreed for A4 well in case no. 2001CW145 (decreed location is 2,780 feet from the north section line and 2,450 feet from the west section line of said section 1).
15) Pursuant to CRS 37-90-137(9)(b) and the Denver Basin Rules, no more than 98% of the nontributary ground water withdrawn annually shall be consumed and the well owner shall demonstrate to the reasonable satisfaction of the State Engineer that no more than 98% of the water withdrawn will be consumed, subject to the applicable terms and conditions of the decree granted in case no. 2001CW145 and of Meridian's existing decrees as summarized in Table 1 of case no. 2001CW145.
16) This well is subject to administration by the Division Engineer in accordance with applicable decrees, statutes, rules, and regulations.

NOTE: The ability of this well to withdraw its authorized amount of water from this non-renewable aquifer may be less than the 100 years upon which the amount of water in the aquifer is allocated, due to anticipated water level declines.

01.05.2009
IDC

APPROVED
IDC

Dick Wolfe
State Engineer

Joanna Williams
By

Receipt No. 3635307C DATE ISSUED 01-05-2009 EXPIRATION DATE N/A augmentation purposes. The water may be used, reused, successively used in accordance with C.R.S. §37-82-106(2), and disposed of by sale, exchange or otherwise to extinction.

3.1.1.6.5. Pursuant to the Decree in Case No. 82CW328: the water withdrawn may be used, reused, successively used and otherwise disposed of for all municipal purposes including domestic, industrial, livestock, irrigation, commercial, recreational, and any other beneficial purpose. Said water will be produced for immediate application to said uses, for storage and subsequent application to said uses, for exchange purposes, for replacement of depletions resulting from the use of water from other sources, and for any and all other augmentation purposes.

3.1.1.7. Amount of Water to be Used in Plan for Augmentation: Full annual appropriation/withdrawal amounts for each well as listed in Table 1 below.

3.1.1.8. Other: See Notes to Table 1 below.

Table No. 1 – Meridian North Lower Dawson Aquifer Well Field

Well Name (Parcel on which located)	Decreed Location	Water Rights Withdrawn (Case No.)	Decreed Source	Max Annual Withdrawal (af/yr)	Pumping Rate (g.p.m.)
LDA-1 (Meridian)	SW¼ NW¼ Section 11 T6S, R67W, 6th PM 1,484 ft FNL 972 ft FWL	83CW359 84CW620 84CW239/242 85CW389A	NT NNT NNT NNT	71.9 50 18.4 86	100 150 400 150
LDA-2 (Meridian)	SE¼ SE¼ Section 10 T6S, R67W, 6th PM 962 ft FSL 53 ft FEL	83CW359 84CW620 84CW239/242 85CW389A	NT NNT NNT NNT	71.9 50 18.4 86	100 150 400 150
LDA-3 (Meridian)	NW¼ NW¼ Section 12 T6S, R67W, 6th PM 698 ft FNL 547 ft FWL	83CW359 84CW620 84CW239/242 85CW389A	NT NNT NNT NNT	71.9 50 18.4 86	100 150 400 150
LDA-4 (Meridian)	SW¼ NW¼ Section 12 T6S, R67W, 6th PM 2,615 ft FNL 295 ft FWL	83CW359 84CW620 84CW239/242 85CW389A	NT NNT NNT NNT	71.9 50 18.4 86	100 150 400 150

LDA-5 (Cordillera)	NE¼ NE¼ Section 12 T6S, R67W, 6th PM 50 ft FNL 1,300 ft FEL	84CW620 84CW239/242 85CW389A	NNT NNT NNT	50 18.4 86	150 400 150
LDA-6 (Cordillera)	SW¼ SE¼ Section 12 T6S, R67W, 6th PM 660 ft FSL 1,975 ft FEL	82CW328 84CW620 84CW239/242 85CW389A	NT NNT NNT NNT	26 50 18.4 86	300 150 400 150

Notes: The following conditions apply to the wells listed in Table No. 1:

(a) Water withdrawn from Well LDA-5 pursuant to Case No. 84CW620 is withdrawn at the location of Well DA#1 (85CW389A).

(b) Water withdrawn from Well LDA-6 pursuant to Case No. 82CW328 is withdrawn at the location of Well DC-3 (82CW328).

(c) Pursuant to Case No. 83CW359, Wells LDA-1 through LDA-4 may each withdraw 71.9 acre-feet annually of nontributary Lower Dawson groundwater decreed in Case No. 83CW359, so long as the combined annual appropriation from all four wells does not exceed 230 acre-feet annually, and so long as the appropriation from any one of the wells during any five calendar year period does not exceed 287.5 acre-feet.

(d) Wells LDA-1 through LDA-6 may withdraw, as additional wells for 18.4 acre-feet annually decreed to well HQ-DA-1 (84CW239/242) no more than 18.4 acre-feet annually combined.

(e) Wells LDA-5 and LDA-6 may withdraw, as additional wells for 86 acre-feet annually decreed to well DA#1 (85CW389A) no more than 86 acre-feet annually combined.

(f) Wells LDA-1 through LDA-6 may withdraw, as additional wells for 50 acre-feet annually decreed to wells LDA-1 through LDA-4 (84CW620) no more than 50 acre-feet annually combined.

(g) Pursuant to Case No. 01CW257, banking, well fields and additional wells pursuant to §37-90-137, C.R.S., as amended by Senate Bill 5, are allowed for all the not-nontributary water rights withdrawn through the wells in Table 1. The nontributary groundwater decreed in 83CW359 and 82CW328 may be withdrawn through additional wells only pursuant to the terms of the 83CW359 and 82CW328 decrees.

(h) Pursuant to Case No. 01CW257, Wells LDA-1 through LDA-6 may withdraw in combination a maximum of 256 acre-feet annually of nontributary, and 154.4 acre-feet annually of not-nontributary, Lower Dawson Aquifer groundwater at the pumping rates described in Table No. 1.

(i) Further location and spacing requirements, set forth in paragraphs 21, 22, 23, and 24 of the decree in Case No. 01CW257, apply to supplemental, additional, and/or alternate point of diversion wells constructed to withdraw the Applicant's full appropriations in the Lower Dawson, Denver, and Laramie-Fox Hills Aquifers.

3.1.2. Meridian North Denver Aquifer Well Field

3.1.2.1. Well Names: DE-5 (aka DC-5); DE-6; DE-7; DE-8; DE-9; DE-10; DE-11 (aka DE-1 (Cordillera))

3.1.2.2. Legal Descriptions (as described in most recent Decree – 01CW257): See Table 2 below.

3.1.2.3. Source:

3.1.2.3.1. Not-nontributary (NNT) Denver Aquifer; see Table 2 below.

3.1.2.3.2. Nontributary (NT) Denver Aquifer; see Table 2 below.

3.1.2.4. Appropriation Date: N/A (*see* §37-92-305(11)).

3.1.2.5. Amounts Decreed to be Withdrawn through Structures: See Table 2 below.

3.1.2.6. Decreed Uses:

3.1.2.6.1. Pursuant to the decree in Case No. 82CW328: See paragraph 3.1.1.6.5 above.

3.1.2.6.2. Pursuant to the decree in Case No. 84CW620: See paragraph 3.1.1.6.2 above.

3.1.2.6.3. Pursuant to the decree in Case No. 84CW239/242: See paragraph 3.1.1.6.3 above.

3.1.2.6.4. Pursuant to the decree in Case No. 85CW389A: See paragraph 3.1.1.6.4 above.

3.1.2.7. Amount of Water to be Used in Plan for Augmentation: Full annual appropriation/withdrawal amounts for each well as listed in Table 2 below.

3.1.2.8. Other: See Notes to Table 2 below.

Table 2 – Meridian North Denver Aquifer Well Field

Well Name (Parcel on which located)	Decreed Location	Water Rights Withdrawn (Case No.)	Decreed Source	Max Annual Withdrawal (af/yr)	Pumping Rate (g.p.m.)
DE-5 (aka DE-1 (85CW389A) and DC-5 (82CW328)) (Cordillera)	SE¼ SE¼ Section 12 T6S, R67W, 6th PM 1,320 ft FSL 1,270 ft FEL	82CW328 84CW620 84CW239/242 85CW389A	NT NNT NNT NNT	46 265.4 312.6 110	100 100 400 100
DE-6 (Meridian)	NW¼ NE¼ Section 11 T6S, R67W, 6th PM 776 ft FNL 1,397 ft FEL	84CW620 84CW239/242 85CW389A	NNT NNT NNT	265.4 312.6 110	100 400 100
DE-7 (Meridian)	NW¼ NW¼ Section 12 T6S, R67W, 6th PM 580 ft FNL 535 ft FWL	84CW620 84CW239/242 85CW389A	NNT NNT NNT	265.4 312.6 110	100 400 100
DE-8 (Meridian)	SW¼ SW¼ Section 11 T6S, R67W, 6th PM 140 ft FSL 894 ft FWL	84CW620 84CW239/242 85CW389A	NNT NNT NNT	265.4 312.6 110	100 100 100
DE-9 (Meridian)	SW¼ SE¼ Section 11 T6S, R67W, 6th PM 99 ft FSL 2,572 ft FEL	84CW620 84CW239/242 85CW389A	NNT NNT NNT	265.4 312.6 110	100 100 100
DE-10 (Meridian)	NW¼ NW¼ Section 11 T6S, R67W, 6th PM 1,306 ft FNL 307 ft FWL	84CW620 84CW239/242 85CW389A	NNT NNT NNT	265.4 312.6 110	100 400 100
DE-11 (Cordillera)	NE¼ NE¼ Section 12 T6S, R67W, 6th PM 50 ft FNL 1,250 ft FEL	84CW620 84CW239/242 85CW389A	NNT NNT NNT	265.4 312.6 110	100 400 100

Note: The following conditions apply to the wells and water rights listed in Table No. 2:

(a) Water decreed to Well DE-11 pursuant to Case No. 84CW620 is withdrawn at the location of Well DE-1 (85CW389A).

(b) Well DE-5 (aka DC-5) may withdraw in addition to not-nontributary Denver Aquifer water, 46 acre-feet of nontributary Denver Aquifer water decreed in Case No. 82CW328 at the location of Well DC-5 (82CW328).

(c) Wells DE-5 through DE-11 decreed in Case No. 01CW257 as additional wells for 265.4 af/yr for Wells DE-6 through DE-10 decreed in Case No. 84CW620, may not withdraw in combination more than 265.4 acre-feet annually on that right.

(d) Wells DE-5 through DE-11 decreed in Case No. 01CW257 as additional wells for 312.6 af/yr for Well HQ-DN-1 decreed in Case No. 84CW239/242, may not withdraw in combination more than 312.6 acre-feet annually on that right.

(e) Wells DE-5 through DE-11 decreed in Case No. 01CW257 as additional wells for 110 af/yr for Well DE-1 (Cordillera) decreed in Case No. 85CW389A, may not withdraw in combination more than 110 acre-feet annually on that right.

(f) Pursuant to Case No. 01CW257, banking, well fields and additional wells pursuant to §37-90-137, C.R.S., as amended by Senate Bill 5, are allowed for all the not-nontributary water rights withdrawn through the wells in Table 2. The nontributary groundwater decreed in 82CW328 may be withdrawn through additional wells only pursuant to the terms of the 82CW328 decree.

(g) Further location and spacing requirements, set forth in paragraphs 21, 22, 23, and 24 of the decree in Case No. 01CW257 apply to supplemental, additional, and/or alternate point of diversion wells constructed to withdraw the Applicant's full appropriations in the Lower Dawson, Denver, and Laramie-Fox Hills Aquifers.

3.1.3. Meridian (North) Nontributary Denver Aquifer Wells

3.1.3.1. Well Names: DE-1; DE-2; DE-3; DE-4

3.1.3.2. Legal Descriptions (as described in most recent Decree – 01CW257): See Table 3 below.

3.1.3.3. Source: Nontributary Denver Aquifer

3.1.3.4. Appropriation Date: N/A (*see* §37-92-305(11)).

3.1.3.5. Amounts Decreed to be Withdrawn through Structures: See Table 3 below.

3.1.3.6. Decreed Uses:

3.1.3.6.1. Pursuant to the decree in Case No. 79CW238: municipal, domestic, commercial, industrial, power generation, mining, manufacturing, mechanical, irrigation, stock watering, recreation, fish and wildlife, fire protection, and the maintenance of adequate storage system and reserves. The water is developed and nontributary water and the right to such water includes the right of successive use pursuant to C.R.S. §37-82-106 and the right to use, reuse, and successively use all such water to extinction, and to dispose of such water free of any limitation, restriction, or requirement as to the place of use, amount of discharge after such use, reuse, successive use or disposition. The water may be used for immediate application to beneficial uses, for storage and subsequent application to beneficial uses, for exchange purposes, for replacement of depletions, and for all augmentation purposes.

3.1.3.7. Amount of Water to be Used in Plan for Augmentation: Full annual appropriation/withdrawal amounts for each well as listed in Table 3 below.

3.1.3.8. Other: See Notes to Table 3 below.

Table No. 3 – Meridian (North) NT Denver Aquifer Wells

Well Name (Parcel on which located)	Decreed Location	Water Rights Withdrawn (Case No.)	Max Annual Withdrawal (af/yr)	Pumping Rate (g.p.m.)
DE-1R (Meridian)	SW¼ SW¼ Section 1 T6S, R67W, 6th P.M. 1,300 ft FSL 1,300 ft FWL	79CW238	160	100
DE-2 (Meridian)	SW¼ NW¼ Section 12 T6S, R67W, 6th P.M. 1,381 ft FNL 1,085 ft FWL	79CW238	160	100
DE-3 (Meridian)	SW¼ SW¼ Section 12 T6S, R67W, 6th P.M. 1,300 ft FSL 1,300 ft FWL	79CW238	160	100

DE-4 (Meridian)	NE¼ SW¼ Section 11 T6S, R67W, 6th P.M. 2,715 ft FSL 2,490 ft FWL	79CW238	160	100

Note: The following conditions apply to the wells and water rights listed in Table No. 3:

(a) Pursuant to Case No. 01CW257, wells DE-1 through DE-4 may withdraw in combination a maximum of 258 acre-feet annually, at a maximum pumping rate of 100 g.p.m. each, and provided that the annual diversion from any one of wells DE-1 through DE-4 shall not exceed 160 acre-feet.

(b) Further location and spacing requirements, set forth in paragraphs 21, 22, 23, and 24 of the decree in Case No. 01CW257 apply to supplemental, additional, and/or alternate point of diversion wells constructed to withdraw the Applicant's full appropriations in the Lower Dawson, Denver, and Laramie-Fox Hills Aquifers.

3.1.4. Meridian (North) Nontributary Arapahoe Aquifer Well Field

3.1.4.1. Well Names: A-2R; A-3; A-4; A-5; A-6

3.1.4.2. Legal Descriptions (as described in most recent Decree – 01CW145): See Table 4 below.

3.1.4.3. Source: Nontributary Arapahoe Aquifer

3.1.4.4. Appropriation Date: N/A (*see* §37-92-305(11)).

3.1.4.5. Amounts Decreed to be Withdrawn through Structures: See Table 4 below.

3.1.4.6. Decreed Uses:

3.1.4.6.1. Pursuant to the decree in Case No. 01CW145, the Arapahoe Aquifer water rights decreed in Cases No. W-7609, W-8033, 79CW238, 82CW328, 84CW239/242, 84CW620, and 85CW389A withdrawn from any of the described wells may be used, reused, and successively used and after use, leased, sold or otherwise disposed of for municipal, domestic, industrial, commercial, irrigation, stock watering, recreational, fish and wildlife, and any other beneficial purpose, to be used on or off the land within the service area of Meridian Metropolitan District. This water will be produced for immediate application to said uses, for storage and subsequent application to said uses, for exchange purposes, for replacement of depletions resulting from the use of water from other sources, and for augmentation purposes.

3.1.4.7. Amount of Water to be Used in Plan for Augmentation: Full annual appropriation/withdrawal amounts for each well as listed in Table 4 below.

3.1.4.8. Other: See Notes to Table 4 below.

Table No. 4 - Meridian (North) NT Arapahoe Aquifer Well Field

Well Name (Parcel on which located)	Decreed Location	Water Rights Withdrawn (Case No.)	Average Annual Withdrawal (af/yr)	Pumping Rate (g.p.m.)
A-2R (Meridian)	NW¼ NW¼ Section 11 T6S, R67W, 6th P.M. 100 FNL 100 NWL	W-7609 W-8033 79CW238 82CW328 84CW239/242 84CW620 85CW389A	500	600
A-3 (Meridian)	SW¼ NW¼ Section 12 T6S, R67W, 6th P.M. 2,600 FNL 50 FWL	W-7609 W-8033 79CW238 82CW328 84CW239/242 84CW620 85CW389A	600	750
A-4 (Meridian)	NE¼ SW¼ Section 1 T6S, R67W, 6th P.M. 2,780 FNL 2,450 FWL	W-7609 W-8033 79CW238 82CW328 84CW239/242 84CW620 85CW389A	500	600
A-5 (Meridian)	SE¼ SE¼ Section 11 T6S, R67W, 6th P.M. 200 FSL 780 FEL	W-7609 W-8033 79CW238 82CW328 84CW239/242 84CW620 85CW389A	300	350

A-6 (Cordillera)	NE¼ NE¼ Section 12 T6S, R67W, 6th P.M. 930 FNL 970 FEL	W-7609 W-8033 79CW238 82CW328 84CW239/242 84CW620 85CW389A	600	750

Note: Pursuant to the decree in Case No. 01CW145, the following conditions apply to the wells and water rights listed in Table No. 4:

(a) In no more than one year out of any five, Meridian may withdraw a maximum of 685 acre-feet at 425 g.p.m. from well A-5; in all other years, Meridian may withdraw a maximum of 300 acre-feet at 350 g.p.m. from well A-5.

(b) In no more than one year out of any five, Meridian may withdraw a maximum of 685 acre-feet at 750 g.p.m. from well A-3; in all other years, Meridian may withdraw a maximum of 600 acre-feet from wells A-3 and A-6 combined at a maximum rate of 750 g.p.m. from each well.

(c) In any single year, Meridian may withdraw a maximum of 500 acre-feet from either well A-2R or A-4 and a total of 800 acre-feet from both wells, at a maximum rate of 600 g.p.m. for each well. These pumping rates and annual withdrawal limits for wells A-2R and A-4 apply to any Arapahoe Aquifer water withdrawn through said wells whether such water is described in the decree (in Case No. 01CW145) or not.

(d) Applicant may not withdraw in excess of 1,370.1 acre-feet annually from its Meridian (North) Arapahoe Aquifer well field.

(e) If supplemental, additional and/or alternate point of diversion wells are needed to pump Meridian's full appropriation of 1,370.1 acre-feet from the Meridian North Arapahoe Aquifer Well Field, then such supplemental, additional and/or alternate point of diversion wells may be drilled no closer than half the distance from Meridian's existing Well A-3 or A-5 to the Colony/Meridian property boundary, as shown on **Exhibit 2** hereto, and may pump at up to half the decreed annual appropriation and pumping rate of such existing well.

3.1.5. Meridian North Nontributary Laramie-Fox Hills Aquifer Well Field

3.1.5.1. Well Names: LFH-1; LFH-2; LFH-3; LFH-4

3.1.5.2. Legal Descriptions (as described in most recent Decree – 01CW257): See Table 5 below.

3.1.5.3. Source: Nontributary Laramie-Fox Hills Aquifer

3.1.5.4. Appropriation Date: N/A (*see* §37-92-305(11)).

3.1.5.5. Amounts Decreed to be Withdrawn through Structures: See Table 5 below.

3.1.5.6. Decreed Uses:

3.1.5.6.1. Pursuant to the decree in Case No. 84CW620: See paragraph 3.1.1.6.2 above.

3.1.5.6.2. Pursuant to the decree in Case No. 84CW239/242: See paragraph 3.1.1.6.3 above.

3.1.5.6.3. Pursuant to the decree in Case No. 85CW389A: See paragraph 3.1.1.6.4 above.

3.1.5.6.4. Pursuant to the decree in Case No. 82CW328: See paragraph 3.1.2.6.1 above.

3.1.5.7. Amount of Water to be Used in Plan for Augmentation: Full annual appropriation/withdrawal amounts for each well as listed in Table 5 below.

3.1.5.8. Other: See Notes to Table 5 below.

Table No. 5 - Meridian North NT Laramie-Fox Hills Aquifer Well Field

Well Name (Parcel on which located)	Decreed Location	Water Rights Withdrawn (Case No.)	Max Annual Withdrawal (af/yr)	Pumping Rate (g.p.m.)
LFH-1 (Meridian)	SE¼ NW¼ Section 11 T6S, R67W, 6th P.M. 2,725 ft FSL 2,318 ft FWL	84CW620 84CW239/242 85CW389A	484	300
LFH-2 (Meridian)	NW¼ NW¼ Section 12 T6S, R67W, 6th P.M. 610 ft FNL 537 ft FWL	84CW620 84CW239/242 85CW389A	484	300

LFH-3 (Meridian)	NW¼ NW¼ Section 11 and/or SW¼SW¼ Section 2 T6S, R67W, 6th P.M. 0 ft FNL and 1,006 ft FWL of Section 11	84CW620 84CW239/242 85CW389A	484	300
LFH-4 (aka DC-6) (Cordillera)	Center of SE¼ Section 12, T6S, R67W, 6th P.M. 1,320 ft FSL 1,320 ft FEL	84CW620 84CW239/242 85CW389A 82CW328	442 42	300

Note: The following conditions apply to the wells and water rights listed in Table No. 5:

(a) Pursuant to Case No. 01CW257, wells LFH-1 through LFH-4 may not withdraw in combination more than 688.6 acre-feet annually. Additionally, the nontributary Laramie-Fox Hills aquifer groundwater decreed pursuant to S.B. 213 in Case No. 82CW328 will only be withdrawn from well LFH-4 and any additional wells pursuant to the provisions in Case No. 82CW328.

(b) Further location and spacing requirements, set forth in paragraphs 21, 22, 23, and 24 of the decree in Case No. 01CW257 apply to supplemental, additional, and/or alternate point of diversion wells constructed to withdraw the Applicant's full appropriations in the Lower Dawson, Denver, and Laramie-Fox Hills Aquifers.

3.1.6. Future Wells. Applicant may inject into and pump out of any wells constructed as supplemental, additional, or alternate point of diversion wells for the foregoing structures ("Future Meridian North Wells"). In the location, construction, and operation of such Future Meridian North Wells, Applicant remains bound by the terms and conditions of the decrees in Case No. 01CW257 (Lower Dawson, Denver, and Laramie-Fox Hills Aquifers),Case No. 01CW145 (Arapahoe Aquifer) and, where applicable, the individual decrees adjudicating the water rights listed above. Applicant must provide written notice to the Objectors and the State Engineer pursuant to paragraph 5.3, and the State Engineer must issue a well permit in accordance with paragraph 17 for any wells constructed as supplemental, additional, or alternate point of diversion wells for the foregoing structures before the new wells may be constructed and used to extract injected water.

3.2. Meridian South CEP (see **Exhibit 1** for a depiction of the CEP)

3.2.1. Meridian South Not-Nontributary Lower Dawson Well Field

3.2.1.1. Well Names: LDA-7; LDA-8

3.2.1.2. Legal Descriptions (as described in most recent Decree – 01CW257): See Table 6 below.

3.2.1.3. Source: Not-nontributary Lower Dawson Aquifer

3.2.1.4. Appropriation Date: N/A (*see* §37-92-305(11))

3.2.1.5. Amounts Decreed to be Withdrawn through Structures: See Table 6 below.

3.2.1.6. Decreed Uses:

3.2.1.6.1. Pursuant to the decree in Case No. 84CW236: All municipal purposes including domestic, agricultural, industrial, commercial, irrigation, stock watering, recreation, fish and wildlife, and fire protection. Water may be produced for immediate application to beneficial use, for storage and subsequent use, for exchange purposes, for replacement of depletions resulting from the use of water from other sources, for relinquishment to the stream pursuant to C.R.S. §37-90-137(9)(b), and for all other augmentation purposes including augmentation of not-nontributary groundwater diversions. The rights approved include the right to reuse, successive use and disposition by sale, exchange or otherwise to extinction, of all such water in accordance with C.R.S. §37-82-106(2).

3.2.1.6.2. Pursuant to the decree in Case No. 84CW240: All municipal purposes including domestic, agricultural, industrial, commercial, irrigation, stock watering, recreation, fish and wildlife, and fire protection. Water may be produced for immediate application to beneficial use, for storage and subsequent application to beneficial use, for exchange purposes, for replacement of depletions resulting from the use of water from other sources, for relinquishment to the stream pursuant to C.R.S. §37-90-137(9)(b), and for all other augmentation purposes including augmentation of not-nontributary groundwater diversions. The rights approved include the right to reuse, successive use and disposition by sale, exchange or otherwise to extinction, of all such water in accordance with C.R.S. §37-82-106(2).

3.2.1.6.3. Pursuant to the decree in Case No. 06CW182: Water withdrawn from the subject aquifers will be used for beneficial purposes on or off of the overlying land, including without limitation, municipal, domestic, industrial, agricultural, commercial, irrigation, stock watering, recreation, fish and wildlife, fire protection, augmentation, and substitution and exchange. Meridian is entitled to recapture, reuse, and successively use, and after use to lease, sell, or otherwise dispose of the groundwater that is the subject of the decree in Case No. 06CW182, subject, however, to the obligation to operate in accordance with a plan for augmentation prior to withdrawal or use of any groundwater from the not-nontributary Lower Dawson Aquifer. The not-nontributary Lower Dawson Aquifer groundwater that is the subject of the decree in Case No. 06CW182 will be withdrawn through Well LDA-8 for immediate application to beneficial use, for storage, and subsequent application to beneficial use, for exchange purposes, for replacement of depletions resulting from the use of water from other sources, and for all other augmentation purposes, including taking credit for all return flows as augmentation for or as offsets against not-nontributary depletions.

3.2.1.7. Amount of Water to be Used in Plan for Augmentation: Full annual appropriation/withdrawal amounts for each well as listed in Table 6 below.

3.2.1.8. Other: See Notes to Table 6 below.

Table No. 6 - Meridian South NNT Lower Dawson Aquifer Well Field

Well Name (Parcel on which located)	Decreed Location	Water Rights Withdrawn (Case No.)	Max Annual Withdrawal per Case No. 01CW257 (af/yr)	Annual Withdrawal per Case No. 06CW182 (af/yr)	Max Annual Withdrawal per Case Nos. 01CW257 and 06CW182 (af/yr)	Pumping Rate (g.p.m.)
LDA-7 (Bradbury South)	SW¼ NW¼ Section 18, T6S, R66W, 6th P.M. 2,600 ft FNL 1,300 ft FWL	84CW236 84CW240	150	0	150	150
LDA-8 (Bradbury South)	Center of Section 19, T6S, R66W, 6th P.M. 2,620 ft FNL 2,620 ft FWL	84CW236 84CW240 06CW182	198.4	17.4	215.8	150
		Total – Not to Exceed	**198.4**		**215.8**	

Note: The following conditions apply to the wells and water rights listed in Table No. 6:

(a) The Lower Dawson Aquifer water rights decreed by Cases No. 84CW236 and 84CW240 are augmented pursuant to Case No. 01CW257. Pursuant to Case No. 01CW257, Wells LDA-7 and LDA-8 may not withdraw in combination more than 198.4 acre-feet annually of the Lower Dawson Aquifer water rights decreed in Cases No. 84CW236 and 84CW240.

(b) The Lower Dawson Aquifer water rights decreed by Case No. 06CW182 are augmented pursuant to Case No. 13CW3130. Pursuant to Case No. 13CW3130, Meridian may withdraw 17.4 acre-feet per year of its Lower Dawson Aquifer water rights decreed in Case No. 06CW182 through Well LDA-8, increasing the annual withdrawal of Lower Dawson Aquifer groundwater by Well LDA-8 to 215.8 acre-feet per year. Nothing in this decree shall alter the terms and conditions decreed in Case No. 13CW3130.

(c) Pursuant to Case No. 06CW182, banking and additional wells pursuant Rule 12 of the Statewide Nontributary Ground Water Rules, 2 CCR 402-7 ("Nontributary Rules"), are allowed for the water rights decreed by Case No. 06CW182 in Table 6.

(d) Further location and spacing requirements, set forth in paragraphs 21, 22, 23, and 24 of the decree in Case No. 01CW257 apply to supplemental, additional, and/or alternate point of diversion wells constructed to withdraw the Applicant's full appropriations in the Lower Dawson, Denver, and Laramie-Fox Hills Aquifers.

3.2.2. Meridian South Not-Nontributary Denver Aquifer Well Field

3.2.2.1. Well Names: DE-12 (aka BP-DN-1); DE-13 (aka HS-DN-1)

3.2.2.2. Legal Descriptions (as described in most recent Decree – 01CW257): See Table 7 below.

3.2.2.3. Source: Not-nontributary Denver Aquifer

3.2.2.4. Appropriation Date: N/A (*see* §37-92-305(11))

3.2.2.5. Amounts Decreed to be Withdrawn through Structures: See Table 7 below.

3.2.2.6. Decreed Uses:

3.2.2.6.1. Pursuant to the decree in Case No. 84CW236: See paragraph 3.2.1.6.1 above.

3.2.2.6.2. Pursuant to the decree in Case No. 84CW240: See paragraph 3.2.1.6.2 above.

3.2.2.6.3. Pursuant to the decree in Case No. 06CW182: Pursuant to the decree in Case No. 06CW182: Water withdrawn from the subject aquifers will be used for beneficial purposes on or off of the overlying land, including without limitation, municipal, domestic, industrial, agricultural, commercial, irrigation, stock watering, recreation, fish and wildlife, fire protection, augmentation, and substitution and exchange. Meridian is entitled to recapture, reuse, and successively use, and after use to lease, sell, or otherwise dispose of the groundwater that is the subject of the decree in Case No. 06CW182, subject, however, to the obligation to operate in accordance with a plan for augmentation prior to withdrawal or use of any groundwater from the not-nontributary Denver Aquifer. The not-nontributary Denver Aquifer groundwater that is the subject of the decree in Case No. 06CW182 will be withdrawn through Well DE-13 for immediate application to beneficial use, for storage, and subsequent application to beneficial use, for exchange purposes, for replacement of depletions resulting from the use of water from other sources, and for all other augmentation purposes, including taking credit for all return flows as augmentation for or as offsets against not-nontributary depletions.

3.2.2.7. Amount of Water to be Used in Plan for Augmentation: Full annual appropriation/withdrawal amounts for each well as listed in Table 7 below.

3.2.2.8. Other: See Notes to Table 7 below.

Table 7 – Meridian South NNT Denver Aquifer Well Field

Well Name (Parcel on which located)	**Decreed Location**	**Water Rights Withdrawn (Case No.)**	**Max Annual Withdrawal per Case No. 01CW257 (af/yr)**	**Annual Withdrawal per Case No. 06CW182 (af/yr)**	**Max Annual Withdrawal per Cases No. 01CW257 and 06CW182 (af/yr)**	**Pumping Rate (g.p.m.)**
DE-12 (aka BP-DN-1) (Bradbury South)	NE¼ NW¼ Section 18, T6S, R66W, 6th P.M. 850 ft FNL 1,800 ft FWL	84CW236 84CW240	150	0	150	200
DE-13 (aka HS-DN-1) (Bradbury South)	NW¼ SE¼ Section 19, T6S, R66W, 6th P.M. 1,900 ft FSL 1,900 ft FEL	84CW236 84CW240 06CW182	272	0.34	272.34	200
		Total – Not to Exceed	**272**		**272.34**	

Note: The following conditions apply to the wells and water rights listed in Table No. 7:

(a) The Denver Aquifer water rights decreed by Cases No. 84CW236 and 84CW240 are augmented pursuant to Case No. 01CW257. Pursuant to Case No. 01CW257, Wells DE-12 and DE-13 may not withdraw in combination more than 272 acre-feet annually of the Denver Aquifer water rights decreed in Cases No. 84CW236 and 84CW240 at a maximum pumping rate of 200 g.p.m.

(b) The Denver Aquifer water rights decreed by Case No. 06CW182 are augmented pursuant to Case No. 13CW3130. Pursuant to Case No. 13CW3130, Meridian may withdraw 0.34 acre-feet per year of its not-nontributary Denver Aquifer water rights decreed in Case No. 06CW182 through Well DE-13, increasing the annual withdrawal of Denver Aquifer groundwater by Well DE-13 to 272.34 acre-feet per year. Nothing in this decree shall alter the terms and conditions decreed in Case No. 13CW3130.

(c) Pursuant to Case No. 06CW182, banking and additional wells pursuant Rule 12 of the Nontributary Rules are allowed for the water rights decreed by Case No. 06CW182 in Table 7.

(d) Further location and spacing requirements, set forth in paragraphs 21, 22, 23, and 24 of the decree in Case No. 01CW257 apply to supplemental, additional, and/or alternate point of diversion wells constructed to withdraw the Applicant's full appropriations in the Lower Dawson, Denver, and Laramie-Fox Hills Aquifers.

3.2.3. Meridian (South) Nontributary Arapahoe Aquifer Wells

3.2.3.1. Well Names: BP-A-1; HS-A-1

3.2.3.2. Legal Descriptions as described in most recent decrees: 84CW236 (Well BP-A-1), and 84CW240 (Well HS-A-1): See Table 8 below.

3.2.3.3. Source: Nontributary Arapahoe Aquifer

3.2.3.4. Appropriation Date: N/A (*see* §37-92-305(11))

3.2.3.5. Amounts Decreed to be Withdrawn through Structures: See Table 8 below.

3.2.3.6. Decreed Uses:

3.2.3.6.1. Pursuant to the decree in Case No. 84CW236: See paragraph 3.2.1.6.1 above.

3.2.3.6.2. Pursuant to the decree in Case No. 84CW240: See paragraph 3.2.1.6.2 above.

3.2.3.7. Amount of Water to be Used in Plan for Augmentation: Full annual appropriation/ withdrawal amounts for each well as listed in Table 8 below.

3.2.3.8. Other: See Notes to Table 8 below.

Table No. 8 – Meridian (South) NT Arapahoe Aquifer Wells

Well Name (Parcel on which located)	Decreed Location	Water Rights Withdrawn (Case No.)	Average Annual Withdrawal (af/yr)	Pumping Rate (g.p.m.)
BP-A-1 (Bradbury South)	SE¼ NW¼ Section 18, T6S, R66W, 6th P.M. 2,600 ft FNL 1,700 ft FWL	84CW236	21.4	800
HS-A-1 (Bradbury South)	NW¼ SE¼ Section 19, T6S, R66W, 6th P.M. 2,400 ft FNL 2,000 ft FEL	84CW240	143	800

Note: The following conditions apply to the wells and water rights listed in Table No. 8:

(a) Pursuant to Cases No. 84CW236 and 84CW240, banking and additional wells pursuant to §37-90-137(10), C.R.S., are allowed for all the water rights withdrawn through the wells in Table 8.

3.2.4. <u>Meridian South Nontributary Laramie-Fox Hills Aquifer Well Field</u>

3.2.4.1. Well Names: LFH-5; LFH-6

3.2.4.2. Legal Descriptions (as described in most recent Decree – 01CW257): See Table 9 below.

3.2.4.3. Source: Nontributary Laramie-Fox Hills Aquifer

3.2.4.4. Appropriation Date: N/A (*see* §37-92-305(11))

3.2.4.5. Amounts Decreed to be Withdrawn through Structures: See Table 9 below.

3.2.4.6. Decreed Uses:

3.2.4.6.1. Pursuant to the decree in Case No. 84CW236: See paragraph 3.2.1.6.1 above.

3.2.4.6.2. Pursuant to the decree in Case No. 84CW240: See paragraph 3.2.1.6.2 above.

3.2.4.6.3. Pursuant to Case No. 06CW182: Water withdrawn from the subject aquifer will be used for beneficial purposes on or off of the overlying land, including without limitation, municipal, domestic, industrial, agricultural, commercial, irrigation, stock watering, recreation, fish and wildlife, fire protection, augmentation, and substitution and exchange. Meridian is entitled to recapture, reuse, and successively use, and after use to lease, sell, or otherwise dispose of the groundwater that is the subject of the decree in Case No. 06CW182, subject, however, to the obligation to consume no more than 98% of the water withdrawn from the Laramie-Fox Hills Aquifer. The Laramie-Fox Hills Aquifer groundwater that is the subject of the decree in Case No. 06CW182 will be withdrawn through Well LFH-5 (aka Well BP-L-1) and Well LFH-6 (aka Well HS-L-1) for immediate application to beneficial use, for storage, and subsequent application to beneficial use, for exchange purposes, for replacement of depletions resulting from the use of water from other sources, and for all other augmentation purposes, including taking credit for all return flows as augmentation for or as offsets against not-nontributary depletions.

3.2.4.7. Amount of Water to be Used in Plan for Augmentation: Full annual appropriation/withdrawal amounts for each well as listed in Table 9 below.

3.2.4.8. Other: See Notes to Table 9 below.

Table No. 9 - Meridian South NT Laramie-Fox Hills Aquifer Well Field

Well Name (Parcel on which located)	Decreed Location	Water Rights Withdrawn (Case No.)	Max Annual Appropriation per Case No. 01CW257 (af/yr)	Annual Appropriation per Case No. 06CW182 (af/yr)	Max Annual Appropriation per Cases No. 01CW257 and 06CW182 (af/yr)	Pumping Rate (g.p.m.)
LFH-5 (Bradbury South)	SW¼ NW¼ Section 18, T6S, R66W, 6th P.M. 2,550 ft FNL 1,300 ft FWL	84CW236 84CW240 06CW182	213.6	20.1	233.7	300
LFH-6 (Bradbury South)	Center of Section 19, T6S, R66W, 6th P.M. 2,620 ft FSL 2,620 ft FEL	84CW236 84CW240 06CW182	213.6	20.1	233.7	300
		Total – Not to Exceed	**213.6**		**233.7**	

Note: The following conditions apply to the wells and water rights listed in Table No. 9:

(a) The Laramie-Fox Hills Aquifer water rights decreed by Cases No. 84CW236 and 84CW240 are withdrawn through Well LFH-5 and Well LFH-6 (Meridian South NT Laramie-Fox Hills Aquifer Well Field) pursuant to Case No. 01CW257. Pursuant to Case No. 01CW257, Well LFH-5 and Well LFH-6 may not withdraw in combination more than 213.6 acre-feet annually of the Laramie-Fox Hills Aquifer water rights decreed in Cases No. 84CW236 and 84CW240.

(b) The Laramie-Fox Hills Aquifer water rights decreed by Case No. 06CW182 are withdrawn through Well LFH-5 and Well LFH-6 (Meridian South NT Laramie-Fox Hills Aquifer Well Field) pursuant to Case No. 06CW182. Pursuant to Case No. 06CW182, Meridian may withdraw 20.1 acre-feet per year of its nontributary Laramie-Fox Hills Aquifer water rights decreed in Case No. 06CW182 through Well LFH-5 and Well LFH-6, increasing the annual withdrawal of Laramie-Fox Hills Aquifer groundwater by Well LFH-5 and Well LFH-6 to 233.7 acre-feet per year.

(c) Pursuant to Case No. 06CW182, banking and additional wells pursuant Rule 12 of the Nontributary Rules is allowed for the water rights decreed by Case No. 06CW182 in Table 9.

(d) Further location and spacing requirements, set forth in paragraphs 21, 22, 23, and 24 of the decree in Case No. 01CW257 apply to supplemental, additional, and/or alternate point of diversion wells constructed to withdraw the Applicant's full appropriations in the Lower Dawson, Denver, and Laramie-Fox Hills Aquifers.

3.2.5. Future Wells. Applicant may inject into and pump out of any wells constructed as supplemental, additional, or alternate point of diversions wells for the foregoing structures ("Future Meridian South Wells"). In the location, construction and operation of such Future Meridian South Wells, Applicant remains bound by the terms and conditions of the decrees in Cases No. 01CW257 (Lower Dawson, Denver, and Laramie-Fox Hills Aquifers), Cases No. 84CW236 and 84CW240 (Arapahoe Aquifer), and Case No. 13CW3130 (Lower Dawson, Denver, and Laramie-Fox Hills Aquifers), and, where applicable, the individual decrees adjudicating the water rights listed above. Applicant must provide written notice to the Objectors and the State Engineer pursuant to paragraph 5.3, and the State Engineer must issue a well permit in accordance with paragraph 17 for any wells constructed as supplemental, additional, or alternate point of diversion wells for the foregoing structures before the new wells may be constructed and used to extract injected water.

4. Water and Water Rights to be used in the Plan (by artificial injection, aquifer storage, and subsequent extraction).

4.1. 84CW239/242. Not-nontributary Lower Dawson Aquifer, not-nontributary Denver Aquifer, nontributary Arapahoe Aquifer, and nontributary Laramie-Fox Hills Aquifer groundwater underlying approximately 684.5 acres (Bradbury North Parcel) decreed in Case No. 84CW239/242, District Court, Water Division No. 1 (May 31, 1989). See **Exhibit 3**.

4.2. 84CW236. Not-nontributary Lower Dawson Aquifer, not-nontributary Denver Aquifer, nontributary Arapahoe Aquifer, and nontributary Laramie-Fox Hills Aquifer groundwater underlying approximately 205.7 acres in the Bradbury South Parcel (Bradbury-Bull Pasture Parcel) decreed in Case No. 84CW236, District Court, Water Division No. 1 (Sept. 7, 1989). See **Exhibit 3**.

4.3. 84CW240. Not-nontributary Lower Dawson Aquifer, not-nontributary Denver Aquifer, nontributary Arapahoe Aquifer, and nontributary Laramie-Fox Hills Aquifer groundwater underlying approximately 553.5 acres (Bradbury South Parcel) decreed in Case No. 84CW240, District Court, Water Division No. 1 (Sept. 7, 1989). See **Exhibit 3**.

4.4. 85CW389A. Not-nontributary Lower Dawson Aquifer, not-nontributary Denver Aquifer, and nontributary Laramie-Fox Hills Aquifer groundwater underlying approximately 320 acres (Cordillera Parcel) decreed in Case No. 85CW389A, District Court, Water Division No. 1 (May 19, 1993). See **Exhibit 3**.

4.5. W-7609 and 84CW620. Not-nontributary Lower Dawson Aquifer, nontributary and not-nontributary Denver Aquifer, nontributary Arapahoe Aquifer, and nontributary Laramie-Fox Hills Aquifer groundwater underlying 1,235 acres in the Meridian Parcel decreed in Cases No. W-7609 (March 16, 1977) and 84CW620, District Court, Water Division No. 1 (Feb. 5, 1992). See **Exhibit 3**. The water rights decreed in Case No. W-7609 to California Arapahoe Well No. 1-017691-F and the California Arapahoe Well No. 2-017693-F are owned by Stonegate and are not included in this Plan for Augmentation or changed by this Decree.

4.6. 82CW328. Nontributary Lower Dawson Aquifer, nontributary Denver Aquifer, nontributary Arapahoe Aquifer, and nontributary Laramie-Fox Hills Aquifer groundwater underlying 160 acres (Daniel Crow Parcel) decreed in Case No. 82CW328, District Court, Water Division No. 1 (Feb. 25, 1985). See **Exhibit 3**.

4.7. 83CW359. Nontributary Lower Dawson Aquifer groundwater underlying 1,250 acres (Meridian Parcel) decreed in Case No. 83CW359, District Court, Water Division No. 1, April 25, 1985. See **Exhibit 3**.

4.8. 79CW238. Nontributary Denver Aquifer and nontributary Arapahoe Aquifer groundwater underlying approximately 1,250 acres (Meridian Parcel) decreed in Case No. 79CW238, District Court, Water Division No. 1 (May 14, 1982). See **Exhibit 3**.

4.9. W-8033. Nontributary Arapahoe Aquifer groundwater underlying 199.36 acres (Sears Parcel) decreed in Case No. W-8033, District Court, Water Division No. 1 (May 31, 1977). See **Exhibit 3**.

4.10. 06CW182. Not-nontributary Lower Dawson Aquifer, not-nontributary Denver Aquifer groundwater, and nontributary Laramie-Fox Hills Aquifer groundwater underlying approximately 72.4 acres (Hough Parcel) decreed in Case No. 06CW182, District Court, Water Division No. 1. See **Exhibit 3**.

4.11. WISE. Fully consumable and/or reusable water delivered to Applicant from the municipal water supply systems of the City and County of Denver acting by and through its Board of Water Commissioners ("Denver Water") and Aurora pursuant to the WISE Partnership effectuated through the WISE Partnership Water Delivery Agreement among Denver Water, Aurora, and the South Metro WISE Authority and the WISE Partnership IGA among SMWSA and members participating in the project, including Applicant.

4.11.1. Nothing in this Decree reopens, reconsiders, alters, amends, affects, or otherwise revises any portion of any agreement involving Aurora or Meridian, including but not limited to the Water Delivery Agreement entered into by Denver Water, Aurora, and the South Metro WISE Authority, dated December 31, 2013.

5. **Statement of Plan for Augmentation.**

5.1. Artificial Recharge and Extraction.

5.1.1. Overview: Applicant will artificially inject fully consumable and/or reusable water derived from the water and water rights described in Paragraph 4 above into the Lower Dawson, Denver, Arapahoe, and Laramie-Fox Hills Aquifers underlying Applicant's service area, by means of the wells described in Paragraph 3 above (including Future Meridian North Wells and Future Meridian South Wells); store such injected water in the aquifers into which it is injected, and subsequently extract the injected water by means of the wells described in Paragraph 3 above (including Future Meridian North Wells and Future Meridian South Wells) for use in and through the municipal water supply system of the Applicant, all in accordance with the Denver Basin Artificial Recharge Extraction Rules, 2 CCR 402-11 ("SEO Rules").

5.1.2. Injection Operations: Injection Operations will be carried out in accordance with the requirements of the SEO Rules. All injected water will be fully consumable and/or reusable, or decreed at the time of injection for storage by means of artificial recharge, or otherwise legally and physically available for storage by means of artificial recharge in the Denver Basin Aquifers, and any augmentation or relinquishment requirements applicable to the water to be injected shall be met prior to or at the time of injection. Water will be injected into the Meridian North CEP by means of the wells described in Paragraph 3.1. above (including Future Meridian North Wells) and into the Meridian South CEP by means of the wells described in Paragraph 3.2. above (including Future Meridian South Wells).

The water and water rights described in paragraphs 4.1 through 4.10 will be injected into the aquifer in one of two ways: (1) pumped from one Denver Basin Aquifer and injected into another Denver Basin Aquifer without initial use; or (2) pumped and used within the District

Service Area and then treated and discharged from Meridian's wastewater treatment facility for subsequent direct injection into an aquifer. The irrigation return flows quantified in Case No. 01CW257 and derived from the water rights described therein shall not be used as a source of water for injection into an aquifer pursuant to this Plan for Augmentation. However, Meridian reserves the right to claim the use of irrigation return flows derived from other sources as a source of water for injection at a future time by subsequent application to the Water Court.

Prior to operating any injection well, Meridian shall obtain authorization by permit or rule pursuant to the U.S. Environmental Protection Agency's ("EPA") Underground Injection Control Program ("UIC"). If Meridian obtains authorization by rule, Meridian shall provide opposers with a copy of the "inventory information" that it submits to the EPA pursuant to 40 C.F.R. 144.26 and/or 40 C.F.R. 144.83. If the EPA determines that Meridian's injection operations require permit authorization, Meridian shall follow the procedures and notice requirements proscribed by 40 C.F.R. 124 and 40 C.F.R. 144 and provide written notice to opposers. All water injected shall be treated and/or otherwise comply with the UIC program and the Safe Drinking Water Act and Meridian shall use any applicable best management practices required by the EPA in operating its injection wells.

5.1.3. Extraction Operations: Extraction of injected water will be carried out in accordance with the requirements of the SEO Rules. Water injected into the Meridian North CEP will be withdrawn by wells located on the Meridian North CEP (i.e. wells described in Paragraph 3.1. (including Future Meridian North Wells)); likewise, water injected into the Meridian South CEP will be withdrawn by wells located on the Meridian South CEP (i.e. wells described in Paragraph 3.2 (including Future Meridian South Wells)); in no case shall the extraction well be located more than 5 miles from the furthest injection site within the same CEP. Water injected into each Denver Basin Aquifer shall only be withdrawn by wells completed into the same Denver Basin Aquifer to which water was injected. If, prior to or during extraction, the aquifer becomes unconfined at any point between any injection site and the remote extraction site, as determined by the State Engineer, extraction of artificially recharged water shall only be permitted through the same well through which the water was injected, or through a remote extraction site located down hydraulic gradient from the injection site(s) and within the same CEP, and in no case shall the remote extraction site be located more than one thousand (1,000) feet from the farthest injection site.

In addition, no extraction shall be accomplished by means of a well authorized to withdraw water from the same aquifer and located within the cylinder of appropriation, as calculated pursuant to Nontributary Rule 4.A.7, of any permitted or decreed well that is not owned by the Applicant without the written permission of the owner of such well.

Further, the maximum amount of artificially recharged water that may be extracted from an aquifer through any one extraction well in any one calendar year must not exceed the lesser of: (1) 5 times the maximum amount of water injected into that aquifer in any one calendar year, or (2) the total amount of water previously injected into that aquifer, less any amounts previously extracted. Pursuant to SEO Rule 7.4, the Applicant may retain water it has artificially recharged into the aquifer indefinitely; and the injection and extraction operations provided for herein do not affect Meridian's ability to "bank" naturally occurring groundwater pursuant to Nontributary Rule 8.A.

Finally, the following maximum pumping rates apply to the extraction of artificially recharged water from each aquifer in each CEP:

Lower Dawson:	400 gpm
Denver:	450 gpm
Arapahoe:	800 gpm
Laramie-Fox Hills:	400 gpm

5.1.4. All wells used for injection or extraction shall be equipped with suitable totalizing flow meters, which shall be operated and maintained to separately measure the amount of water injected and extracted. The meters must be installed according to the manufacturer's recommendations and must contain sufficient recording digits to assure that "roll over" to zero does not occur prior to accumulating a total of 999 acre-feet. At any time when a meter is not operational, the Applicant shall not inject or extract water by means of the well. Flow meters installed on existing wells authorized to withdraw naturally occurring groundwater shall be reverified to be in accurate working condition prior to initiation of injection and/or extraction operations, and must be reverified to be in accurate working condition every four years thereafter. Totalizing flow meters installed on new wells to be used for injection and/or extraction operations must be reverified in the field to be in accurate working condition under the supervision of an individual or entity approved by the State Engineer every four years after the date of original installation. The State Engineer must be notified in writing of the date and name of the person performing reverifications. All totalizing flow meters must be accurate with a range of ±5%.

5.2. <u>Right to Recapture</u>. The Court finds that Applicant has the right to withdraw, use, and recapture all of the water injected into the Lower Dawson, Denver, Arapahoe, and Laramie-Fox Hills Aquifers subject to the terms and conditions of this decree.

5.2.1. All injected water, when recaptured, will be reusable and fully consumable. Recaptured water shall not be subject to augmentation or relinquishment requirements.

5.3. **Addition of Wells to Plan for Augmentation.** In the event Applicant seeks to use new wells that were constructed as supplemental, additional, or alternate point of diversion wells for the wells described in Paragraph 3 to extract water injected pursuant to the Plan for Augmentation decreed herein, Applicant shall provide written notice of said addition to all Objectors and to the Division Engineer at least sixty (60) days before the State Engineer may issue a well permit for a new well to extract injected water. Such notice must include at least the following information: (1) the location of any new well; (2) the aquifer into which the well is completed; and (3) the capacity of the new well. The Court has perpetual jurisdiction to resolve any dispute regarding the State Engineer's permitting of any new well used to extract water injected pursuant to the Plan for Augmentation decreed herein.

6. **No Change of Water Rights Necessary.** The water rights described in Paragraph 4 above are fully consumable and currently decreed for municipal, augmentation, and storage use (among other uses). The Court finds that the proposed use of the water rights described in paragraph 4 for artificial recharge into, storage in, and extraction as contemplated by the conjunctive use program from the Denver Basin Aquifers is fully consistent with the currently decreed uses for these water rights.

7. **Confirmation of Use of Water Rights.** The water rights described in Paragraph 4 above are fully consumable and currently decreed for municipal, augmentation, and storage use (among other uses) and therefore may be artificially recharged into, stored in, and subsequently extracted from the Lower Dawson, Denver, Arapahoe, and Laramie-Fox Hills Aquifers in accordance with the Plan for Augmentation decreed herein and the terms and conditions hereof and thereafter used in the municipal water supply system of the Applicant.

8. **No Injury.** The Court finds that no injury will result from the Plan for Augmentation decreed herein.

CONCLUSIONS OF LAW

9. **Incorporation by Reference.** To the extent they include conclusions of law, the Findings of Fact set forth in paragraphs 1-8 above are incorporated herein by this reference as though set forth herein.

10. **Contemplated by Law.** Pursuant to C.R.S. §37-92-103(9), a plan for augmentation is a detailed program to increase the supply of water available for beneficial use by appropriate means. Meridian's program for artificial aquifer recharge, storage, and subsequent extraction of recharged water into and from the Denver Basin Aquifers decreed herein is a plan for augmentation contemplated by law that may be adjudicated pursuant to the Water Right Determination and Administration Act of 1969 ("1969 Act") C.R.S. §37-92-101 *et. seq.*, and implemented pursuant to this Decree.

11. **Jurisdiction.** This Court has jurisdiction to adjudicate plans for augmentation and to permit the injection, storage, and withdrawal of water in the Lower Dawson, Denver, Arapahoe and Laramie-Fox Hills Aquifers underlying the Meridian North CEP and the Meridian South CEP. Further, timely and adequate notice of the pendency of this proceeding having been given in the manner required by law, and the time for filing statements of opposition and for seeking leave to intervene having expired, this Court has jurisdiction over the subject matter of the Application and this proceeding, and over all persons that would have standing to appear as parties, regardless of whether they have appeared.

12. **Burdens of Proof Satisfied.** Applicant has complied with all requirements and satisfied all standards and burdens of proof, including but not limited to those set forth in C.R.S. §§ 37-92-302 through 305, as amended. Meridian is entitled to a decree confirming and approving the plan for augmentation sought herein.

13. **Administrability.** The plan for augmentation herein is administrable by the officials of the State of Colorado.

14. **No Injury.** If implemented in accordance with the terms and conditions of this Decree, the Plan for Augmentation will permit the use of water in compliance with law and without material injury to the vested or conditionally decreed water rights of others.

JUDGMENT AND DECREE

15. **Findings of Fact and Conclusions of Law.** The foregoing Findings of Fact and Conclusions of Law are hereby fully incorporated into this Judgment and Decree, as though set forth in full.

16. **Approval of Plan for Augmentation.** Meridian's conjunctive use program to inject, store, and subsequently extract water in the Lower Dawson, Denver, Arapahoe, and Laramie-Fox Hills Aquifers underlying the Meridian North CEP and the Meridian South CEP, including its use of the Denver Basin Aquifers for that purpose, is specifically approved and adjudicated as a Plan for Augmentation, as defined in C.R.S. §37-92-103(9) as described herein, subject to the terms and conditions herein.

16.1. Terms and Conditions. The Plan will be operated as set forth in Paragraph 5 above, and also in accordance with the following terms and conditions, which will prevent injury to the vested rights of others:

16.1.1. Applicant will comply with the applicable EPA regulation pertaining to the injection of water into aquifers that may be used as drinking water sources.

16.1.2. Applicant will comply with the Denver Basin Artificial Recharge Extraction Rules found in 2 CCR 402-11.

16.1.3. Applicant will comply with the terms and conditions of the decrees for water to be artificially recharged, stored, and subsequently extracted in accordance with this plan, including the applicable terms and conditions of all other plans for augmentation decreed in connection with such water rights. This decree allows Meridian's nontributary and not-nontributary wells identified in paragraph 3 to be used for injection and extraction. This decree does not modify the terms and conditions for the withdrawal from those wells of the nontributary and not-nontributary groundwater rights adjudicated in the previous decrees identified in paragraphs 3 and 4.

16.1.4. The maximum amount of recharged water that may be extracted from an aquifer shall not exceed the total amount of water previously injected into that aquifer.

16.1.5. Injection pressure that results in new fractures or propagates existing fractures in the receiving aquifer ("hydraulic fracturing") is not permitted to facilitate the injection or withdrawal of water pursuant to the Augmentation Plan decreed herein.

17. **Well Permits**. Applicant shall submit to the State Engineer an application for a Permit to Extract Artificially Recharged Water pursuant to Rules 6.2 and 6.3 of the SEO Rules and filing fee. Upon receipt of a complete well permit application and filing fee, the State Engineer shall issue the appropriate permits for injection and extraction wells constructed and/or operated in accordance with the terms of the Plan for Augmentation decreed herein.

18. **No Change of Water Rights Necessary.** Because the water rights described in Paragraph 4 above are fully consumable and currently decreed for municipal, augmentation, and storage use (among other uses), and such uses are fully consistent with the conjunctive use program decreed herein, this Court determines that the water rights in Paragraph 4 are currently available for use in the Augmentation Plan decreed herein without the requested change.

19. **Confirmation of Use of Water Rights.** The use of the water rights described in Paragraph 4 above for artificial recharge and extraction from the Lower Dawson, Denver, Arapahoe, and Laramie-Fox Hills Aquifers in accordance with the Plan decreed herein and the terms and conditions hereof and use in the municipal water supply system of the Applicant is hereby confirmed.

19.1. All use of WISE water by Meridian is limited by the terms and conditions of the WISE Partnership Water Delivery Agreement among Denver Water, Aurora, and the SMWSA, as it currently exists or as amended, and the WISE Partnership IGA among SMWSA and its members, as it currently exists or as amended.

20. **Administration.** The State Engineer and Division Engineer for Water Division One and the Water Commissioner shall administer the augmentation plan in accordance with the terms and conditions contained in this Decree. So long as Meridian operates in accordance with this Decree, the augmentation plan can be operated without adversely affecting the owners or users of vested water rights or decreed conditional water rights and will comply with law.

20.1. Accounting. Applicant shall prepare and submit to the State Engineer and Division Engineer for Water Division One, water commissioner, and opposers proposed accounting forms prior to operation of the augmentation plan described herein. The accounting forms submitted will show all information required to account properly for the proposed artificial recharge and extraction program. Applicant shall submit to the State Engineer and Division Engineer for Water Division One an annual report, or more frequently as reasonably requested by the Division Engineer, that summarizes diversions, depletions, and replacements made under the augmentation plan decreed herein, and any other accounting as required by the State Engineer and Division Engineer for Water Division One. Applicant shall make such annual report available to the opposers upon request.

20.1.1. Applicant must maintain permanent records of the timing, types of water, location and amounts of water injected and extracted into each aquifer. These records shall be collected and maintained on a weekly basis and shall be submitted to the State Engineer and Division Engineer for Water Division One by February 15 of each year for the preceding calendar year, and shall be subject to inspection at any time by the State Engineer and Division Engineer for Water Division One upon request.

20.1.2. All water level data acquired by Applicant in anticipation of extraction of artificially recharged water shall be submitted to the State Engineer annually at the end of each calendar year. Upon initiation of extraction, Applicant shall continue to submit such water level data to the State Engineer on an annual basis at the end of each calendar year along with the data described in paragraph 20.1.1 above.

20.2. Measurement: Meridian must install and maintain appropriate measuring devices and continuous recording devices as required by the Division Engineer for the administration of the augmentation plan decreed herein.

21. **Retained Jurisdiction.** Pursuant to the provisions of §37-92-304(6), C.R.S., the Court retains jurisdiction over this matter for the reconsideration of the question of injury to the vested water rights of others as follows:

21.1. There shall be a separate retained jurisdiction period over artificial recharge into each Denver Basin Aquifer (Lower Dawson, Denver, Arapahoe and Laramie-Fox Hills) within each CEP (Meridian North CEP and Meridian South CEP). The Court's retained jurisdiction over artificial recharge of an individual Denver Basin Aquifer within a CEP shall commence upon entry of this Decree and shall extend for a period of five (5) years after the Applicant provides written notice to all Opposers that it has artificially recharged more than 100 acre-feet of water annually pursuant to this decree in three (3) consecutive years in the individual Denver Basin Aquifer.

21.2. The Court permanently retains jurisdiction to resolve any dispute regarding the permitting of any new well that extracts injected water pursuant to paragraph 5.3.

21.3. Any person, within such period, may petition the Court to invoke its retained jurisdiction, by filing a verified petition with the Court setting forth the factual and legal basis for the relief requested in the petition, together with proposed decretal language to effect the petition. The party filing the petition shall have the burden of proof of going forward to establish the facts alleged in the petition. If the Court finds those facts are established, Applicant shall thereupon have the burden of proof to show: (1) that the petitioner is not injured, or (2) that any modification sought by the petitioner is not required to avoid injury to the petitioner, or (3) that any term or condition proposed by Applicant in response to the petition does avoid injury to the petitioner. If no such petition is filed within such period and the retained jurisdiction period is not extended by the Court in accordance with the provisions of the 1969 Act, this matter shall become final under its own terms.

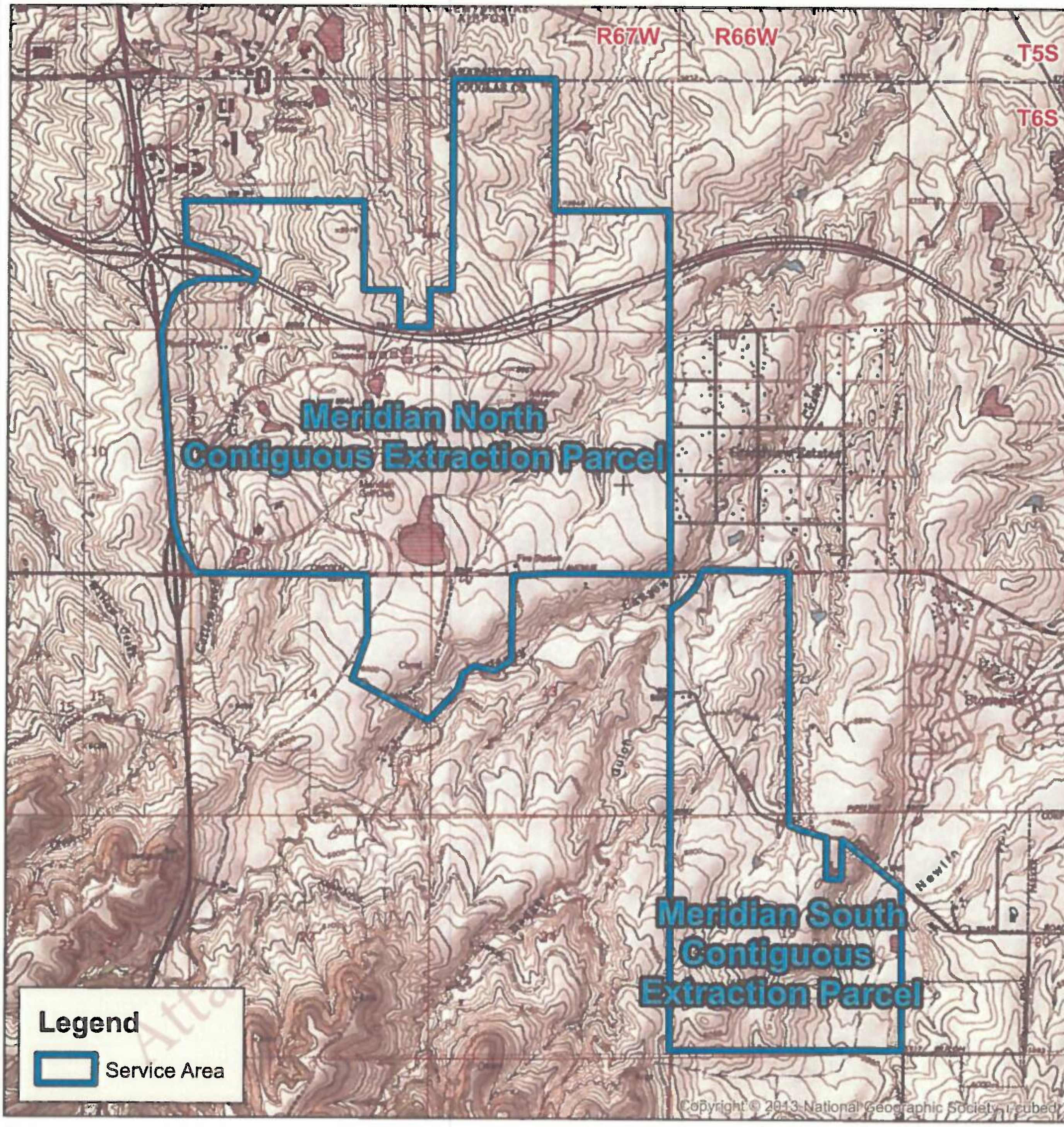
A copy of this Decree shall be filed with the Water Clerk for Water Division No. 1, and the Decree shall become effective upon filing. Copies shall also be filed with the State Engineer and the Division Engineer for Water Division No. 1.

Dated this 5th day of December, 2016.

BY THE COURT:

James Hartmann

James F. Hartman, Water Judge
Water Division No. 1



Sources:
USGS 7.5' Topographc Maps: Parker, CO
and Highlands Ranch, CO 1980 PR

Projection:
UTM NAD83

Job No. 109.1
Prepared By: KCD 10/30/2013
Checked By: JLJ 10/30/2013

1 inch = 3,000 feet

0 3,000 6,000 Feet

N
W E
S

Jehn Water Consultants, Inc.
1565 Gilpin Street
Denver, CO 80218
(303) 321-8335
(303) 321-8346 fax
www.jehnwater.com

Meridian Metropolitan District
Service Area and Contiguous Extraction Parcels

Exhibit 1

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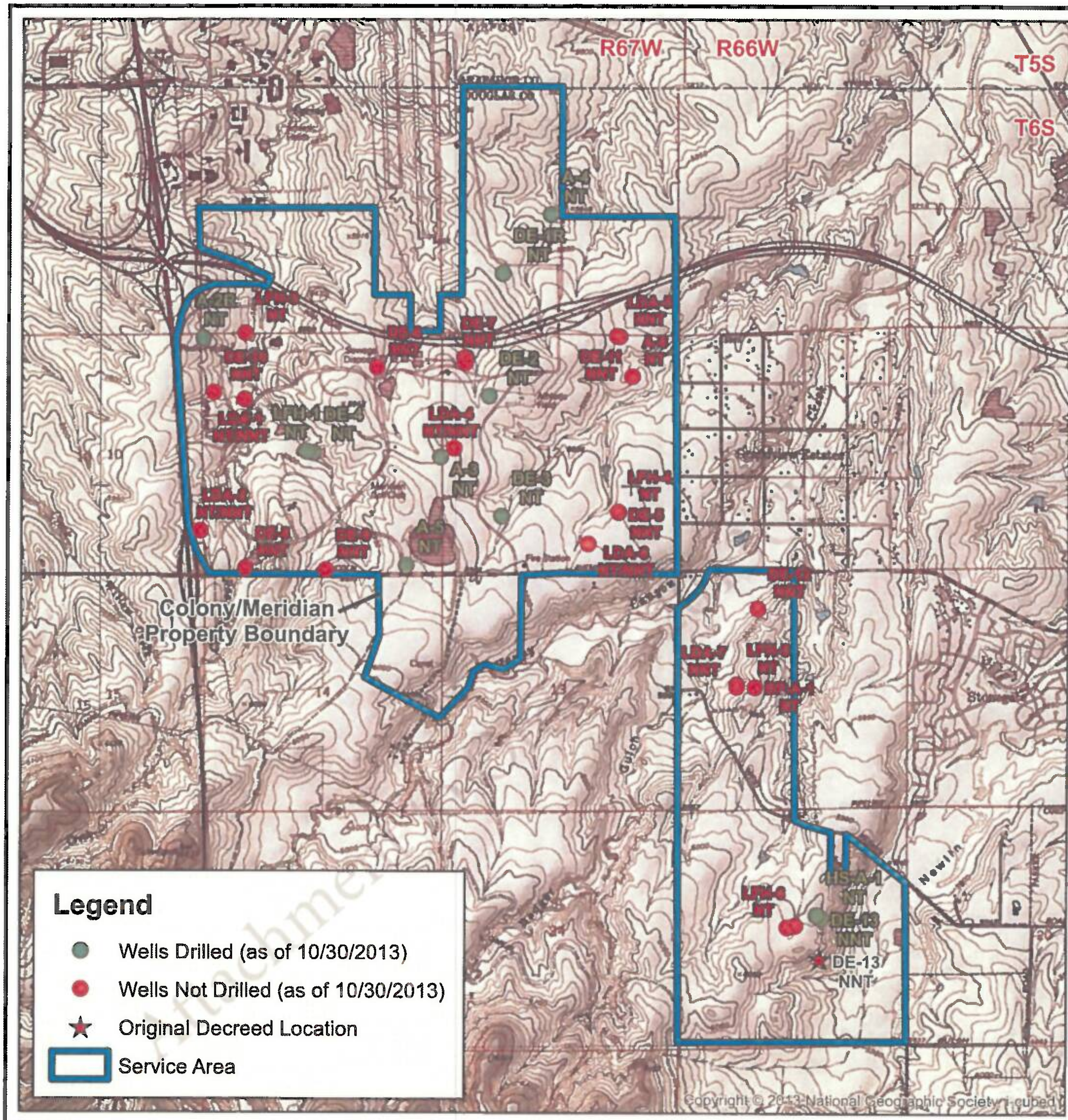

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USGS 7.5' Topographc Maps: Parker, CO
and Highlands Ranch, CO 1980 PR.

Projection:
UTM NAD83

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Prepared By: KCD 10/30/2013
Checked By: JLJ 10/30/2013

1 inch = 3,000 feet

0 3,000 6,000 Feet

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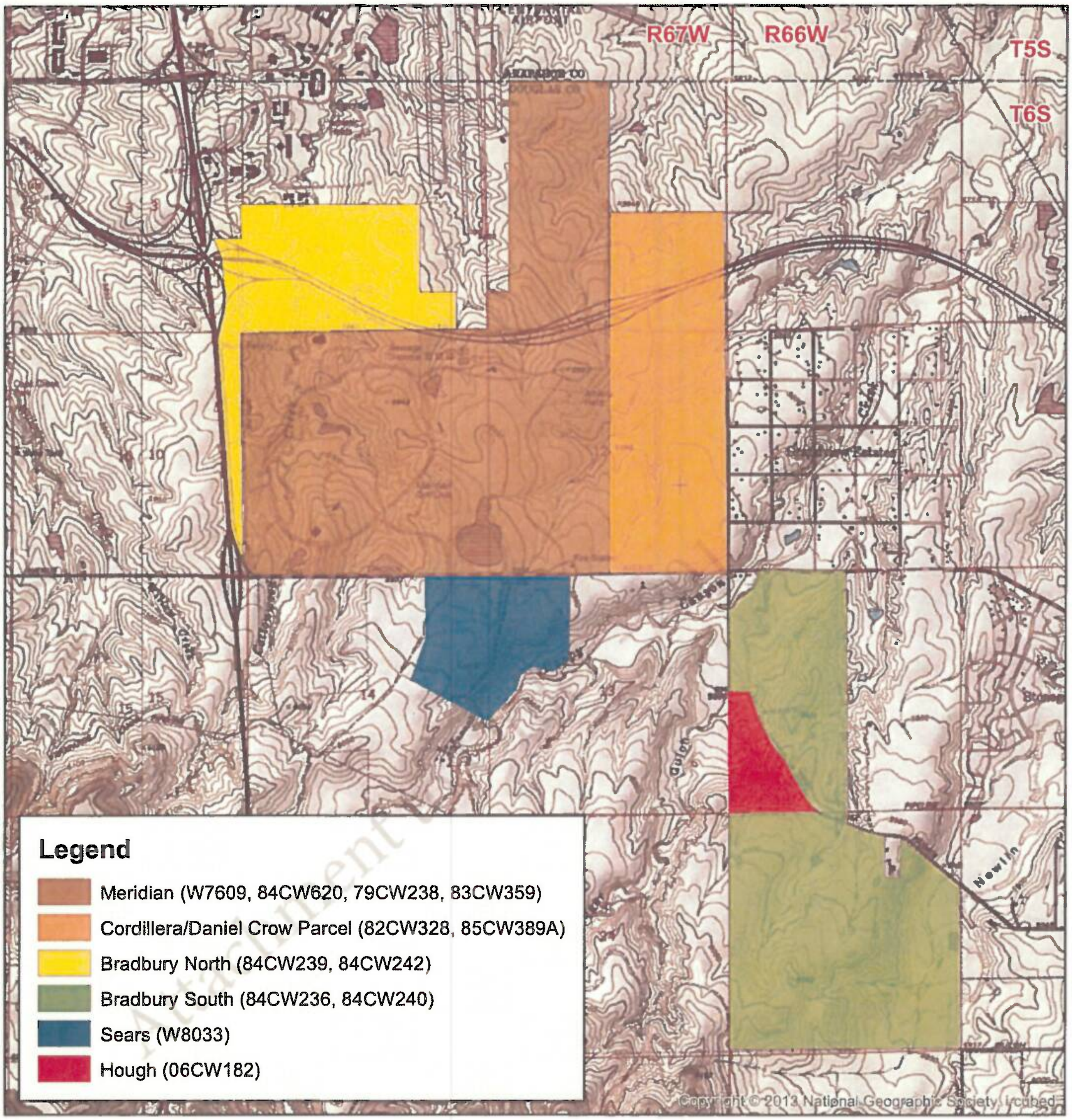
Meridian Metropolitan District Decreed Well Sites

Exhibit 2

P:\Meridian\GIS\KCDMXD\InjectionAppEx2.mxd



Sources:
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and Highlands Ranch, CO 1980 PR

Projection:
UTM NAD83

Job No. 109.1
Prepared By: KCD 10/31/2013
Checked By: JLJ 10/31/2013

1 inch = 3,000 feet

0 3,000 6,000 Feet

N W E S

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(303) 321-8335
(303) 321-8346 fax
www.jehnwater.com

Meridian Metropolitan District Water Rights Parcels

Exhibit 3

P:\Meridian\GIS\KCDMXD\InjectionAppEx3.mxd

INDUCTION
GUARD LOG
GAMMA RAY

OENIX SURVEYS, INC.

Company	Layne Western
Well	Meridian A-1R
Field	Permit #056744-F
County	Douglas
State	Colorado

Well
Field
County
State/Prv

Location
2780' FNL & 2470' FWL
NE SW
Sec - 1, Twp - 6S, Rge - 67W

Other Services
CDL/CNL/ML

Elevation
K B 5849
D F 5848
G L 5840

nanent Datum		Elevation 5840
Measured From	GL	
ng Measured From	GL	

e	November 18, 2001
Number	1
th Driller	1811
th Logger	1806
tom Logged Interval	1806
Log Interval	Casing
ing Driller	10
ing Logger	40
Size	20"
e Fluid in Hole	Chem Gel
sity / Viscosity	9 1 / 31
/ Fluid Loss	7 5 / 10 0
rce of Sample	
@ Meas Temp	
f @ Meas Temp	
@ Meas Temp	
e of Rmf / Rmc	
e Circulation Stopped	
e Logger Bottom	
mum Recorded Temperature	
ment Number	
essed By	[illegible] Edwards

Fold Here

All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions set out in our current Price Schedule.

Comments

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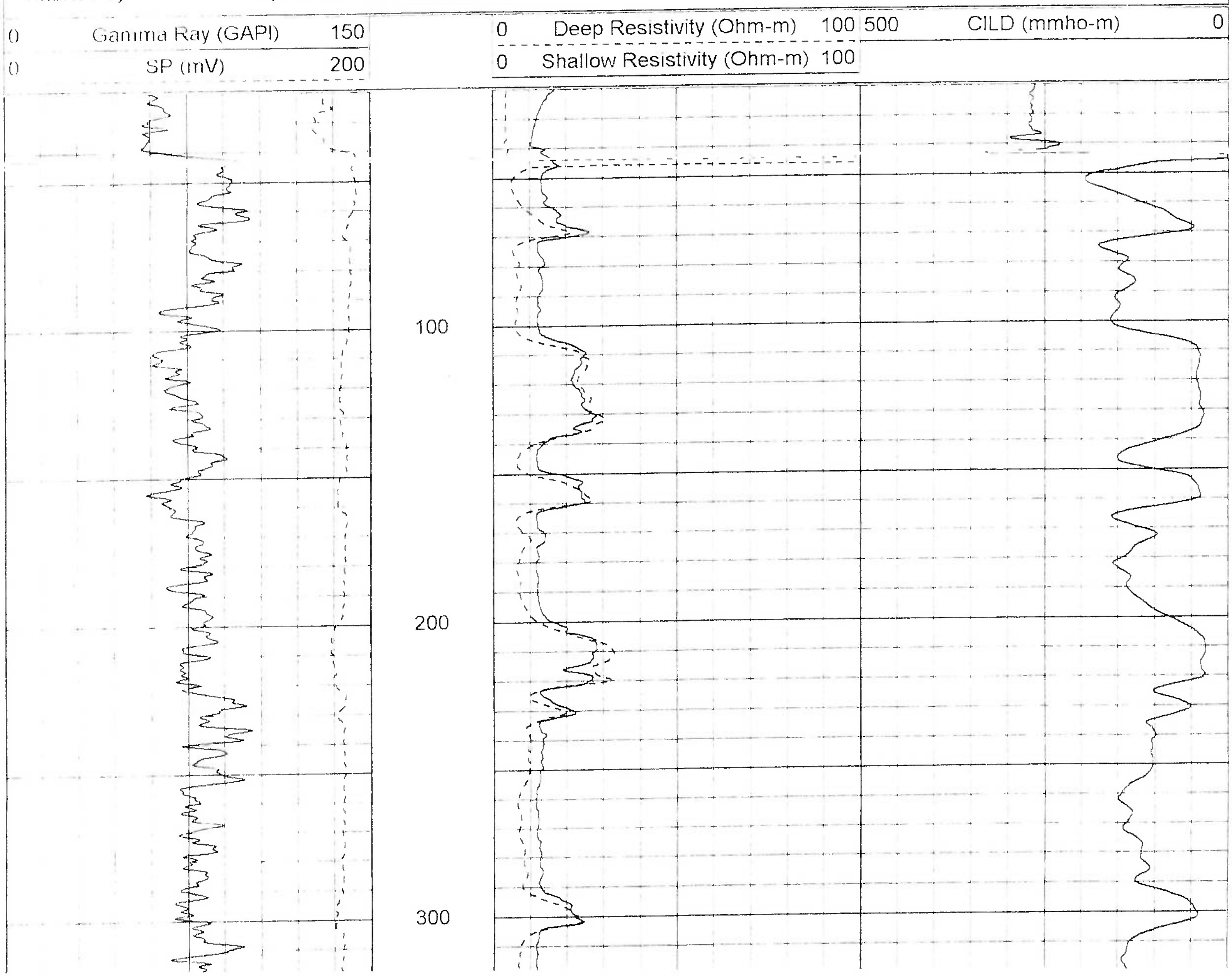

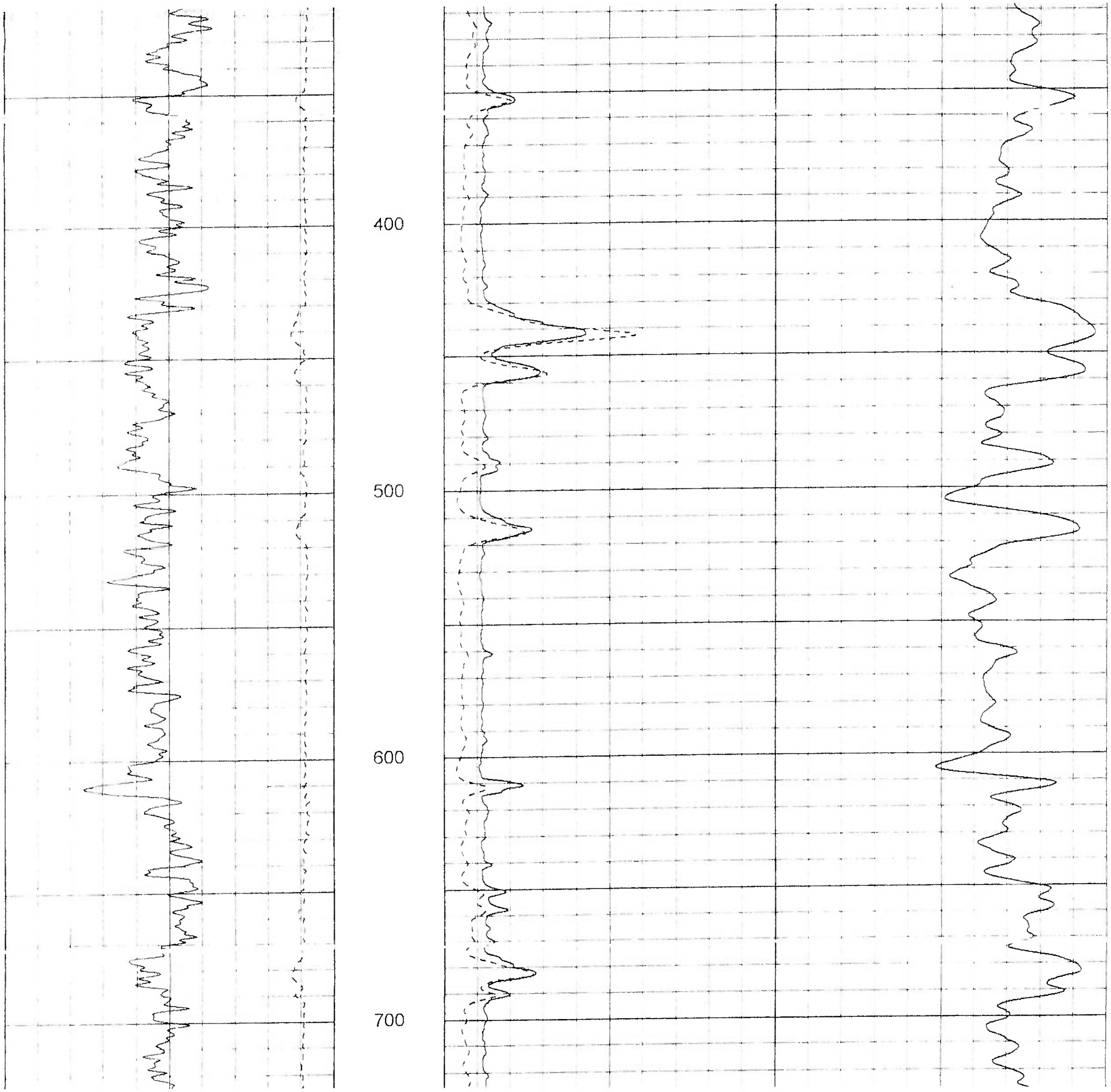
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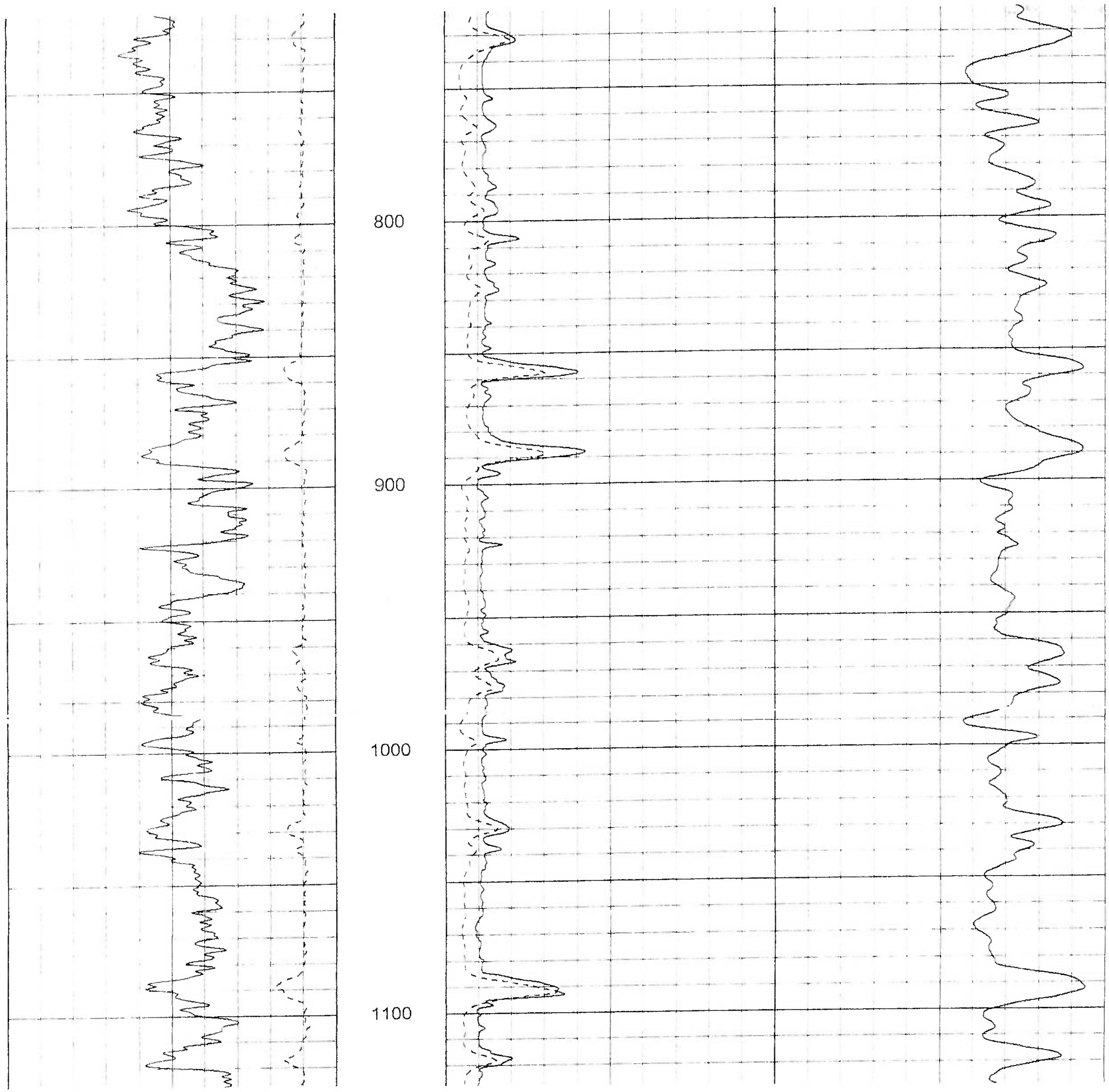
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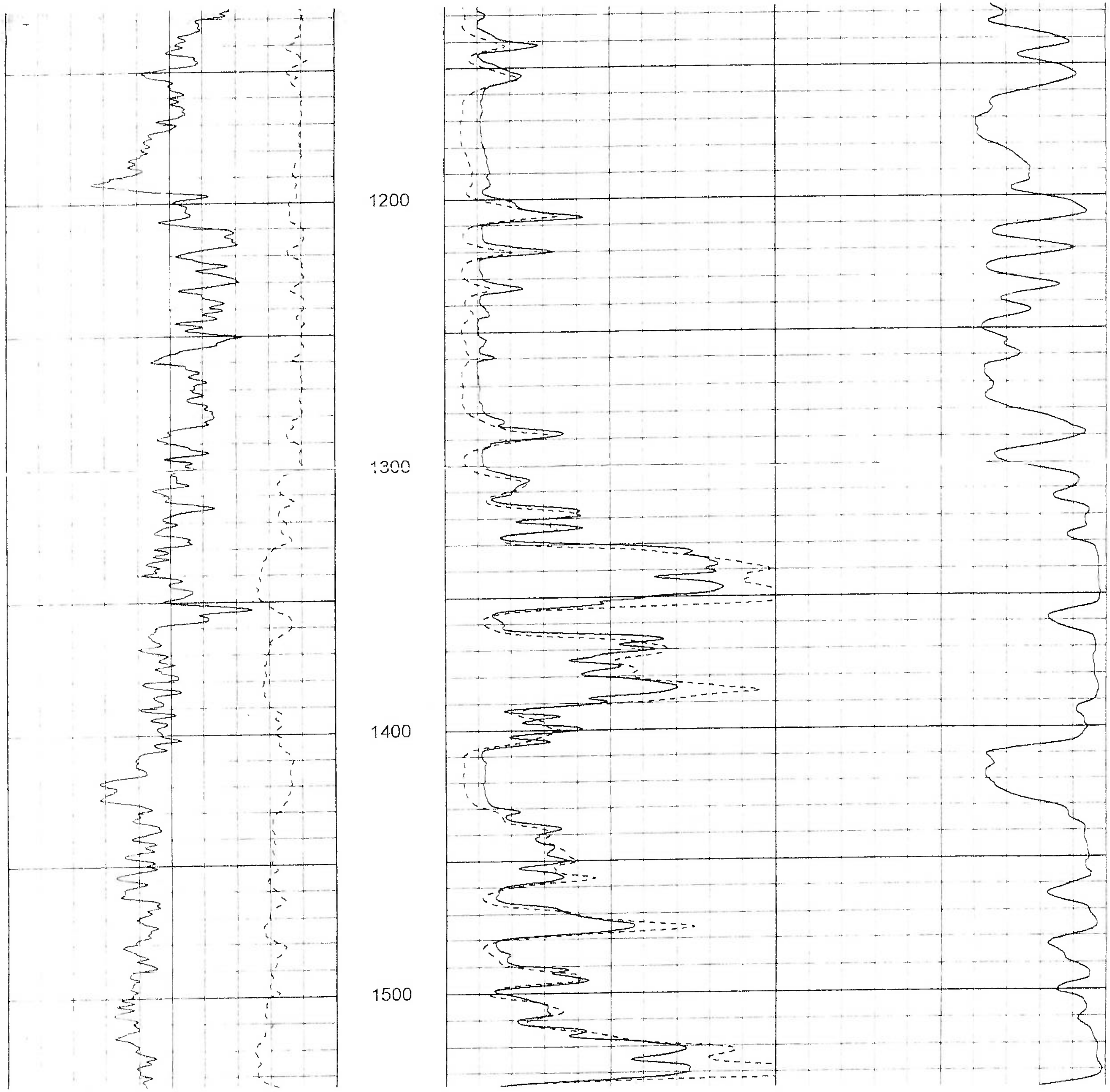
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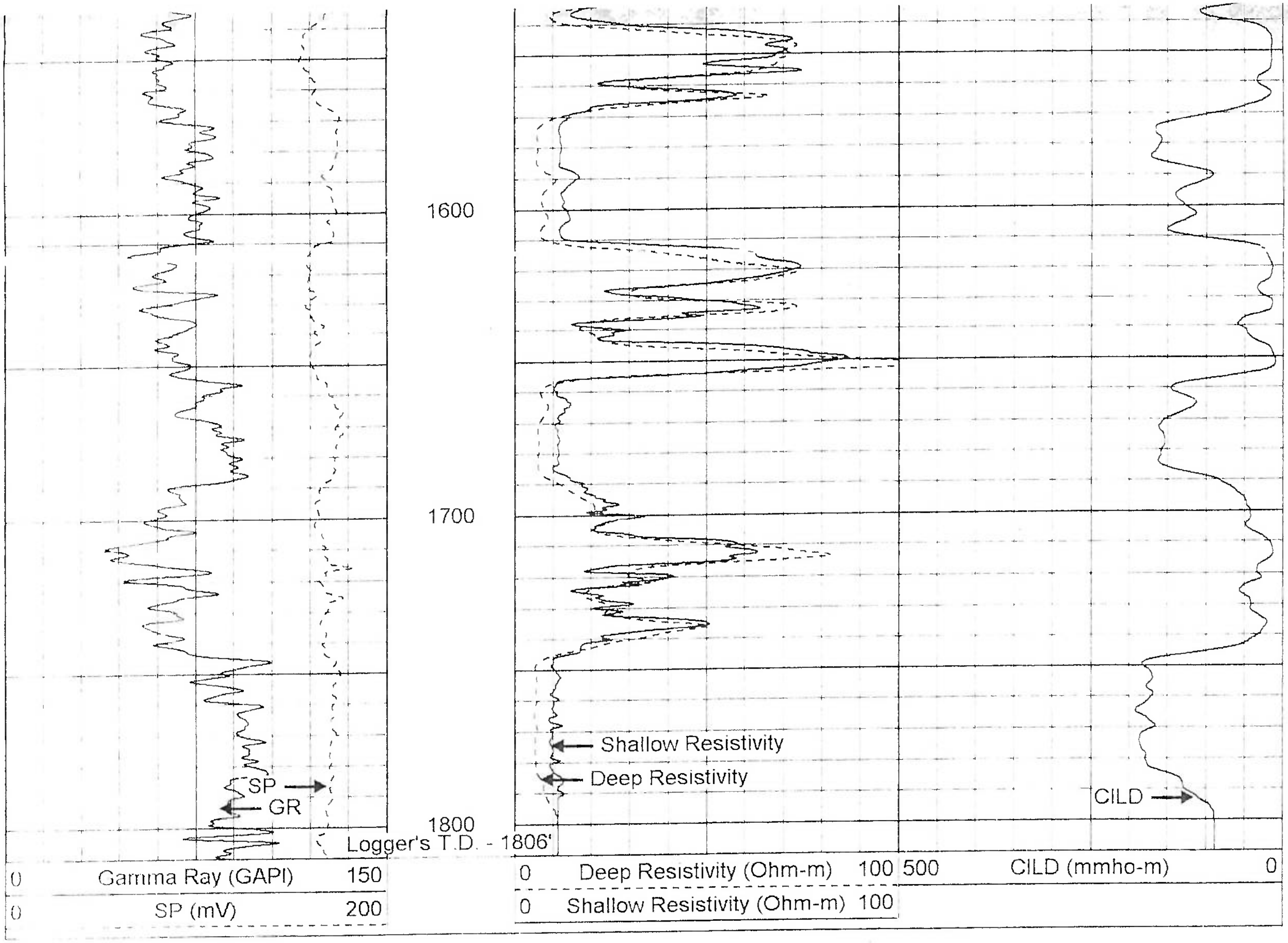
1300
1400
1500



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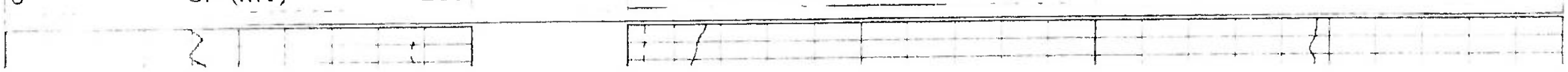
0	Gamma Ray (GAPI)	150	0	Deep Resistivity (Ohm-m)	100	500 CILD (mmho-m)	0
0	SP (mV)	200	0	Shallow Resistivity (Ohm-m)	100		



CUSTOMER		Meridian		Job No.			Install Date	6/25/2009
	Well No	A-4	Data By	Jeremy	Start witness	Josh/Jeremy/ Geo	Start up Date	10/20/2009
Site								
	Well TD	1781'	Casing ID	12"	Casing Mat		Reduct. Elev	
	Reduct. ID	NO	Building	NO	STATIC W.L.	1208'	5/6/2009	
Pipe								
	Pitless Mfg	Baski	Model	spool	S/N or Model#		Pull pipe thrd.	7" 8rd
	Pitless Depth	9'	Joint length	Range 3	Drop pipe OD	5 1/2" 8rd	API/ASTM	J 55
	Wt/Ft	15.50#	Pipe tally	1601'	Check Dia.	5 1/2"	Check Thrd.	8rd
	Check Depths	1571' & 1532'	Drain KO	Yes	Pup pipe Thrd.	5 1/2" 8rd	TOTALTALLY	1682'
Cable								
	AWG	#1 5KV	CODE	Round Armour	Cable Cond.	New	Ground Cable	#4 separate
	Airline Lgth	2 ea. 1613.95'	Airline Cond	New	PVC Dia.	1 1/2" & 1 1/4"	PVC Length	1613.95'
Pump								
	Type	Sub.	Pump Mfg	Reda	SERIES/MOD	862/738	Stages	24
	Design GPM	600	Design TDH	2190	Pump Cond.	New	Pump part #	1179282
	Disch Thrd/Dia	7" 8rd	Pump S/N	Note #1	TYPE	Note #2	HSG	24
	LENGTH	16.16'	Shaft Size	1.37 HS MON				
Motor								
	Type	Sub.	Mfg.	Reda	Mod.TYPE		VR HP	450
	RPM.	3500	Volts	1524	Phase	3	VR Amps	178
	SFA		PT#	100053927	Motor Cond.	New	LENGTH	35.75'
	Date Code		Motor S/N	1HB8F27052	SERIES	562	Resistance	0.23
	Stator Code		Winding code	F150	T Brg Type	HL		
	Shroud Lgth.	69.5'	Shroud OD	10 3/4"	Shroud ID	10 1/4"	Material	Steel
Seal								
	MFG	Reda	S/N	3TB8L48725	TYPE	Note #3	PART /N	100004238
	SHAFT SIZE	1.50/1.37 INC625	T BRG Type	NTB/HL	SERIES	738/562	LENGTH	11.93'
	Oil type	#5						
	NOTES:	#1= 2TB8L63581-Max Hp 988		#2= M520-A C-LT-ARZ-AFL-CS				
		#3= BPBSL 738/562 AFL-CS						

FLOW MTR								
	MFG	Neptune	MODEL		SIZE & ENDS	6" Flange	TOTAL GAL.	
	SERIAL NO							
POWER SUPPLY								
	PWR SERV CO	IREA	METER NO		KVA EA.		TRANS QTY	
	LINE VOLTAGE	480V						
	STEP TRANS MFG	South West	TRANS KVA	520	TRANS TYPE	Step Up		
	INPUT WYE/DELTA	480V	OUT WYE/DELT					
	TAP SETTINGS	sw1=3 sw2=C	SERFACE VOLTS	1650				
CONTROL								
	CONTROL MFG		NEMA CLASS		STARTER SIZE		Contact kit	
	STARTER MFG		STARTER MOD		HEATER SIZE		AMP RATING	
	BREAKER MFG		BREAKER MOD		BREAKER SIZE		FUSE SIZE	
	GROUNDING?		PROTECTION		OVERLOAD SET		UNDERLOAD SET	
	CT RATIO		RESTART TIME		ARRESTOR			
	NOTES							
ELECTRONICS								
	SOFT START MFG		SF MODEL		START TIME		CURRENT RANGE	
	CURRENT %		VOLTAGE LIMIT					
	VFD MFG	Toshiba	VFD MODEL	H-7	VFD KVA	518	MAX AMP	623
	VFD S/N	90104796	CRITICAL FREQ	None				
	MIN FRQ	45 HZ	MAX VOLT	460	RESTARTS	0		
	MAX FRQ	60 HZ/250hz	MIN VOLT	0				
	OVER CURRENT	593 Amps	RAMP UP TIME	25 seconds				
	Low current trip		RAMP DOWN	23 seconds				
	VFD NOTES	Rated capacity of motor						
		under voltage ridethrough/uv stall level						
	LEVEL SENS MFG	Dynotek	PTX	1730-9190	LENGTH	1700'	Extra	
	S/N	2440729	PSI rating	350 psi sg	VDC	30-Sep		
	PROBE ELEVATION	1613.95'	ON	not set yet	OFF	not set yet		

Pre-start Up

	@ Meg ohms	2000Meg ohms	@ VOLT	1000V				Motor HP	450
	L1	2000	L2	2000	L3	2000		Volt	1524
								Amps	178
	OHM L1-L2	0.8	OHM L1-L3	0.8	OHM L2-L3	0.8		Airline PSI	130
								RTM HRS.	
no load	VOLT L1-L2	488	L1-L3	484	L2-L3	491			
no load	VOLT L1	278	L2	281	L3	281			

PRESTART NOTES

START UP

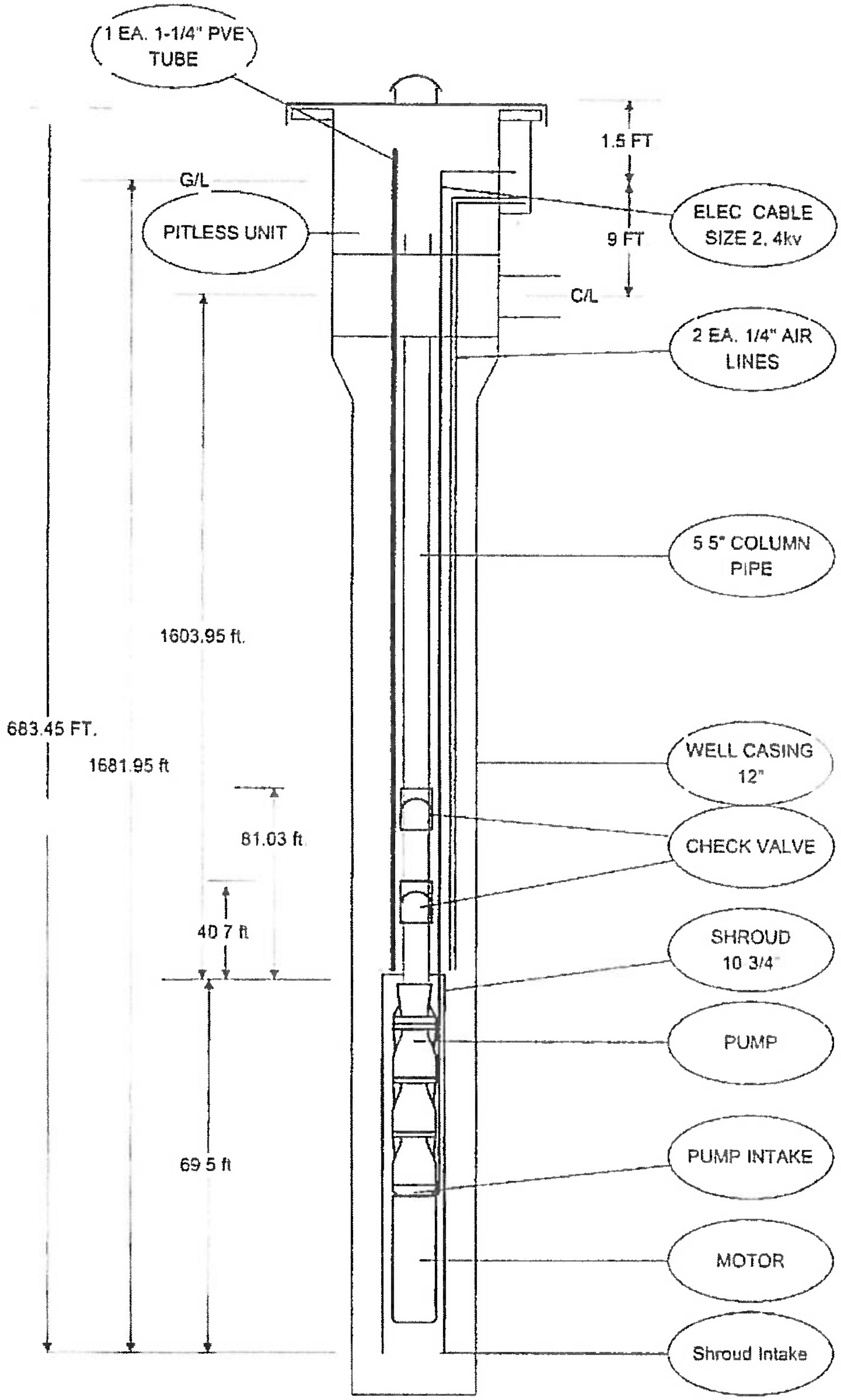
Time	Amps	HZ	VOLTS	GPM	AIRLINE PSI	SYSTEM PSI	SAND PPM	Dynotek
	Lvolts/Hvolts				130 at start			
11:41	/107	45			120			273'
11:47	452/106	48		420	117	90		
11:52	392/	45		350	116	90		
11:57	390/	45		350	116	90		
12:00	489/	50	384	480	115	110		264'
12:10	545/130	53	408	520	112	119		255'
	583/	55		570		124		
12:27	617/150	57		620	108	127		243'
12:54		55		585		124		

RUN AMPS A-B ______ A-C ______ B-C ______ HZ
RUN VOLT A-B ______ RV A-C ______ RV B-C ______ HZ

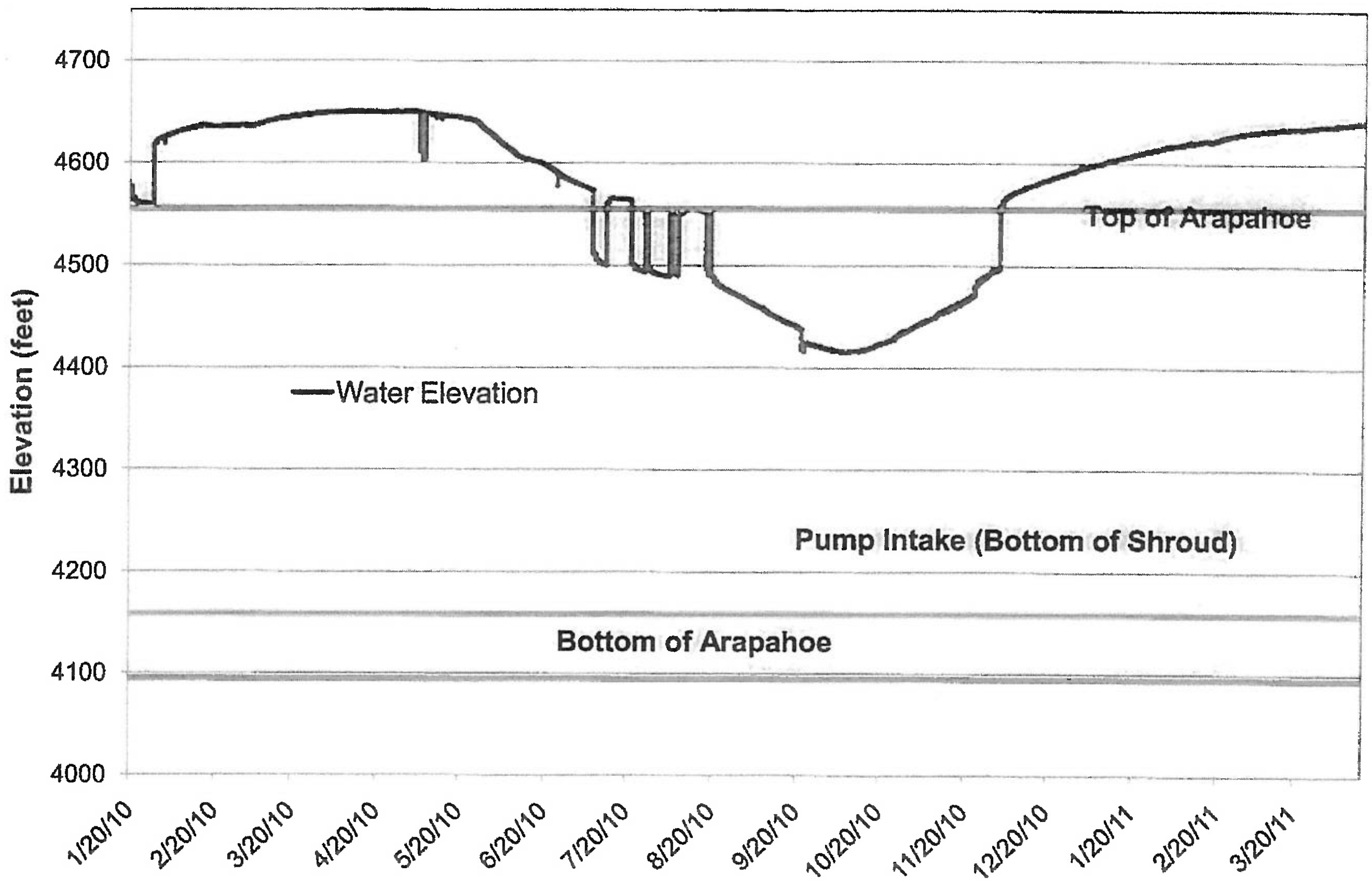
NOTES

Colorado Pump
Service & Supply Co
Castle Rock CO 303/ 688-6462

Meridian
Well A-4
10/20/09



Meridian Metropolitan District
Arapahoe Well A-4 Water Levels, Jan 2010 to April 13, 2011



HEMENWAY GROUNDWATER ENGINEERING, Inc.

TRANSMITTAL

TO: EPA Region 8
1595 Wynkoop Street
8P-W-GW
Denver, CO 80202-1129

FROM: Courtney Hemenway
Hemenway Groundwater
Engineering, Inc.
17011 Lincoln Avenue, PMB 416
Parker, CO 80134

ATTN: Linda Bowling

DATE: June 14, 2017

RE: Updated Baseline Water Quality Sampling for Injection Water for the Rule Authorization Request to EPA for Meridian Metropolitan District Wells A-4 & DE-1R

PROJECT NUMBER: CO-0002-16

WE ARE SENDING YOU:

♦ ATTACHED

UNDER SEPARATE COVER VIA

SHOP DRAWINGS

DOCUMENTS

TRACINGS

PRINTS

SPECIFICATIONS

CATALOGS

COPY OF LETTER

OTHER:

QUANTITY	DESCRIPTION
2	Updated Baseline Water Quality Summaries (Table 4-1) for Injection Water from Binney and Griswold WTP's for the Rule Authorization Request to EPA for Meridian Metropolitan District Wells A-4 & DE-1R
1	Updated Baseline Water Quality Summaries (Table 4-1) for Injection Water from South Metropolitan Water Supply Authority Quebec Street WTP for the Rule Authorization Request to EPA for Meridian Metropolitan District Wells A-4 & DE-1R
1	Updated Baseline Water Quality Summaries (Table 4-1) for Native Groundwater from Denver Well DE-1R for the Rule Authorization Request to EPA for Meridian Metropolitan District Wells A-4 & DE-1R
1	Updated Baseline Water Quality Summaries (Table 4-1) for Native Groundwater from Arapahoe Well A-4 for the Rule Authorization Request to EPA for Meridian Metropolitan District Wells A-4 & DE-1R

IF MATERIAL RECEIVED IS NOT AS LISTED, PLEASE NOTIFY US AT ONCE

REMARKS:

Please review the attached updated baseline injection water quality summary tables for the Rule Authorization for ASR operations in Meridian Denver Well DE-1R and Arapahoe Well A-4. An updated water quality summary table will be submitted for Aurora Wemlinger WTP once the plant is operational later this month.

COPY TO: Eric Hecox/Meridian Metropolitan District
Randy Gabriel/Meridian Metropolitan District

Hemenway Groundwater Engineering, Inc.
17011 Lincoln Avenue, PMB 416
Parker, CO 80134 **Voice: 303-805-1750** **FAX: 303-805-1850**

Table 4-1

Baseline Laboratory Water Quality Data for SMWSA WISE Water – Quebec Street WTP			
			Meridian Metropolitan Districts WISE Water Quebec Street WTP Baseline Water Quality Sample
Sample ID			QSWTP
Sample Date			April 24, 2017
Sample Time			9:34 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Total Metals (Inorganics) and Miscellaneous Parameters			
Alkalinity, Total	mg/l as CaCO3	NS	110
Aluminum	μg/l	200	<20
Ammonia Nitrogen	mg/l as N	0.01	NS
Antimony	μg/l	6	<1
Arsenic	μg/l	10	<1
Asbestos	MFL	7	<0.19
Barium	μg/l	2,000	120
Beryllium	μg/l	4	<1
Bicarbonate	mg/l as HCO3	NS	130
Carbonate	mg/l as CO3	NS	<2
Boron	mg/l	6	<0.05
Cadmium	μg/l	5	<0.5
Calcium	mg/l	NS	23
Chlorine Dioxide	mg/l	0.8	<0.24
Chloride	mg/l	250	3.4
Chlorite	mg/l	1.0	<0.01
Chromium	μg/l	100	<1
Copper	μg/l	1,300	<2.0
Cyanide	mg/l	0.2	<0.025
Cyanogen Chloride	mg/l	0.4	<0.035
Fluoride	mg/l	4.0 (2.0 Secondary MCL)	1.0
Free Chlorine	mg/l	4	0.16
Iron	mg/l	0.3	<0.02
Lead	μg/l	15	<0.5
Magnesium	mg/l	NS	1.9
Manganese	μg/l	300	<2
Mercury	μg/l	2	<0.2
Molybdenum	μg/l	40	<2
Nitrate	mg/l as N	10	<0.1
Nitrite	mg/l as N	1	<0.05[b]
Nickel	μg/l	100	<5
Laboratory pH	pH units	6.5 – 8.5	8.2
Potassium	mg/l	NS	3.3
Selenium	μg/l	50	<5
Silver	μg/l	100	<0.5
Sodium	mg/l	NS	27
Strontium	mg/l	4	0.40
Sulfate	mg/l	250	22
Thallium	μg/l	2	<1
Total Dissolved Solids	mg/l	500	180
Total Organic Carbon	mg/l	NS	<0.3
Uranium	μg/l	30	<1

Table 4-1

Baseline Laboratory Water Quality Data for SMWSA WISE Water – Quebec Street WTP			
			Meridian Metropolitan Districts WISE Water Quebec Street WTP Baseline Water Quality Sample
Sample ID			QSWTP
Sample Date			April 24, 2017
Sample Time			9:34 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Zinc	µg/l	2000	<20
Radio Chemistry			
Gross Alpha, Total	pCi/l	15	<3
Gross Beta, Total	pCi/l	50 pCi/l Trigger Level	4.3
Radium-226, Total	pCi/l	(5 for 226 + 228)	<1
Radium-228, Total	pCi/l	(5 for 226 + 228)	<1
Radon, Total	pCi/l	NS	
Organochlorine Pesticides/PCBs (EPA 505)			
Alachlor (Alanex)	µg/l	2	<0.1
Aldrin	µg/l	0.2	<0.01
Chlordane	µg/l	2	<0.1
Dieldrin	µg/l	0.2	<0.01
Endrin	µg/l	2	<0.01
Heptachlor	µg/l	0.4	<0.01
Heptachlor Epoxide	µg/l	0.2	<0.01
Lindane (gamma-BHC)	µg/l	0.2	<0.01
Methoxychlor	µg/l	40	<0.05
PCB 1016 Aroclor	µg/l	0.5	<0.08
PCB 1221 Aroclor	µg/l	0.5	<0.1
PCB 1232 Aroclor	µg/l	0.5	<0.1
PCB 1242 Aroclor	µg/l	0.5	<0.1
PCB 1248 Aroclor	µg/l	0.5	<0.1
PCB 1254 Aroclor	µg/l	0.5	<0.1
PCB 1260 Aroclor	µg/l	0.5	<0.1
Total PCBs	µg/l	0.5	<0.1
Toxaphene	µg/l	3	<0.5
Haloacetic Acids (SM 6251B)			
Dibromoacetic acid	µg/l	NS	<1
Dichloroacetic acid	µg/l	NS	<1
Monobromoacetic acid	µg/l	NS	<1
Monochloroacetic acid	µg/l	NS	<2
Total Haloacetic acids (HAA5)	µg/l	60	<2
Trichloroacetic acid	µg/l	NS	<1
EDB/DBCP/HAN (EPA 551.1)			
Dibromochloropropane (DBCP)	µg/l	NS	<0.01
Ethylene Dibromide (EDB)	µg/l	NS	<0.01
Base/Neutral/Acid Extractables (EPA 625)			

Table 4-1

Baseline Laboratory Water Quality Data for SMWSA WISE Water – Quebec Street WTP			
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Sample ID			QSWTP
Sample Date			April 24, 2017
Sample Time			9:34 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
1,2,4-Trichlorobenzene	µg/l	70	<5
1,2-Diphenyhydrazine	µg/l	NS	<10
2,4,5-Trichlorophenol	µg/l	NS	<5
2,4,6-Trichlorophenol	µg/l	2	<5
2,4-Dichlorophenol	µg/l	20	<5
2,4-Dimethylphenol	µg/l	NS	<5
2,4-Dinitrophenol	µg/l	NS	<50
2,4-Dinitrotoluene	µg/l	5	<5
2,6-Dinitrotoluene	µg/l	5	<5
2-Chloronapthalene	µg/l	NS	<5
2-Chlorophenol	µg/l	40	<5
2-Methylnaphtalene	µg/l	NS	<5
2-Methyphenol	µg/l	NS	<5
2-Nitroaniline	µg/l	NS	<10
2-Nitrophenol	µg/l	NS	<5
3,3-Dichlorobenzidine	µg/l	NS	<50
3-Nitroaniline	µg/l	NS	<20
4,6-Dintro-o-cresol	µg/l	NS	<50
4-Bromophenylphenylether	µg/l	NS	<5
4-Chloroaniline	µg/l	NS	<5
4-Chlorophenylphenylether	µg/l	NS	<5
4-Methylphenol	µg/l	NS	<5
4-Nitroaniline	µg/l	NS	<20
4-Nitrophenol	µg/l	60	<10
Acenaphthene	µg/l	400	<5
Acenaphtylene	µg/l	NS	<5
Aniline	µg/l	NS	<10
Anthracene	µg/l	2000	<5
Benzidine	µg/l	NS	<50
Benzo(a)anthracene	µg/l	NS	<5
Benzo(a)pyrene	µg/l	0.2	<5
Benzo(b)fluoranthene	µg/l	NS	<5
Benzo(g,h,i)perylene	µg/l	NS	<10
Benzo(k)fluoranthene	µg/l	NS	<5
Benzoic Acid	µg/l	NS	<50
Benzyl Alcohol	µg/l	NS	<5
bis(2-Chloroethoxy)methane	µg/l	NS	<10
bis(2-Chloroethyl)ether	µg/l	NS	<10
bis(2-Chloroisopropyl)ether	µg/l	NS	<10
Butylbenzylphthalate	µg/l	1000	<5
Chrysene	µg/l	NS	<5
Di(ethylhexyl)phthalate	µg/l	NS	<4
Dibenz(a,h)anthracene	µg/l	NS	<10

Table 4-1

Baseline Laboratory Water Quality Data for SMWSA WISE Water – Quebec Street WTP			
			Meridian Metropolitan Districts WISE Water Quebec Street WTP Baseline Water Quality Sample
Sample ID			QSWTP
Sample Date			April 24, 2017
Sample Time			9:34 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Dibenzofuran	µg/l	NS	<5
Diethylphthalate	µg/l	6000	<5
Dimethylphthalate	µg/l	NS	<5
Di-n-butylphthalate	µg/l	800	<10
Di-n-octylphthalate	µg/l	NS	<10
Fluoranthene	µg/l	NS	<5
Fluorene	µg/l	200	<5
Hexachlorobenzene	µg/l	1	<5
Hexachlorobutadiene	µg/l	2	<10
Hexachlorocyclopentadiene	µg/l	50	<10
Hexachloroethane	µg/l	1	<5
Indeno(1,2,3-c,d)pyrene	µg/l	NS	<10
Isophorone	µg/l	100	<5
Naphthalene	µg/l	100	<5
Nitrobenzene	µg/l	NS	<5
N-Nitroso-dimethylamine	µg/l	NS	<5
N-Nitrosodi-n-propylamine	µg/l	NS	<5
N-Nitrosodiphenylamine	µg/l	NS	<5
p-Chloro-m-cresol	µg/l	NS	<5
Pentachlorophenol	µg/l	1	<20
Phenanthrene	µg/l	NS	<5
Phenol	µg/l	2000	<5
Pyrene	µg/l	200	<5
Nitrosamines (EPA 521)			
N-Nitrosodibutylamine (NDBA)	ng/l	NS	<2
N-Nitrosodiethylamine (NDEA)	ng/l	NS	<2
N-Nitroso-dimethylamine (NDMA)	ng/l	NS	<2
N-Nitrosodi-n-propylamine (NDPA)	ng/l	NS	<2
N-Nitrosomethylethylamine (NMEA)	ng/l	NS	<2
N-Nitrosomorpholine	ng/l	NS	<2
N-Nitrosopiperidine (NPIP)	ng/l	NS	<2
N-Nitrosopyrollidine (NPYR)	ng/l	NS	<2
Aldicarbs (EPA 531.2)			
3-Hyroxycarbofuran	µg/l	NS	<0.5
Aldicarb (Temik)	µg/l	3	<0.5
Aldicarb sulfone	µg/l	2	<0.5
Aldicarb sulfoxide	µg/l	4	<0.5
Baygon	µg/l	NS	<0.5
Carbaryl	µg/l	NS	<0.5
Carbofuran (Furadan)	µg/l	NS	<0.5
Methiocarb	µg/l	NS	<0.5
Methomyl	µg/l	200	<0.5

Table 4-1

Baseline Laboratory Water Quality Data for SMWSA WISE Water – Quebec Street WTP			
			Meridian Metropolitan Districts WISE Water Quebec Street WTP Baseline Water Quality Sample
Sample ID			QSWTP
Sample Date			April 24, 2017
Sample Time			9:34 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Oxamyl (Vydate)	µg/l	7	<0.5
EPA 525.2 Extended List			
1,2,4,5-Tetrachlorobenzene	µg/l	NS	<0.5
1-Methylnaphthalene	µg/l	NS	<0.1
2,2,3,3,4,4,6-Heptachlorobiphenyl	µg/l	NS	<0.5
2,2,3,3,4,5,6,6-Octachlorobiphenyl	µg/l	NS	<0.5
2,2,3,4,6-Pentachlorobiphenyl	µg/l	NS	<0.5
2,2,4,4,5,6-Hexachlorobiphenyl	µg/l	NS	<0.1
2,2,4,4-Tetrachlorobiphenyl	µg/l	NS	<0.1
2,3-Dichlorobiphenyl	µg/l	NS	<0.1
2,4,5-Trichlorbiphenyl	µg/l	NS	<0.1
2,4-Dinitrotoluene	µg/l	5	<0.5
2,6-Dinitrotoluene	µg/l	5	<0.5
2-Chlorobiphenyl	µg/l	NS	<0.1
2-methylnaphthalene	µg/l	NS	<0.1
4,4-DDD	µg/l	NS	<0.1
4,4-DDE	µg/l	NS	<0.1
4,4-DDT	µg/l	NS	<0.1
Acenaphthene	µg/l	400	<0.1
acenapthylene	µg/l	NS	<0.1
Acetochlor	µg/l	NS	<0.1
Alachlor	µg/l	2	<0.1
Aldrin	µg/l	0.2	<0.1
Alpha-BHC	µg/l	NS	<0.1
Alpha-Chlordane	µg/l	2	<0.1
Ametryn	µg/l	NS	<0.1
Anilazine	µg/l	NS	<1
Anthracene	µg/l	2000	<0.1
Aspon	µg/l	NS	<0.1
Atrazine	µg/l	3	<0.1
Azinphos-ethyl	µg/l	NS	<0.5
Azinphos-methyl	µg/l	NS	<0.5
Bendiocarb	µg/l	NS	<0.5
Benfluralin	µg/l	NS	<0.1
Benzo(a)anthracene	µg/l	NS	<0.1
Benzo(a)pyrene	µg/l	0.2	<0.02
Benzo(b)fluoranthene	µg/l	NS	<0.1
Benzo(g,h,i)perylene	µg/l	NS	<0.1
Benzo(k)fluoranthene	µg/l	NS	<0.1
beta-BHC	µg/l	NS	<0.1
Bolstar	µg/l	NS	<0.1
Bromacil	µg/l	NS	<0.1

Table 4-1

Baseline Laboratory Water Quality Data for SMWSA WISE Water – Quebec Street WTP			
			Meridian Metropolitan Districts WISE Water Quebec Street WTP Baseline Water Quality Sample
Sample ID			QSWTP
Sample Date			April 24, 2017
Sample Time			9:34 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Butachlor	µg/l	NS	<0.1
Butylate	µg/l	NS	<0.1
Butylbenzylphthalate	µg/l	1000	<1
Carbophenothion	µg/l	NS	<0.5
Carboxin	µg/l	700	<0.1
Chlorfenvinphos	µg/l	NS	<5
Chlorbenzilate	µg/l	NS	<0.1
Chloroneb	µg/l	NS	<0.1
Chlorpropylate	µg/l	NS	<0.1
Chlorothalonil	µg/l	100	<0.1
Chlorpropham	µg/l	NS	<0.1
Chlorpyrifos	µg/l	NS	<0.1
Chlorpyifos methyl	µg/l	NS	<0.5
Chrysene	µg/l	NS	<0.1
cis-Noachlor	µg/l	NS	<0.1
cis-Permethrin	µg/l	NS	<0.1
Clomazone	µg/l	NS	<0.1
Clopyralid	µg/l	NS	<10
Coumaphos	µg/l	NS	<0.1
Crotoxyphos	µg/l	NS	<0.5
Cycloate	µg/l	NS	<0.1
DCPA	µg/l	70	<0.1
delta-BHC	µg/l	NS	<0.1
Demeton O	µg/l	NS	<0.5
Demeton S	µg/l	NS	<0.5
Desethylatrazine	µg/l	NS	<1
Desisopropylatrazine	µg/l	NS	<1
Di(2-ethylhexyl)adipate	µg/l	400	<0.6
Di(2-Ethylhexy)phthalate	µg/l	6	<0.6
Diazinon	µg/l	1	<0.1
Dibenzo(a,h)anthracene	µg/l	NS	<0.1
Dichlobenil	µg/l	NS	<0.1
Dichlofenthion	µg/l	NS	<0.1
Dichloran	µg/l	NS	<0.5
Dichlorvos	µg/l	NS	<0.1
Dicrotophos	µg/l	NS	<0.5
Dieldrin	µg/l	0.2	<0.1
Diethylphthalate	µg/l	6000	<1
Dimethoate	µg/l	NS	<0.5
Dimethylphthalate	µg/l	NS	<1
Di-n-butylphthalate	µg/l	800	<2
Di-n-octylphthalate	µg/l	NS	<2
Dioxathion	µg/l	NS	<0.5

Table 4-1

Baseline Laboratory Water Quality Data for SMWSA WISE Water – Quebec Street WTP			
			Meridian Metropolitan Districts WISE Water Quebec Street WTP Baseline Water Quality Sample
Sample ID			QSWTP
Sample Date			April 24, 2017
Sample Time			9:34 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Diphenamid	µg/l	200	<0.1
Disulfoton	µg/l	0.7	<0.1
Disulfoton Sulfone	µg/l	NS	<0.1
Disulfoton Sulfoxide	µg/l	NS	<10
Endosulfan I	µg/l	NS	<0.1
Endosulfan II	µg/l	NS	<0.1
Endosulfan Sulfate	µg/l	NS	<0.1
Endrin	µg/l	2	<0.0098
Endrin Aldehyde	µg/l	NS	<0.5
E-Phosphamidon	µg/l	NS	<0.5
EPN	µg/l	NS	<0.5
EPTC	µg/l	NS	<0.1
Erucylamide	µg/l	NS	<5
Esfenvalerate	µg/l	NS	<0.5
Ethalfluralin	µg/l	NS	<0.1
Ethion	µg/l	NS	<5
Ethofumesate	µg/l	NS	<0.5
Ethoprop	µg/l	NS	<0.1
Etridiazole	µg/l	NS	<0.1
Famphur	µg/l	NS	<0.1
Fenamiphos	µg/l	0.7	<0.1
Fenarimol	µg/l	NS	<1
Fenitrothion	µg/l	NS	<0.5
Fenoxaprop-ethyl	µg/l	NS	<1
Fensulfothion	µg/l	NS	<0.5
Fenthion	µg/l	NS	<0.1
Fluazifop-butyl	µg/l	NS	<0.1
Fluchloralin	µg/l	NS	<0.1
Fluometuron	µg/l	NS	<0.5
Fluoranthene	µg/l	NS	<0.1
Fluorene	µg/l	200	<0.1
Fluridone	µg/l	NS	<1
Fonofos	µg/l	NS	<0.1
Gamma-BHC	µg/l	0.2	<0.02
Gamma-Chlordane	µg/l	2	<0.1
Heptachlor	µg/l	0.4	<0.04
Heptachlor Epoxide	µg/l	0.2	<0.02
Hexachlorobenzene	µg/l	1	<0.1
Hexachlorocyclopentadiene	µg/l	50	<0.1
Hexazinone	µg/l	400	<0.1
Indeno(1,2,3,c,d)Pyrene	µg/l	NS	<0.1
Iprodione	µg/l	NS	<0.5
Isofenphos	µg/l	NS	<0.5

Table 4-1

Baseline Laboratory Water Quality Data for SMWSA WISE Water – Quebec Street WTP			
			Meridian Metropolitan Districts WISE Water Quebec Street WTP Baseline Water Quality Sample
Sample ID			QSWTP
Sample Date			April 24, 2017
Sample Time			9:34 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Isphorone	µg/l	NS	<0.1
Leptophos	µg/l	NS	<0.5
Malathion	µg/l	NS	<0.1
Metalaxyl	µg/l	NS	<0.5
Methoxychlor	µg/l	40	<0.1
Methyl paraoxon	µg/l	NS	<0.5
Methyl Parathion	µg/l	NS	<0.5
Metolachlor	µg/l	700	<0.1
Metribuzin	µg/l	70	<0.1
Metsulfuron-methyl	µg/l	NS	<10
Mevinphos	µg/l	NS	<0.1
MGK 264 isomer a	µg/l	NS	<0.1
MGK 264 isomer b	µg/l	NS	<0.1
MGK 326	µg/l	NS	<0.1
Mirex	µg/l	NS	<0.5
Molinate	µg/l	NS	<0.1
Monocrotophos	µg/l	NS	<0.5
Naled	µg/l	NS	<0.5
Naphthalene	µg/l	100	<0.1
Napropamide	µg/l	NS	<0.1
Norflurazon	µg/l	NS	<1
Oryzalin	µg/l	NS	<10
Oxadiazon	µg/l	NS	<0.1
Oxyxhlordane	µg/l	NS	<0.1
Oxyfluorfen	µg/l	NS	<0.5
Parathion	µg/l	NS	<0.5
Pebulate	µg/l	NS	<0.1
Pendimethalin	µg/l	NS	<0.1
Pentachlorobenzene	µg/l	NS	<0.5
Pentachloronitrobenzene	µg/l	NS	<0.5
Pentachlorophenol	µg/l	1	<1
Phenanthrene	µg/l	NS	<0.1
Phorate	µg/l	NS	<0.1
Phosmet	µg/l	NS	<0.5
Profluralin	µg/l	NS	<0.1
Prometryn	µg/l	NS	<0.1
Pronamide	µg/l	100	<0.1
Propachlor	µg/l	100	<0.1
Propanil	µg/l	NS	<0.5
Propazine	µg/l	10	<0.1
Propiconazole isomer a	µg/l	NS	<5
Propiconazole isomer	µg/l	NS	<5
Prothiofos	µg/l	NS	<0.5

Table 4-1			
Baseline Laboratory Water Quality Data for SMWSA WISE Water – Quebec Street WTP			
			Meridian Metropolitan Districts WISE Water Quebec Street WTP Baseline Water Quality Sample
Sample ID			**QSWTP**
Sample Date			**April 24, 2017**
Sample Time			**9:34 am**
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Pyrene	µg/l	200	<0.1
Simazine	µg/l	4	<0.07
Simetryn	µg/l	NS	<0.1
Stirofos	µg/l	NS	<0.1
Sulfotep	µg/l	NS	<0.5
Tebuthiuron	µg/l	500	<10
TEPP	µg/l	NS	<1
Terbacil	µg/l	90	<0.1
Terbufos	µg/l	0.4	<0.5
Terbutryn	µg/l	NS	<0.1
Thiabendazole	µg/l	NS	<10
Thiobencarb	µg/l	NS	<0.1
Thionazin	µg/l	NS	<0.5
trans-Nonachlor	µg/l	NS	<0.1
trans-Permethrin	µg/l	NS	<0.1
Triadimefon	µg/l	NS	<0.5
Tribufos	µg/l	NS	<0.1
Trichloronate	µg/l	NS	<0.5
Tricylazole	µg/l	NS	<1
Trifluralin	µg/l	10	<0.1
Vernolate	µg/l	NS	<0.1
Vinclozolin	µg/l	NS	<0.5
Z-Phosphamidon	µg/l	NS	<0.5
Volatile Organics (EPA 524.2)			
1,1,1,2-Tetrachloroethane	µg/l	70	<0.5
1,1,1-Trichloroethane	µg/l	200	<0.5
1,1,2,2-Tetrachloroethane	µg/l	40	<0.5
1,1,2-Trichloroethane	µg/l	5	<0.5
1,1-Dichloroethane	µg/l	NS	<0.5
1,1-Dichloroethylene	µg/l	7	<0.5
1,1-Dichloropropene	µg/l	NS	<0.5
1,2,3-Trichlorobenzene	µg/l	NS	<0.5
1,2,3-Trichloropropane	µg/l	20	<0.5
1,2,4-Trichlorobenzene	µg/l	70	<0.5
1,2,4-Trimethylbenzene	µg/l	NS	<0.5
1,2-Dichloroethane	µg/l	5	<0.5
1,2-Dichloropropane	µg/l	5	<0.5
1,3,5-Trimethylbenzene	µg/l	NS	<0.5
1,3-Dichloropropane	µg/l	NS	<0.5
2,2-Dichloropropane	µg/l	NS	<0.5
2-Butanone (MEK)	µg/l	4000	<5
2-Hexanone	µg/l	NS	<10

Table 4-1

Baseline Laboratory Water Quality Data for SMWSA WISE Water – Quebec Street WTP			
			Meridian Metropolitan Districts WISE Water Quebec Street WTP Baseline Water Quality Sample
Sample ID			QSWTP
Sample Date			April 24, 2017
Sample Time			9:34 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
4-Methyl-2-Pentanone (MIBK)	µg/l	NS	<5
Acetone	µg/l	6000	<10
Benzene	µg/l	5	<0.5
Bromobenzene	µg/l	60	<0.5
Bromochloromethane	µg/l	90	<0.5
Bromodichloromethane	µg/l	20	<0.5
Bromoethane	µg/l	10	<0.5
Bromoform	µg/l	200	<0.5
Bromomethane (Methyl Bromide)	µg/l	NS	<0.5
Carbon disulfide	µg/l	NS	<0.5
Carbon Tetrachloride	µg/l	5	<0.5
Chlorobenzene	µg/l	100	<0.5
Chlorodibromomethane	µg/l	60	5.0
Chloroethane	µg/l	NS	<0.5
Chloroform (Trichloromethane)	µg/l	70	<0.5
Chloromethane (Methyl Chloride)	µg/l	400	<0.5
cis-1,2-Dichloroethylene	µg/l	70	<0.5
cis-1,3-Dichloropropene	µg/l	NS	<0.5
Dibromomethane	µg/l	NS	<0.5
Dichlorodifluoromethane	µg/l	1000	<0.5
Dichloromethane	µg/l	5	<0.5
Di-isopropyl ether	µg/l	NS	<3
Ethyl benzene	µg/l	700	<0.5
Hexachlorobutadiene	µg/l	2	<0.5
Isopropylbenzene	µg/l	800	<0.5
m,p-Xylenes	µg/l	10,000 (Total Xylenes)	<0.5
m-Dichlorobenzene (1,3-DCB)	µg/l	600	<0.5
Methyl Tert-butyl ether (MTBE)	µg/l	NS	<0.5
Naphthalene	µg/l	100	<0.5
n-Butylbenzene	µg/l	NS	<0.5
n-Propylbenzene	µg/l	NS	<0.5
o-Chlorotoluene	µg/l	100	<0.5
o-Dichlorobenzene (1,2-DCB)	µg/l	600	<0.5
o-Xylene	µg/l	10,000 (Total Xylenes)	<0.5
p-Chlorotoluene	µg/l	100	<0.5
p-Dichlorobenzene (1,4-DCB)	µg/l	75	<0.5
p-Isopropyltoluene	µg/l	NS	<0.5
sec-Butylbenzene	µg/l	NS	<0.5
Styrene	µg/l	100	<0.5
tert-amyl Methyl Ether	µg/l	NS	<3
tert-Butyl Ethyl Ether	µg/l	NS	<3
tert-Butylbenzene	µg/l	NS	<0.5
Tetrachloroethylene (PCE)	µg/l	5	<0.5

Table 4-1

Baseline Laboratory Water Quality Data for SMWSA WISE Water – Quebec Street WTP			
			Meridian Metropolitan Districts WISE Water Quebec Street WTP Baseline Water Quality Sample
Sample ID			QSWTP
Sample Date			April 24, 2017
Sample Time			9:34 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Toluene	µg/l	1000	<0.5
Total 1,3-Dichloropropene	µg/l	NS	<0.5
Total THM	µg/l	80	<0.5
Total xylenes	µg/l	10000	<0.5
trans 1,2-Dichloroethylene	µg/l	100	<0.5
trans 1,3-Dichloropropene	µg/l	NS	<0.5
Trichloroethylene (TCE)	µg/l	5	<0.5
Trichlorofluoromethane	µg/l	2000	<0.5
Trichlorotrifluoroethane (Freon 113)	µg/l	NS	<0.5
Vinyl chloride (VC)	µg/l	2	<0.3
Acrolein/Acrylonitrile (EPA 624)			
Acrolein	µg/l	NS	<2
Acrylonitrile	µg/l	6	<2

[a]Standards are based on Colorado Department of Public Health and Environment, Water Quality Control Division Drinking Water Standards dated January 19, 2005, U.S. EPA National Safe Drinking Water Standards, and U.S. EPA Region 8 Baseline Water Sampling Criteria

Notes:
NS = No Standard Available
ml = milliliter
mg/l = milligrams per liter or parts per million (ppm)
pCi/l = picocuries per liter
NA = No Analysis
CaCO3 = Calcium carbonate
ug/l = micrograms per liter or parts per billion (ppb)

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Griswold WTP			
			Meridian Metropolitan Districts WISE Water Griswold WTP Baseline Water Quality Sample
Sample ID			Griswold
Sample Date			September 20, 2016
Sample Time			8:55 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Total Metals (Inorganics) and Miscellaneous Parameters			
Alkalinity, Total	mg/l as CaCO3	NS	76
Aluminum	μg/l	200	66
Ammonia Nitrogen	mg/l as N	0.01	0.32[b]
Antimony	μg/l	6	<1
Arsenic	μg/l	10	<1
Asbestos	MFL	7	<0.2[b]
Barium	μg/l	2,000	50
Beryllium	μg/l	4	<1
Bicarbonate	mg/l as CaCO3	NS	92
Carbonate	mg/l as CO3	NS	<2
Boron	mg/l	6	<0.05
Cadmium	μg/l	5	<0.5
Calcium	mg/l	NS	45
Chlorine Dioxide	mg/l	0.8	<0.24
Chloride	mg/l	250	43
Chlorite	mg/l	1.0	0.50
Chromium	μg/l	100	<1
Copper	μg/l	1,300	<2.0
Cyanide	mg/l	0.2	<0.025[b]
Cyanogen Chloride	mg/l	0.4	<0.35
Fluoride	mg/l	4.0 (2.0 Secondary MCL)	0.87[b]
Free Chlorine	mg/l	4	0.22
Iron	mg/l	0.3	<0.02
Lead	μg/l	15	<0.5
Magnesium	mg/l	NS	9.3
Manganese	μg/l	300	<2
Mercury	μg/l	2	<0.2
Molybdenum	μg/l	40	7.5
Nitrate	mg/l as N	10	0.31[b]
Nitrite	mg/l as N	1	<0.05[b]
Nickel	μg/l	100	<5
Laboratory pH	pH units	6.5 – 8.5	8.2
Potassium	mg/l	NS	2.8
Selenium	μg/l	50	<5
Silver	μg/l	100	0.92
Sodium	mg/l	NS	31
Strontium	mg/l	4	0.33
Sulfate	mg/l	250	56
Thallium	μg/l	2	<1
Total Dissolved Solids	mg/l	500	287
Total Organic Carbon	mg/l	NS	2.42
Uranium	μg/l	30	4.1

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Griswold WTP			
			Meridian Metropolitan Districts WISE Water Griswold WTP Baseline Water Quality Sample
Sample ID			Griswold
Sample Date			September 20, 2016
Sample Time			8:55 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Zinc	µg/l	2000	<20
Radio Chemistry			
Gross Alpha, Total	pCi/l	15	<3
Gross Beta, Total	pCi/l	50 pCi/l Trigger Level	<3
Radium-226, Total	pCi/l	(5 for 226 + 228)	<1
Radium-228, Total	pCi/l	(5 for 226 + 228)	<1
Radon, Total	pCi/l	NS	
Organochlorine Pesticides/PCBs (EPA 505)			
Alachlor (Alanex)	µg/l	2	<0.1
Aldrin	µg/l	0.2	<0.01
Chlordane	µg/l	2	<0.1
Dieldrin	µg/l	0.2	<0.01
Endrin	µg/l	2	<0.01
Heptachlor	µg/l	0.4	<0.01
Heptachlor Epoxide	µg/l	0.2	<0.01
Lindane (gamma-BHC)	µg/l	0.2	<0.01
Methoxychlor	µg/l	40	<0.05
PCB 1016 Aroclor	µg/l	0.5	<0.08
PCB 1221 Aroclor	µg/l	0.5	<0.1
PCB 1232 Aroclor	µg/l	0.5	<0.1
PCB 1242 Aroclor	µg/l	0.5	<0.1
PCB 1248 Aroclor	µg/l	0.5	<0.1
PCB 1254 Aroclor	µg/l	0.5	<0.1
PCB 1260 Aroclor	µg/l	0.5	<0.1
Total PCBs	µg/l	0.5	<0.1
Toxaphene	µg/l	3	<0.5
Haloacetic Acids (SM 6251B)			
Dibromoacetic acid	µg/l	NS	2.8
Dichloroacetic acid	µg/l	NS	6.4
Monobromoacetic acid	µg/l	NS	<1
Monochloroacetic acid	µg/l	NS	<2
Total Haloacetic acids (HAA5)	µg/l	60	15
Trichloroacetic acid	µg/l	NS	5.4
EDB/DBCP/HAN (EPA 551.1)			
Dibromochloropropane (DBCP)	µg/l	NS	<0.01
Ethylene Dibromide (EDB)	µg/l	NS	<0.01
Base/Neutral/Acid Extractables (EPA 625)			

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Griswold WTP			
			Meridian Metropolitan Districts WISE Water Griswold WTP Baseline Water Quality Sample
Sample ID			Griswold
Sample Date			September 20, 2016
Sample Time			8:55 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
1,2,4-Trichlorobenzene	µg/l	70	<5
1,2-Diphenyhydrazine	µg/l	NS	<10
2,4,5-Trichlorophenol	µg/l	NS	<5
2,4,6-Trichlorophenol	µg/l	2	<5
2,4-Dichlorophenol	µg/l	20	<5
2,4-Dimethylphenol	µg/l	NS	<5
2,4-Dinitrophenol	µg/l	NS	<50
2,4-Dinitrotoluene	µg/l	5	<5
2,6-Dinitrotoluene	µg/l	5	<5
2-Chloronapthalene	µg/l	NS	<5
2-Chlorophenol	µg/l	40	<5
2-Methylnaphtalene	µg/l	NS	<5
2-Methyphenol	µg/l	NS	<5
2-Nitroaniline	µg/l	NS	<10
2-Nitrophenol	µg/l	NS	<5
3,3-Dichlorobenzidine	µg/l	NS	<50
3-Nitroaniline	µg/l	NS	<20
4,6-Dintro-o-cresol	µg/l	NS	<50
4-Bromophenylphenylether	µg/l	NS	<5
4-Chloroaniline	µg/l	NS	<5
4-Chlorophenylphenylether	µg/l	NS	<5
4-Methylphenol	µg/l	NS	<5
4-Nitroaniline	µg/l	NS	<20
4-Nitrophenol	µg/l	60	<10
Acenaphthene	µg/l	400	<5
Acenaphtylene	µg/l	NS	<5
Aniline	µg/l	NS	<10
Anthracene	µg/l	2000	<5
Benzidine	µg/l	NS	<50
Benzo(a)anthracene	µg/l	NS	<5
Benzo(a)pyrene	µg/l	0.2	<5
Benzo(b)fluoranthene	µg/l	NS	<5
Benzo(g,h,i)perylene	µg/l	NS	<10
Benzo(k)fluoranthene	µg/l	NS	<5
Benzoic Acid	µg/l	NS	<50
Benzyl Alcohol	µg/l	NS	<5
bis(2-Chloroethoxy)methane	µg/l	NS	<10
bis(2-Chloroethyl)ether	µg/l	NS	<10
bis(2-Chloroisopropyl)ether	µg/l	NS	<10
Butylbenzylphthalate	µg/l	1000	<5
Chrysene	µg/l	NS	<5
Dibenz(a,h)anthracene	µg/l	NS	<10
Dibenzofuran	µg/l	NS	<5

Table 4-1			
Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Griswold WTP			
			Meridian Metropolitan Districts WISE Water Griswold WTP Baseline Water Quality Sample
Sample ID			**Griswold**
Sample Date			**September 20, 2016**
Sample Time			**8:55 am**
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Diethylphthalate	μg/l	6000	<5
Dimethylphthalate	μg/l	NS	<5
Di-n-butylphthalate	μg/l	800	<10
Di-n-octylphthalate	μg/l	NS	<10
Fluoranthene	μg/l	NS	<5
Fluorene	μg/l	200	<5
Hexachlorobenzene	μg/l	1	<5
Hexachlorobutadiene	μg/l	2	<10
Hexachlorocyclopentadiene	μg/l	50	<10
Hexachloroethane	μg/l	1	<5
Indeno(1,2,3-c,d)pyrene	μg/l	NS	<10
Isophorone	μg/l	100	<5
Naphthalene	μg/l	100	<5
Nitrobenzene	μg/l	NS	<5
N-Nitroso-dimethylamine	μg/l	NS	<5
N-Nitrosodi-n-propylamine	μg/l	NS	<5
N-Nitrosodiphenylamine	μg/l	NS	<5
p-Chloro-m-cresol	μg/l	NS	<5
Pentachlorophenol	μg/l	1	<20
Phenanthrene	μg/l	NS	<5
Phenol	μg/l	2000	<5
Pyrene	μg/l	200	<5
Nitrosamines (EPA 521)			
N-Nitrosodibutylamine (NDBA)	ng/l	NS	<2
N-Nitrosodiethylamine (NDEA)	ng/l	NS	<2
N-Nitroso-dimethylamine (NDMA)	ng/l	NS	3.2
N-Nitrosodi-n-propylamine (NDPA)	ng/l	NS	<2
N-Nitrosomethylethylamine (NMEA)	ng/l	NS	<2
N-Nitrosomorpholine	ng/l	NS	<2
N-Nitrosopiperidine (NPIP)	ng/l	NS	<2
N-Nitrosopyrollidine (NPYR)	ng/l	NS	<2
Aldicarbs (EPA 531.2)			
3-Hyroxycarbofuran	μg/l	NS	<0.5
Aldicarb (Temik)	μg/l	3	<0.5
Aldicarb sulfone	μg/l	2	<0.5
Aldicarb sulfoxide	μg/l	4	<0.5
Baygon	μg/l	NS	<0.5
Carbaryl	μg/l	NS	<0.5
Carbofuran (Furadan)	μg/l	NS	<0.5
Methiocarb	μg/l	NS	<0.5
Methomyl	μg/l	200	<0.5
Oxamyl (Vydate)	μg/l	7	<0.5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Griswold WTP			
			Meridian Metropolitan Districts WISE Water Griswold WTP Baseline Water Quality Sample
Sample ID			Griswold
Sample Date			September 20, 2016
Sample Time			8:55 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
EPA 525.2 Extended List			
1,2,4,5-Tetrachlorobenzene	µg/l	NS	<0.5
1-Methylnaphthalene	µg/l	NS	<0.1
2,2,3,3,4,4,6-Heptachlorobiphenyl	µg/l	NS	<0.5
2,2,3,3,4,5,6,6-Octachlorobiphenyl	µg/l	NS	<0.5
2,2,3,4,6-Pentachlorobiphenyl	µg/l	NS	<0.1
2,2,4,4,5,6-Hexachlorobiphenyl	µg/l	NS	<0.1
2,2,4,4-Tetrachlorobiphenyl	µg/l	NS	<0.1
2,3-Dichlorobiphenyl	µg/l	NS	<0.1
2,4,5-Trichlorbiphenyl	µg/l	NS	<0.1
2,4-Dinitrotoluene	µg/l	5	<0.5
2,6-Dinitrotoluene	µg/l	5	<0.5
2-Chlorobiphenyl	µg/l	NS	<0.1
2-methylnaphthalene	µg/l	NS	<0.1
4,4-DDD	µg/l	NS	<0.1
4,4-DDE	µg/l	NS	<0.1
4,4-DDT	µg/l	NS	<0.1
Acenaphthene	µg/l	400	<0.1
acenapthylene	µg/l	NS	<0.1
Acetochlor	µg/l	NS	<0.1
Alachlor	µg/l	2	<0.1
Aldrin	µg/l	0.2	<0.1
Alpha-BHC	µg/l	NS	<0.1
Alpha-Chlordane	µg/l	2	<0.1
Ametryn	µg/l	NS	<0.1
Anilazine	µg/l	NS	<1
Anthracene	µg/l	2000	<0.1
Aspon	µg/l	NS	<0.1
Atrazine	µg/l	3	<0.1
Azinphos-ethyl	µg/l	NS	<0.5
Azinphos-methyl	µg/l	NS	<0.5
Bendiocarb	µg/l	NS	<0.5
Benfluralin	µg/l	NS	<0.1
Benzo(a)anthracene	µg/l	NS	<0.1
Benzo(a)pyrene	µg/l	0.2	<0.02
Benzo(b)fluoranthene	µg/l	NS	<0.1
Benzo(g,h,i)perylene	µg/l	NS	<0.1
Benzo(k)fluoranthene	µg/l	NS	<0.1
beta-BHC	µg/l	NS	<0.1
Bolstar	µg/l	NS	<0.1
Bromacil	µg/l	NS	<0.1
Butachlor	µg/l	NS	<0.1

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Griswold WTP			
			Meridian Metropolitan Districts WISE Water Griswold WTP Baseline Water Quality Sample
Sample ID			Griswold
Sample Date			September 20, 2016
Sample Time			8:55 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Butylate	μg/l	NS	<0.1
Butylbenzylphthalate	μg/l	1000	<1
Carbophenothion	μg/l	NS	<0.5
Carboxin	μg/l	700	<0.1
Chlorfenvinphos	μg/l	NS	<5
Chlorbenzilate	μg/l	NS	<0.1
Chloroneb	μg/l	NS	<0.1
Chlorpropylate	μg/l	NS	<0.1
Chlorothalonil	μg/l	100	<0.1
Chlorpropham	μg/l	NS	<0.1
Chlorpyrifos	μg/l	NS	<0.1
Chlorpyifos methyl	μg/l	NS	<0.5
Chrysene	μg/l	NS	<0.1
cis-Noachlor	μg/l	NS	<0.1
cis-Permethrin	μg/l	NS	<0.1
Clomazone	μg/l	NS	<0.1
Clopyralid	μg/l	NS	<10
Coumaphos	μg/l	NS	<0.1
Crotoxyphos	μg/l	NS	<0.5
Cycloate	μg/l	NS	<0.1
DCPA	μg/l	70	<0.1
delta-BHC	μg/l	NS	<0.1
Demeton O	μg/l	NS	<0.5
Demeton S	μg/l	NS	<0.5
Desethylatrazine	μg/l	NS	<1
Desisopropylatrazine	μg/l	NS	<1
Di(2-ethylhexyl)adipate	μg/l	400	<0.6
Di(2-Ethylhexy)phthalate	μg/l	6	<0.6
Diazinon	μg/l	1	<0.1
Dibenzo(a,h)anthracene	μg/l	NS	<0.1
Dichlobenil	μg/l	NS	<0.1
Dichlofenthion	μg/l	NS	<0.1
Dichloran	μg/l	NS	<0.5
Dichlorvos	μg/l	NS	<0.1
Dicrotophos	μg/l	NS	<0.5
Dieldrin	μg/l	0.2	<0.1
Diethylphthalate	μg/l	6000	<1
Dimethoate	μg/l	NS	<0.5
Dimethylphthalate	μg/l	NS	<1
Di-n-butylphthalate	μg/l	800	<2
Di-n-octylphthalate	μg/l	NS	<2
Dioxathion	μg/l	NS	<0.5
Diphenamid	μg/l	200	<0.1

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Griswold WTP			
			Meridian Metropolitan Districts WISE Water Griswold WTP Baseline Water Quality Sample
	Sample ID		Griswold
	Sample Date		September 20, 2016
	Sample Time		8:55 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Disulfoton	µg/l	0.7	<0.1
Disulfoton Sulfone	µg/l	NS	<0.1
Disulfoton Sulfoxide	µg/l	NS	<10
Endosulfan I	µg/l	NS	<0.1
Endosulfan II	µg/l	NS	<0.1
Endosulfan Sulfate	µg/l	NS	<0.1
Endrin	µg/l	2	<0.0099
Endrin Aldehyde	µg/l	NS	<0.5
E-Phosphamidon	µg/l	NS	<0.5
EPN	µg/l	NS	<0.5
EPTC	µg/l	NS	<0.1
Erucylamide	µg/l	NS	<5
Esfenvalerate	µg/l	NS	<0.5
Ethalfluralin	µg/l	NS	<0.1
Ethion	µg/l	NS	<5
Ethofumesate	µg/l	NS	<0.5
Ethoprop	µg/l	NS	<0.1
Etridiazole	µg/l	NS	<0.1
Famphur	µg/l	NS	<0.1
Fenamiphos	µg/l	0.7	<0.1
Fenarimol	µg/l	NS	<1
Fenitrothion	µg/l	NS	<0.5
Fenoxaprop-ethyl	µg/l	NS	<1
Fensulfothion	µg/l	NS	<0.5
Fenthion	µg/l	NS	<0.1
Fluazifop-butyl	µg/l	NS	<0.1
Fluchloralin	µg/l	NS	<0.1
Fluometuron	µg/l	NS	<0.5
Fluoranthene	µg/l	NS	<0.1
Fluorene	µg/l	200	<0.1
Fluridone	µg/l	NS	<1
Fonofos	µg/l	NS	<0.1
Gamma-BHC	µg/l	0.2	<0.02
Gamma-Chlordane	µg/l	2	<0.1
Heptachlor	µg/l	0.4	<0.04
Heptachlor Epoxide	µg/l	0.2	<0.02
Hexachlorobenzene	µg/l	1	<0.1
Hexachlorocyclopentadiene	µg/l	50	<0.1
Hexazinone	µg/l	400	<0.1
Indeno(1,2,3,c,d)Pyrene	µg/l	NS	<0.1
Iprodione	µg/l	NS	<0.5
Isofenphos	µg/l	NS	<0.5
Isphorone	µg/l	NS	<0.1

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Griswold WTP			
			Meridian Metropolitan Districts WISE Water Griswold WTP Baseline Water Quality Sample
Sample ID			Griswold
Sample Date			September 20, 2016
Sample Time			8:55 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Leptophos	µg/l	NS	<0.5
Malathion	µg/l	NS	<0.1
Metalaxyl	µg/l	NS	<0.5
Methoxychlor	µg/l	40	<0.1
Methyl paraoxon	µg/l	NS	<0.5
Methyl Parathion	µg/l	NS	<0.5
Metolachlor	µg/l	700	<0.1
Metribuzin	µg/l	70	<0.1
Metsulfuron-methyl	µg/l	NS	<10
Mevinphos	µg/l	NS	<0.1
MGK 264 isomer a	µg/l	NS	<0.1
MGK 264 isomer b	µg/l	NS	<0.1
MGK 326	µg/l	NS	<0.1
Mirex	µg/l	NS	<0.5
Molinate	µg/l	NS	<0.1
Monocrotophos	µg/l	NS	<0.5
Naled	µg/l	NS	<0.5
Naphthalene	µg/l	100	<0.1
Napropamide	µg/l	NS	<0.1
Norflurazon	µg/l	NS	<1
Oryzalin	µg/l	NS	<10
Oxadiazon	µg/l	NS	<0.1
Oxyxhlordane	µg/l	NS	<0.1
Oxyfluorfen	µg/l	NS	<0.5
Parathion	µg/l	NS	<0.5
Pebulate	µg/l	NS	<0.1
Pendimethalin	µg/l	NS	<0.1
Pentachlorobenzene	µg/l	NS	<0.5
Pentachloronitrobenzene	µg/l	NS	<0.5
Pentachlorophenol	µg/l	1	<1
Phenanthrene	µg/l	NS	<0.1
Phorate	µg/l	NS	<0.1
Phosmet	µg/l	NS	<0.5
Profluralin	µg/l	NS	<0.1
Prometryn	µg/l	NS	<0.1
Pronamide	µg/l	100	<0.1
Propachlor	µg/l	100	<0.1
Propanil	µg/l	NS	<0.5
Propazine	µg/l	10	<0.1
Propiconazole isomer a	µg/l	NS	<5
Propiconazole isomer	µg/l	NS	<5
Prothiofos	µg/l	NS	<0.5
Pyrene	µg/l	200	<0.1

Table 4-1			
Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Griswold WTP			
			Meridian Metropolitan Districts WISE Water Griswold WTP Baseline Water Quality Sample
Sample ID			Griswold
Sample Date			September 20, 2016
Sample Time			8:55 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Simazine	µg/l	4	<0.07
Simetryn	µg/l	NS	<0.1
Stirofos	µg/l	NS	<0.1
Sulfotep	µg/l	NS	<0.5
Tebuthiuron	µg/l	500	<10
TEPP	µg/l	NS	<1
Terbacil	µg/l	90	<0.1
Terbufos	µg/l	0.4	<0.5
Terbutryn	µg/l	NS	<0.1
Thiabendazole	µg/l	NS	<10
Thiobencarb	µg/l	NS	<0.1
Thionazin	µg/l	NS	<0.5
trans-Nonachlor	µg/l	NS	<0.1
trans-Permethrin	µg/l	NS	<0.1
Triadimefon	µg/l	NS	<0.5
Tribufos	µg/l	NS	<0.1
Trichloronate	µg/l	NS	<0.5
Tricylazole	µg/l	NS	<1
Trifluralin	µg/l	10	<0.1
Vernolate	µg/l	NS	<0.1
Vinclozolin	µg/l	NS	<0.5
Z-Phosphamidon	µg/l	NS	<0.5
Volatile Organics (EPA 524.2)			
1,1,1,2-Tetrachloroethane	µg/l	70	<0.5
1,1,1-Trichloroethane	µg/l	200	<0.5
1,1,2,2-Tetrachloroethane	µg/l	40	<0.5
1,1,2-Trichloroethane	µg/l	5	<0.5
1,1-Dichloroethane	µg/l	NS	<0.5
1,1-Dichloroethylene	µg/l	7	<0.5
1,1-Dichloropropene	µg/l	NS	<0.5
1,2,3-Trichlorobenzene	µg/l	NS	<0.5
1,2,3-Trichloropropane	µg/l	20	<0.5
1,2,4-Trichlorobenzene	µg/l	70	<0.5
1,2,4-Trimethylbenzene	µg/l	NS	<0.5
1,2-Dichloroethane	µg/l	5	<0.5
1,2-Dichloropropane	µg/l	5	<0.5
1,3,5-Trimethylbenzene	µg/l	NS	<0.5
1,3-Dichloropropane	µg/l	NS	<0.5
2,2-Dichloropropane	µg/l	NS	<0.5
2-Butanone (MEK)	µg/l	4000	<5
2-Hexanone	µg/l	NS	<10
4-Methyl-2-Pentanone (MIBK)	µg/l	NS	<5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Griswold WTP			
			Meridian Metropolitan Districts WISE Water Griswold WTP Baseline Water Quality Sample
Sample ID			Griswold
Sample Date			September 20, 2016
Sample Time			8:55 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Acetone	µg/l	6000	<10
Benzene	µg/l	5	<0.5
Bromobenzene	µg/l	60	<0.5
Bromochloromethane	µg/l	90	<0.5
Bromodichloromethane	µg/l	20	8.3
Bromoethane	µg/l	10	<0.5
Bromoform	µg/l	200	1.5
Bromomethane (Methyl Bromide)	µg/l	NS	<0.5
Carbon disulfide	µg/l	NS	<0.5
Carbon Tetrachloride	µg/l	5	<0.5
Chlorobenzene	µg/l	100	<0.5
Chlorodibromomethane	µg/l	60	5.0
Chloroethane	µg/l	NS	<0.5
Chloroform (Trichloromethane)	µg/l	70	11
Chloromethane (Methyl Chloride)	µg/l	400	<0.5
cis-1,2-Dichloroethylene	µg/l	70	<0.5
cis-1,3-Dichloropropene	µg/l	NS	<0.5
Dibromomethane	µg/l	NS	<0.5
Dichlorodifluoromethane	µg/l	1000	<0.5
Dichloromethane	µg/l	5	<0.5
Di-isopropyl ether	µg/l	NS	<3
Ethyl benzene	µg/l	700	<0.5
Hexachlorobutadiene	µg/l	2	<0.5
Isopropylbenzene	µg/l	800	<0.5
m,p-Xylenes	µg/l	10,000 (Total Xylenes)	<0.5
m-Dichlorobenzene (1,3-DCB)	µg/l	600	<0.5
Methyl Tert-butyl ether (MTBE)	µg/l	NS	<0.5
Naphthalene	µg/l	100	<0.5
n-Butylbenzene	µg/l	NS	<0.5
n-Propylbenzene	µg/l	NS	<0.5
o-Chlorotoluene	µg/l	100	<0.5
o-Dichlorobenzene (1,2-DCB)	µg/l	600	<0.5
o-Xylene	µg/l	10,000 (Total Xylenes)	<0.5
p-Chlorotoluene	µg/l	100	<0.5
p-Dichlorobenzene (1,4-DCB)	µg/l	75	<0.5
p-Isopropyltoluene	µg/l	NS	<0.5
sec-Butylbenzene	µg/l	NS	<0.5
Styrene	µg/l	100	<0.5
tert-amyl Methyl Ether	µg/l	NS	<3
tert-Butyl Ethyl Ether	µg/l	NS	<3
tert-Butylbenzene	µg/l	NS	<0.5
Tetrachloroethylene (PCE)	µg/l	5	<0.5
Toluene	µg/l	1000	<0.5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Griswold WTP			
			Meridian Metropolitan Districts WISE Water Griswold WTP Baseline Water Quality Sample
Sample ID			Griswold
Sample Date			September 20, 2016
Sample Time			8:55 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Total 1,3-Dichloropropene	µg/l	NS	<0.5
Total THM	µg/l	80	26
Total xylenes	µg/l	10000	<0.5
trans 1,2-Dichloroethylene	µg/l	100	<0.5
trans 1,3-Dichloropropene	µg/l	NS	<0.5
Trichloroethylene (TCE)	µg/l	5	<0.5
Trichlorofluoromethane	µg/l	2000	<0.5
Trichlorotrifluoroethane (Freon 113)	µg/l	NS	<0.5
Vinyl chloride (VC)	µg/l	2	<0.3
Acrolein/Acrylonitrile (EPA 624)			
Acrolein	µg/l	NS	<2
Acrylonitrile	µg/l	6	<2

[a]Standards are based on Colorado Department of Public Health and Environment, Water Quality Control Division Drinking Water Standards dated January 19, 2005, U.S. EPA National Safe Drinking Water Standards, and U.S. EPA Region 8 Baseline Water Sampling Criteria

[b]Sample for parameter collected in a separate collection at 16:07 on October 19, 2016

Notes:
NS = No Standard Available
ml = milliliter
mg/l = milligrams per liter or parts per million (ppm)
pCi/l = picocuries per liter
NA = No Analysis
CaCO3 = Calcium carbonate
ug/l = micrograms per liter or parts per billion (ppb)

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			Well A-4
Sample Date			November 16, 2016
Sample Time			10:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[b]**	**Results**
Total Metals (Inorganics) and Miscellaneous Parameters			
Alkalinity, Total	mg/l as CaCO3	NS	100
Aluminum	µg/l	200	<20
Ammonia Nitrogen	mg/l as N	0.01	0.14
Antimony	µg/l	6	<1
Arsenic	µg/l	10	<1
Asbestos	MFL	7	<0.18
Barium	µg/l	2,000	150
Beryllium	µg/l	4	<1
Bicarbonate	mg/l as CaCO3	NS	100
Carbonate	mg/l as CO3	NS	NA
Boron	mg/l	6	<0.05
Cadmium	µg/l	5	<0.5
Calcium	mg/l	NS	21
Chlorine Dioxide	mg/l	0.8	<0.24
Chloride	mg/l	250	<1
Chlorite	mg/l	1.0	<0.01
Chromium	µg/l	100	<1
Copper	µg/l	1,300	2.5
Cyanide	mg/l	0.2	<0.025
Cyanogen Chloride	mg/l	0.4	<0.35
Fluoride	mg/l	4.0 (2.0 Secondary MCL)	1.1
Free Chlorine	mg/l	4	<0.1
Iron	mg/l	0.3	0.13
Lead	µg/l	15	0.80
Magnesium	mg/l	NS	2.2
Manganese	µg/l	300	46
Mercury	µg/l	2	<0.2
Molybdenum	µg/l	40	<2
Nitrate	mg/l as N	10	<0.1
Nitrite	mg/l as N	1	<0.05
Nickel	µg/l	100	<5
Laboratory pH	pH units	6.5 – 8.5	8.1
Potassium	mg/l	NS	3.6
Selenium	µg/l	50	<5
Silver	µg/l	100	<0.5
Sodium	mg/l	NS	30
Strontium	mg/l	4	0.31
Sulfate	mg/l	250	18
Thallium	µg/l	2	<1
Total Dissolved Solids	mg/l	500	160
Total Organic Carbon	mg/l	NS	<0.3
Uranium	µg/l	30	<1

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			Well A-4
Sample Date			November 16, 2016
Sample Time			10:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[b]**	**Results**
Zinc	µg/l	2000	<20
Radio Chemistry			
Gross Alpha, Total	pCi/l	15	<3
Gross Beta, Total	pCi/l	50 pCi/l Trigger Level	6.4
Radium-226, Total	pCi/l	(5 for 226 + 228)	<1
Radium-228, Total	pCi/l	(5 for 226 + 228)	<1
Organochlorine Pesticides/PCBs (EPA 505)			
Alachlor (Alanex)	µg/l	2	<0.1
Aldrin	µg/l	0.2	<0.01
Chlordane	µg/l	2	<0.1
Dieldrin	µg/l	0.2	<0.01
Endrin	µg/l	2	<0.01
Heptachlor	µg/l	0.4	<0.01
Heptachlor Epoxide	µg/l	0.2	<0.01
Lindane (gamma-BHC)	µg/l	0.2	<0.01
Methoxychlor	µg/l	40	<0.05
PCB 1016 Aroclor	µg/l	0.5	<0.08
PCB 1221 Aroclor	µg/l	0.5	<0.1
PCB 1232 Aroclor	µg/l	0.5	<0.1
PCB 1242 Aroclor	µg/l	0.5	<0.1
PCB 1248 Aroclor	µg/l	0.5	<0.1
PCB 1254 Aroclor	µg/l	0.5	<0.1
PCB 1260 Aroclor	µg/l	0.5	<0.1
Total PCBs	µg/l	0.5	<0.1
Toxaphene	µg/l	3	<0.5
Haloacetic Acids (SM 6251B)			
Dibromoacetic acid	µg/l	NS	<1
Dichloroacetic acid	µg/l	NS	<1
Monobromoacetic acid	µg/l	NS	<1
Monochloroacetic acid	µg/l	NS	<2
Total Haloacetic acids (HAA5)	µg/l	60	<2
Trichloroacetic acid	µg/l	NS	<1
EDB/DBCP/HAN (EPA 551.1)			
Dibromochloropropane (DBCP)	µg/l	NS	<0.01
Ethylene Dibromide (EDB)	µg/l	NS	<0.01
Base/Neutral/Acid Extractables (EPA 625)			

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			Well A-4
Sample Date			November 16, 2016
Sample Time			10:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[b]**	**Results**
1,2,4-Trichlorobenzene	µg/l	70	<5
1,2-Diphenyhydrazine	µg/l	NS	<10
2,4,5-Trichlorophenol	µg/l	NS	<5
2,4,6-Trichlorophenol	µg/l	2	<5
2,4-Dichlorophenol	µg/l	20	<5
2,4-Dimethylphenol	µg/l	NS	<5
2,4-Dinitrophenol	µg/l	NS	<50
2,4-Dinitrotoluene	µg/l	5	<5
2,6-Dinitrotoluene	µg/l	5	<5
2-Chloronapthalene	µg/l	NS	<5
2-Chlorophenol	µg/l	40	<5
2-Methylnaphtalene	µg/l	NS	<5
2-Methyphenol	µg/l	NS	<5
2-Nitroaniline	µg/l	NS	<10
2-Nitrophenol	µg/l	NS	<5
3,3-Dichlorobenzidine	µg/l	NS	<50
3-Nitroaniline	µg/l	NS	<20
4,6-Dintro-o-cresol	µg/l	NS	<50
4-Bromophenylphenylether	µg/l	NS	<5
4-Chloroaniline	µg/l	NS	<5
4-Chlorophenylphenylether	µg/l	NS	<5
4-Methylphenol	µg/l	NS	<5
4-Nitroaniline	µg/l	NS	<20
4-Nitrophenol	µg/l	60	<10
Acenaphthene	µg/l	400	<5
Acenaphtylene	µg/l	NS	<5
Aniline	µg/l	NS	<10
Anthracene	µg/l	2000	<5
Benzidine	µg/l	NS	<50
Benzo(a)anthracene	µg/l	NS	<5
Benzo(a)pyrene	µg/l	0.2	<5
Benzo(b)fluoranthene	µg/l	NS	<5
Benzo(g,h,i)perylene	µg/l	NS	<10
Benzo(k)fluoranthene	µg/l	NS	<5
Benzoic Acid	µg/l	NS	<50
Benzyl Alcohol	µg/l	NS	<5
bis(2-Chloroethoxy)methane	µg/l	NS	<10
bis(2-Chloroethyl)ether	µg/l	NS	<10
bis(2-Chloroisopropyl)ether	µg/l	NS	<10
Butylbenzylphthalate	µg/l	1000	<5
Chrysene	µg/l	NS	<5
Dibenz(a,h)anthracene	µg/l	NS	<10
Dibenzofuran	µg/l	NS	<5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			Well A-4
Sample Date			November 16, 2016
Sample Time			10:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[b]**	**Results**
Diethylphthalate	μg/l	6000	<5
Dimethylphthalate	μg/l	NS	<5
Di-n-butylphthalate	μg/l	800	<10
Di-n-octylphthalate	μg/l	NS	<10
Fluoranthene	μg/l	NS	<5
Fluorene	μg/l	200	<5
Hexachlorobenzene	μg/l	1	<5
Hexachlorobutadiene	μg/l	2	<10
Hexachlorocyclopentadiene	μg/l	50	<10
Hexachloroethane	μg/l	1	<5
Indeno(1,2,3-c,d)pyrene	μg/l	NS	<10
Isophorone	μg/l	100	<5
Naphthalene	μg/l	100	<5
Nitrobenzene	μg/l	NS	<5
N-Nitroso-dimethylamine	μg/l	NS	<5
N-Nitrosodi-n-propylamine	μg/l	NS	<5
N-Nitrosodiphenylamine	μg/l	NS	<5
p-Chloro-m-cresol	μg/l	NS	<5
Pentachlorophenol	μg/l	1	<20
Phenanthrene	μg/l	NS	<5
Phenol	μg/l	2000	<5
Pyrene	μg/l	200	<5
Nitrosamines (EPA 521)			
N-Nitrosodibutylamine (NDBA)	ng/l	NS	<2
N-Nitrosodiethylamine (NDEA)	ng/l	NS	<2
N-Nitroso-dimethylamine (NDMA)	ng/l	NS	<2
N-Nitrosodi-n-propylamine (NDPA)	ng/l	NS	<2
N-Nitrosomethylethylamine (NMEA)	ng/l	NS	<2
N-Nitrosomorpholine	ng/l	NS	<2
N-Nitrosopiperidine (NPIP)	ng/l	NS	<2
N-Nitrosopyrollidine (NPYR)	ng/l	NS	<2
Aldicarbs (EPA 531.2)			
3-Hyroxycarbofuran	μg/l	NS	<0.5
Aldicarb (Temik)	μg/l	3	<0.5
Aldicarb sulfone	μg/l	2	<0.5
Aldicarb sulfoxide	μg/l	4	<0.5
Baygon	μg/l	NS	<0.5
Carbaryl	μg/l	NS	<0.5
Carbofuran (Furadan)	μg/l	NS	<0.5
Methiocarb	μg/l	NS	<0.5
Methomyl	μg/l	200	<0.5
Oxamyl (Vydate)	μg/l	7	<0.5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			Well A-4
Sample Date			November 16, 2016
Sample Time			10:00 am
Test Description	Units	Primary/Secondary Drinking Water Limits[b]	Results
EPA 525.2 Extended List			
1,2,4,5-Tetrachlorobenzene	µg/l	NS	<0.5
1-Methylnaphthalene	µg/l	NS	<0.1
2,2,3,3,4,4,6-Heptachlorobiphenyl	µg/l	NS	<0.5
2,2,3,3,4,5,6,6-Octachlorobiphenyl	µg/l	NS	<0.5
2,2,3,4,6-Pentachlorobiphenyl	µg/l	NS	<0.5
2,2,4,4,5,6-Hexachlorobiphenyl	µg/l	NS	<0.1
2,2,4,4-Tetrachlorobiphenyl	µg/l	NS	<0.1
2,3-Dichlorobiphenyl	µg/l	NS	<0.1
2,4,5-Trichlorbiphenyl	µg/l	NS	<0.1
2,4-Dinitrotoluene	µg/l	5	<0.5
2,6-Dinitrotoluene	µg/l	5	<0.5
2-Chlorobiphenyl	µg/l	NS	<0.1
2-methylnaphthalene	µg/l	NS	<0.1
4,4-DDD	µg/l	NS	<0.1
4,4-DDE	µg/l	NS	<0.1
4,4-DDT	µg/l	NS	<0.1
Acenaphthene	µg/l	400	<0.1
acenapthylene	µg/l	NS	<0.1
Acetochlor	µg/l	NS	<0.1
Alachlor	µg/l	2	<0.1
Aldrin	µg/l	0.2	<0.1
Alpha-BHC	µg/l	NS	<0.1
Alpha-Chlordane	µg/l	2	<0.1
Ametryn	µg/l	NS	<0.1
Anilazine	µg/l	NS	<1
Anthracene	µg/l	2000	<0.1
Aspon	µg/l	NS	<0.1
Atrazine	µg/l	3	<0.1
Azinphos-ethyl	µg/l	NS	<0.5
Azinphos-methyl	µg/l	NS	<0.5
Bendiocarb	µg/l	NS	<0.5
Benfluralin	µg/l	NS	<0.1
Benzo(a)anthracene	µg/l	NS	<0.1
Benzo(a)pyrene	µg/l	0.2	<0.02
Benzo(b)fluoranthene	µg/l	NS	<0.1
Benzo(g,h,i)perylene	µg/l	NS	<0.1
Benzo(k)fluoranthene	µg/l	NS	<0.1
beta-BHC	µg/l	NS	<0.1
Bolstar	µg/l	NS	<0.1
Bromacil	µg/l	NS	<0.1
Butachlor	µg/l	NS	<0.1

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			Well A-4
Sample Date			November 16, 2016
Sample Time			10:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[b]**	**Results**
Butylate	μg/l	NS	<0.1
Butylbenzylphthalate	μg/l	1000	<1
Carbophenothion	μg/l	NS	<0.5
Carboxin	μg/l	700	<0.1
Chlorfenvinphos	μg/l	NS	<5
Chlorbenzilate	μg/l	NS	<0.1
Chloroneb	μg/l	NS	<0.1
Chlorpropylate	μg/l	NS	<0.1
Chlorothalonil	μg/l	100	<0.1
Chlorpropham	μg/l	NS	<0.1
Chlorpyrifos	μg/l	NS	<0.1
Chlorpyifos methyl	μg/l	NS	<0.5
Chrysene	μg/l	NS	<0.1
cis-Noachlor	μg/l	NS	<0.1
cis-Permethrin	μg/l	NS	<0.1
Clomazone	μg/l	NS	<0.1
Clopyralid	μg/l	NS	<10
Coumaphos	μg/l	NS	<0.1
Crotoxyphos	μg/l	NS	<0.5
Cycloate	μg/l	NS	<0.1
DCPA	μg/l	70	<0.1
delta-BHC	μg/l	NS	<0.1
Demeton O	μg/l	NS	<0.5
Demeton S	μg/l	NS	<0.5
Desethylatrazine	μg/l	NS	<1
Desisopropylatrazine	μg/l	NS	<1
Di(2-ethylhexyl)adipate	μg/l	400	<0.6
Di(2-Ethylhexy)phthalate	μg/l	6	<0.6
Diazinon	μg/l	1	<0.1
Dibenzo(a,h)anthracene	μg/l	NS	<0.1
Dichlobenil	μg/l	NS	<0.1
Dichlofenthion	μg/l	NS	<0.1
Dichloran	μg/l	NS	<0.5
Dichlorvos	μg/l	NS	<0.1
Dicrotophos	μg/l	NS	<0.5
Dieldrin	μg/l	0.2	<0.1
Diethylphthalate	μg/l	6000	<1
Dimethoate	μg/l	NS	<0.5
Dimethylphthalate	μg/l	NS	<1
Di-n-butylphthalate	μg/l	800	<2
Di-n-octylphthalate	μg/l	NS	<2
Dioxathion	μg/l	NS	<0.5
Diphenamid	μg/l	200	<0.1

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			Well A-4
Sample Date			November 16, 2016
Sample Time			10:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[b]**	**Results**
Disulfoton	µg/l	0.7	<0.1
Disulfoton Sulfone	µg/l	NS	<0.1
Disulfoton Sulfoxide	µg/l	NS	<10
Endosulfan I	µg/l	NS	<0.1
Endosulfan II	µg/l	NS	<0.1
Endosulfan Sulfate	µg/l	NS	<0.1
Endrin	µg/l	2	<0.0097
Endrin Aldehyde	µg/l	NS	<0.5
E-Phosphamidon	µg/l	NS	<0.5
EPN	µg/l	NS	<0.5
EPTC	µg/l	NS	<0.1
Erucylamide	µg/l	NS	<5
Esfenvalerate	µg/l	NS	<0.5
Ethalfluralin	µg/l	NS	<0.1
Ethion	µg/l	NS	<5
Ethofumesate	µg/l	NS	<0.5
Ethoprop	µg/l	NS	<0.1
Etridiazole	µg/l	NS	<0.1
Famphur	µg/l	NS	<0.1
Fenamiphos	µg/l	0.7	<0.1
Fenarimol	µg/l	NS	<1
Fenitrothion	µg/l	NS	<0.5
Fenoxaprop-ethyl	µg/l	NS	<1
Fensulfothion	µg/l	NS	<0.5
Fenthion	µg/l	NS	<0.1
Fluazifop-butyl	µg/l	NS	<0.1
Fluchloralin	µg/l	NS	<0.1
Fluometuron	µg/l	NS	<0.5
Fluoranthene	µg/l	NS	<0.1
Fluorene	µg/l	200	<0.1
Fluridone	µg/l	NS	<1
Fonofos	µg/l	NS	<0.1
Gamma-BHC	µg/l	0.2	<0.02
Gamma-Chlordane	µg/l	2	<0.1
Heptachlor	µg/l	0.4	<0.04
Heptachlor Epoxide	µg/l	0.2	<0.02
Hexachlorobenzene	µg/l	1	<0.1
Hexachlorocyclopentadiene	µg/l	50	<0.1
Hexazinone	µg/l	400	<0.1
Indeno(1,2,3,c,d)Pyrene	µg/l	NS	<0.1
Iprodione	µg/l	NS	<0.5
Isofenphos	µg/l	NS	<0.5
Isphorone	µg/l	NS	<0.1

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			Well A-4
Sample Date			November 16, 2016
Sample Time			10:00 am
Test Description	Units	Primary/Secondary Drinking Water Limits[b]	Results
Leptophos	µg/l	NS	<0.5
Malathion	µg/l	NS	<0.1
Metalaxyl	µg/l	NS	<0.5
Methoxychlor	µg/l	40	<0.1
Methyl paraoxon	µg/l	NS	<0.5
Methyl Parathion	µg/l	NS	<0.5
Metolachlor	µg/l	700	<0.1
Metribuzin	µg/l	70	<0.1
Metsulfuron-methyl	µg/l	NS	<10
Mevinphos	µg/l	NS	<0.1
MGK 264 isomer a	µg/l	NS	<0.1
MGK 264 isomer b	µg/l	NS	<0.1
MGK 326	µg/l	NS	<0.1
Mirex	µg/l	NS	<0.5
Molinate	µg/l	NS	<0.1
Monocrotophos	µg/l	NS	<0.5
Naled	µg/l	NS	<0.5
Naphthalene	µg/l	100	<0.1
Napropamide	µg/l	NS	<0.1
Norflurazon	µg/l	NS	<1
Oryzalin	µg/l	NS	<10
Oxadiazon	µg/l	NS	<0.1
Oxyxhlordane	µg/l	NS	<0.1
Oxyfluorfen	µg/l	NS	<0.5
Parathion	µg/l	NS	<0.5
Pebulate	µg/l	NS	<0.1
Pendimethalin	µg/l	NS	<0.1
Pentachlorobenzene	µg/l	NS	<0.5
Pentachloronitrobenzene	µg/l	NS	<0.5
Pentachlorophenol	µg/l	1	<1
Phenanthrene	µg/l	NS	<0.1
Phorate	µg/l	NS	<0.1
Phosmet	µg/l	NS	<0.5
Profluralin	µg/l	NS	<0.1
Prometryn	µg/l	NS	<0.1
Pronamide	µg/l	100	<0.1
Propachlor	µg/l	100	<0.1
Propanil	µg/l	NS	<0.5
Propazine	µg/l	10	<0.1
Propiconazole isomer a	µg/l	NS	<5
Propiconazole isomer	µg/l	NS	<5
Prothiofos	µg/l	NS	<0.5
Pyrene	µg/l	200	<0.1

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			Well A-4
Sample Date			November 16, 2016
Sample Time			10:00 am
Test Description	Units	Primary/Secondary Drinking Water Limits[b]	Results
Simazine	µg/l	4	<0.07
Simetryn	µg/l	NS	<0.1
Stirofos	µg/l	NS	<0.1
Sulfotep	µg/l	NS	<0.5
Tebuthiuron	µg/l	500	<10
TEPP	µg/l	NS	<1
Terbacil	µg/l	90	<0.1
Terbufos	µg/l	0.4	<0.5
Terbutryn	µg/l	NS	<0.1
Thiabendazole	µg/l	NS	<10
Thiobencarb	µg/l	NS	<0.1
Thionazin	µg/l	NS	<0.5
trans-Nonachlor	µg/l	NS	<0.1
trans-Permethrin	µg/l	NS	<0.1
Triadimefon	µg/l	NS	<0.5
Tribufos	µg/l	NS	<0.1
Trichloronate	µg/l	NS	<0.5
Tricylazole	µg/l	NS	<1
Trifluralin	µg/l	10	<0.1
Vernolate	µg/l	NS	<0.1
Vinclozolin	µg/l	NS	<0.5
Z-Phosphamidon	µg/l	NS	<0.5
Volatile Organics (EPA 524.2)			
1,1,1,2-Tetrachloroethane	µg/l	70	<0.5
1,1,1-Trichloroethane	µg/l	200	<0.5
1,1,2,2-Tetrachloroethane	µg/l	40	<0.5
1,1,2-Trichloroethane	µg/l	5	<0.5
1,1-Dichloroethane	µg/l	NS	<0.5
1,1-Dichloroethylene	µg/l	7	<0.5
1,1-Dichloropropene	µg/l	NS	<0.5
1,2,3-Trichlorobenzene	µg/l	NS	<0.5
1,2,3-Trichloropropane	µg/l	20	<0.5
1,2,4-Trichlorobenzene	µg/l	70	<0.5
1,2,4-Trimethylbenzene	µg/l	NS	<0.5
1,2-Dichloroethane	µg/l	5	<0.5
1,2-Dichloropropane	µg/l	5	<0.5
1,3,5-Trimethylbenzene	µg/l	NS	<0.5
1,3-Dichloropropane	µg/l	NS	<0.5
2,2-Dichloropropane	µg/l	NS	<0.5
2-Butanone (MEK)	µg/l	4000	<5
2-Hexanone	µg/l	NS	<10
4-Methyl-2-Pentanone (MIBK)	µg/l	NS	<5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			Well A-4
Sample Date			November 16, 2016
Sample Time			10:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[b]**	**Results**
Acetone	µg/l	6000	<10
Benzene	µg/l	5	<0.5
Bromobenzene	µg/l	60	<0.5
Bromochloromethane	µg/l	90	<0.5
Bromodichloromethane	µg/l	20	<0.5
Bromoethane	µg/l	10	<0.5
Bromoform	µg/l	200	<0.5
Bromomethane (Methyl Bromide)	µg/l	NS	<0.5
Carbon disulfide	µg/l	NS	<0.5
Carbon Tetrachloride	µg/l	5	<0.5
Chlorobenzene	µg/l	100	<0.5
Chlorodibromomethane	µg/l	60	<0.5
Chloroethane	µg/l	NS	<0.5
Chloroform (Trichloromethane)	µg/l	70	<0.5
Chloromethane (Methyl Chloride)	µg/l	400	<0.5
cis-1,2-Dichloroethylene	µg/l	70	<0.5
cis-1,3-Dichloropropene	µg/l	NS	<0.5
Dibromomethane	µg/l	NS	<0.5
Dichlorodifluoromethane	µg/l	1000	<0.5
Dichloromethane	µg/l	5	<0.5
Di-isopropyl ether	µg/l	NS	<3
Ethyl benzene	µg/l	700	<0.5
Hexachlorobutadiene	µg/l	2	<0.5
Isopropylbenzene	µg/l	800	<0.5
m,p-Xylenes	µg/l	10,000 (Total Xylenes)	<0.5
m-Dichlorobenzene (1,3-DCB)	µg/l	600	<0.5
Methyl Tert-butyl ether (MTBE)	µg/l	NS	<0.5
Naphthalene	µg/l	100	<0.5
n-Butylbenzene	µg/l	NS	<0.5
n-Propylbenzene	µg/l	NS	<0.5
o-Chlorotoluene	µg/l	100	<0.5
o-Dichlorobenzene (1,2-DCB)	µg/l	600	<0.5
o-Xylene	µg/l	10,000 (Total Xylenes)	<0.5
p-Chlorotoluene	µg/l	100	<0.5
p-Dichlorobenzene (1,4-DCB)	µg/l	75	<0.5
p-Isopropyltoluene	µg/l	NS	<0.5
sec-Butylbenzene	µg/l	NS	<0.5
Styrene	µg/l	100	<0.5
tert-amyl Methyl Ether	µg/l	NS	<3
tert-Butyl Ethyl Ether	µg/l	NS	<3
tert-Butylbenzene	µg/l	NS	<0.5
Tetrachloroethylene (PCE)	µg/l	5	<0.5
Toluene	µg/l	1000	<0.5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			Well A-4
Sample Date			November 16, 2016
Sample Time			10:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[b]**	**Results**
Total 1,3-Dichloropropene	µg/l	NS	<0.5
Total THM	µg/l	80	<0.5
Total xylenes	µg/l	10000	<0.5
trans 1,2-Dichloroethylene	µg/l	100	<0.5
trans 1,3-Dichloropropene	µg/l	NS	<0.5
Trichloroethylene (TCE)	µg/l	5	<0.5
Trichlorofluoromethane	µg/l	2000	<0.5
Trichlorotrifluoroethane (Freon 113)	µg/l	NS	<0.5
Vinyl chloride (VC)	µg/l	2	<0.3
Acrolein/Acrylonitrile (EPA 624)			
Acrolein	µg/l	NS	<2
Acrylonitrile	µg/l	6	<2

[a]Standards are based on Colorado Department of Public Health and Environment, Water Quality Control Division Drinking Water Standards dated January 19, 2005, U.S. EPA National Safe Drinking Water Standards, and U.S. EPA Region 8 Baseline Water Sampling Criteria

Notes:

NS =	No Standard Available	NA =	No Analysis
ml =	milliliter	CaCO3 =	Calcium carbonate
mg/l =	milligrams per liter or parts per million (ppm)	ug/l =	micrograms per liter or parts per billion (ppb)
pCi/l =	picocuries per liter		

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Total Metals (Inorganics) and Miscellaneous Parameters			
Alkalinity, Total	mg/l as CaCO3	NS	130
Aluminum	µg/l	200	<20
Ammonia Nitrogen	mg/l as N	0.01	<0.05
Antimony	µg/l	6	<1
Arsenic	µg/l	10	<1
Asbestos	MFL	7	<0.18
Barium	µg/l	2,000	110
Beryllium	µg/l	4	<1
Bicarbonate	mg/l as CaCO3	NS	130
Carbonate	mg/l as CO3	NS	NA
Boron	mg/l	6	0.060
Cadmium	µg/l	5	<0.5
Calcium	mg/l	NS	17
Chlorine Dioxide	mg/l	0.8	<0.24
Chloride	mg/l	250	1.9
Chlorite	mg/l	1.0	<0.01
Chromium	µg/l	100	<1
Copper	µg/l	1,300	<2.0
Cyanide	mg/l	0.2	<0.025
Cyanogen Chloride	mg/l	0.4	<0.35
Fluoride	mg/l	4.0 (2.0 Secondary MCL)	1.2
Free Chlorine	mg/l	4	<0.1
Iron	mg/l	0.3	0.050
Lead	µg/l	15	<0.5
Magnesium	mg/l	NS	1.8
Manganese	µg/l	300	22
Mercury	µg/l	2	<0.2
Molybdenum	µg/l	40	2.0
Nitrate	mg/l as N	10	<0.1
Nitrite	mg/l as N	1	<0.05
Nickel	µg/l	100	<5
Laboratory pH	pH units	6.5 – 8.5	8.2
Potassium	mg/l	NS	3.0
Selenium	µg/l	50	<5
Silver	µg/l	100	<0.5
Sodium	mg/l	NS	52
Strontium	mg/l	4	0.30
Sulfate	mg/l	250	21
Thallium	µg/l	2	<1
Total Dissolved Solids	mg/l	500	190
Total Organic Carbon	mg/l	NS	0.41
Uranium	µg/l	30	<1

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Zinc	µg/l	2000	<20
Radio Chemistry			
Gross Alpha, Total	pCi/l	15	3.1
Gross Beta, Total	pCi/l	50 pCi/l Trigger Level	<3
Radium-226, Total	pCi/l	(5 for 226 + 228)	<1
Radium-228, Total	pCi/l	(5 for 226 + 228)	<1
Organochlorine Pesticides/PCBs (EPA 505)			
Alachlor (Alanex)	µg/l	2	<0.1
Aldrin	µg/l	0.2	<0.01
Chlordane	µg/l	2	<0.1
Dieldrin	µg/l	0.2	<0.01
Endrin	µg/l	2	<0.01
Heptachlor	µg/l	0.4	<0.01
Heptachlor Epoxide	µg/l	0.2	<0.01
Lindane (gamma-BHC)	µg/l	0.2	<0.01
Methoxychlor	µg/l	40	<0.05
PCB 1016 Aroclor	µg/l	0.5	<0.08
PCB 1221 Aroclor	µg/l	0.5	<0.1
PCB 1232 Aroclor	µg/l	0.5	<0.1
PCB 1242 Aroclor	µg/l	0.5	<0.1
PCB 1248 Aroclor	µg/l	0.5	<0.1
PCB 1254 Aroclor	µg/l	0.5	<0.1
PCB 1260 Aroclor	µg/l	0.5	<0.1
Total PCBs	µg/l	0.5	<0.1
Toxaphene	µg/l	3	<0.5
Haloacetic Acids (SM 6251B)			
Dibromoacetic acid	µg/l	NS	<1
Dichloroacetic acid	µg/l	NS	<1
Monobromoacetic acid	µg/l	NS	<1
Monochloroacetic acid	µg/l	NS	<2
Total Haloacetic acids (HAA5)	µg/l	60	<2
Trichloroacetic acid	µg/l	NS	<1
EDB/DBCP/HAN (EPA 551.1)			
Dibromochloropropane (DBCP)	µg/l	NS	<0.01
Ethylene Dibromide (EDB)	µg/l	NS	<0.01
Base/Neutral/Acid Extractables (EPA 625)			

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	Units	Primary/Secondary Drinking Water Limits[a]	Results
1,2,4-Trichlorobenzene	µg/l	70	<5
1,2-Diphenyhydrazine	µg/l	NS	<10
2,4,5-Trichlorophenol	µg/l	NS	<5
2,4,6-Trichlorophenol	µg/l	2	<5
2,4-Dichlorophenol	µg/l	20	<5
2,4-Dimethylphenol	µg/l	NS	<5
2,4-Dinitrophenol	µg/l	NS	<50
2,4-Dinitrotoluene	µg/l	5	<5
2,6-Dinitrotoluene	µg/l	5	<5
2-Chloronapthalene	µg/l	NS	<5
2-Chlorophenol	µg/l	40	<5
2-Methylnaphtalene	µg/l	NS	<5
2-Methyphenol	µg/l	NS	<5
2-Nitroaniline	µg/l	NS	<10
2-Nitrophenol	µg/l	NS	<5
3,3-Dichlorobenzidine	µg/l	NS	<50
3-Nitroaniline	µg/l	NS	<20
4,6-Dintro-o-cresol	µg/l	NS	<50
4-Bromophenylphenylether	µg/l	NS	<5
4-Chloroaniline	µg/l	NS	<5
4-Chlorophenylphenylether	µg/l	NS	<5
4-Methylphenol	µg/l	NS	<5
4-Nitroaniline	µg/l	NS	<20
4-Nitrophenol	µg/l	60	<10
Acenaphthene	µg/l	400	<5
Acenaphtylene	µg/l	NS	<5
Aniline	µg/l	NS	<10
Anthracene	µg/l	2000	<5
Benzidine	µg/l	NS	<50
Benzo(a)anthracene	µg/l	NS	<5
Benzo(a)pyrene	µg/l	0.2	<5
Benzo(b)fluoranthene	µg/l	NS	<5
Benzo(g,h,i)perylene	µg/l	NS	<10
Benzo(k)fluoranthene	µg/l	NS	<5
Benzoic Acid	µg/l	NS	<50
Benzyl Alcohol	µg/l	NS	<5
bis(2-Chloroethoxy)methane	µg/l	NS	<10
bis(2-Chloroethyl)ether	µg/l	NS	<10
bis(2-Chloroisopropyl)ether	µg/l	NS	<10
Butylbenzylphthalate	µg/l	1000	<5
Chrysene	µg/l	NS	<5
Dibenz(a,h)anthracene	µg/l	NS	<10
Dibenzofuran	µg/l	NS	<5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Diethylphthalate	µg/l	6000	<5
Dimethylphthalate	µg/l	NS	<5
Di-n-butylphthalate	µg/l	800	<10
Di-n-octylphthalate	µg/l	NS	<10
Fluoranthene	µg/l	NS	<5
Fluorene	µg/l	200	<5
Hexachlorobenzene	µg/l	1	<5
Hexachlorobutadiene	µg/l	2	<10
Hexachlorocyclopentadiene	µg/l	50	<10
Hexachloroethane	µg/l	1	<5
Indeno(1,2,3-c,d)pyrene	µg/l	NS	<10
Isophorone	µg/l	100	<5
Naphthalene	µg/l	100	<5
Nitrobenzene	µg/l	NS	<5
N-Nitroso-dimethylamine	µg/l	NS	<5
N-Nitrosodi-n-propylamine	µg/l	NS	<5
N-Nitrosodiphenylamine	µg/l	NS	<5
p-Chloro-m-cresol	µg/l	NS	<5
Pentachlorophenol	µg/l	1	<20
Phenanthrene	µg/l	NS	<5
Phenol	µg/l	2000	<5
Pyrene	µg/l	200	<5
Nitrosamines (EPA 521)			
N-Nitrosodibutylamine (NDBA)	ng/l	NS	<2
N-Nitrosodiethylamine (NDEA)	ng/l	NS	<2
N-Nitroso-dimethylamine (NDMA)	ng/l	NS	<2
N-Nitrosodi-n-propylamine (NDPA)	ng/l	NS	<2
N-Nitrosomethylethylamine (NMEA)	ng/l	NS	<2
N-Nitrosomorpholine	ng/l	NS	<2
N-Nitrosopiperidine (NPIP)	ng/l	NS	<2
N-Nitrosopyrollidine (NPYR)	ng/l	NS	<2
Aldicarbs (EPA 531.2)			
3-Hyroxycarbofuran	µg/l	NS	<0.5
Aldicarb (Temik)	µg/l	3	<0.5
Aldicarb sulfone	µg/l	2	<0.5
Aldicarb sulfoxide	µg/l	4	<0.5
Baygon	µg/l	NS	<0.5
Carbaryl	µg/l	NS	<0.5
Carbofuran (Furadan)	µg/l	NS	<0.5
Methiocarb	µg/l	NS	<0.5
Methomyl	µg/l	200	<0.5
Oxamyl (Vydate)	µg/l	7	<0.5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	Units	Primary/Secondary Drinking Water Limits[a]	Results
EPA 525.2 Extended List			
1,2,4,5-Tetrachlorobenzene	µg/l	NS	<0.5
1-Methylnaphthalene	µg/l	NS	<0.1
2,2,3,3,4,4,6-Heptachlorobiphenyl	µg/l	NS	<0.5
2,2,3,3,4,5,6,6-Octachlorobiphenyl	µg/l	NS	<0.5
2,2,3,4,6-Pentachlorobiphenyl	µg/l	NS	<0.5
2,2,4,4,5,6-Hexachlorobiphenyl	µg/l	NS	<0.1
2,2,4,4-Tetrachlorobiphenyl	µg/l	NS	<0.1
2,3-Dichlorobiphenyl	µg/l	NS	<0.1
2,4,5-Trichlorbiphenyl	µg/l	NS	<0.1
2,4-Dinitrotoluene	µg/l	5	<0.5
2,6-Dinitrotoluene	µg/l	5	<0.5
2-Chlorobiphenyl	µg/l	NS	<0.1
2-methylnaphthalene	µg/l	NS	<0.1
4,4-DDD	µg/l	NS	<0.1
4,4-DDE	µg/l	NS	<0.1
4,4-DDT	µg/l	NS	<0.1
Acenaphthene	µg/l	400	<0.1
acenapthylene	µg/l	NS	<0.1
Acetochlor	µg/l	NS	<0.1
Alachlor	µg/l	2	<0.1
Aldrin	µg/l	0.2	<0.1
Alpha-BHC	µg/l	NS	<0.1
Alpha-Chlordane	µg/l	2	<0.1
Ametryn	µg/l	NS	<0.1
Anilazine	µg/l	NS	<1
Anthracene	µg/l	2000	<0.1
Aspon	µg/l	NS	<0.1
Atrazine	µg/l	3	<0.1
Azinphos-ethyl	µg/l	NS	<0.5
Azinphos-methyl	µg/l	NS	<0.5
Bendiocarb	µg/l	NS	<0.5
Benfluralin	µg/l	NS	<0.1
Benzo(a)anthracene	µg/l	NS	<0.1
Benzo(a)pyrene	µg/l	0.2	<0.02
Benzo(b)fluoranthene	µg/l	NS	<0.1
Benzo(g,h,i)perylene	µg/l	NS	<0.1
Benzo(k)fluoranthene	µg/l	NS	<0.1
beta-BHC	µg/l	NS	<0.1
Bolstar	µg/l	NS	<0.1
Bromacil	µg/l	NS	<0.1
Butachlor	µg/l	NS	<0.1

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Butylate	µg/l	NS	<0.1
Butylbenzylphthalate	µg/l	1000	<1
Carbophenothion	µg/l	NS	<0.5
Carboxin	µg/l	700	<0.1
Chlorfenvinphos	µg/l	NS	<5
Chlorbenzilate	µg/l	NS	<0.1
Chloroneb	µg/l	NS	<0.1
Chlorpropylate	µg/l	NS	<0.1
Chlorothalonil	µg/l	100	<0.1
Chlorpropham	µg/l	NS	<0.1
Chlorpyrifos	µg/l	NS	<0.1
Chlorpyifos methyl	µg/l	NS	<0.5
Chrysene	µg/l	NS	<0.1
cis-Noachlor	µg/l	NS	<0.1
cis-Permethrin	µg/l	NS	<0.1
Clomazone	µg/l	NS	<0.1
Clopyralid	µg/l	NS	<10
Coumaphos	µg/l	NS	<0.1
Crotoxyphos	µg/l	NS	<0.5
Cycloate	µg/l	NS	<0.1
DCPA	µg/l	70	<0.1
delta-BHC	µg/l	NS	<0.1
Demeton O	µg/l	NS	<0.5
Demeton S	µg/l	NS	<0.5
Desethylatrazine	µg/l	NS	<1
Desisopropylatrazine	µg/l	NS	<1
Di(2-ethylhexyl)adipate	µg/l	400	<0.6
Di(2-Ethylhexy)phthalate	µg/l	6	<0.6
Diazinon	µg/l	1	<0.1
Dibenzo(a,h)anthracene	µg/l	NS	<0.1
Dichlobenil	µg/l	NS	<0.1
Dichlofenthion	µg/l	NS	<0.1
Dichloran	µg/l	NS	<0.5
Dichlorvos	µg/l	NS	<0.1
Dicrotophos	µg/l	NS	<0.5
Dieldrin	µg/l	0.2	<0.1
Diethylphthalate	µg/l	6000	<1
Dimethoate	µg/l	NS	<0.5
Dimethylphthalate	µg/l	NS	<1
Di-n-butylphthalate	µg/l	800	<2
Di-n-octylphthalate	µg/l	NS	<2
Dioxathion	µg/l	NS	<0.5
Diphenamid	µg/l	200	<0.1

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Disulfoton	µg/l	0.7	<0.1
Disulfoton Sulfone	µg/l	NS	<0.1
Disulfoton Sulfoxide	µg/l	NS	<10
Endosulfan I	µg/l	NS	<0.1
Endosulfan II	µg/l	NS	<0.1
Endosulfan Sulfate	µg/l	NS	<0.1
Endrin	µg/l	2	<0.0097
Endrin Aldehyde	µg/l	NS	<0.5
E-Phosphamidon	µg/l	NS	<0.5
EPN	µg/l	NS	<0.5
EPTC	µg/l	NS	<0.1
Erucylamide	µg/l	NS	<5
Esfenvalerate	µg/l	NS	<0.5
Ethalfluralin	µg/l	NS	<0.1
Ethion	µg/l	NS	<5
Ethofumesate	µg/l	NS	<0.5
Ethoprop	µg/l	NS	<0.1
Etridiazole	µg/l	NS	<0.1
Famphur	µg/l	NS	<0.1
Fenamiphos	µg/l	0.7	<0.1
Fenarimol	µg/l	NS	<1
Fenitrothion	µg/l	NS	<0.5
Fenoxaprop-ethyl	µg/l	NS	<1
Fensulfothion	µg/l	NS	<0.5
Fenthion	µg/l	NS	<0.1
Fluazifop-butyl	µg/l	NS	<0.1
Fluchloralin	µg/l	NS	<0.1
Fluometuron	µg/l	NS	<0.5
Fluoranthene	µg/l	NS	<0.1
Fluorene	µg/l	200	<0.1
Fluridone	µg/l	NS	<1
Fonofos	µg/l	NS	<0.1
Gamma-BHC	µg/l	0.2	<0.02
Gamma-Chlordane	µg/l	2	<0.1
Heptachlor	µg/l	0.4	<0.04
Heptachlor Epoxide	µg/l	0.2	<0.02
Hexachlorobenzene	µg/l	1	<0.1
Hexachlorocyclopentadiene	µg/l	50	<0.1
Hexazinone	µg/l	400	<0.1
Indeno(1,2,3,c,d)Pyrene	µg/l	NS	<0.1
Iprodione	µg/l	NS	<0.5
Isofenphos	µg/l	NS	<0.5
Isphorone	µg/l	NS	<0.1

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Leptophos	µg/l	NS	<0.5
Malathion	µg/l	NS	<0.1
Metalaxyl	µg/l	NS	<0.5
Methoxychlor	µg/l	40	<0.1
Methyl paraoxon	µg/l	NS	<0.5
Methyl Parathion	µg/l	NS	<0.5
Metolachlor	µg/l	700	<0.1
Metribuzin	µg/l	70	<0.1
Metsulfuron-methyl	µg/l	NS	<10
Mevinphos	µg/l	NS	<0.1
MGK 264 isomer a	µg/l	NS	<0.1
MGK 264 isomer b	µg/l	NS	<0.1
MGK 326	µg/l	NS	<0.1
Mirex	µg/l	NS	<0.5
Molinate	µg/l	NS	<0.1
Monocrotophos	µg/l	NS	<0.5
Naled	µg/l	NS	<0.5
Naphthalene	µg/l	100	<0.1
Napropamide	µg/l	NS	<0.1
Norflurazon	µg/l	NS	<1
Oryzalin	µg/l	NS	<10
Oxadiazon	µg/l	NS	<0.1
Oxyxhlordane	µg/l	NS	<0.1
Oxyfluorfen	µg/l	NS	<0.5
Parathion	µg/l	NS	<0.5
Pebulate	µg/l	NS	<0.1
Pendimethalin	µg/l	NS	<0.1
Pentachlorobenzene	µg/l	NS	<0.5
Pentachloronitrobenzene	µg/l	NS	<0.5
Pentachlorophenol	µg/l	1	<1
Phenanthrene	µg/l	NS	<0.1
Phorate	µg/l	NS	<0.1
Phosmet	µg/l	NS	<0.5
Profluralin	µg/l	NS	<0.1
Prometryn	µg/l	NS	<0.1
Pronamide	µg/l	100	<0.1
Propachlor	µg/l	100	<0.1
Propanil	µg/l	NS	<0.5
Propazine	µg/l	10	<0.1
Propiconazole isomer a	µg/l	NS	<5
Propiconazole isomer	µg/l	NS	<5
Prothiofos	µg/l	NS	<0.5
Pyrene	µg/l	200	<0.1

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	Units	Primary/Secondary Drinking Water Limits[a]	Results
Simazine	µg/l	4	<0.07
Simetryn	µg/l	NS	<0.1
Stirofos	µg/l	NS	<0.1
Sulfotep	µg/l	NS	<0.5
Tebuthiuron	µg/l	500	<10
TEPP	µg/l	NS	<1
Terbacil	µg/l	90	<0.1
Terbufos	µg/l	0.4	<0.5
Terbutryn	µg/l	NS	<0.1
Thiabendazole	µg/l	NS	<10
Thiobencarb	µg/l	NS	<0.1
Thionazin	µg/l	NS	<0.5
trans-Nonachlor	µg/l	NS	<0.1
trans-Permethrin	µg/l	NS	<0.1
Triadimefon	µg/l	NS	<0.5
Tribufos	µg/l	NS	<0.1
Trichloronate	µg/l	NS	<0.5
Tricylazole	µg/l	NS	<1
Trifluralin	µg/l	10	<0.1
Vernolate	µg/l	NS	<0.1
Vinclozolin	µg/l	NS	<0.5
Z-Phosphamidon	µg/l	NS	<0.5
Volatile Organics (EPA 524.2)			
1,1,1,2-Tetrachloroethane	µg/l	70	<0.5
1,1,1-Trichloroethane	µg/l	200	<0.5
1,1,2,2-Tetrachloroethane	µg/l	40	<0.5
1,1,2-Trichloroethane	µg/l	5	<0.5
1,1-Dichloroethane	µg/l	NS	<0.5
1,1-Dichloroethylene	µg/l	7	<0.5
1,1-Dichloropropene	µg/l	NS	<0.5
1,2,3-Trichlorobenzene	µg/l	NS	<0.5
1,2,3-Trichloropropane	µg/l	20	<0.5
1,2,4-Trichlorobenzene	µg/l	70	<0.5
1,2,4-Trimethylbenzene	µg/l	NS	<0.5
1,2-Dichloroethane	µg/l	5	<0.5
1,2-Dichloropropane	µg/l	5	<0.5
1,3,5-Trimethylbenzene	µg/l	NS	<0.5
1,3-Dichloropropane	µg/l	NS	<0.5
2,2-Dichloropropane	µg/l	NS	<0.5
2-Butanone (MEK)	µg/l	4000	<5
2-Hexanone	µg/l	NS	<10
4-Methyl-2-Pentanone (MIBK)	µg/l	NS	<5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Acetone	µg/l	6000	<10
Benzene	µg/l	5	<0.5
Bromobenzene	µg/l	60	<0.5
Bromochloromethane	µg/l	90	<0.5
Bromodichloromethane	µg/l	20	<0.5
Bromoethane	µg/l	10	<0.5
Bromoform	µg/l	200	<0.5
Bromomethane (Methyl Bromide)	µg/l	NS	<0.5
Carbon disulfide	µg/l	NS	<0.5
Carbon Tetrachloride	µg/l	5	<0.5
Chlorobenzene	µg/l	100	<0.5
Chlorodibromomethane	µg/l	60	<0.5
Chloroethane	µg/l	NS	<0.5
Chloroform (Trichloromethane)	µg/l	70	<0.5
Chloromethane (Methyl Chloride)	µg/l	400	<0.5
cis-1,2-Dichloroethylene	µg/l	70	<0.5
cis-1,3-Dichloropropene	µg/l	NS	<0.5
Dibromomethane	µg/l	NS	<0.5
Dichlorodifluoromethane	µg/l	1000	<0.5
Dichloromethane	µg/l	5	<0.5
Di-isopropyl ether	µg/l	NS	<3
Ethyl benzene	µg/l	700	<0.5
Hexachlorobutadiene	µg/l	2	<0.5
Isopropylbenzene	µg/l	800	<0.5
m,p-Xylenes	µg/l	10,000 (Total Xylenes)	<0.5
m-Dichlorobenzene (1,3-DCB)	µg/l	600	<0.5
Methyl Tert-butyl ether (MTBE)	µg/l	NS	<0.5
Naphthalene	µg/l	100	<0.5
n-Butylbenzene	µg/l	NS	<0.5
n-Propylbenzene	µg/l	NS	<0.5
o-Chlorotoluene	µg/l	100	<0.5
o-Dichlorobenzene (1,2-DCB)	µg/l	600	<0.5
o-Xylene	µg/l	10,000 (Total Xylenes)	<0.5
p-Chlorotoluene	µg/l	100	<0.5
p-Dichlorobenzene (1,4-DCB)	µg/l	75	<0.5
p-Isopropyltoluene	µg/l	NS	<0.5
sec-Butylbenzene	µg/l	NS	<0.5
Styrene	µg/l	100	<0.5
tert-amyl Methyl Ether	µg/l	NS	<3
tert-Butyl Ethyl Ether	µg/l	NS	<3
tert-Butylbenzene	µg/l	NS	<0.5
Tetrachloroethylene (PCE)	µg/l	5	<0.5
Toluene	µg/l	1000	<0.5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Total 1,3-Dichloropropene	μg/l	NS	<0.5
Total THM	μg/l	80	<0.5
Total xylenes	μg/l	10000	<0.5
trans 1,2-Dichloroethylene	μg/l	100	<0.5
trans 1,3-Dichloropropene	μg/l	NS	<0.5
Trichloroethylene (TCE)	μg/l	5	<0.5
Trichlorofluoromethane	μg/l	2000	<0.5
Trichlorotrifluoroethane (Freon 113)	μg/l	NS	<0.5
Vinyl chloride (VC)	μg/l	2	<0.3
Acrolein/Acrylonitrile (EPA 624)			
Acrolein	μg/l	NS	<2
Acrylonitrile	μg/l	6	<2

[a]Standards are based on Colorado Department of Public Health and Environment, Water Quality Control Division Drinking Water Standards dated January 19, 2005, U.S. EPA National Safe Drinking Water Standards, and U.S. EPA Region 8 Baseline Water Sampling Criteria

Notes:
NS = No Standard Available
ml = milliliter
mg/l = milligrams per liter or parts per million (ppm)
pCi/l = picocuries per liter
NA = No Analysis
CaCO3 = Calcium carbonate
ug/l = micrograms per liter or parts per billion (ppb)

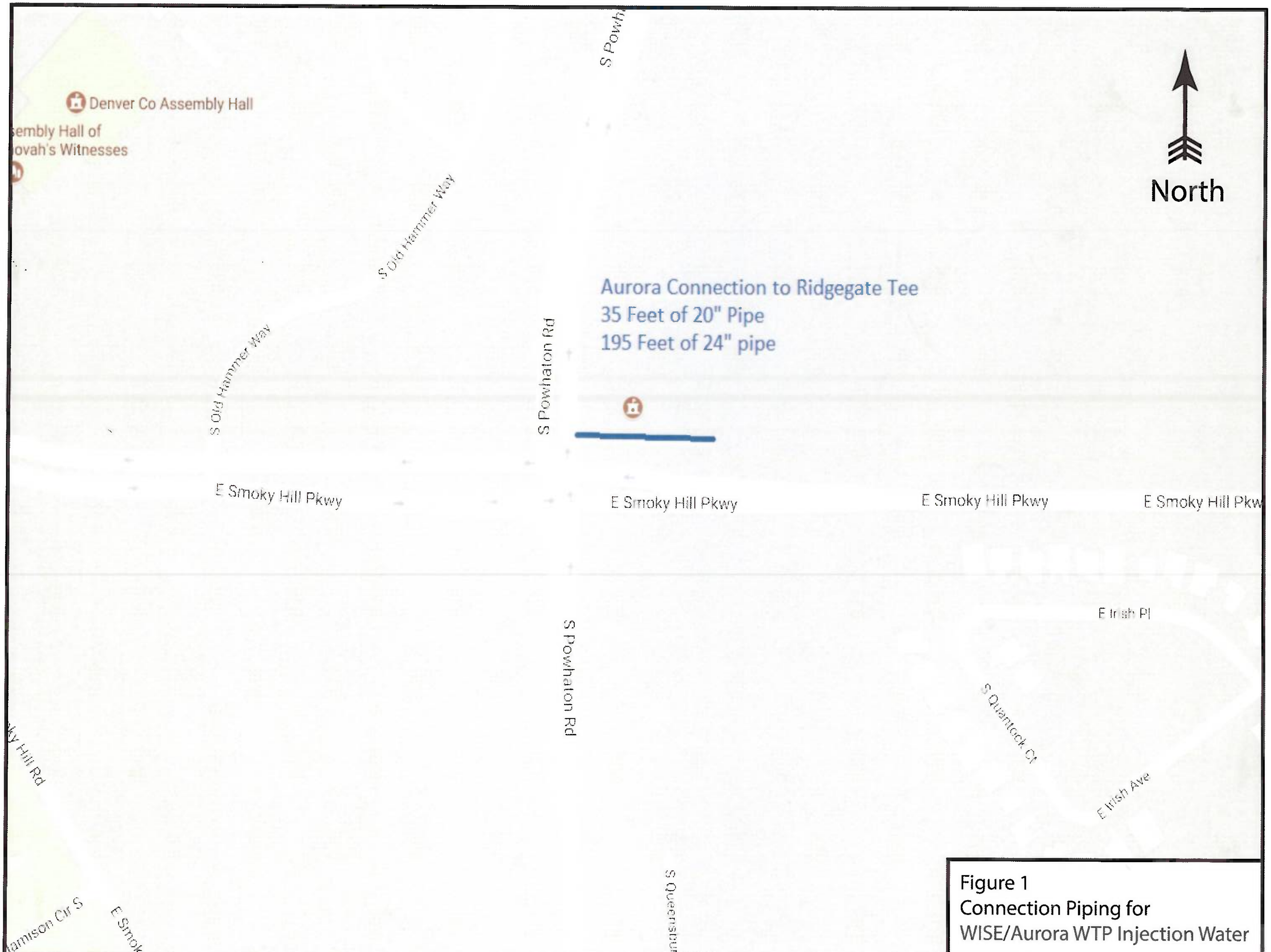


Figure 1
Connection Piping for
WISE/Aurora WTP Injection Water

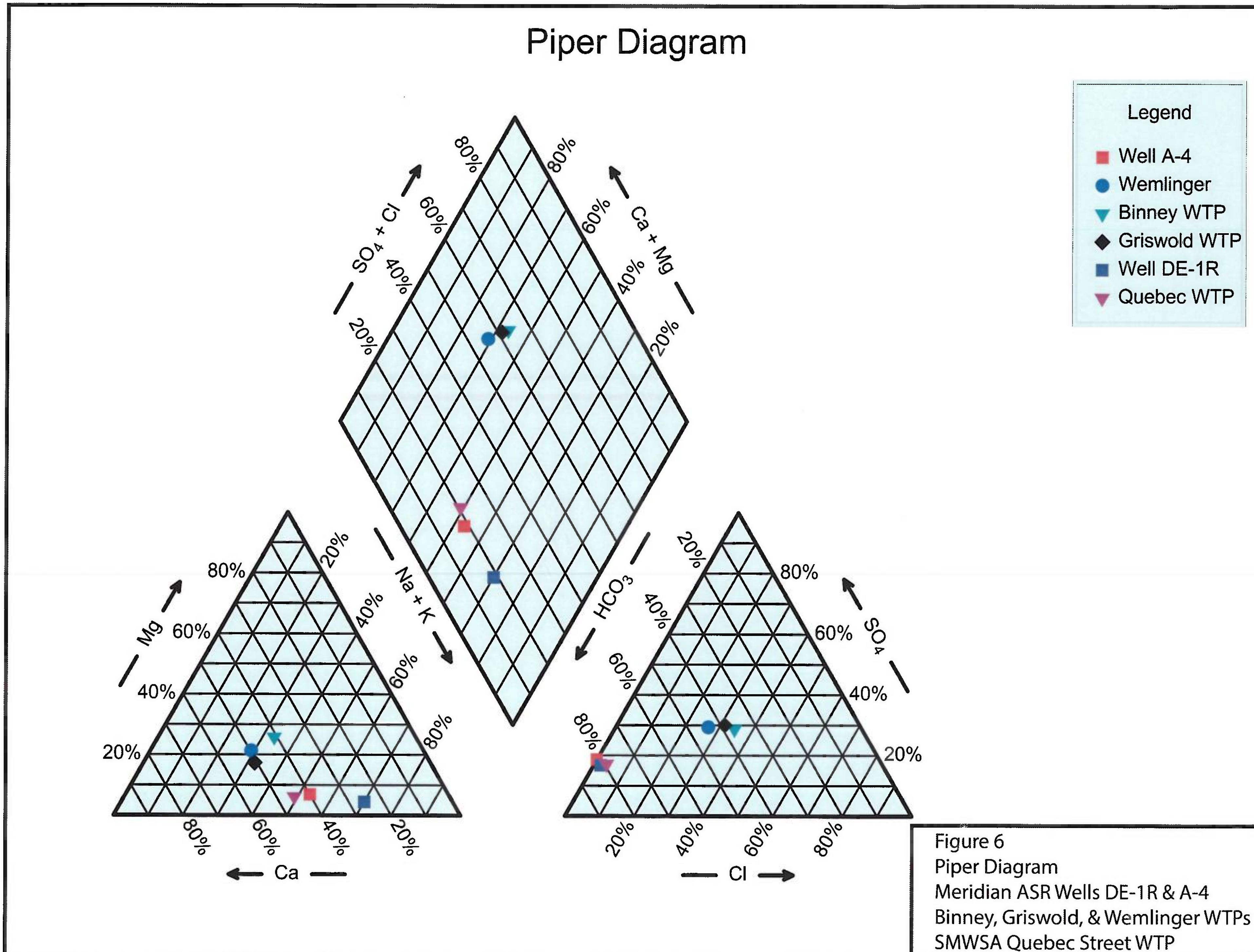


Figure 6
Piper Diagram
Meridian ASR Wells DE-1R & A-4
Binney, Griswold, & Wemlinger WTPs
SMWSA Quebec Street WTP

HEMENWAY GROUNDWATER ENGINEERING, Inc.

TRANSMITTAL

TO: EPA Region 8
1595 Wynkoop Street
Denver, CO 80202-1129

FROM: Courtney Hemenway
Hemenway Groundwater
Engineering, Inc.
17011 Lincoln Avenue, PMB 416
Parker, CO 80134

ATTN: Sarah Bahrman

DATE: September 19, 2017

RE: Meridian Metropolitan District EPA Second Supplemental Data Request ASR Pilot Test Letter

PROJECT NUMBER: CO-0002-16

WE ARE SENDING YOU:

♦ ATTACHED | UNDER SEPARATE COVER VIA

SHOP DRAWINGS | DOCUMENTS | TRACINGS

PRINTS | SPECIFICATIONS | CATALOGS

COPY OF LETTER | OTHER:

QUANTITY	DESCRIPTION
1	MMD EPA Second Supplemental Data Request ASR Pilot Test Letter with Attachments A & B, Figures 1- 6

IF MATERIAL RECEIVED IS NOT AS LISTED, PLEASE NOTIFY US AT ONCE

REMARKS:

Please review the attached supplemental data requested for the Rule Authorization for ASR operations in Meridian Denver Well DE-1R and Arapahoe Well A-4.

COPY TO: Randy Gabriel/Meridian Metropolitan District
Mason H. Brown/Carlson, Hammond & Paddock, LLC

September 19, 2017

CO-0002-16

Sarah Bahrman
U.S. Environmental Protection Agency, Region 8
MAIL CODE 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202

Hemenway Groundwater Engineering, Inc.

Dear Sarah:

Subject: Second Supplemental Data Request for the Rule Authorization for Underground Injection at Meridian Metropolitan District Denver Well DE-1R and Arapahoe Well A-4

As you requested in your email dated June 26, 2017, I am submitting responses to several requests for supplemental data regarding the proposed Aquifer Storage and Recovery (ASR) Pilot Test Program for Meridian Metropolitan District (MMD). This is a supplemental data request for the pending Rule Authorization for ASR injection operations for two wells for MMD. One well is completed in the Denver formation (Well DE-1R) and one in the Arapahoe formation (Well A-4). The following are the requests by the Environmental Protection Agency (EPA) and the corresponding responses from MMD:

1. **Request**: Please provide a detailed description of the treatment train at the East Cherry Creek Valley Facility (ECCV) and each Aurora Water Treatment Plants (WTPs): Wemlinger, Binney, and Griswold. Include a description of the raw water sources and any pretreatment (e.g. riverbank filtration), as well as individual treatment processes (including where and what types of treatment chemicals are routinely added.)

   Response: This request was forwarded on to Aurora for response for the three Aurora WTPS. Attachment A is Aurora's responses to these data requests. With respect to the Water Infrastructure and Supply Efficiency (WISE) ECCV Quebec Street WTP, the following information was supplied by South Metropolitan Water Supply Authority (SMWSA) WISE Partnership:

   a. The Quebec Street WISE/ECCV WTP is an 8 Million Gallon per Day (MGD) treatment facility.

   b. Source water for the WISE/ECCV WTP is groundwater from ECCV Denver Basin groundwater wells.

   c. There is no pretreatment prior to the water entering the WTP.

   d. The treatment processes are disinfection, filtration, and final disinfection.

   e. Chemicals used in the treatment process, purpose, and feed points are:

i. Sodium Hypochlorite: Primary disinfection at the raw water feed point

ii. Liquid Ammonium Sulfate: Final disinfection at the filter effluent feed point

iii. Polymer: Backwash Equalization Basin settling prior to recycling water; Backwash system feed point

2. **Request:** Please describe how each of the three treatment plants influence distribution of treated water to the injection sites. Please also describe how and when those flow conditions would change such that water from the other treatment plants might be injected, and how often these alternate conditions may occur (e.g. one facility down).

   Response: Aurora's response in Attachment A addresses these operational issues. In general, any of the three Aurora WTPs may provide water for injection at the MMD well sites. However, the Binney WTP will be the primary source of water from Aurora's treated potable water supply system. Initially, water from the WISE/ECCV WTP will be used for injection at the MMD wells.

3. **Request:** Provide a schematic that clearly demonstrates how treated water from each of the treatment plants would flow to the proposed injection well locations, as well as a description of whether flow from each facility is based on distribution system pressure or physically controlled by valves. Also, include transmission line lengths as well as the location of water storage tanks and major transmission line connections along the flow path (to give an indication of travel time between treatment plant and injection site).

   Response: As included in Response 2, water from the three Aurora WTPs will be distributed throughout Aurora's potable water supply system. However, the transmission of the water to the MMD injection wells will be initiated at a common connection point located near the intersection of South Powhaton Road and East Smoky Hill Parkway (see Figure 1). From that connection point, water from the Aurora WTPs will follow transmission pipelines to the west to a connection point at MMD as shown in Figure 2. At Smoky Hill and E-470, SMWSA has a 2 million-gallon (MG) potable water storage tank (see Figure 2). For most WISE water deliveries, the water will bypass the storage tank location. However, in some situations the water will be temporarily stored in the tank prior to delivery to MMD.

   From the SMWSA connection at MMD near E-470 and Liberty Boulevard (see Figure 2), the water is directly piped to both proposed injection wells (Denver Well DE-1R and Arapahoe Well A-4). The length of the MMD piping to the individual wells are shown in Figure 3.

Initial deliveries of WISE water will be derived from the Quebec Street WISE/ECCV WTP. A schematic of the pipelines for delivery of water from this source to the SMWSA/MMD connection point is shown in Figure 4.

With respect to the control of the flow of the water to the well, water will be delivered to each of the two MMD wells at system pressure in the pipeline from the SMWSA connection point to the wells. The line pressure at the wellheads will be less than 20 pounds per square inch (psi). In addition, flow into the wells is controlled by a downhole flow control valve that maintains positive pressure in the column pipes in the wells during injection. No cascading water or cavitation will be permitted during injection into the wells.

4. **Request:** Confirm that water transported from the four treatment plants to the Meridian and Rangeview Water Districts will be injected directly into the wells without any further treatment. Confirm that water from the ECCV Plant may be transported to the Rangeview Metropolitan District as well.

   Response: There will be no additional treatment of the water delivered from the three Aurora WTPs or the Quebec Street WISE/ECCV WTP prior to injection into the two proposed injection wells for MMD (Well DE-1R and A-4) or into the proposed injection well (A-5) for Rangeview. Figure 5 shows the transmission piping schematic for water delivers from the Quebec Street WISE/ECCV WTP to the Rangeview SMWSA/WISE connection point near the intersection of South Powhaton Road and East Smoky Hill Parkway (see Figure 1).

5. **Request:** Provide additional nitrosamine data that was collected outside of the Unregulated Contaminant Monitoring Rule (UCMR) data.

   Response: Aurora water utilities responded that no additional nitrosamine sample data is available. In addition, no additional nitrosamine sample data is available from SMWSA regarding water from the Quebec Street WISE/ECCV WTP.

6. **Request:** To evaluate the impact of injected water(s) on the receiving formation(s), plot the major anions and cations from the analyses of the injectate, the receiving formation fluids, and mixed fluids on a trilinear diagram or Piper diagram. Provide a brief assessment regarding the chemistry of the injected water and any expected reactions with the receiving formation fluids (e.g. mineral dissolution, precipitation, etc.).

   Response: Attached is a trilinear plot or Piper diagram (Figure 6) for MMD Wells DE-1R and A-4. The plot shows the injection water and the native groundwater at each of the well sites. No mixed water samples were available for analysis illustration on the Piper diagrams.

> Attachment B contains the geochemical analyses regarding the mixing of the various injection waters (three Aurora WTPs and the Quebec Street WISE/ECCV WTP) with the native groundwater from the Denver formation (Well DE-1R) and the Arapahoe formation (Well A-4). The analyses were completed using the United States Geological Survey (USGS) PHREEQC geochemical model. Dr. Jens Blotevogel of Blotevogel Environmental Consulting completed the analyses. The results showed no major concerns for the potential precipitation of minerals from the mixed waters or the potential for dissolution of formation minerals."

With respect to the ASR proposed testing at MMD Arapahoe Well A-4, three injection/storage/recovery cycle tests will be completed during the pilot testing. The first of the three cycle tests will be of a short duration. Typically, the first injection is continuous for three days and then the water is immediately recovered with little storage time in the Arapahoe aquifer. This test provides for a simple confirmation of the water quality compatibility assessments made prior to the testing. The second cycle test will run with seven days of injection followed by seven days of storage in the aquifer prior to recovery. This test is used to further confirm the water compatibility issues related to ASR operations, as well as to identify the effects of storing the injected water in the Arapahoe aquifer. If the first two tests indicate that ASR operations are feasible at the site, an extended-duration test will be conducted to determine the actual operating criteria for long-term ASR operations in the wells. This test usually runs injection up to 45 days continuously with storage in the aquifer for 30 to 60 days prior to recovery. All of the proposed testing is predicated on the availability and delivery schedule for the WISE water to be used in the ASR testing.

HGE will be responsible for coordinating and/or collecting the water quality information and samples during ASR testing phases. Field water quality data sheets will be prepared and posted in the existing well vault at Well A-4. Field sampling protocols will be communicated to all personnel participating in the collection of field data from the ASR tests. Daily flow rates (injection and pumping), flow totalizer meter readings, and well water levels will be collected on a daily basis. Water level data for each of the tests will be automatically recorded by a surface data logger and pressure transducers installed in the well. Field water parameters of temperature, pH, and specific conductance will be collected by HGE staff on a frequent basis throughout the ASR test phases (injection and pumping). In addition to the field water quality data collection, sand content measurements will be recorded on a daily basis during all recovery (pumping) phases of the testing. All field data sheets will be posted in the well vault for inspection by MMD, CDPHE, EPA, or other regulatory agency personnel.

In the initial application for Rule Authorization, MMD proposed a water quality sampling scheduled based HGE's normal requirements for analyzing and evaluating ASR operations for MMD. In addition to field water quality measurements, the proposed laboratory water quality sampling schedule was as follows:

> "Two comprehensive laboratory water quality samples will be collected during the three ASR test cycles to identify the quality of the recovered water prior to incorporation into the potable water supply system. The recovered water will be discharged to the raw water transmission pipeline and treated at the MMD treatment facility. The two comprehensive water quality samples will be collected during the first and third recovery cycles to provide geochemical information and to verify the quality of the water being discharged to the raw water system prior to treatment. HGE will notify MMD staff prior to each sampling event to coordinate any split sample requirements during the ASR testing. The preliminary list of water quality constituents required for analysis during the testing is shown in Table 1. Additional samples for analyses of major cations and anions will be collected on a variable basis if the preliminary test results indicate additional test data are required. Samples collected by HGE will be analyzed by Eurofins Eaton Analytical Laboratories in Lakewood, Colorado.
>
> During the first ASR cycle test, one water quality sample will be collected for analysis by Eurofins Eaton Analytical Laboratories during the recovery pumping. For the second ASR cycle test, field water quality samples will be recorded during the recovery phase at approximately 50 and 90 percent of the injected volume recovered. During the third and final ASR cycle test, one laboratory water quality sample will be collected during the recovery pumping at 50 percent of the injected volume recovered. Field water quality samples will be collected at the wellhead during the injection phase of the cycle test to evaluate any changes to the injection water quality throughout the three injection cycles.

TABLE 1
Water Quality Sample Parameters

Total Alkalinity	Oil and Grease
Total Organic Carbon (TOC)	Total Plate Count
Total Coliform	PH
Fecal Coliform	Orthophosphate
Chloride	Total Phosphorus
Chemical Oxygen Demand (COD)	Total Dissolved Solids (TDS)
Color	Sulfate
Cyanide	Sulfide
Fluoride	Surfactants
Fecal Streptococcus	Turbidity
Total Organic Halide (TOX)	Dissolved and Total Metals
Calcium Hardness	Regulated Volatile Organic Compounds (VOCs)
Total Hardness	Nonregulated VOCs
Langelier Saturation Index	Pesticides
Ammonia, Nitrogen	Herbicides
Total Kjeldahl Nitrogen	Gross Alpha and Beta
Nitrate, Nitrogen	Radium 226

TABLE 1
Water Quality Sample Parameters

Nitrite, Nitrogen	Radium 228
Odor	Radon
N-nitroso-dimethylamine (NDMA)	N-nitroso-di-n-butylamine (NDBA)

MMD proposes to add additional nitrosamine sampling to the initial water quality sampling schedule. One water quality sample will be collected during each injection and recovery phase of the proposed ASR testing at MMD and analyzed for nitrosamines. Nitrosamine samples will also be added to any sample collected for anion and cation analyses. At a minimum, the collection of water quality samples for nitrosamine evaluation will collected at the following schedule:

Additional Nitrosamine Sample Schedule for MMD ASR Cycle Testing

ASR Cycle Test Number	Injection Volume Percentage (%)	Recovery Volume Percentage (%)
1	50	50
2	50	50
		90
3	50	25
	90	50
		90

Please do not hesitate to contact me if you have any questions regarding the information presented in this letter or regarding the proposed injection operations. If everything is in order for the proposed injection program, please notify Randy Gabriel at MMD and me as soon as possible of your issuing a Rule Authorization for these wells.

Sincerely,
Hemenway Groundwater Engineering, Inc.

Courtney Hemenway
President
HGE/MMDEPAPILOTASRPROG
c: Eric Hecox & Randy Gabriel/Meridian Metropolitan District
Mason H. Brown/Carlson, Hammond & Paddock, LLC

Attachment A
Aurora Water Treatment Facilities Information

Wemlinger:

Wemlinger is an 80 MGD direct filtration facility. Sources for Wemlinger are Rampart Reservoir and Aurora Reservoir.

There is no pretreatment prior to entering the facility.

The treatment processes are disinfection, coagulation, flocculation, filtration, and final disinfection.

Chemicals used in the treatment process, purpose and feed point are:

Chlorine dioxide-primary disinfection-Raw Water feed point
Chlorine-primary disinfection-Raw Water feed point
Aluminum Sulfate-coagulation-Raw Water feed point
Cationic polymer-coagulant aid-Raw Water feed point
Sodium hydroxide-pH adjustment-Raw Water feed point
Non-ionic polymer-filter aid-Filter Influent channel feed point
Aqua ammonia-final disinfection-Filter effluent structure feed point
Chlorine-final disinfection-Filter effluent structure feed point

Griswold:

Griswold is an 80 MGD direct filtration facility. Sources for Griswold are Rampart Reservoir, Quincy Reservoir and the Cherry Creek Well field.

There is no pretreatment prior to entering the facility.

The treatment processes are disinfection, coagulation, flocculation, filtration, and final disinfection.

Chemicals used in the treatment process, purpose and feed point are:

Chlorine dioxide-primary disinfection-Raw Water feed point
Chlorine-primary disinfection-Raw Water feed point
Aluminum Sulfate-coagulation-Raw Water feed point
Cationic polymer-coagulant aid-Raw Water feed point
Sodium hydroxide-pH adjustment-Combined filter effluent structure feed point
Aqua ammonia-final disinfection-Combined filter effluent structure feed point
Chlorine-final disinfection- Combined filter effluent structure feed point

Binney:

Binney is a 50 MGD conventional water purification facility. Sources for Binney are Aurora Reservoir and South Platte River north of Denver.

There is no pretreatment on the water from Aurora Reservoir.
The water from the North Campus is collected through Riverbank Filtration (RBF). This is a natural pretreatment process. North Campus water can also be directed to an aquifer recharge and recovery process which is a natural pretreatment process. The water is then collected and pumped to the purification plant.

The processes at Binney are separate until the end for the two sources of water. The processes for the two sources are:

Aurora Reservoir: Coagulation, flocculation, sedimentation, filtration with biologically active filters, disinfection, final disinfection.

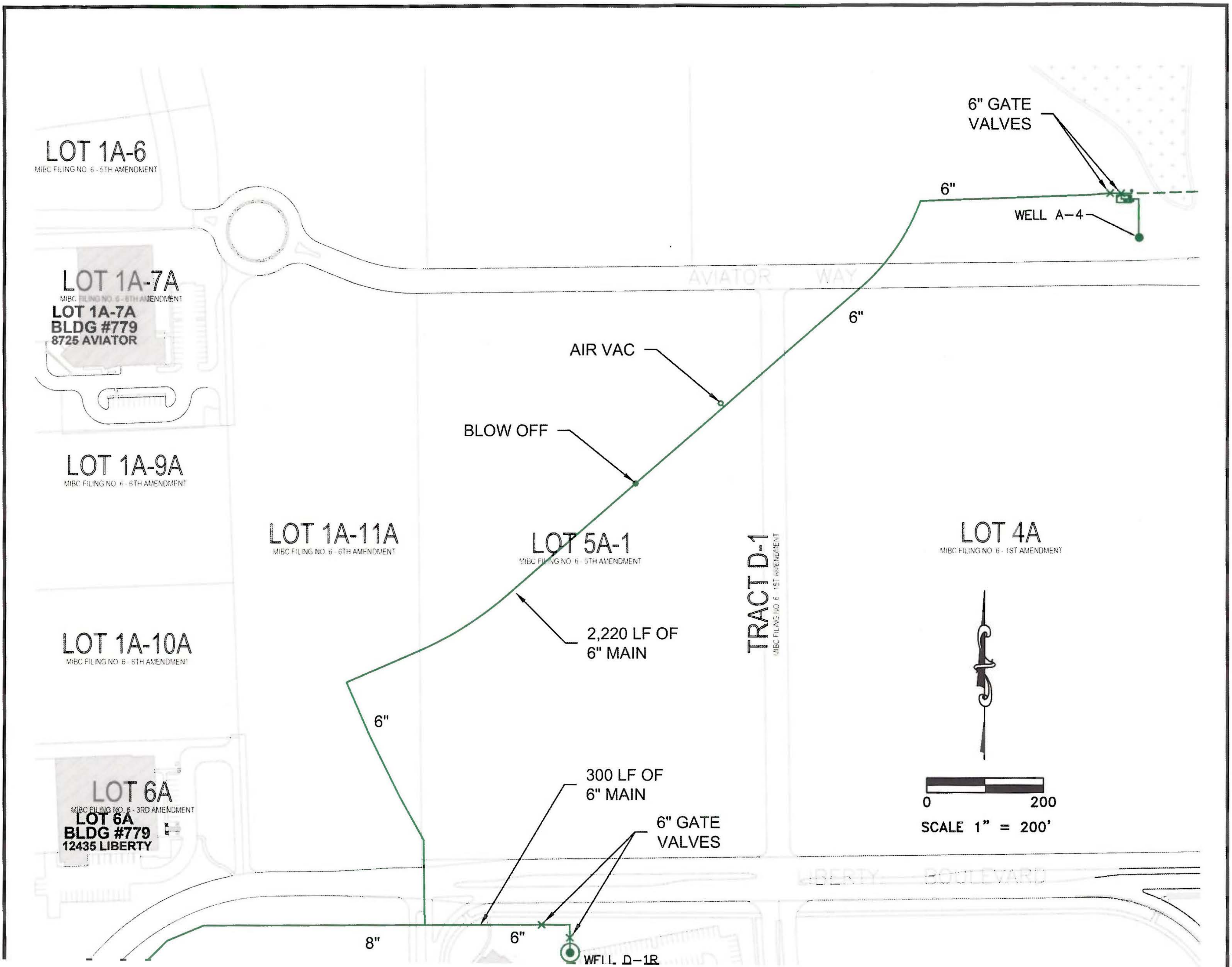
North Campus: Coagulation, precipitive softening, flocculation sedimentation, recarbonation, advanced oxidation, filtration with biologically active filters, absorption, disinfection and final disinfection.

Chemical used in treatment for Binney are:

Aurora Reservoir train
Potassium permanganate-oxidation-Raw Water influent feed point
Ferric chloride-coagulation--Raw Water influent feed point
Cationic polymer-coagulant aid-Raw Water influent feed point
Anionic polymer-filter aid- Flocculation basin influent feed point
Non-ionic polymer-filter aid-Filter influent channel feed point

South Platte train
Sodium hydroxide-softening-Softening reactor feed point
Ferric Chloride-coagulation-Softening reactor feed point
Cationic polymer-coagulation- Softening solids contactor feed point
Carbon dioxide-recarbonation- Post softening solids contactor feed point
Hydrogen peroxide-advanced oxidation-Pre UV advanced oxidation feed point
Non-ionic polymer-filter aid-South Platte filter influent channel feed point

Combined
Chlorine- final disinfection-Chlorine contact basin effluent feed point
Aqua ammonia final disinfection-Chlorine contact basin effluent feed point
Sodium hydroxide-pH adjustment-Chlorine contact basin effluent feed point


6" GATE VALVES
6"
WELL A-4
LOT 1A-6
MIBC FILING NO. 6 - 5TH AMENDMENT
LOT 1A-7A
MIBC FILING NO. 6 - 6TH AMENDMENT
LOT 1A-7A
BLDG #779
8725 AVIATOR
AVIATOR WAY
6"
AIR VAC
BLOW OFF
LOT 1A-9A
MIBC FILING NO. 6 - 6TH AMENDMENT
LOT 1A-11A
MIBC FILING NO. 6 - 6TH AMENDMENT
LOT 5A-1
MIBC FILING NO. 6 - 5TH AMENDMENT
TRACT D-1
MIBC FILING NO. 6 - 1ST AMENDMENT
LOT 4A
MIBC FILING NO. 6 - 1ST AMENDMENT
2,220 LF OF 6" MAIN
LOT 1A-10A
MIBC FILING NO. 6 - 6TH AMENDMENT
6"
LOT 6A
MIBC FILING NO. 6 - 3RD AMENDMENT
LOT 6A
BLDG #779
12435 LIBERTY
300 LF OF 6" MAIN
6" GATE VALVES
0
200
SCALE 1" = 200'
LIBERTY BOULEVARD
8"
6"
WELL D-1R

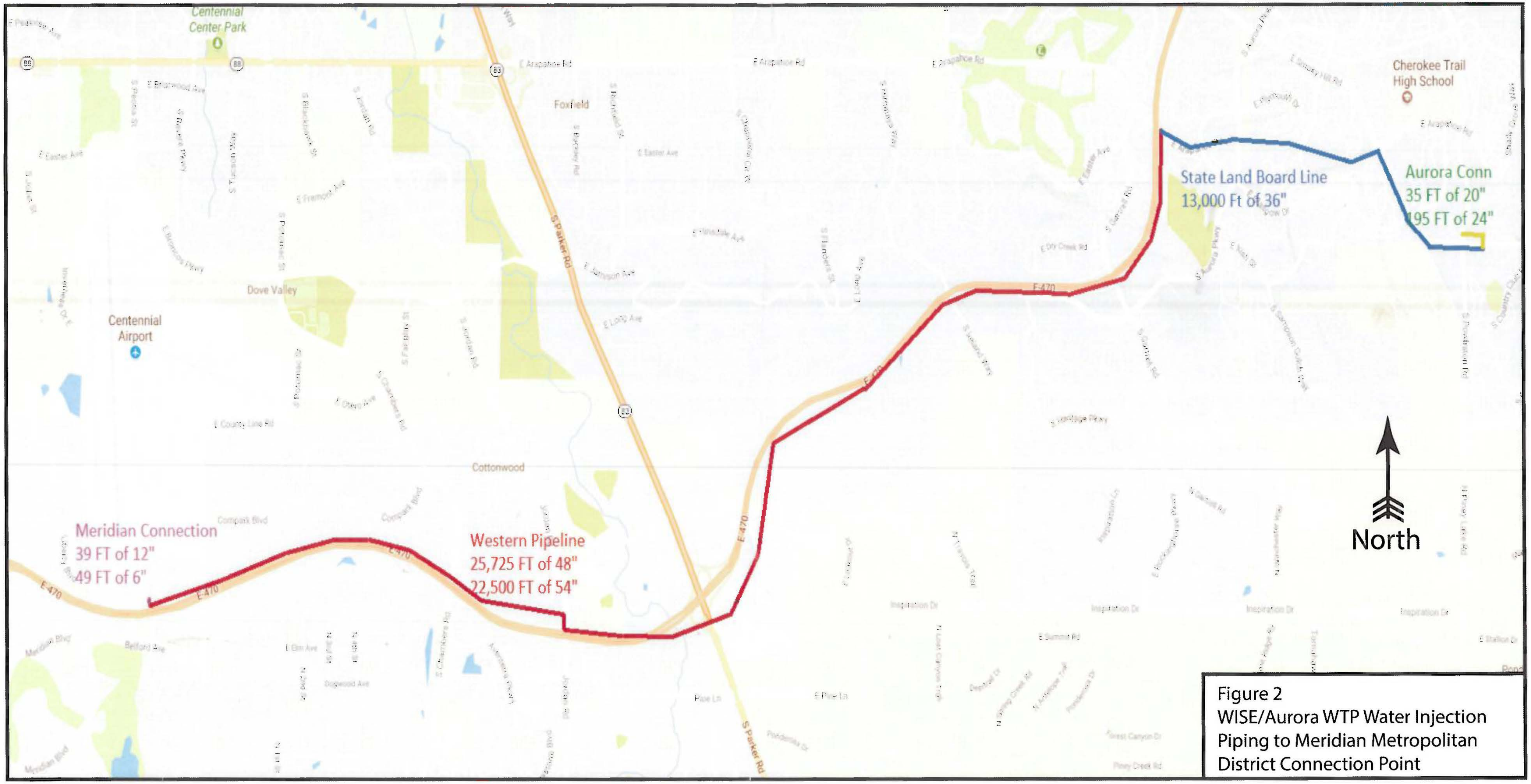


Figure 2
WISE/Aurora WTP Water Injection
Piping to Meridian Metropolitan
District Connection Point

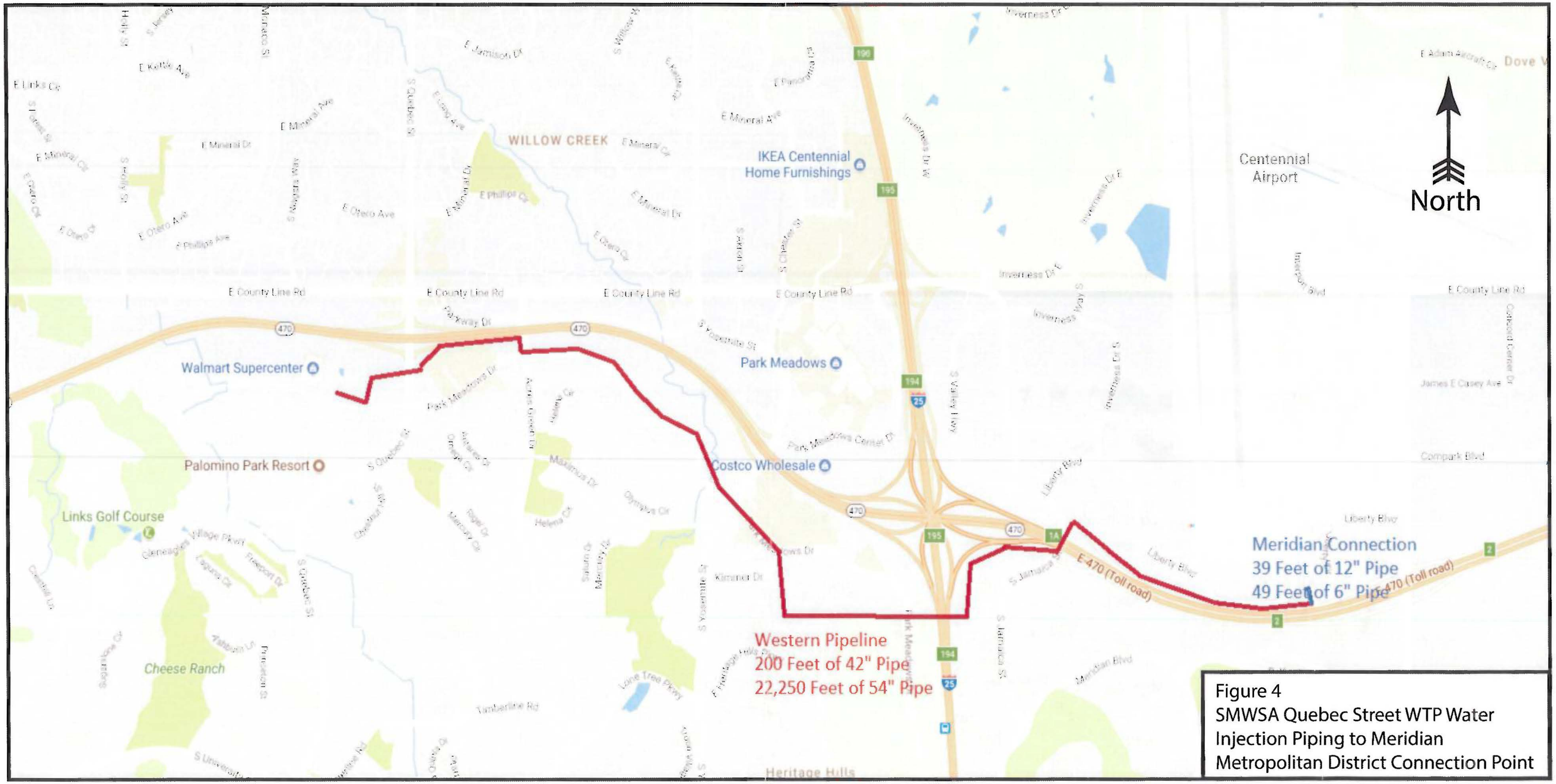


Figure 4
SMWSA Quebec Street WTP Water Injection Piping to Meridian Metropolitan District Connection Point

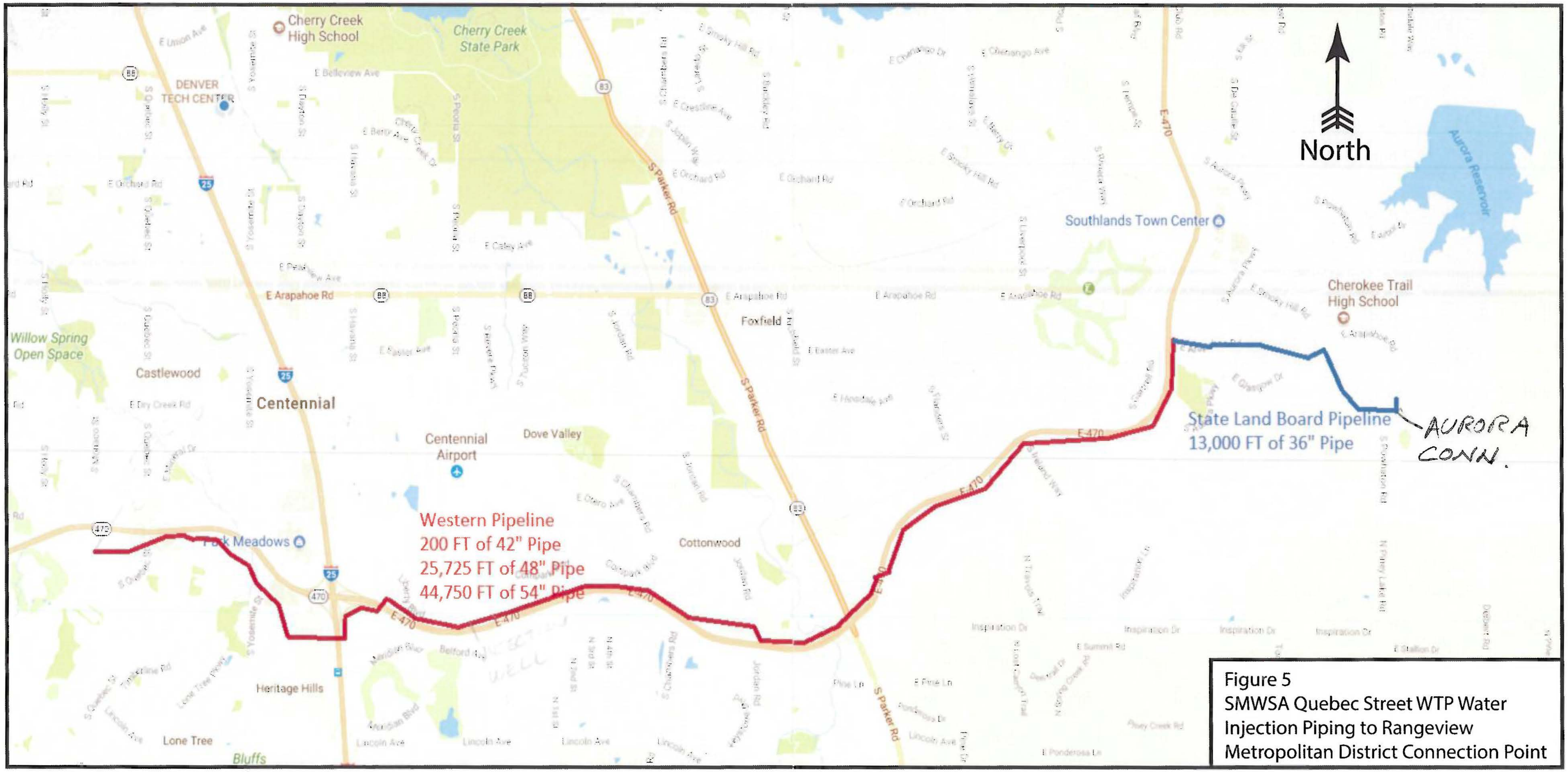


Figure 5
SMWSA Quebec Street WTP Water Injection Piping to Rangeview Metropolitan District Connection Point

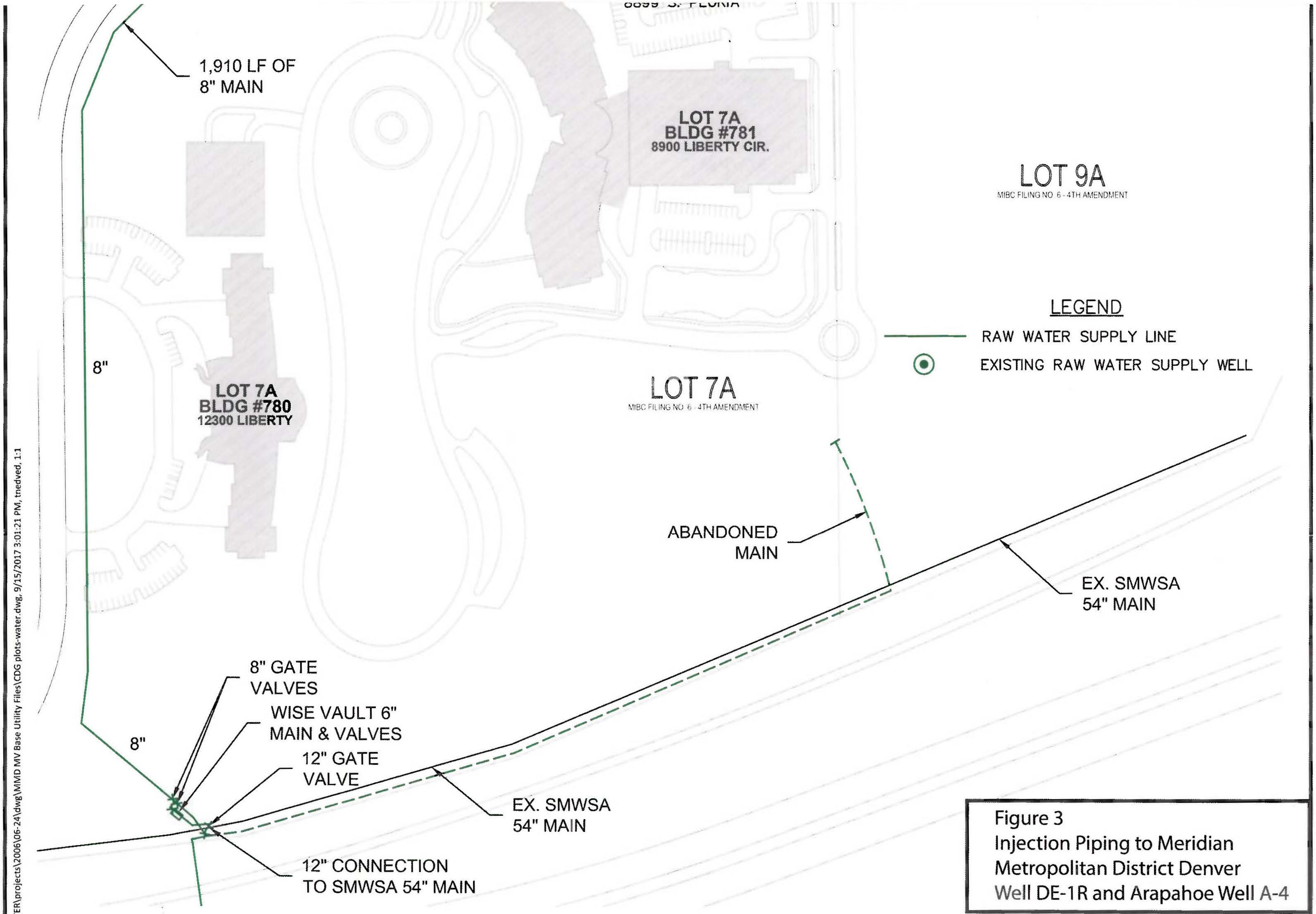


Figure 3
Injection Piping to Meridian Metropolitan District Denver Well DE-1R and Arapahoe Well A-4

NOTE: THIS PLAN IS SCHEMATIC. THIS PLAN MAKES NO STATEMENT REGARDING THE ACTUAL PRESENCE OR ABSENCE OF ANY SERVICE OR UTILITY LINE. CONTROLLED UNDERGROUND EXPLORATORY EFFORT TOGETHER WITH "UNCC" MARKINGS IS REQUIRED TO DETERMINE THE FULL EXTENT OF UNDERGROUND SERVICE AND UTILITY LINES. CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO (811). FUTURE LINE INFORMATION IS UNAVAILABLE AT THIS TIME.

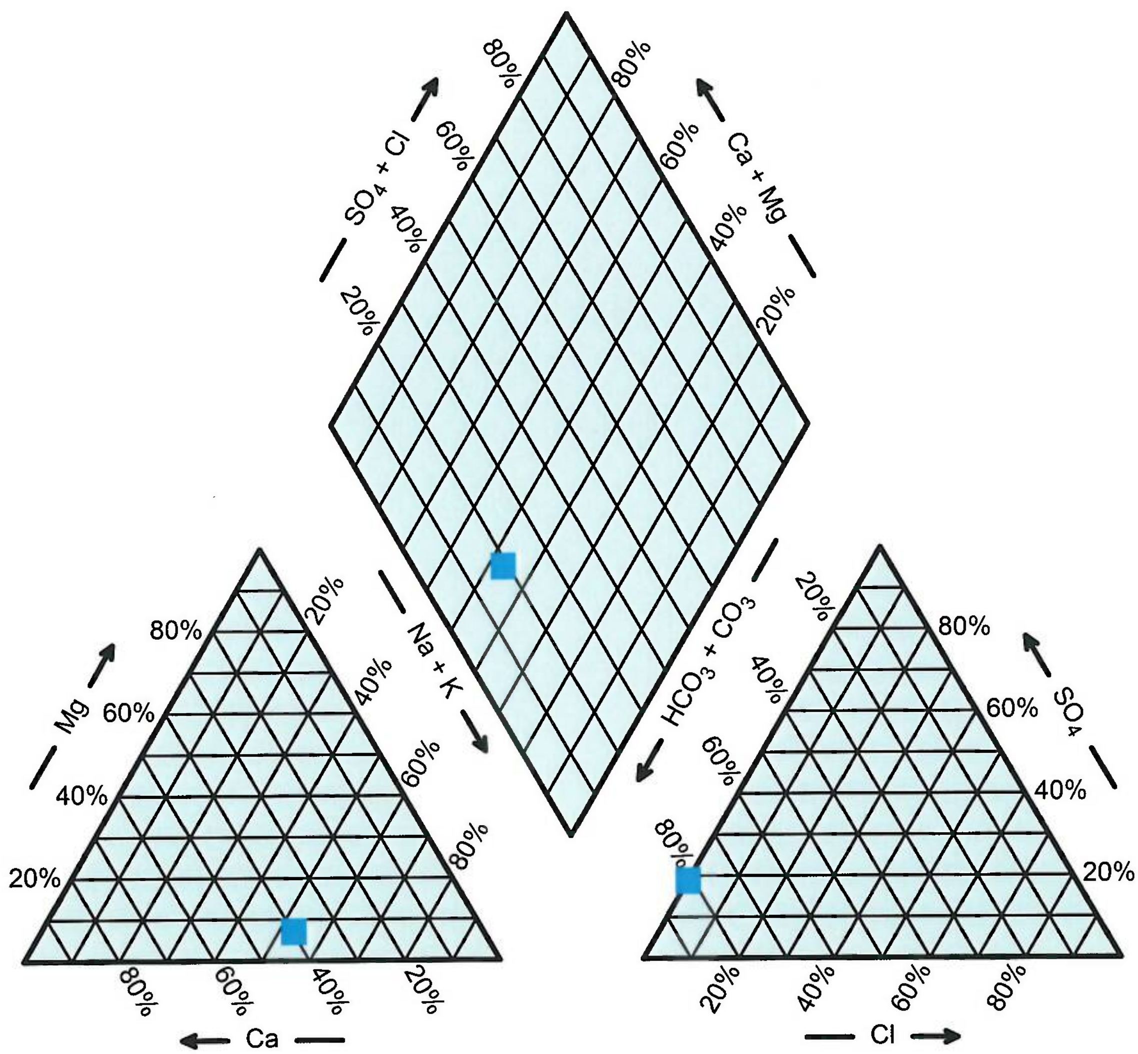
WISE/A4/DE-1R CONNECTION SYSTEM

MERIDIAN
INTERNATIONAL BUSINESS CENTER
Meridian Metropolitan District

Baseline Water Quality Data and Piper Diagram

Arapahoe Well A-4

Piper Diagram



Meridian Metropolitan District
Arapahoe Well A-4

Table 4-1			
Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			**Well A-4**
Sample Date			**November 16, 2016**
Sample Time			**10:00 am**
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[b]**	**Results**
Total Metals (Inorganics) and Miscellaneous Parameters			
Alkalinity, Total	mg/l as CaCO3	0.006	100
Aluminum	µg/l	200	<20
Ammonia Nitrogen	mg/l as N	0.01	0.14
Antimony	µg/l	6	<1
Arsenic	µg/l	10	<1
Asbestos	MFL	7	<0.18
Barium	µg/l	2,000	150
Beryllium	µg/l	4	<1
Bicarbonate	mg/l as CaCO3	NS	100
Carbonate	mg/l as CO3	NS	NA
Boron	mg/l	6	<0.05
Cadmium	µg/l	5	<0.5
Calcium	mg/l	NS	21
Chlorine Dioxide	mg/l	0.8	<0.24
Chloride	mg/l	250	<1
Chlorite	mg/l	1.0	<0.01
Chromium	µg/l	100	<1
Copper	µg/l	1,300	2.5
Cyanide	mg/l	0.2	<0.025
Cyanogen Chloride	mg/l	0.4	<0.35
Fluoride	mg/l	4.0 (2.0 Secondary MCL)	1.1
Free Chlorine	mg/l	4	<0.1
Iron	mg/l	0.3	0.13
Lead	µg/l	15	0.80
Magnesium	mg/l	NS	2.2
Manganese	µg/l	300	46
Mercury	µg/l	2	<0.2
Molybdenum	µg/l	40	<2
Nitrate	mg/l as N	10	<0.1
Nitrite	mg/l as N	1	<0.05
Nickel	µg/l	100	<5
Laboratory pH	pH units	6.5 – 8.5	8.1
Potassium	mg/l	NS	3.6
Selenium	µg/l	50	<5
Silver	µg/l	100	<0.5
Sodium	mg/l	NS	30
Strontium	mg/l	4	0.31
Sulfate	mg/l	250	18
Thallium	µg/l	2	<1
Uranium	µg/l	30	<1
Zinc	µg/l	2000	<20

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			Well A-4
Sample Date			November 16, 2016
Sample Time			10:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[b]**	**Results**
Radio Chemistry			
Gross Alpha, Total	pCi/l	15	<3
Gross Beta, Total	pCi/l	50 pCi/l Trigger Level	6.4
Radium-226, Total	pCi/l	(5 for 226 + 228)	<1
Radium-228, Total	pCi/l	(5 for 226 + 228)	<1
Organochlorine Pesticides/PCBs (EPA 505)			
Alachlor (Alanex)	µg/l	2	<0.1
Aldrin	µg/l	0.2	<0.01
Chlordane	µg/l	2	<0.1
Dieldrin	µg/l	0.2	<0.01
Endrin	µg/l	2	<0.01
Heptachlor	µg/l	0.4	<0.01
Heptachlor Epoxide	µg/l	0.2	<0.01
Lindane (gamma-BHC)	µg/l	0.2	<0.01
Methoxychlor	µg/l	40	<0.05
PCB 1016 Aroclor	µg/l	0.5	<0.08
PCB 1221 Aroclor	µg/l	0.5	<0.1
PCB 1232 Aroclor	µg/l	0.5	<0.1
PCB 1242 Aroclor	µg/l	0.5	<0.1
PCB 1248 Aroclor	µg/l	0.5	<0.1
PCB 1254 Aroclor	µg/l	0.5	<0.1
PCB 1260 Aroclor	µg/l	0.5	<0.1
Total PCBs	µg/l	0.5	<0.1
Toxaphene	µg/l	3	<0.5
Haloacetic Acids (SM 6251B)			
Dibromoacetic acid	µg/l	NS	<1
Dichloroacetic acid	µg/l	NS	<1
Monobromoacetic acid	µg/l	NS	<1
Monochloroacetic acid	µg/l	NS	<2
Total Haloacetic acids (HAA5)	µg/l	60	<2
Trichloroacetic acid	µg/l	NS	<1
EDB/DBCP/HAN (EPA 551.1)			
Dibromochloropropane (DBCP)	µg/l	NS	<0.01
Ethylene Dibromide (EDB)	µg/l	NS	<0.01
Base/Neutral/Acid Extractables (EPA 625)			
1,2,4-Trichlorobenzene	µg/l	70	<5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			Well A-4
Sample Date			November 16, 2016
Sample Time			10:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[b]**	**Results**
1,2-Diphenyhydrazine	µg/l	NS	<10
2,4,5-Trichlorophenol	µg/l	NS	<5
2,4,6-Trichlorophenol	µg/l	2	<5
2,4-Dichlorophenol	µg/l	20	<5
2,4-Dimethylphenol	µg/l	NS	<5
2,4-Dinitrophenol	µg/l	NS	<50
2,4-Dinitrotoluene	µg/l	5	<5
2,6-Dinitrotoluene	µg/l	5	<5
2-Chloronapthalene	µg/l	NS	<5
2-Chlorophenol	µg/l	40	<5
2-Methylnaphtalene	µg/l	NS	<5
2-Methyphenol	µg/l	NS	<5
2-Nitroaniline	µg/l	NS	<10
2-Nitrophenol	µg/l	NS	<5
3,3-Dichlorobenzidine	µg/l	NS	<50
3-Nitroaniline	µg/l	NS	<20
4,6-Dintro-o-cresol	µg/l	NS	<50
4-Bromophenylphenylether	µg/l	NS	<5
4-Chloroaniline	µg/l	NS	<5
4-Chlorophenylphenylether	µg/l	NS	<5
4-Methylphenol	µg/l	NS	<5
4-Nitroaniline	µg/l	NS	<20
4-Nitrophenol	µg/l	60	<10
Acenaphthene	µg/l	400	<5
Acenaphtylene	µg/l	NS	<5
Aniline	µg/l	NS	<10
Anthracene	µg/l	2000	<5
Benzidine	µg/l	NS	<50
Benzo(a)anthracene	µg/l	NS	<5
Benzo(a)pyrene	µg/l	0.2	<5
Benzo(b)fluoranthene	µg/l	NS	<5
Benzo(g,h,i)perylene	µg/l	NS	<10
Benzo(k)fluoranthene	µg/l	NS	<5
Benzoic Acid	µg/l	NS	<50
Benzyl Alcohol	µg/l	NS	<5
bis(2-Chloroethoxy)methane	µg/l	NS	<10
bis(2-Chloroethyl)ether	µg/l	NS	<10
bis(2-Chloroisopropyl)ether	µg/l	NS	<10
Butylbenzylphthalate	µg/l	1000	<5
Chrysene	µg/l	NS	<5
Dibenz(a,h)anthracene	µg/l	NS	<10
Dibenzofuran	µg/l	NS	<5
Diethylphthalate	µg/l	6000	<5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			Well A-4
Sample Date			November 16, 2016
Sample Time			10:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[b]**	**Results**
Dimethylphthalate	µg/l	NS	<5
Di-n-butylphthalate	µg/l	800	<10
Di-n-octylphthalate	µg/l	NS	<10
Fluoranthene	µg/l	NS	<5
Fluorene	µg/l	200	<5
Hexachlorobenzene	µg/l	1	<5
Hexachlorobutadiene	µg/l	2	<10
Hexachlorocyclopentadiene	µg/l	50	<10
Hexachloroethane	µg/l	1	<5
Indeno(1,2,3-c,d)pyrene	µg/l	NS	<10
Isophorone	µg/l	100	<5
Naphthalene	µg/l	100	<5
Nitrobenzene	µg/l	NS	<5
N-Nitroso-dimethylamine	µg/l	NS	<5
N-Nitrosodi-n-propylamine	µg/l	NS	<5
N-Nitrosodiphenylamine	µg/l	NS	<5
p-Chloro-m-cresol	µg/l	NS	<5
Pentachlorophenol	µg/l	1	<20
Phenanthrene	µg/l	NS	<5
Phenol	µg/l	2000	<5
Pyrene	µg/l	200	<5
Nitrosamines (EPA 521)			
N-Nitrosodibutylamine (NDBA)	ng/l	NS	<2
N-Nitrosodiethylamine (NDEA)	ng/l	NS	<2
N-Nitroso-dimethylamine (NDMA)	ng/l	NS	<2
N-Nitrosodi-n-propylamine (NDPA)	ng/l	NS	<2
N-Nitrosomethylethylamine (NMEA)	ng/l	NS	<2
N-Nitrosomorpholine	ng/l	NS	<2
N-Nitrosopiperidine (NPIP)	ng/l	NS	<2
N-Nitrosopyrollidine (NPYR)	ng/l	NS	<2
Aldicarbs (EPA 531.2)			
3-Hyroxycarbofuran	µg/l	NS	<0.5
Aldicarb (Temik)	µg/l	3	<0.5
Aldicarb sulfone	µg/l	2	<0.5
Aldicarb sulfoxide	µg/l	4	<0.5
Baygon	µg/l	NS	<0.5
Carbaryl	µg/l	NS	<0.5
Carbofuran (Furadan)	µg/l	NS	<0.5
Methiocarb	µg/l	NS	<0.5
Methomyl	µg/l	200	<0.5
Oxamyl (Vydate)	µg/l	7	<0.5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			Well A-4
Sample Date			November 16, 2016
Sample Time			10:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[b]**	**Results**
EPA 525.2 Extended List			
1,2,4,5-Tetrachlorobenzene	µg/l	NS	<0.5
1-Methylnaphthalene	µg/l	NS	<0.1
2,2,3,3,4,4,6-Heptachlorobiphenyl	µg/l	NS	<0.5
2,2,3,3,4,5,6,6-Octachlorobiphenyl	µg/l	NS	<0.5
2,2,3,4,6-Pentachlorobiphenyl	µg/l	NS	<0.5
2,2,4,4,5,6-Hexachlorobiphenyl	µg/l	NS	<0.1
2,2,4,4-Tetrachlorobiphenyl	µg/l	NS	<0.1
2,3-Dichlorobiphenyl	µg/l	NS	<0.1
2,4,5-Trichlorbiphenyl	µg/l	NS	<0.1
2,4-Dinitrotoluene	µg/l	5	<0.5
2,6-Dinitrotoluene	µg/l	5	<0.5
2-Chlorobiphenyl	µg/l	NS	<0.1
2-methylnaphthalene	µg/l	NS	<0.1
4,4-DDD	µg/l	NS	<0.1
4,4-DDE	µg/l	NS	<0.1
4,4-DDT	µg/l	NS	<0.1
Acenaphthene	µg/l	400	<0.1
acenapthylene	µg/l	NS	<0.1
Acetochlor	µg/l	NS	<0.1
Alachlor	µg/l	2	<0.1
Aldrin	µg/l	0.2	<0.1
Alpha-BHC	µg/l	NS	<0.1
Alpha-Chlordane	µg/l	2	<0.1
Ametryn	µg/l	NS	<0.1
Anilazine	µg/l	NS	<1
Anthracene	µg/l	2000	<0.1
Aspon	µg/l	NS	<0.1
Atrazine	µg/l	3	<0.1
Azinphos-ethyl	µg/l	NS	<0.5
Azinphos-methyl	µg/l	NS	<0.5
Bendiocarb	µg/l	NS	<0.5
Benfluralin	µg/l	NS	<0.1
Benzo(a)anthracene	µg/l	NS	<0.1
Benzo(a)pyrene	µg/l	0.2	<0.02
Benzo(b)fluoranthene	µg/l	NS	<0.1
Benzo(g,h,i)perylene	µg/l	NS	<0.1
Benzo(k)fluoranthene	µg/l	NS	<0.1
beta-BHC	µg/l	NS	<0.1
Bolstar	µg/l	NS	<0.1
Bromacil	µg/l	NS	<0.1
Butachlor	µg/l	NS	<0.1
Butylate	µg/l	NS	<0.1

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			Well A-4
Sample Date			November 16, 2016
Sample Time			10:00 am
Test Description	Units	Primary/Secondary Drinking Water Limits[b]	Results
Butylbenzylphthalate	µg/l	1000	<1
Carbophenothion	µg/l	NS	<0.5
Carboxin	µg/l	700	<0.1
Chlorfenvinphos	µg/l	NS	<5
Chlorbenzilate	µg/l	NS	<0.1
Chloroneb	µg/l	NS	<0.1
Chlorpropylate	µg/l	NS	<0.1
Chlorothalonil	µg/l	100	<0.1
Chlorpropham	µg/l	NS	<0.1
Chlorpyrifos	µg/l	NS	<0.1
Chlorpyifos methyl	µg/l	NS	<0.5
Chrysene	µg/l	NS	<0.1
cis-Noachlor	µg/l	NS	<0.1
cis-Permethrin	µg/l	NS	<0.1
Clomazone	µg/l	NS	<0.1
Clopyralid	µg/l	NS	<10
Coumaphos	µg/l	NS	<0.1
Crotoxyphos	µg/l	NS	<0.5
Cycloate	µg/l	NS	<0.1
DCPA	µg/l	70	<0.1
delta-BHC	µg/l	NS	<0.1
Demeton O	µg/l	NS	<0.5
Demeton S	µg/l	NS	<0.5
Desethylatrazine	µg/l	NS	<1
Desisopropylatrazine	µg/l	NS	<1
Di(2-ethylhexyl)adipate	µg/l	400	<0.6
Di(2-Ethylhexy)phthalate	µg/l	6	<0.6
Diazinon	µg/l	1	<0.1
Dibenzo(a,h)anthracene	µg/l	NS	<0.1
Dichlobenil	µg/l	NS	<0.1
Dichlofenthion	µg/l	NS	<0.1
Dichloran	µg/l	NS	<0.5
Dichlorvos	µg/l	NS	<0.1
Dicrotophos	µg/l	NS	<0.5
Dieldrin	µg/l	0.2	<0.1
Diethylphthalate	µg/l	6000	<1
Dimethoate	µg/l	NS	<0.5
Dimethylphthalate	µg/l	NS	<1
Di-n-butylphthalate	µg/l	800	<2
Di-n-octylphthalate	µg/l	NS	<2
Dioxathion	µg/l	NS	<0.5
Diphenamid	µg/l	200	<0.1
Disulfoton	µg/l	0.7	<0.1

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			Well A-4
Sample Date			November 16, 2016
Sample Time			10:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[b]**	**Results**
Disulfoton Sulfone	μg/l	NS	<0.1
Disulfoton Sulfoxide	μg/l	NS	<10
Endosulfan I	μg/l	NS	<0.1
Endosulfan II	μg/l	NS	<0.1
Endosulfan Sulfate	μg/l	NS	<0.1
Endrin	μg/l	2	<0.0097
Endrin Aldehyde	μg/l	NS	<0.5
E-Phosphamidon	μg/l	NS	<0.5
EPN	μg/l	NS	<0.5
EPTC	μg/l	NS	<0.1
Erucylamide	μg/l	NS	<5
Esfenvalerate	μg/l	NS	<0.5
Ethalfluralin	μg/l	NS	<0.1
Ethion	μg/l	NS	<5
Ethofumesate	μg/l	NS	<0.5
Ethoprop	μg/l	NS	<0.1
Etridiazole	μg/l	NS	<0.1
Famphur	μg/l	NS	<0.1
Fenamiphos	μg/l	0.7	<0.1
Fenarimol	μg/l	NS	<1
Fenitrothion	μg/l	NS	<0.5
Fenoxaprop-ethyl	μg/l	NS	<1
Fensulfothion	μg/l	NS	<0.5
Fenthion	μg/l	NS	<0.1
Fluazifop-butyl	μg/l	NS	<0.1
Fluchloralin	μg/l	NS	<0.1
Fluometuron	μg/l	NS	<0.5
Fluoranthene	μg/l	NS	<0.1
Fluorene	μg/l	200	<0.1
Fluridone	μg/l	NS	<1
Fonofos	μg/l	NS	<0.1
Gamma-BHC	μg/l	0.2	<0.02
Gamma-Chlordane	μg/l	2	<0.1
Heptachlor	μg/l	0.4	<0.04
Heptachlor Epoxide	μg/l	0.2	<0.02
Hexachlorobenzene	μg/l	1	<0.1
Hexachlorocyclopentadiene	μg/l	50	<0.1
Hexazinone	μg/l	400	<0.1
Indeno(1,2,3,c,d)Pyrene	μg/l	NS	<0.1
Iprodione	μg/l	NS	<0.5
Isofenphos	μg/l	NS	<0.5
Isphorone	μg/l	NS	<0.1
Leptophos	μg/l	NS	<0.5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			Well A-4
Sample Date			November 16, 2016
Sample Time			10:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[b]**	**Results**
Malathion	µg/l	NS	<0.1
Metalaxyl	µg/l	NS	<0.5
Methoxychlor	µg/l	40	<0.1
Methyl paraoxon	µg/l	NS	<0.5
Methyl Parathion	µg/l	NS	<0.5
Metolachlor	µg/l	700	<0.1
Metribuzin	µg/l	70	<0.1
Metsulfuron-methyl	µg/l	NS	<10
Mevinphos	µg/l	NS	<0.1
MGK 264 isomer a	µg/l	NS	<0.1
MGK 264 isomer b	µg/l	NS	<0.1
MGK 326	µg/l	NS	<0.1
Mirex	µg/l	NS	<0.5
Molinate	µg/l	NS	<0.1
Monocrotophos	µg/l	NS	<0.5
Naled	µg/l	NS	<0.5
Naphthalene	µg/l	100	<0.1
Napropamide	µg/l	NS	<0.1
Norflurazon	µg/l	NS	<1
Oryzalin	µg/l	NS	<10
Oxadiazon	µg/l	NS	<0.1
Oxyxhlordane	µg/l	NS	<0.1
Oxyfluorfen	µg/l	NS	<0.5
Parathion	µg/l	NS	<0.5
Pebulate	µg/l	NS	<0.1
Pendimethalin	µg/l	NS	<0.1
Pentachlorobenzene	µg/l	NS	<0.5
Pentachloronitrobenzene	µg/l	NS	<0.5
Pentachlorophenol	µg/l	1	<1
Phenanthrene	µg/l	NS	<0.1
Phorate	µg/l	NS	<0.1
Phosmet	µg/l	NS	<0.5
Profluralin	µg/l	NS	<0.1
Prometryn	µg/l	NS	<0.1
Pronamide	µg/l	100	<0.1
Propachlor	µg/l	100	<0.1
Propanil	µg/l	NS	<0.5
Propazine	µg/l	10	<0.1
Propiconazole isomer a	µg/l	NS	<5
Propiconazole isomer	µg/l	NS	<5
Prothiofos	µg/l	NS	<0.5
Pyrene	µg/l	200	<0.1
Simazine	µg/l	4	<0.07

Table 4-1			
Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			Well A-4
Sample Date			November 16, 2016
Sample Time			10:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[b]**	**Results**
Simetryn	µg/l	NS	<0.1
Stirofos	µg/l	NS	<0.1
Sulfotep	µg/l	NS	<0.5
Tebuthiuron	µg/l	500	<10
TEPP	µg/l	NS	<1
Terbacil	µg/l	90	<0.1
Terbufos	µg/l	0.4	<0.5
Terbutryn	µg/l	NS	<0.1
Thiabendazole	µg/l	NS	<10
Thiobencarb	µg/l	NS	<0.1
Thionazin	µg/l	NS	<0.5
trans-Nonachlor	µg/l	NS	<0.1
trans-Permethrin	µg/l	NS	<0.1
Triadimefon	µg/l	NS	<0.5
Tribufos	µg/l	NS	<0.1
Trichloronate	µg/l	NS	<0.5
Tricylazole	µg/l	NS	<1
Trifluralin	µg/l	10	<0.1
Vernolate	µg/l	NS	<0.1
Vinclozolin	µg/l	NS	<0.5
Z-Phosphamidon	µg/l	NS	<0.5
Volatile Organics (EPA 524.2)			
1,1,1,2-Tetrachloroethane	µg/l	70	<0.5
1,1,1-Trichloroethane	µg/l	200	<0.5
1,1,2,2-Tetrachloroethane	µg/l	40	<0.5
1,1,2-Trichloroethane	µg/l	5	<0.5
1,1-Dichloroethane	µg/l	NS	<0.5
1,1-Dichloroethylene	µg/l	7	<0.5
1,1-Dichloropropene	µg/l	NS	<0.5
1,2,3-Trichlorobenzene	µg/l	NS	<0.5
1,2,3-Trichloropropane	µg/l	20	<0.5
1,2,4-Trichlorobenzene	µg/l	70	<0.5
1,2,4-Trimethylbenzene	µg/l	NS	<0.5
1,2-Dichloroethane	µg/l	5	<0.5
1,2-Dichloropropane	µg/l	5	<0.5
1,3,5-Trimethylbenzene	µg/l	NS	<0.5
1,3-Dichloropropane	µg/l	NS	<0.5
2,2-Dichloropropane	µg/l	NS	<0.5
2-Butanone (MEK)	µg/l	4000	<5
2-Hexanone	µg/l	NS	<10
4-Methyl-2-Pentanone (MIBK)	µg/l	NS	<5
Acetone	µg/l	6000	<10

Table 4-1			
Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			Well A-4
Sample Date			November 16, 2016
Sample Time			10:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[b]**	**Results**
Benzene	µg/l	5	<0.5
Bromobenzene	µg/l	60	<0.5
Bromochloromethane	µg/l	90	<0.5
Bromodichloromethane	µg/l	20	<0.5
Bromoethane	µg/l	10	<0.5
Bromoform	µg/l	200	<0.5
Bromomethane (Methyl Bromide)	µg/l	NS	<0.5
Carbon disulfide	µg/l	NS	<0.5
Carbon Tetrachloride	µg/l	5	<0.5
Chlorobenzene	µg/l	100	<0.5
Chlorodibromomethane	µg/l	60	<0.5
Chloroethane	µg/l	NS	<0.5
Chloroform (Trichloromethane)	µg/l	70	<0.5
Chloromethane (Methyl Chloride)	µg/l	400	<0.5
cis-1,2-Dichloroethylene	µg/l	70	<0.5
cis-1,3-Dichloropropene	µg/l	NS	<0.5
Dibromomethane	µg/l	NS	<0.5
Dichlorodifluoromethane	µg/l	1000	<0.5
Dichloromethane	µg/l	5	<0.5
Di-isopropyl ether	µg/l	NS	<3
Ethyl benzene	µg/l	700	<0.5
Hexachlorobutadiene	µg/l	2	<0.5
Isopropylbenzene	µg/l	800	<0.5
m,p-Xylenes	µg/l	10,000 (Total Xylenes)	<0.5
m-Dichlorobenzene (1,3-DCB)	µg/l	600	<0.5
Methyl Tert-butyl ether (MTBE)	µg/l	NS	<0.5
Naphthalene	µg/l	100	<0.5
n-Butylbenzene	µg/l	NS	<0.5
n-Propylbenzene	µg/l	NS	<0.5
o-Chlorotoluene	µg/l	100	<0.5
o-Dichlorobenzene (1,2-DCB)	µg/l	600	<0.5
o-Xylene	µg/l	10,000 (Total Xylenes)	<0.5
p-Chlorotoluene	µg/l	100	<0.5
p-Dichlorobenzene (1,4-DCB)	µg/l	75	<0.5
p-Isopropyltoluene	µg/l	NS	<0.5
sec-Butylbenzene	µg/l	NS	<0.5
Styrene	µg/l	100	<0.5
tert-amyl Methyl Ether	µg/l	NS	<3
tert-Butyl Ethyl Ether	µg/l	NS	<3
tert-Butylbenzene	µg/l	NS	<0.5
Tetrachloroethylene (PCE)	µg/l	5	<0.5
Toluene	µg/l	1000	<0.5
Total 1,3-Dichloropropene	µg/l	NS	<0.5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Arapahoe Well A-4			
			Meridian Metropolitan Districts Arapahoe Well A-4 Baseline Water Quality Sample
Sample ID			Well A-4
Sample Date			November 16, 2016
Sample Time			10:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[b]**	**Results**
Total THM	µg/l	80	<0.5
Total xylenes	µg/l	10000	<0.5
trans 1,2-Dichloroethylene	µg/l	100	<0.5
trans 1,3-Dichloropropene	µg/l	NS	<0.5
Trichloroethylene (TCE)	µg/l	5	<0.5
Trichlorofluoromethane	µg/l	2000	<0.5
Trichlorotrifluoroethane (Freon 113)	µg/l	NS	<0.5
Vinyl chloride (VC)	µg/l	2	<0.3
Acrolein/Acrylonitrile (EPA 624)			
Acrolein	µg/l	NS	<2
Acrylonitrile	µg/l	6	<2

[a]Standards are based on Colorado Department of Public Health and Environment, Water Quality Control Division Drinking Water Standards dated January 19, 2005, U.S. EPA National Safe Drinking Water Standards, and U.S. EPA Region 8 Baseline Water Sampling Criteria

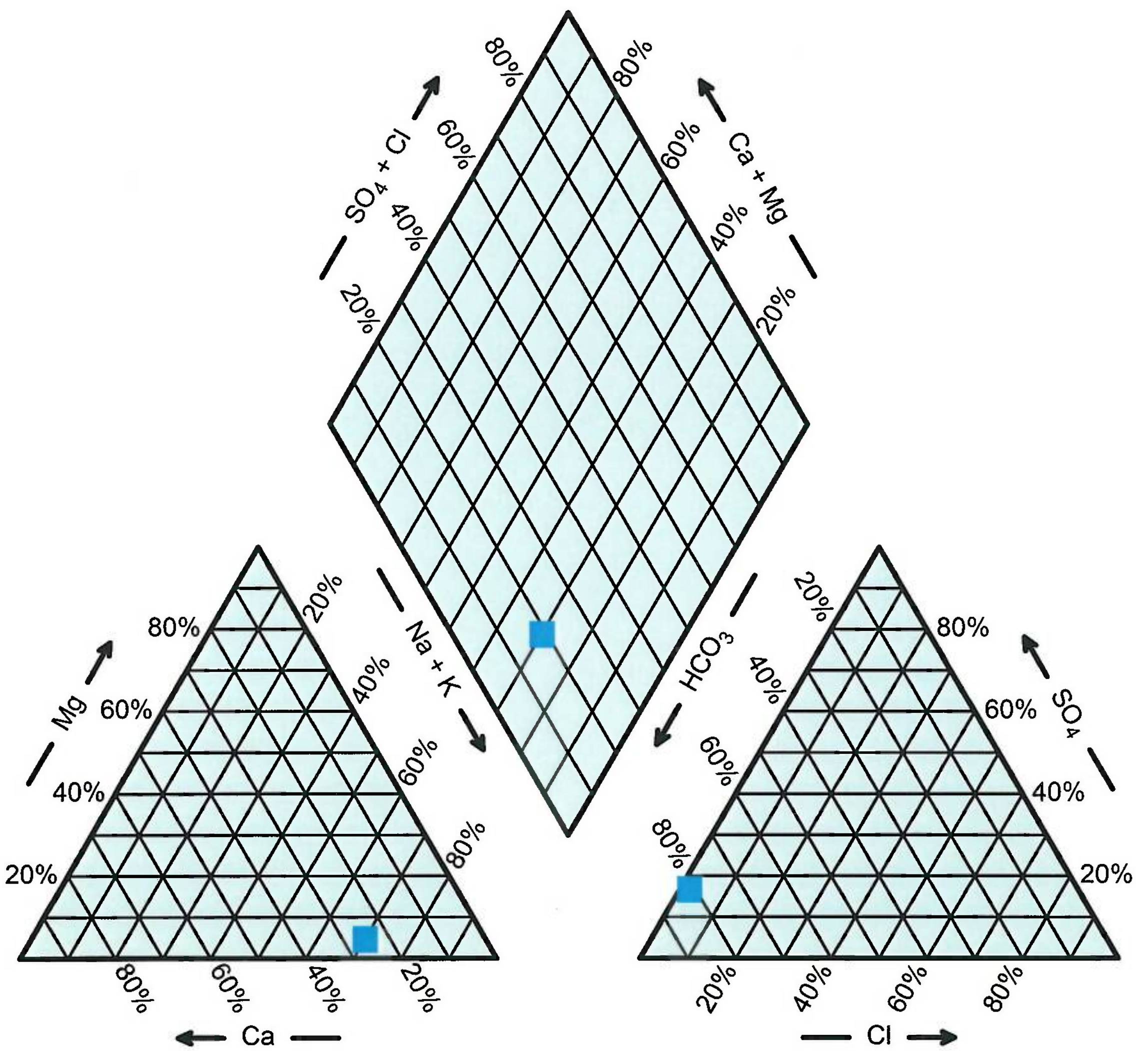
Notes:
NS = No Standard Available
ml = milliliter
mg/l = milligrams per liter or parts per million (ppm)
pCi/l = picocuries per liter
NA = No Analysis
CaCO3 = Calcium carbonate
ug/l = micrograms per liter or parts per billion (ppb)

Water Quality Data

Baseline Water Quality Data and Piper Diagram

Denver Well DE-1R

Piper Diagram



Meridian Metropolitan District
Denver Well DE-1R

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Total Metals (Inorganics) and Miscellaneous Parameters			
Alkalinity, Total	mg/l as CaCO3	0.006	130
Aluminum	µg/l	200	<20
Ammonia Nitrogen	mg/l as N	0.01	<0.05
Antimony	µg/l	6	<1
Arsenic	µg/l	10	<1
Asbestos	MFL	7	<0.18
Barium	µg/l	2,000	110
Beryllium	µg/l	4	<1
Bicarbonate	mg/l as CaCO3	NS	130
Carbonate	mg/l as CO3	NS	NA
Boron	mg/l	6	0.060
Cadmium	µg/l	5	<0.5
Calcium	mg/l	NS	17
Chlorine Dioxide	mg/l	0.8	<0.24
Chloride	mg/l	250	1.9
Chlorite	mg/l	1.0	<0.01
Chromium	µg/l	100	<1
Copper	µg/l	1,300	<2.0
Cyanide	mg/l	0.2	<0.025
Cyanogen Chloride	mg/l	0.4	<0.35
Fluoride	mg/l	4.0 (2.0 Secondary MCL)	1.2
Free Chlorine	mg/l	4	<0.1
Iron	mg/l	0.3	0.050
Lead	µg/l	15	<0.5
Magnesium	mg/l	NS	1.8
Manganese	µg/l	300	22
Mercury	µg/l	2	<0.2
Molybdenum	µg/l	40	2.0
Nitrate	mg/l as N	10	<0.1
Nitrite	mg/l as N	1	<0.05
Nickel	µg/l	100	<5
Laboratory pH	pH units	6.5 – 8.5	8.2
Potassium	mg/l	NS	3.0
Selenium	µg/l	50	<5
Silver	µg/l	100	<0.5
Sodium	mg/l	NS	52
Strontium	mg/l	4	0.30
Sulfate	mg/l	250	21
Thallium	µg/l	2	<1
Uranium	µg/l	30	<1
Zinc	µg/l	2000	<20

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Radio Chemistry			
Gross Alpha, Total	pCi/l	15	3.1
Gross Beta, Total	pCi/l	50 pCi/l Trigger Level	<3
Radium-226, Total	pCi/l	(5 for 226 + 228)	<1
Radium-228, Total	pCi/l	(5 for 226 + 228)	<1
Organochlorine Pesticides/PCBs (EPA 505)			
Alachlor (Alanex)	μg/l	2	<0.1
Aldrin	μg/l	0.2	<0.01
Chlordane	μg/l	2	<0.1
Dieldrin	μg/l	0.2	<0.01
Endrin	μg/l	2	<0.01
Heptachlor	μg/l	0.4	<0.01
Heptachlor Epoxide	μg/l	0.2	<0.01
Lindane (gamma-BHC)	μg/l	0.2	<0.01
Methoxychlor	μg/l	40	<0.05
PCB 1016 Aroclor	μg/l	0.5	<0.08
PCB 1221 Aroclor	μg/l	0.5	<0.1
PCB 1232 Aroclor	μg/l	0.5	<0.1
PCB 1242 Aroclor	μg/l	0.5	<0.1
PCB 1248 Aroclor	μg/l	0.5	<0.1
PCB 1254 Aroclor	μg/l	0.5	<0.1
PCB 1260 Aroclor	μg/l	0.5	<0.1
Total PCBs	μg/l	0.5	<0.1
Toxaphene	μg/l	3	<0.5
Haloacetic Acids (SM 6251B)			
Dibromoacetic acid	μg/l	NS	<1
Dichloroacetic acid	μg/l	NS	<1
Monobromoacetic acid	μg/l	NS	<1
Monochloroacetic acid	μg/l	NS	<2
Total Haloacetic acids (HAA5)	μg/l	60	<2
Trichloroacetic acid	μg/l	NS	<1
EDB/DBCP/HAN (EPA 551.1)			
Dibromochloropropane (DBCP)	μg/l	NS	<0.01
Ethylene Dibromide (EDB)	μg/l	NS	<0.01
Base/Neutral/Acid Extractables (EPA 625)			
1,2,4-Trichlorobenzene	μg/l	70	<5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	Units	Primary/Secondary Drinking Water Limits[a]	Results
1,2-Diphenyhydrazine	µg/l	NS	<10
2,4,5-Trichlorophenol	µg/l	NS	<5
2,4,6-Trichlorophenol	µg/l	2	<5
2,4-Dichlorophenol	µg/l	20	<5
2,4-Dimethylphenol	µg/l	NS	<5
2,4-Dinitrophenol	µg/l	NS	<50
2,4-Dinitrotoluene	µg/l	5	<5
2,6-Dinitrotoluene	µg/l	5	<5
2-Chloronapthalene	µg/l	NS	<5
2-Chlorophenol	µg/l	40	<5
2-Methylnaphtalene	µg/l	NS	<5
2-Methyphenol	µg/l	NS	<5
2-Nitroaniline	µg/l	NS	<10
2-Nitrophenol	µg/l	NS	<5
3,3-Dichlorobenzidine	µg/l	NS	<50
3-Nitroaniline	µg/l	NS	<20
4,6-Dintro-o-cresol	µg/l	NS	<50
4-Bromophenylphenylether	µg/l	NS	<5
4-Chloroaniline	µg/l	NS	<5
4-Chlorophenylphenylether	µg/l	NS	<5
4-Methylphenol	µg/l	NS	<5
4-Nitroaniline	µg/l	NS	<20
4-Nitrophenol	µg/l	60	<10
Acenaphthene	µg/l	400	<5
Acenaphtylene	µg/l	NS	<5
Aniline	µg/l	NS	<10
Anthracene	µg/l	2000	<5
Benzidine	µg/l	NS	<50
Benzo(a)anthracene	µg/l	NS	<5
Benzo(a)pyrene	µg/l	0.2	<5
Benzo(b)fluoranthene	µg/l	NS	<5
Benzo(g,h,i)perylene	µg/l	NS	<10
Benzo(k)fluoranthene	µg/l	NS	<5
Benzoic Acid	µg/l	NS	<50
Benzyl Alcohol	µg/l	NS	<5
bis(2-Chloroethoxy)methane	µg/l	NS	<10
bis(2-Chloroethyl)ether	µg/l	NS	<10
bis(2-Chloroisopropyl)ether	µg/l	NS	<10
Butylbenzylphthalate	µg/l	1000	<5
Chrysene	µg/l	NS	<5
Dibenz(a,h)anthracene	µg/l	NS	<10
Dibenzofuran	µg/l	NS	<5
Diethylphthalate	µg/l	6000	<5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	Units	Primary/Secondary Drinking Water Limits[a]	Results
Dimethylphthalate	µg/l	NS	<5
Di-n-butylphthalate	µg/l	800	<10
Di-n-octylphthalate	µg/l	NS	<10
Fluoranthene	µg/l	NS	<5
Fluorene	µg/l	200	<5
Hexachlorobenzene	µg/l	1	<5
Hexachlorobutadiene	µg/l	2	<10
Hexachlorocyclopentadiene	µg/l	50	<10
Hexachloroethane	µg/l	1	<5
Indeno(1,2,3-c,d)pyrene	µg/l	NS	<10
Isophorone	µg/l	100	<5
Naphthalene	µg/l	100	<5
Nitrobenzene	µg/l	NS	<5
N-Nitroso-dimethylamine	µg/l	NS	<5
N-Nitrosodi-n-propylamine	µg/l	NS	<5
N-Nitrosodiphenylamine	µg/l	NS	<5
p-Chloro-m-cresol	µg/l	NS	<5
Pentachlorophenol	µg/l	1	<20
Phenanthrene	µg/l	NS	<5
Phenol	µg/l	2000	<5
Pyrene	µg/l	200	<5
Nitrosamines (EPA 521)			
N-Nitrosodibutylamine (NDBA)	ng/l	NS	<2
N-Nitrosodiethylamine (NDEA)	ng/l	NS	<2
N-Nitroso-dimethylamine (NDMA)	ng/l	NS	<2
N-Nitrosodi-n-propylamine (NDPA)	ng/l	NS	<2
N-Nitrosomethylethylamine (NMEA)	ng/l	NS	<2
N-Nitrosomorpholine	ng/l	NS	<2
N-Nitrosopiperidine (NPIP)	ng/l	NS	<2
N-Nitrosopyrollidine (NPYR)	ng/l	NS	<2
Aldicarbs (EPA 531.2)			
3-Hyroxycarbofuran	µg/l	NS	<0.5
Aldicarb (Temik)	µg/l	3	<0.5
Aldicarb sulfone	µg/l	2	<0.5
Aldicarb sulfoxide	µg/l	4	<0.5
Baygon	µg/l	NS	<0.5
Carbaryl	µg/l	NS	<0.5
Carbofuran (Furadan)	µg/l	NS	<0.5
Methiocarb	µg/l	NS	<0.5
Methomyl	µg/l	200	<0.5
Oxamyl (Vydate)	µg/l	7	<0.5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	Units	Primary/Secondary Drinking Water Limits[a]	Results
EPA 525.2 Extended List			
1,2,4,5-Tetrachlorobenzene	µg/l	NS	<0.5
1-Methylnaphthalene	µg/l	NS	<0.1
2,2,3,3,4,4,6-Heptachlorobiphenyl	µg/l	NS	<0.5
2,2,3,3,4,5,6,6-Octachlorobiphenyl	µg/l	NS	<0.5
2,2,3,4,6-Pentachlorobiphenyl	µg/l	NS	<0.5
2,2,4,4,5,6-Hexachlorobiphenyl	µg/l	NS	<0.1
2,2,4,4-Tetrachlorobiphenyl	µg/l	NS	<0.1
2,3-Dichlorobiphenyl	µg/l	NS	<0.1
2,4,5-Trichlorbiphenyl	µg/l	NS	<0.1
2,4-Dinitrotoluene	µg/l	5	<0.5
2,6-Dinitrotoluene	µg/l	5	<0.5
2-Chlorobiphenyl	µg/l	NS	<0.1
2-methylnaphthalene	µg/l	NS	<0.1
4,4-DDD	µg/l	NS	<0.1
4,4-DDE	µg/l	NS	<0.1
4,4-DDT	µg/l	NS	<0.1
Acenaphthene	µg/l	400	<0.1
acenapthylene	µg/l	NS	<0.1
Acetochlor	µg/l	NS	<0.1
Alachlor	µg/l	2	<0.1
Aldrin	µg/l	0.2	<0.1
Alpha-BHC	µg/l	NS	<0.1
Alpha-Chlordane	µg/l	2	<0.1
Ametryn	µg/l	NS	<0.1
Anilazine	µg/l	NS	<1
Anthracene	µg/l	2000	<0.1
Aspon	µg/l	NS	<0.1
Atrazine	µg/l	3	<0.1
Azinphos-ethyl	µg/l	NS	<0.5
Azinphos-methyl	µg/l	NS	<0.5
Bendiocarb	µg/l	NS	<0.5
Benfluralin	µg/l	NS	<0.1
Benzo(a)anthracene	µg/l	NS	<0.1
Benzo(a)pyrene	µg/l	0.2	<0.02
Benzo(b)fluoranthene	µg/l	NS	<0.1
Benzo(g,h,i)perylene	µg/l	NS	<0.1
Benzo(k)fluoranthene	µg/l	NS	<0.1
beta-BHC	µg/l	NS	<0.1
Bolstar	µg/l	NS	<0.1
Bromacil	µg/l	NS	<0.1
Butachlor	µg/l	NS	<0.1
Butylate	µg/l	NS	<0.1

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	Units	Primary/Secondary Drinking Water Limits[a]	Results
Butylbenzylphthalate	µg/l	1000	<1
Carbophenothion	µg/l	NS	<0.5
Carboxin	µg/l	700	<0.1
Chlorfenvinphos	µg/l	NS	<5
Chlorbenzilate	µg/l	NS	<0.1
Chloroneb	µg/l	NS	<0.1
Chlorpropylate	µg/l	NS	<0.1
Chlorothalonil	µg/l	100	<0.1
Chlorpropham	µg/l	NS	<0.1
Chlorpyrifos	µg/l	NS	<0.1
Chlorpyifos methyl	µg/l	NS	<0.5
Chrysene	µg/l	NS	<0.1
cis-Noachlor	µg/l	NS	<0.1
cis-Permethrin	µg/l	NS	<0.1
Clomazone	µg/l	NS	<0.1
Clopyralid	µg/l	NS	<10
Coumaphos	µg/l	NS	<0.1
Crotoxyphos	µg/l	NS	<0.5
Cycloate	µg/l	NS	<0.1
DCPA	µg/l	70	<0.1
delta-BHC	µg/l	NS	<0.1
Demeton O	µg/l	NS	<0.5
Demeton S	µg/l	NS	<0.5
Desethylatrazine	µg/l	NS	<1
Desisopropylatrazine	µg/l	NS	<1
Di(2-ethylhexyl)adipate	µg/l	400	<0.6
Di(2-Ethylhexy)phthalate	µg/l	6	<0.6
Diazinon	µg/l	1	<0.1
Dibenzo(a,h)anthracene	µg/l	NS	<0.1
Dichlobenil	µg/l	NS	<0.1
Dichlofenthion	µg/l	NS	<0.1
Dichloran	µg/l	NS	<0.5
Dichlorvos	µg/l	NS	<0.1
Dicrotophos	µg/l	NS	<0.5
Dieldrin	µg/l	0.2	<0.1
Diethylphthalate	µg/l	6000	<1
Dimethoate	µg/l	NS	<0.5
Dimethylphthalate	µg/l	NS	<1
Di-n-butylphthalate	µg/l	800	<2
Di-n-octylphthalate	µg/l	NS	<2
Dioxathion	µg/l	NS	<0.5
Diphenamid	µg/l	200	<0.1
Disulfoton	µg/l	0.7	<0.1

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Disulfoton Sulfone	µg/l	NS	<0.1
Disulfoton Sulfoxide	µg/l	NS	<10
Endosulfan I	µg/l	NS	<0.1
Endosulfan II	µg/l	NS	<0.1
Endosulfan Sulfate	µg/l	NS	<0.1
Endrin	µg/l	2	<0.0097
Endrin Aldehyde	µg/l	NS	<0.5
E-Phosphamidon	µg/l	NS	<0.5
EPN	µg/l	NS	<0.5
EPTC	µg/l	NS	<0.1
Erucylamide	µg/l	NS	<5
Esfenvalerate	µg/l	NS	<0.5
Ethalfluralin	µg/l	NS	<0.1
Ethion	µg/l	NS	<5
Ethofumesate	µg/l	NS	<0.5
Ethoprop	µg/l	NS	<0.1
Etridiazole	µg/l	NS	<0.1
Famphur	µg/l	NS	<0.1
Fenamiphos	µg/l	0.7	<0.1
Fenarimol	µg/l	NS	<1
Fenitrothion	µg/l	NS	<0.5
Fenoxaprop-ethyl	µg/l	NS	<1
Fensulfothion	µg/l	NS	<0.5
Fenthion	µg/l	NS	<0.1
Fluazifop-butyl	µg/l	NS	<0.1
Fluchloralin	µg/l	NS	<0.1
Fluometuron	µg/l	NS	<0.5
Fluoranthene	µg/l	NS	<0.1
Fluorene	µg/l	200	<0.1
Fluridone	µg/l	NS	<1
Fonofos	µg/l	NS	<0.1
Gamma-BHC	µg/l	0.2	<0.02
Gamma-Chlordane	µg/l	2	<0.1
Heptachlor	µg/l	0.4	<0.04
Heptachlor Epoxide	µg/l	0.2	<0.02
Hexachlorobenzene	µg/l	1	<0.1
Hexachlorocyclopentadiene	µg/l	50	<0.1
Hexazinone	µg/l	400	<0.1
Indeno(1,2,3,c,d)Pyrene	µg/l	NS	<0.1
Iprodione	µg/l	NS	<0.5
Isofenphos	µg/l	NS	<0.5
Isphorone	µg/l	NS	<0.1
Leptophos	µg/l	NS	<0.5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Malathion	μg/l	NS	<0.1
Metalaxyl	μg/l	NS	<0.5
Methoxychlor	μg/l	40	<0.1
Methyl paraoxon	μg/l	NS	<0.5
Methyl Parathion	μg/l	NS	<0.5
Metolachlor	μg/l	700	<0.1
Metribuzin	μg/l	70	<0.1
Metsulfuron-methyl	μg/l	NS	<10
Mevinphos	μg/l	NS	<0.1
MGK 264 isomer a	μg/l	NS	<0.1
MGK 264 isomer b	μg/l	NS	<0.1
MGK 326	μg/l	NS	<0.1
Mirex	μg/l	NS	<0.5
Molinate	μg/l	NS	<0.1
Monocrotophos	μg/l	NS	<0.5
Naled	μg/l	NS	<0.5
Naphthalene	μg/l	100	<0.1
Napropamide	μg/l	NS	<0.1
Norflurazon	μg/l	NS	<1
Oryzalin	μg/l	NS	<10
Oxadiazon	μg/l	NS	<0.1
Oxyxhlordane	μg/l	NS	<0.1
Oxyfluorfen	μg/l	NS	<0.5
Parathion	μg/l	NS	<0.5
Pebulate	μg/l	NS	<0.1
Pendimethalin	μg/l	NS	<0.1
Pentachlorobenzene	μg/l	NS	<0.5
Pentachloronitrobenzene	μg/l	NS	<0.5
Pentachlorophenol	μg/l	1	<1
Phenanthrene	μg/l	NS	<0.1
Phorate	μg/l	NS	<0.1
Phosmet	μg/l	NS	<0.5
Profluralin	μg/l	NS	<0.1
Prometryn	μg/l	NS	<0.1
Pronamide	μg/l	100	<0.1
Propachlor	μg/l	100	<0.1
Propanil	μg/l	NS	<0.5
Propazine	μg/l	10	<0.1
Propiconazole isomer a	μg/l	NS	<5
Propiconazole isomer	μg/l	NS	<5
Prothiofos	μg/l	NS	<0.5
Pyrene	μg/l	200	<0.1
Simazine	μg/l	4	<0.07

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	Units	Primary/Secondary Drinking Water Limits[a]	Results
Simetryn	µg/l	NS	<0.1
Stirofos	µg/l	NS	<0.1
Sulfotep	µg/l	NS	<0.5
Tebuthiuron	µg/l	500	<10
TEPP	µg/l	NS	<1
Terbacil	µg/l	90	<0.1
Terbufos	µg/l	0.4	<0.5
Terbutryn	µg/l	NS	<0.1
Thiabendazole	µg/l	NS	<10
Thiobencarb	µg/l	NS	<0.1
Thionazin	µg/l	NS	<0.5
trans-Nonachlor	µg/l	NS	<0.1
trans-Permethrin	µg/l	NS	<0.1
Triadimefon	µg/l	NS	<0.5
Tribufos	µg/l	NS	<0.1
Trichloronate	µg/l	NS	<0.5
Tricylazole	µg/l	NS	<1
Trifluralin	µg/l	10	<0.1
Vernolate	µg/l	NS	<0.1
Vinclozolin	µg/l	NS	<0.5
Z-Phosphamidon	µg/l	NS	<0.5
Volatile Organics (EPA 524.2)			
1,1,1,2-Tetrachloroethane	µg/l	70	<0.5
1,1,1-Trichloroethane	µg/l	200	<0.5
1,1,2,2-Tetrachloroethane	µg/l	40	<0.5
1,1,2-Trichloroethane	µg/l	5	<0.5
1,1-Dichloroethane	µg/l	NS	<0.5
1,1-Dichloroethylene	µg/l	7	<0.5
1,1-Dichloropropene	µg/l	NS	<0.5
1,2,3-Trichlorobenzene	µg/l	NS	<0.5
1,2,3-Trichloropropane	µg/l	20	<0.5
1,2,4-Trichlorobenzene	µg/l	70	<0.5
1,2,4-Trimethylbenzene	µg/l	NS	<0.5
1,2-Dichloroethane	µg/l	5	<0.5
1,2-Dichloropropane	µg/l	5	<0.5
1,3,5-Trimethylbenzene	µg/l	NS	<0.5
1,3-Dichloropropane	µg/l	NS	<0.5
2,2-Dichloropropane	µg/l	NS	<0.5
2-Butanone (MEK)	µg/l	4000	<5
2-Hexanone	µg/l	NS	<10
4-Methyl-2-Pentanone (MIBK)	µg/l	NS	<5
Acetone	µg/l	6000	<10

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Benzene	μg/l	5	<0.5
Bromobenzene	μg/l	60	<0.5
Bromochloromethane	μg/l	90	<0.5
Bromodichloromethane	μg/l	20	<0.5
Bromoethane	μg/l	10	<0.5
Bromoform	μg/l	200	<0.5
Bromomethane (Methyl Bromide)	μg/l	NS	<0.5
Carbon disulfide	μg/l	NS	<0.5
Carbon Tetrachloride	μg/l	5	<0.5
Chlorobenzene	μg/l	100	<0.5
Chlorodibromomethane	μg/l	60	<0.5
Chloroethane	μg/l	NS	<0.5
Chloroform (Trichloromethane)	μg/l	70	<0.5
Chloromethane (Methyl Chloride)	μg/l	400	<0.5
cis-1,2-Dichloroethylene	μg/l	70	<0.5
cis-1,3-Dichloropropene	μg/l	NS	<0.5
Dibromomethane	μg/l	NS	<0.5
Dichlorodifluoromethane	μg/l	1000	<0.5
Dichloromethane	μg/l	5	<0.5
Di-isopropyl ether	μg/l	NS	<3
Ethyl benzene	μg/l	700	<0.5
Hexachlorobutadiene	μg/l	2	<0.5
Isopropylbenzene	μg/l	800	<0.5
m,p-Xylenes	μg/l	10,000 (Total Xylenes)	<0.5
m-Dichlorobenzene (1,3-DCB)	μg/l	600	<0.5
Methyl Tert-butyl ether (MTBE)	μg/l	NS	<0.5
Naphthalene	μg/l	100	<0.5
n-Butylbenzene	μg/l	NS	<0.5
n-Propylbenzene	μg/l	NS	<0.5
o-Chlorotoluene	μg/l	100	<0.5
o-Dichlorobenzene (1,2-DCB)	μg/l	600	<0.5
o-Xylene	μg/l	10,000 (Total Xylenes)	<0.5
p-Chlorotoluene	μg/l	100	<0.5
p-Dichlorobenzene (1,4-DCB)	μg/l	75	<0.5
p-Isopropyltoluene	μg/l	NS	<0.5
sec-Butylbenzene	μg/l	NS	<0.5
Styrene	μg/l	100	<0.5
tert-amyl Methyl Ether	μg/l	NS	<3
tert-Butyl Ethyl Ether	μg/l	NS	<3
tert-Butylbenzene	μg/l	NS	<0.5
Tetrachloroethylene (PCE)	μg/l	5	<0.5
Toluene	μg/l	1000	<0.5
Total 1,3-Dichloropropene	μg/l	NS	<0.5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts Denver Well DE-1R			
			Meridian Metropolitan Districts Denver Well DE-1R Baseline Water Quality Sample
Sample ID			Well DE-1R
Sample Date			November 16, 2016
Sample Time			11:00 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Total THM	µg/l	80	<0.5
Total xylenes	µg/l	10000	<0.5
trans 1,2-Dichloroethylene	µg/l	100	<0.5
trans 1,3-Dichloropropene	µg/l	NS	<0.5
Trichloroethylene (TCE)	µg/l	5	<0.5
Trichlorofluoromethane	µg/l	2000	<0.5
Trichlorotrifluoroethane (Freon 113)	µg/l	NS	<0.5
Vinyl chloride (VC)	µg/l	2	<0.3
Acrolein/Acrylonitrile (EPA 624)			
Acrolein	µg/l	NS	<2
Acrylonitrile	µg/l	6	<2

[a]Standards are based on Colorado Department of Public Health and Environment, Water Quality Control Division Drinking Water Standards dated January 19, 2005, U.S. EPA National Safe Drinking Water Standards, and U.S. EPA Region 8 Baseline Water Sampling Criteria

Notes:
NS = No Standard Available
ml = milliliter
mg/l = milligrams per liter or parts per million (ppm)
pCi/l = picocuries per liter
NA = No Analysis
CaCO3 = Calcium carbonate
ug/l = micrograms per liter or parts per billion (ppb)

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AT-1807

Laboratory Report

for

Hemenway Groundwater Engineering, Inc
17011 Lincoln Avenue, PMB 416
Parker, CO 80134
Attention: Courtney Hemenway
Fax: 303-805-1850

Date of Issue
12/19/2016
EUROFINS EATON ANALYTICAL

ORELAP 4034

TRG6: Shea Greiner

Project Manager

Report: 617466
Project: ASR
Group: Meridian Metropolitan District ASR

* Accredited in accordance with TNI 2009 and ISO/IEC 17025:2005.
* Laboratory certifies that the test results meet all **TNI 2009 and ISO/IEC 17025:2005** requirements unless noted under the individual analysis.
* Following the cover page are State Certification List, ISO 17025 Accredited Method List, Acknowledgement of Samples Received, Comments, Hits Report, Data Report, QC Summary, QC Report and Regulatory Forms, as applicable.
* Test results relate only to the sample(s) tested.
* This report shall not be reproduced except in full, without the written approval of the laboratory.

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STATE CERTIFICATION LIST

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----------	--------	Montana	Cert 0035
Arizona	AZ0778	Nebraska	Certified
Arkansas	Certified	Nevada	CA00006-2016
California-Monrovia-ELAP	2813	New Hampshire *	2959
California-Colton- ELAP	2812	New Jersey *	CA 008
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Connecticut	PH-0107	North Dakota	R-009
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Kentucky	90107	Vermont	VT0114
Louisiana *	LA16003	Virginia *	460260
Maine	CA0006	Washington	C838
Maryland	224	----------	----------
Commonwealth of Northern Marianas Is.	MP0004	----------	----------
Massachusetts	M-CA006	EPA Region 5	Certified
Michigan	9906	Los Angeles County Sanitation Districts	10264

* NELAP/TNI Recognized Accreditation Bodies

ISO 17025 Accredited Method List

The tests listed below are accredited and meet the requirements of ISO 17025 as verified by the ANSI-ASQ National Accreditation Board/ANAB.
Refer to Certificate and scope of accreditation (AT 1807) found at: http://www.eatonanalytical.com

SPECIFIC TESTS	METHOD OR TECHNIQUE USED	Environ-mental (Drinking Water)	Environ-mental (Waste Water)	Water as a Component of Food and Bev/Bev/ Bottled Water
1,4-Dioxane	EPA 522	x		x
2,3,7,8-TCDD	Modified EPA 1613B	x		x
Acrylamide	In House Method (2440)	x		x
Alkalinity	SM 2320B	x	x	x
Ammonia	EPA 350.1		x	x
Ammonia	SM 4500-NH3 H		x	x
Anions and DBPs by IC	EPA 300.0	x	x	x
Anions and DBPs by IC	EPA 300.1	x		x
Asbestos	EPA 100.2	x	x	
Bicarbonate Alkalinity as HCO3	SM 2320B	x	x	x
BOD / CBOD	SM 5210B		x	x
Bromate	In House Method (2447)	x		x
Carbamates	EPA 531.2	x		x
Carbonate as CO3	SM 2330B	x	x	x
Carbonyls	EPA 556	x		x
COD	EPA 410.4 / SM 5220D		x	
Chloramines	SM 4500-CL G	x	x	x
Chlorinated Acids	EPA 515.4	x		x
Chlorinated Acids	EPA 555	x		x
Chlorine Dioxide	SM 4500-CLO2 D	x		x
Chlorine -Total/Free/ Combined Residual	SM 4500-Cl G	x	x	x
Conductivity	EPA 120.1		x	
Conductivity	SM 2510B	x	x	x
Corrosivity (Langelier Index)	SM 2330B	x		x
Cryptosporidium	EPA 1623	x		x
Cyanide, Amenable	SM 4500-CN G	x	x	
Cyanide, Free	SM 4500CN F	x	x	x
Cyanide, Total	EPA 335.4	x	x	x
Cyanogen Chloride (screen)	In House Method (2470)	x		x
Diquat and Paraquat	EPA 549.2	x		x
DBP/HAA	SM 6251B	x		x
Dissolved Oxygen	SM 4500-O G		x	x
DOC	SM 5310C	x		x
E. Coli	(MTF/EC+MUG)	x		x
E. Coli	CFR 141.21(f)(6)(i)	x		x
E. Coli	SM 9223		x	
E. Coli (Enumeration)	SM 9221B.1/ SM 9221F	x		x
E. Coli (Enumeration)	SM 9223B	x		x
EDB/DCBP	EPA 504.1	x		
EDB/DBCP and DBP	EPA 551.1	x		x
EDTA and NTA	In House Method (2454)	x		x
Endothall	EPA 548.1	x		x
Endothall	In-house Method (2445)	x		x
Enterococci	SM 9230B	x	x	
Fecal Coliform	SM 9221 E (MTF/EC)	x		
Fecal Coliform	SM 9221C, E (MTF/EC)		x	
Fecal Coliform (Enumeration)	SM 9221E (MTF/EC)	x		x
Fecal Coliform with Chlorine Present	SM 9221E		x	
Fecal Streptococci	SM 9230B	x	x	
Fluoride	SM 4500-F C	x	x	x
Giardia	EPA 1623	x		x
Glyphosate	EPA 547	x		x
Gross Alpha/Beta	EPA 900.0	x	x	x
Gross Alpha Coprecipitation	SM 7110 C	x	x	x
Hardness	SM 2340B	x	x	x
Heterotrophic Bacteria	In House Method (2439)	x		x
Heterotrophic Bacteria	SM 9215 B	x		x
Hexavalent Chromium	EPA 218.6	x	x	x

SPECIFIC TESTS	METHOD OR TECHNIQUE USED	Environ-mental (Drinking Water)	Environ-mental (Waste Water)	Water as a Component of Food and Bev/Bev/ Bottled Water
Hexavalent Chromium	EPA 218.7	x		x
Hexavalent Chromium	SM 3500-Cr B		x	
Hormones	EPA 539	x		x
Hydroxide as OH Calc.	SM 2330B	x		x
Kjeldahl Nitrogen	EPA 351.2		x	
Legionella	CDC Legionella	x		x
Mercury	EPA 245.1	x	x	x
Metals	EPA 200.7 / 200.8	x	x	x
Microcystin LR	ELISA (2360)	x		x
NDMA	EPA 521	x		x
NDMA	TQ In house method based on EPA 521 (2425)	x		x
Nitrate/Nitrite Nitrogen	EPA 353.2	x	x	x
OCL, Pesticides/PCB	EPA 505	x		x
Ortho Phosphate	EPA 365.1	x	x	x
Ortho Phosphate	SM 4500P E			x
Ortho Phosphorous	SM 4500P E	x		
Oxyhalides Disinfection Byproducts	EPA 317.0	x		x
Perchlorate	EPA 331.0	x		x
Perchlorate (low and high)	EPA 314.0	x		x
Perfluorinated Alkyl Acids	EPA 537	x		x
pH	EPA 150.1	x		
pH	SM 4500-H+B	x	x	x
Phenylurea Pesticides/ Herbicides	In House Method, based on EPA 532 (2448)	x		x
Pseudomonas	IDEXX Pseudalert (2461)	x		x
Radium-226	GA Institute of Tech	x		x
Radium-228	GA Institute of Tech	x		x
Radon-222	SM 7500RN	x		x
Residue, Filterable	SM 2540C	x	x	x
Residue, Non-filterable	SM 2540D		x	
Residue, Total	SM 2540B		x	x
Residue, Volatile	EPA 160.4		x	
Semi-VOC	EPA 525.2	x		x
Semi-VOC	EPA 625		x	x
Silica	SM 4500-Si D	x	x	
Silica	SM 4500-SiO2 C	x	x	
Sulfide	SM 4500-$S^{=}$ D		x	
Sulfite	SM 4500-SO^{3}B	x	x	x
Surfactants	SM 5540C	x	x	x
Taste and Odor Analytes	SM 6040E	x		x
Total Coliform (P/A)	SM 9221 A, B	x		x
Total Coliform (Enumeration)	SM 9221 A, B, C	x		x
Total Coliform / E. coli	Colisure SM 9223	x		x
Total Coliform	SM 9221B		x	
Total Coliform with Chlorine Present	SM 9221B		x	
Total Coliform / E.coli (P/A and Enumeration)	SM 9223	x		x
TOC	SM 5310C	x	x	x
TOX	SM 5320B		x	
Total Phenols	EPA 420.1		x	
Total Phenols	EPA 420.4	x	x	x
Total Phosphorous	SM 4500 P E		x	
Turbidity	EPA 180.1	x	x	x
Turbidity	SM 2130B	x	x	
Uranium by ICP/MS	EPA 200.8	x		x
UV 254	SM 5910B	x		
VOC	EPA 524.2/EPA 524.3	x		x
VOC	EPA 624		x	x
VOC	EPA SW 846 8260	x		x
VOC	In House Method (2411)	x		x
Yeast and Mold	SM 9610	x		x

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Acknowledgement of Samples Received

Addr:	**Hemenway Groundwater Engineering, Inc**	Client ID:	HEMENWAYGW-CO
	17011 Lincoln Avenue, PMB 416	Folder #:	617466
	Parker, CO 80134	Project:	ASR
		Sample Group:	Meridian Metropolitan District ASR
Attn:	Courtney Hemenway	Project Manager:	Shea Greiner
Phone:	303-805-1750	Phone:	(720) 491-1749

The following samples were received from you on **October 18, 2016** at **1240**. They have been scheduled for the tests listed below each sample. If this information is incorrect, please contact your service representative. Thank you for using Eurofins Eaton Analytical.

Sample #	Sample ID	Sample Date
201610180749	MMD Arapahoe Well A-4	10/16/2016 1000

@525.2_SB Long List	@551_EDB-DBCP	@624-Acrln-Acronrtl
@BNA	@HAA5	@ML505
@ML521_SPE8	@ML531.2	@RA226 GA
@RA228 GA	@RAD	@VOASDWA plus plus TICS
Alkalinity in CaCO3 units	Aluminum Total ICAP/MS	Ammonia Nitrogen
Antimony Total ICAP/MS	Arsenic Total ICAP/MS	Asbestos (Subbed)
Barium Total ICAP/MS	Beryllium Total ICAP/MS	Bicarbonate
Boron Total ICAP	Cadmium Total ICAP/MS	Calcium Total ICAP
Carbonate as CO3, Calculated	Chloride	Chlorine Dioxide
Chlorite	Chromium Total ICAP/MS	Copper Total ICAP/MS
Cyanide	Cyanogen Chloride Screen	Fluoride
Free Chlorine Residual	Iron Total ICAP RCRA	Lead Total ICAP/MS
Magnesium Total ICAP	Manganese Total ICAP/MS	Mercury
Molybdenum Total ICAP/MS	Nickel Total ICAP/MS	Nitrate as Nitrogen by IC
Nitrite Nitrogen by IC	PH (H3=past HT not compliant)	Potassium Total ICAP
Selenium Total ICAP/MS	Silver Total ICAP/MS	Sodium Total ICAP
Strontium ICAP	Sulfate	Thallium Total ICAP/MS
Uranium ICAP/MS	Zinc Total ICAP/MS	

Sample #	Sample ID	Sample Date
201610180755	Travel Blank	10/16/2016 1000

@551_EDB_DBCP TB	@624-Acrln-Acronrtl TB	@VOASDWA plus plus TICS TB

Sample #	Sample ID	Sample Date
201610180757	MMD Denver Well DE-1R	10/17/2016 1100

750 Royal Oaks Drive, Suite 100, Monrovia, CA 91016 Tel (626) 386-1100 Fax (626) 386-1101 www.EurofinsUS.com/Eaton

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Acknowledgement of Samples Received

Addr: **Hemenway Groundwater Engineering, Inc**	Client ID: HEMENWAYGW-CO
17011 Lincoln Avenue, PMB 416	Folder #: 617466
Parker, CO 80134	Project: ASR
	Sample Group: Meridian Metropolitan District ASR
Attn: Courtney Hemenway	Project Manager: Shea Greiner
Phone: 303-805-1750	Phone: (720) 491-1749

The following samples were received from you on **October 18, 2016** at **1240**. They have been scheduled for the tests listed below each sample. If this information is incorrect, please contact your service representative. Thank you for using Eurofins Eaton Analytical.

Sample #	Sample ID		Sample Date
	@525.2_SB Long List	@551_EDB-DBCP	@624-Acrln-Acronrtl
	@BNA	@HAA5	@ML505
	@ML521_SPE8	@ML531.2	@RA226 GA
	@RA228 GA	@RAD	@VOASDWA plus plus TICS
	Alkalinity in CaCO3 units	Aluminum Total ICAP/MS	Ammonia Nitrogen
	Antimony Total ICAP/MS	Arsenic Total ICAP/MS	Asbestos (Subbed)
	Barium Total ICAP/MS	Beryllium Total ICAP/MS	Bicarbonate
	Boron Total ICAP	Cadmium Total ICAP/MS	Calcium Total ICAP
	Carbonate as CO3, Calculated	Chloride	Chlorine Dioxide
	Chlorite	Chromium Total ICAP/MS	Copper Total ICAP/MS
	Cyanide	Cyanogen Chloride Screen	Fluoride
	Free Chlorine Residual	Iron Total ICAP RCRA	Lead Total ICAP/MS
	Magnesium Total ICAP	Manganese Total ICAP/MS	Mercury
	Molybdenum Total ICAP/MS	Nickel Total ICAP/MS	Nitrate as Nitrogen by IC
	Nitrite Nitrogen by IC	PH (H3=past HT not compliant)	Potassium Total ICAP
	Selenium Total ICAP/MS	Silver Total ICAP/MS	Sodium Total ICAP
	Strontium ICAP	Sulfate	Thallium Total ICAP/MS
	Uranium ICAP/MS	Zinc Total ICAP/MS	
201610180758	Travel Blank		10/17/2016 1100
	@551_EDB_DBCP TB	@624-Acrln-Acronrtl TB	@VOASDWA plus plus TICS TB

Test Description

@525.2_SB Long List -- EPA 525.2 Extended List

@551_EDB_DBCP TB -- EDB/DBCP/HAN by EPA 551.1

@551_EDB-DBCP -- EDB/DBCP/HAN by EPA 551.1

@624-Acrln-Acronrtl -- Acrolein/Acrylonitrile by 624

@624-Acrln-Acronrtl TB -- Acrolein/Acrylonitrile by 624

@BNA -- Base/Neutral/Acid Extractables

@HAA5 -- Haloacetic Acids

@ML505 -- Organochlorine Pesticides/PCBs

@ML521_SPE8 -- Nitrosamines by GCMS

@ML531.2 -- Aldicarbs

@RA226 GA -- Radium 226

@RA228 GA -- Radium 228

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Eaton Analytical

Acknowledgement of Samples Received

Addr: **Hemenway Groundwater Engineering, Inc**
17011 Lincoln Avenue, PMB 416
Parker, CO 80134

Attn: Courtney Hemenway
Phone: 303-805-1750

Client ID: HEMENWAYGW-CO
Folder #: 617466
Project: ASR
Sample Group: Meridian Metropolitan District ASR

Project Manager: Shea Greiner
Phone: (720) 491-1749

The following samples were received from you on **October 18, 2016** at **1240**. They have been scheduled for the tests listed below each sample. If this information is incorrect, please contact your service representative. Thank you for using Eurofins Eaton Analytical.

Sample #	Sample ID	Sample Date
	@RAD -- Gross Alpha/Beta Radiation	
	@VOASDWA plus plus TICS -- Volatile Organics by GCMS	
	@VOASDWA plus plus TICS TB -- Volatile Organics by GCMS	

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CHAIN OF CUSTODY RECORD

6/7466

1 of 3 coolers

750 Royal Oaks Drive, Suite 100
Monrovia, CA 91016-3629

Phone: 626 386 1100
Fax: 626 386 1101

800 566 LABS (800 566 5227)

Website: www.EatonAnalytical.com

EUROFINS EATON ANALYTICAL USE ONLY:

LOGIN COMMENTS: ____

SAMPLES CHECKED AGAINST COC BY: WB

SAMPLES LOGGED IN BY: RZ

SAMPLE TEMP RECEIVED AT:

SAMPLES REC'D DAY OF COLLECTION? ☐ (check for yes)

☐ ____ (Other) IR Gun ID = ____ (Observation= ____ °C) (Corr.Factor ____ °C) (Final = ____ °C)

☑ Monrovia IR Gun ID = 352A (Observation= 1.4 °C) (Corr.Factor 0.2 °C) (Final = 1.2 °C)

Compliance Acceptance Criteria: (Chemistry 4 ± 2 °C) (Microbiology < 10°C)

TYPE OF ICE: Real ✓ Synthetic ____ No Ice ____ CONDITION OF ICE: Frozen ____ Partially Frozen ✓ Thawed ____ N/A ____

METHOD OF SHIPMENT: Pick-Up / Walk-In / FedEx / UPS / DHL / Area Fast / Top Line / Other: ____

Lisa 13:23 OCT 18 2016

TO BE COMPLETED BY SAMPLER:

COMPANY/AGENCY NAME:	PROJECT CODE:	COMPLIANCE SAMPLES ☐ (check for yes) - Requires state forms ☐	NON-COMPLIANCE SAMPLES ☒ (check for yes) REGULATION INVOLVED: ____ (eg. SDWA, NPDES, etc.)
Hemenway Groundwater Engineering	ASR	Type of samples (circle one): ROUTINE SPECIAL CONFIRMATION	
EEA CLIENT CODE: Hemenway GW-CO	COC ID:	SAMPLE GROUP: Meridian Metropolitan	SEE ATTACHED KIT ORDER FOR ANALYSES ☒ (check for yes), OR

TAT requested: rush by adv notice only STD ___ 1 wk ___ 3 day ___ 2 day ___ 1 day ___

List ALL ANALYSES REQUIRED (enter number of bottles sent for each test for each sample)

SAMPLE DATE	SAMPLE TIME	SAMPLE ID	CLIENT LAB ID	MATRIX *	FIELD DATA	FIELD DATA															SAMPLER COMMENTS
10-16-17	1000	MMD Arapahoe Well A-4																			
10-16-17	1100	MMD Denver Well DE-1R																			

* MATRIX TYPES: RSW = Raw Surface Water; RGW = Raw Ground Water; CFW = Chlor(am)inated Finished Water; FW = Other Finished Water; SEAW = Sea Water; WW = Waste Water; BW = Bottled Water; SW = Storm Water; SO = Soil; SL = Sludge; O = Other - Please Identify

	SIGNATURE	PRINT NAME	COMPANY/TITLE	DATE	TIME
SAMPLED BY	[signature]	Courtney Hemenway	Hemenway Groundwater Engineering	10-16-17	12:55
RELINQUISHED BY	[signature]	Courtney Hemenway	Hemenway Groundwater Engineering	10-16-17	12:55
RECEIVED BY	Shea Greiner	Shea Greiner	EEA	10/17/16	1255
RELINQUISHED BY	Shea Greiner	" "	EEA	10/17/16	1700
RECEIVED BY	[signature]	Miguel Zavala	EEA	10/18/16	12:40

QA FO 0029.2 (Version 2) (08/28/2014)

PAGE ____ OF ____

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Kit Order for Hemenway Groundwater Engineering, Inc

Shea Greiner is your Eurofins Eaton Analytical Service Manager

750 Royal Oaks Drive, Suite 100
Monrovia, California 91016-3629
(626) 386-1100 FAX (626) 386-1101

Note: Sampler Please return this paper with your samples

Template: 47754

Client ID: HEMENWAYGW-CO
Project Code: ASR Bottle Orders
Group Name: Meridian Metropolitan District ASR
PO#/JOB#:

Track # 7774 9019 7575

Created By: - [TRG6]
Deliver By: 10/14/2016
STG: Bottle Orders
Ice Type: W
Pre Registered

Ship Sample Kits to	Send Report to	Billing Address
Hemenway Groundwater Engineering, Inc 17011 Lincoln Avenue, PMB 416 Parker, CO 80134 Attn: Courtney Hemenway Phone: 303-805-1750 Fax: 303-805-1850	Hemenway Groundwater Engineering, Inc 17011 Lincoln Avenue, PMB 416 Parker, CO 80134 Attn: Courtney Hemenway Phone: 303-805-1750 Fax: 303-805-1850	Hemenway Groundwater Engineering, Inc 17011 Lincoln Avenue, PMB 416 Parker, CO 80134 Attn: Courtney Hemenway Phone: 303-805-1750 Fax: 303-805-1850

# of Samples	Tests	Bottle Qty - Type [preservative information]	UN DOT #
2	Chlorine Dioxide, Free Chlorine Residual MR	1 - 125ml amber glass [no preservative]	
2	Chloride, Nitrate as Nitrogen by IC, Nitrite Nitrogen by IC, Sulfate CD	1 - 125ml poly [no preservative]	
2	@525.2_SB Long List	2 - 1L amber glass [6 ml 1:1 HCL]	
2	@BNA	2 - 1L amber glass [no preservative]	
2	@RA226 GA, @RA228 GA	4 - 1L poly [4ml HNO3 (18%)]	UN2031
2	Asbestos by TEM - >10 microns MR	1 - 1L poly sonicated [no preservative]	
2	Cyanide	1 - 250 ml poly [2 ml NaOH (30%)+6 scoops AA]	
2	Fluoride	1 - 250 ml poly [no preservative]	
2	Ammonia Nitrogen	1 - 250ml poly [0.5 ml H2SO4 (50%)]	UN1830
2	Alkalinity in CaCO3 units, Bicarbonate	1 - 250ml poly [no preservative]	
2	@624-Acrln-Acronrtl	4 - 40ml amb vial [field pH adj 4-5]	
2	@ML531.2	2 - 40ml amber glass vial [0.37g KH2Citrate+6mg ThioSO4]	
2	@ML505	4 - 40ml amber glass vial [1 drop Thio (8%)]	
2	@VOASDWA plus plus TICS, @VOASDWA plus plus TICS TB	3 - 40ml amber glass vial [4drops 6N HCL (36%)]	UN1789
2	@624-Acrln-Acronrtl TB	2 - 40ml amber glass vial [4drops HCl 6N HCl (36%) + H2O]	
2	@HAA5	3 - 40ml amber glass vial [65 mg NH4Cl]	
2	Cyanogen Chloride Screen MR	2 - 40ml amber glass vial [no preservative]	
2	Aluminum Total ICAP/MS, Antimony Total ICAP/MS, Arsenic Total ICAP/MS, Barium Total ICAP/MS, Beryllium Total ICAP/MS, Boron Total ICAP, Cadmium Total ICAP/MS, Calcium Total ICAP, Chromium Total ICAP/MS, Copper Total ICAP/MS, Iron Total ICAP RCRA, Lead Total ICAP/MS, Magnesium Total ICAP, Manganese Total ICAP/MS, Mercury, Molybdenum Total ICAP/MS, Nickel Total ICAP/MS, Potassium Total ICAP, Selenium Total ICAP/MS, Silver Total ICAP/MS, Sodium Total ICA Strontium ICAP, Thallium Total ICAP/MS, Uranium ICAP	1 - 500ml acid poly [2ml HNO3 (18%)]	UN2031
2	@ML521_SPE8	3 - 500ml amber glass [40-50 mg Na Thiosulfate]	
2	@RAD	2 - 500ml poly [2ml 18%HNO3+125ml poly/no pres]	UN2031
2	@551_EDB_DBCP TB	2 - 60ml amber glass [1g(1%NaP/99%KP)+0.6%NH4CL+ H2O]	
2	@551 EDB-DBCP	3 - 60ml amber glass [EDB1g(1%NaP/99%KP)+0.6%NH4CL]	

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CHAIN OF CUSTODY RECORD

750 Royal Oaks Drive, Suite 100
Monrovia, CA 91016-3629

Phone: 626 386 1100
Fax: 626 386 1101

800 566 LABS (800 566 5227)

Website: www.EatonAnalytical.com

Lisa 17:55 OCT 18 2016

EUROFINS EATON ANALYTICAL USE ONLY:

COPY 2 of 3 coolers

LOGIN COMMENTS: ____

SAMPLES CHECKED AGAINST COC BY: ____

SAMPLES LOGGED IN BY: ____

SAMPLE TEMP RECEIVED AT:

SAMPLES REC'D DAY OF COLLECTION? ☐ (check for yes)

☐ ____ (Other) IR Gun ID = ____ (Observation= ____ °C) (Corr.Factor ____ °C) (Final = ____ °C)

☑ Monrovia IR Gun ID = 352 (Observation= 1.8 °C) (Corr.Factor -0.2 °C) (Final = 1.6 °C)

Compliance Acceptance Criteria: (Chemistry: 4 ± 2 °C) (Microbiology: < 10°C)

TYPE OF ICE: Real ____ Synthetic ____ No Ice ____ CONDITION OF ICE: Frozen ____ Partially Frozen ____ Thawed ____ N/A ____

METHOD OF SHIPMENT: Pick-Up / Walk-In / FedEx / UPS / DHL / Area Fast / Top Line / Other: ____

TO BE COMPLETED BY SAMPLER:

COMPANY/AGENCY NAME:	PROJECT CODE:
Hemenway Groundwater Engineering	ASR

EEA CLIENT CODE:	COC ID:	SAMPLE GROUP:
HemenwayGW-CO		Meridian Metropolitan

TAT requested: rush by adv notice only STD ___ 1 wk ___ 3 day ___ 2 day ___ 1 day ___

COMPLIANCE SAMPLES ☐ (check for yes) - Requires state forms ☐

NON-COMPLIANCE SAMPLES ☒ (check for yes)

REGULATION INVOLVED: ____ (eg. SDWA, NPDES, etc.)

Type of samples (circle one): ROUTINE SPECIAL CONFIRMATION

SEE ATTACHED KIT ORDER FOR ANALYSES ☒ (check for yes), OR

List ALL ANALYSES REQUIRED (enter number of bottles sent for each test for each sample)

SAMPLE DATE	SAMPLE TIME	SAMPLE ID	CLIENT LAB ID	MATRIX *	FIELD DATA	FIELD DATA															SAMPLER COMMENTS
10-16-17	1200	MMD Arapahoe Well A-4																			
10-16-17	1100	MMD Denver Well DE-1R																			

* MATRIX TYPES: RSW = Raw Surface Water, RGW = Raw Ground Water, CFW = Chlor(am)inated Finished Water, FW = Other Finished Water, SEAW = Sea Water, WW = Waste Water, BW = Bottled Water, SW = Storm Water, SO = Soil, SL = Sludge, O = Other - Please Identify

	SIGNATURE	PRINT NAME	COMPANY/TITLE	DATE	TIME
SAMPLED BY:	[signature]	Courtney Hemenway	Hemenway Groundwater Engineering	10-16-17	12:55
RELINQUISHED BY:	[signature]	Courtney Hemenway	Hemenway Groundwater Engineering	10-16-17	12:55
RECEIVED BY:	Shea Greiner	Shea Greiner	EEA	10/17/16	1255
RELINQUISHED BY	Shea Greiner	" "	EEA	10/17/16	1700
RECEIVED BY:	[signature]	Salvador Mot	EEA	10/18/16	1655

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Eaton Analytical

Kit Order for Hemenway Groundwater Engineering, Inc

Shea Greiner is your Eurofins Eaton Analytical Service Manager

750 Royal Oaks Drive, Suite 100
Monrovia, California 91016-3629
(626) 386-1100 FAX (626) 386-1101

Note: Sampler Please return this paper with your samples

Template: 47754

Created By: - [TRG6]
Deliver By: 10/14/2016
STG: Bottle Orders
Ice Type: W
Pre Registered

Client ID: HEMENWAYGW-CO
Project Code: ASR Bottle Orders
Group Name: Meridian Metropolitan District ASR
PO#/JOB#:

Ship Sample Kits to
Hemenway Groundwater Engineering, Inc
17011 Lincoln Avenue, PMB 416
Parker, CO 80134

Attn: Courtney Hemenway
Phone: 303-805-1750
Fax: 303-805-1850

Send Report to
Hemenway Groundwater Engineering, Inc
17011 Lincoln Avenue, PMB 416
Parker, CO 80134

Attn: Courtney Hemenway
Phone: 303-805-1750
Fax: 303-805-1850

Billing Address
Hemenway Groundwater Engineering, Inc
17011 Lincoln Avenue, PMB 416
Parker, CO 80134

Attn: Courtney Hemenway
Phone: 303-805-1750
Fax: 303-805-1850

# of Samples	Tests	Bottle Qty - Type [preservative information]	UN DOT #
2	Chlorine Dioxide, Free Chlorine Residual	1 - 125ml amber glass [no preservative]	
2	Chloride, Nitrate as Nitrogen by IC, Nitrite Nitrogen by IC, Sulfate	1 - 125ml poly [no preservative]	
2	@525.2_SB Long List	2 - 1L amber glass [6 ml 1:1 HCL]	
2	@BNA	2 - 1L amber glass [no preservative]	
2	@RA226 GA, @RA228 GA	4 - 1L poly [4ml HNO3 (18%)]	UN2031
2	Asbestos by TEM - >10 microns	1 - 1L poly sonicated [no preservative]	
2	Cyanide	1 - 250 ml poly [2 ml NaOH (30%)+6 scoops AA]	
2	Fluoride	1 - 250 ml poly [no preservative]	
2	Ammonia Nitrogen	1 - 250ml poly [0.5 ml H2SO4 (50%)]	UN1830
2	Alkalinity in CaCO3 units, Bicarbonate	1 - 250ml poly [no preservative]	
2	@624-Acrln-Acronrtl	4 - 40ml amb vial [field pH adj 4-5]	
2	@ML531.2	2 - 40ml amber glass vial [0.37g KH2Citrate+6mg ThioSO4]	
2	@ML505	4 - 40ml amber glass vial [1 drop Thio (8%)]	
2	@VOASDWA plus plus TICS, @VOASDWA plus plus TICS TB	3 - 40ml amber glass vial [4drops 6N HCL (36%)]	UN1789
2	@624-Acrln-Acronrtl TB	2 - 40ml amber glass vial [4drops HCl 6N HCl (36%) + H2O]	
2	@HAA5	3 - 40ml amber glass vial [65 mg NH4Cl]	
2	Cyanogen Chloride Screen	2 - 40ml amber glass vial [no preservative]	
2	Aluminum Total ICAP/MS, Antimony Total ICAP/MS, Arsenic Total ICAP/MS, Barium Total ICAP/MS, Beryllium Total ICAP/MS, Boron Total ICAP, Cadmium Total ICAP/MS, Calcium Total ICAP, Chromium Total ICAP/MS, Copper Total ICAP/MS, Iron Total ICAP RCRA, Lead Total ICAP/MS, Magnesium Total ICAP, Manganese Total ICAP/MS, Mercury, Molybdenum Total ICAP/MS, Nickel Total ICAP/MS, Potassium Total ICAP, Selenium Total ICAP/MS, Silver Total ICAP/MS, Sodium Total ICA Strontium ICAP, Thallium Total ICAP/MS, Uranium ICAP	1 - 500ml acid poly [2ml HNO3 (18%)]	UN2031
2	@ML521_SPE8	3 - 500ml amber glass [40-50 mg Na Thiosulfate]	
2	@RAD	2 - 500ml poly [2ml 18%HNO3+125ml poly/no pres]	UN2031
2	@551_EDB_DBCP TB	2 - 60ml amber glass [1g(1%NaP/99%KP)+0.6%NH4CL+ H2O]	
2	@551_EDB-DBCP	3 - 60ml amber glass [EDB1g(1%NaP/99%KP)+0.6%NH4CL]	

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Kit Order for Hemenway Groundwater Engineering, Inc

Shea Greiner is your Eurofins Eaton Analytical Service Manager

750 Royal Oaks Drive, Suite 100
Monrovia, California 91016-3629
(626) 386-1100 FAX (626) 386-1101

Note: Sampler Please return this paper with your samples

Template: 47754

Created By: - [TRG6]
Deliver By: 10/14/2016
STG: Bottle Orders
Ice Type: W
Pre Registered

Client ID: HEMENWAYGW-CO
Project Code: ASR Bottle Orders
Group Name: Meridian Metropolitan District ASR
PO#/JOB#:

Ship Sample Kits to	Send Report to	Billing Address
Hemenway Groundwater Engineering, Inc 17011 Lincoln Avenue, PMB 416 Parker, CO 80134 Attn: Courtney Hemenway Phone: 303-805-1750 Fax: 303-805-1850	Hemenway Groundwater Engineering, Inc 17011 Lincoln Avenue, PMB 416 Parker, CO 80134 Attn: Courtney Hemenway Phone: 303-805-1750 Fax: 303-805-1850	Hemenway Groundwater Engineering, Inc 17011 Lincoln Avenue, PMB 416 Parker, CO 80134 Attn: Courtney Hemenway Phone: 303-805-1750 Fax: 303-805-1850

# of Samples	Tests	Bottle Qty - Type [preservative information]	UN DOT #
2	Chlorite ✓	1 - 60mL poly [0.6 mL 1% EDA solution]	

Comments

For Delivery by 10:30 am on Friday 10/14.

Use 2 coolers, one sample set in each. Radium 226/228 and @Rad for both samples can go together in a seperate cooler if necessary to leave enough room for ice in the other coolers.

Include All Sampling Instructions.

Code	Status	Date Shipped	Via	Tracking #	# of Coolers	Prepared By

ORIGIN ID:WHHA (720) 491-1749
SHEA GREINER
EUROFINS EATON ANALYTICAL
1746 COLE BLVD., STE. 225

LAKEWOOD, CO 80401
UNITED STATES US

SHIP DATE: 17OCT16
ACTWGT: 70.00 LB
CAD: 107116703/INET3790

BILL THIRD PARTY

TO SAMPLE LOG IN
EUROFINS EATON ANALYTICAL
750 ROYAL OAKS DRIVE
SUITE 100
MONROVIA CA 91016
(626) 386-1136 REF: H60WOS EUROFINS
INV
PO DEPT

544J3/FB42/14E8

FedEx Express

1 of 4
TUE - 18 OCT 3:00P
STANDARD OVERNIGHT

TRK# 0201 7774 9019 7976
MASTER

XH WHPA

91016
CA-US BUR

After printing this label:
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3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

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CHAIN OF CUSTODY RECORD

750 Royal Oaks Drive, Suite 100
Monrovia, CA 91016-3629

Phone: 626 386 1100
Fax: 626 386 1101

800 566 LABS (800 566 5227)

Website: www.EatonAnalytical.com

EUROFINS EATON ANALYTICAL USE ONLY: Copy 3 of 3 coolers

LOGIN COMMENTS: Radiologicals ONLY GA Received in cooler CO 10/18/16

SAMPLES CHECKED AGAINST COC BY: MZ

SAMPLES LOGGED IN BY: ______

SAMPLE TEMP RECEIVED AT: **SAMPLES REC'D DAY OF COLLECTION?** ☐ (check for yes)

☐ ______ (Other) IR Gun ID = ______ (Observation= ______ °C) (Corr.Factor ______ °C) (Final = ______ °C)

☑ Monrovia IR Gun ID = 352R (Observation= 21.2 °C) (Corr.Factor 0.2 °C) (Final = 21.0 °C)

Compliance Acceptance Criteria: (Chemistry: 4 ± 2 °C) (Microbiology: < 10°C)

TYPE OF ICE: Real ____ Synthetic ____ No Ice ✓ **CONDITION OF ICE:** Frozen ____ Partially Frozen ____ Thawed ____ N/A ✓

METHOD OF SHIPMENT: Pick-Up / Walk-In / FedEx / UPS / DHL / Area Fast / Top Line / Other: ______

TO BE COMPLETED BY SAMPLER:

COMPANY/AGENCY NAME: Hemenway Groundwater Engineering

PROJECT CODE: ASR

EEA CLIENT CODE: HemenwayGW-CO

COC ID:

SAMPLE GROUP: Meridian Metropolitan

COMPLIANCE SAMPLES ☐ (check for yes)
- Requires state forms ☐

NON-COMPLIANCE SAMPLES ☒ (check for yes)

REGULATION INVOLVED: ______ (eg. SDWA, NPDES, etc.)

Type of samples (circle one): ROUTINE **SPECIAL** CONFIRMATION

SEE ATTACHED KIT ORDER FOR ANALYSES ☒ (check for yes), OR

List **ALL ANALYSES REQUIRED** (enter number of bottles sent for each test for each sample)

TAT requested: rush by adv notice only STD ___ 1 wk ___ 3 day ___ 2 day ___ 1 day ___

SAMPLE DATE	SAMPLE TIME	SAMPLE ID	CLIENT LAB ID	MATRIX *	FIELD DATA	FIELD DATA	SAMPLER COMMENTS
10-16-17	1000	MMD Arapahoe Well A-4					
10-16-17	1100	MMD Denver Well DE-1R					

*** MATRIX TYPES:** RSW = Raw Surface Water; RGW = Raw Ground Water; CFW = Chlor(am)inated Finished Water; FW = Other Finished Water; SEAW = Sea Water; WW = Waste Water; BW = Bottled Water; SW = Storm Water; SO = Soil; SL = Sludge; O = Other - Please Identify

	SIGNATURE	PRINT NAME	COMPANY/TITLE	DATE	TIME
SAMPLED BY:	[signature]	Courtney Hemenway	Hemenway Groundwater Engineering	10-16-17	12:55
RELINQUISHED BY:	[signature]	Courtney Hemenway	Hemenway Groundwater Engineering	10-16-17	12:55
RECEIVED BY:	Shea Greiner	Shea Greiner	EEA	10/17/16	1255
RELINQUISHED BY:	Shea Greiner	" "	EEA	10/17/16	1700
RECEIVED BY:	Miguel Zoe	Miguel Zoe	EEA	10/18/16	13:01

QA FO 0029.2 (Version 2) (08/28/2014) PAGE ____ OF ____

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Kit Order for Hemenway Groundwater Engineering, Inc

Shea Greiner is your Eurofins Eaton Analytical Service Manager

750 Royal Oaks Drive, Suite 100
Monrovia, California 91016-3629
(626) 386-1100 FAX (626) 386-1101

Note: Sampler Please return this paper with your samples

Template: 47754

Created By: - [TRG6]
Deliver By: 10/14/2016
STG: Bottle Orders
Ice Type: W
Pre Registered

Client ID: HEMENWAYGW-CO
Project Code: ASR Bottle Orders
Group Name: Meridian Metropolitan District ASR
PO#/JOB#:

Ship Sample Kits to	Send Report to	Billing Address
Hemenway Groundwater Engineering, Inc 17011 Lincoln Avenue, PMB 416 Parker, CO 80134 Attn: Courtney Hemenway Phone: 303-805-1750 Fax: 303-805-1850	Hemenway Groundwater Engineering, Inc 17011 Lincoln Avenue, PMB 416 Parker, CO 80134 Attn: Courtney Hemenway Phone: 303-805-1750 Fax: 303-805-1850	Hemenway Groundwater Engineering, Inc 17011 Lincoln Avenue, PMB 416 Parker, CO 80134 Attn: Courtney Hemenway Phone: 303-805-1750 Fax: 303-805-1850

# of Samples	Tests	Bottle Qty - Type [preservative information]	UN DOT #
2	Chlorite	1 - 60mL poly [0.6 mL 1% EDA solution]	

Comments

For Delivery by 10:30 am on Friday 10/14.

Use 2 coolers, one sample set in each. Radium 226/228 and @Rad for both samples can go together in a seperate cooler if necessary to leave enough room for ice in the other coolers.

Include All Sampling Instructions.

Code	Status	Date Shipped	Via	Tracking #	# of Coolers	Prepared By

ORIGIN ID:WHHA (720) 491-1749
SHEA GREINER
EUROFINS EATON ANALYTICAL
1746 COLE BLVD., STE. 225

LAKEWOOD, CO 80401
UNITED STATES US

SHIP DATE: 17OCT16
ACTWGT: 26.00 LB
CAD: 107116703/INET3790

BILL THIRD PARTY

TO SAMPLE LOG IN
EUROFINS EATON ANALYTICAL
750 ROYAL OAKS DRIVE
SUITE 100
MONROVIA CA 91016
(626) 386-1136 REF HBDWGS EUROFINS
INV
PO DEPT

544J3/FB42/14E8

FedEx Express

J162016101201uv

TUE - 18 OCT 3:00P
STANDARD OVERNIGHT

4 of 4
MPS# 7774 9019 8516 0201
0263
Mstr# 7774 9019 7976

91016
XH WHPA CA-US BUR

After printing this label:

1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
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Laboratory Comments
Report: 617466

Hemenway Groundwater Engineering, Inc
Courtney Hemenway
17011 Lincoln Avenue, PMB 416
Parker, CO 80134

Folder Comments

201610180749 524.2 TICs None Detected
201610180757 524.2 TICs None Detected
201610180758 524.2 TICs None Detected
Analytical results for 525.2 are submitted by Eurofins Eaton Analytical in South Bend IN
CAELAP 2920 exp 4-30-18
Analytical results for Asbestos are submitted by EMSL Analtyical in Cinnaminson NJ

Flags Legend:

L1 - The associated blank spike recovery was above laboratory acceptance limits.

LE - MRL Check recovery was above laboratory acceptance limits.

LK - The associated blank spike recovery was above method acceptance limits. This target analyte was not detected in the sample.

M2 - Matrix spike recovery was low; the associated blank spike recovery was acceptable.

R5 - MS/MSD RPD exceeded the laboratory acceptance limit. Recovery met acceptance criteria.

R7 - LFB/LFBD RPD exceeded the laboratory acceptance limit. Recovery met acceptance criteria.

The Comments Report may be blank if there are no comments for this report.

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Laboratory Hits
Report: 617466

Hemenway Groundwater Engineering, Inc
Courtney Hemenway
17011 Lincoln Avenue, PMB 416
Parker, CO 80134

Samples Received on:
10/18/2016 1240

Analyzed	Analyte	Sample ID	Result	Federal MCL	Units	MRL
	201610180749	**MMD Arapahoe Well A-4**				
10/22/2016 19:12	Alkalinity in CaCO3 units		100		mg/L	2
10/26/2016 12:30	Ammonia Nitrogen		0.14		mg/L	0.05
10/24/2016 12:32	Barium Total ICAP/MS		150	2000	ug/L	2
10/25/2016 09:14	Beta, Gross		6.4		pCi/L	3
11/28/2016 19:21	Bicarbonate as CaCO3		100		mg/L	
10/19/2016 22:26	Calcium Total ICAP		21		mg/L	1
10/24/2016 12:32	Copper Total ICAP/MS		2.5	1300	ug/L	2
10/19/2016 14:10	Fluoride		1.1	4	mg/L	0.05
10/19/2016 22:26	Iron Total ICAP		0.13	0.3	mg/L	0.02
10/24/2016 12:32	Lead Total ICAP/MS		0.80	15	ug/L	0.5
10/19/2016 22:26	Magnesium Total ICAP		2.2		mg/L	0.1
10/24/2016 12:32	Manganese Total ICAP/MS		46	50	ug/L	2
10/22/2016 19:12	PH (H3=past HT not compliant)		8.1		Units	0.1
10/19/2016 22:26	Potassium Total ICAP		3.6		mg/L	1
10/19/2016 22:26	Sodium Total ICAP		30		mg/L	1
10/19/2016 22:26	Strontium ICAP		0.31		mg/L	0.01
10/18/2016 21:12	Sulfate		18	250	mg/L	0.5
	201610180757	**MMD Denver Well DE-1R**				
10/22/2016 17:15	Alkalinity in CaCO3 units		130		mg/L	2
10/25/2016 11:27	Alpha, Gross		3.1	15	pCi/L	3
10/24/2016 12:34	Barium Total ICAP/MS		110	2000	ug/L	2
11/28/2016 19:16	Bicarbonate as CaCO3		130		mg/L	
10/19/2016 22:43	Boron Total ICAP		0.060		mg/L	0.05
10/19/2016 22:43	Calcium Total ICAP		17		mg/L	1
10/18/2016 20:03	Chloride		1.9	250	mg/L	1
10/19/2016 14:13	Fluoride		1.2	4	mg/L	0.05
10/25/2016 11:27	Gross Alpha + adjusted error		3.7	15	pCi/L	3
10/19/2016 22:43	Iron Total ICAP		0.050	0.3	mg/L	0.02
10/19/2016 22:43	Magnesium Total ICAP		1.8		mg/L	0.1
10/24/2016 12:34	Manganese Total ICAP/MS		22	50	ug/L	2
10/24/2016 12:34	Molybdenum Total ICAP/MS		2.0		ug/L	2
10/22/2016 17:15	PH (H3=past HT not compliant)		8.2		Units	0.1
10/19/2016 22:43	Potassium Total ICAP		3.0		mg/L	1
10/19/2016 22:43	Sodium Total ICAP		52		mg/L	1
10/19/2016 22:43	Strontium ICAP		0.30		mg/L	0.01

SUMMARY OF POSITIVE DATA ONLY

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Laboratory Hits
Report: 617466

Hemenway Groundwater Engineering, Inc
Courtney Hemenway
17011 Lincoln Avenue, PMB 416
Parker, CO 80134

Samples Received on:
10/18/2016 1240

Analyzed	Analyte	Sample ID	Result	Federal MCL	Units	MRL
10/18/2016 20:03	Sulfate		21	250	mg/L	0.5

SUMMARY OF POSITIVE DATA ONLY

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Laboratory Data
Report: 617466

Hemenway Groundwater Engineering, Inc
Courtney Hemenway
17011 Lincoln Avenue, PMB 416
Parker, CO 80134

Samples Received on:
10/18/2016 1240

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
10/25/16	10/25/16 19:41	945224	945229	(EPA 624)	Acrylonitrile	ND	ug/L	2	1
10/25/16	10/25/16 19:41	945224	945229	(EPA 624)	1,2-Dichloroethane-d4	101	%		1
10/25/16	10/25/16 19:41	945224	945229	(EPA 624)	4-Bromofluorobenzene	106	%		1
10/25/16	10/25/16 19:41	945224	945229	(EPA 624)	Toluene-d8	97	%		1
MMD Denver Well DE-1R (201610180757)						**Sampled on 10/17/2016 1100**			
		EPA 200.8 - ICPMS Metals							
10/18/16	10/24/16 12:34	943587	944224	(EPA 200.8)	Aluminum Total ICAP/MS	ND	ug/L	20	1
10/18/16	10/24/16 12:34	943587	944224	(EPA 200.8)	Antimony Total ICAP/MS	ND	ug/L	1	1
10/18/16	10/24/16 12:34	943587	944224	(EPA 200.8)	Arsenic Total ICAP/MS	ND	ug/L	1	1
10/18/16	10/24/16 12:34	943587	944224	(EPA 200.8)	Barium Total ICAP/MS	110	ug/L	2	1
10/18/16	10/24/16 12:34	943587	944224	(EPA 200.8)	Beryllium Total ICAP/MS	ND	ug/L	1	1
10/18/16	10/24/16 12:34	943587	944224	(EPA 200.8)	Cadmium Total ICAP/MS	ND	ug/L	0.5	1
10/18/16	10/24/16 12:34	943587	944224	(EPA 200.8)	Chromium Total ICAP/MS	ND	ug/L	1	1
10/18/16	10/24/16 12:34	943587	944224	(EPA 200.8)	Copper Total ICAP/MS	ND	ug/L	2	1
10/18/16	10/24/16 12:34	943587	944224	(EPA 200.8)	Lead Total ICAP/MS	ND	ug/L	0.5	1
10/18/16	10/24/16 12:34	943587	944224	(EPA 200.8)	Manganese Total ICAP/MS	22	ug/L	2	1
10/18/16	10/24/16 12:34	943587	944224	(EPA 200.8)	Molybdenum Total ICAP/MS	2.0	ug/L	2	1
10/18/16	10/24/16 12:34	943587	944224	(EPA 200.8)	Nickel Total ICAP/MS	ND	ug/L	5	1
10/18/16	10/24/16 12:34	943587	944224	(EPA 200.8)	Selenium Total ICAP/MS	ND	ug/L	5	1
10/18/16	10/21/16 00:32	943587	944230	(EPA 200.8)	Silver Total ICAP/MS	ND	ug/L	0.5	1
10/18/16	10/24/16 12:34	943587	944224	(EPA 200.8)	Thallium Total ICAP/MS	ND	ug/L	1	1
10/18/16	10/24/16 12:34	943587	944224	(EPA 200.8)	Uranium ICAP/MS	ND	ug/L	1	1
10/18/16	10/24/16 12:34	943587	944224	(EPA 200.8)	Zinc Total ICAP/MS	ND	ug/L	20	1
		EPA 200.7 - ICP Metals							
10/18/16	10/19/16 22:43	943587	943953	(EPA 200.7)	Boron Total ICAP	0.060	mg/L	0.05	1
10/18/16	10/19/16 22:43	943587	943953	(EPA 200.7)	Calcium Total ICAP	17	mg/L	1	1
10/18/16	10/19/16 22:43	943587	943953	(EPA 6010)	Iron Total ICAP	0.050	mg/L	0.02	1
10/18/16	10/19/16 22:43	943587	943953	(EPA 200.7)	Magnesium Total ICAP	1.8	mg/L	0.1	1
10/18/16	10/19/16 22:43	943587	943953	(EPA 200.7)	Potassium Total ICAP	3.0	mg/L	1	1
10/18/16	10/19/16 22:43	943587	943953	(EPA 200.7)	Sodium Total ICAP	52	mg/L	1	1
10/18/16	10/19/16 22:43	943587	943953	(EPA 200.7)	Strontium ICAP	0.30	mg/L	0.01	1
		EPA 245.1 - Mercury Total							
10/20/16	10/21/16 13:39	944250	944418	(EPA 245.1)	Mercury	ND	ug/L	0.2	1
		SM2330B - Carbonate as CO3, Calculated							
	:			(SM2330B)	Carbonate as CO3, Calculated	NA	mg/L	2	1
		SM 2320B - Bicarbonate as CaCO3, calc							
	11/28/16 19:16			(SM 2320B)	Bicarbonate as CaCO3	130	mg/L		1
		EPA 505 - Organochlorine Pesticides/PCBs							

Rounding on totals after summation.
(c) - indicates calculated results

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Tel: (626) 386-1100
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1 800 566 LABS (1 800 566 5227)

Laboratory Data Report: 617466

Hemenway Groundwater Engineering, Inc
Courtney Hemenway
17011 Lincoln Avenue, PMB 416
Parker, CO 80134

Samples Received on:
10/18/2016 1240

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
10/21/16	10/22/16 04:07	944064	945197	(EPA 505)	Alachlor (Alanex)	ND	ug/L	0.1	1
10/21/16	10/22/16 04:07	944064	945197	(EPA 505)	Aldrin	ND	ug/L	0.01	1
10/21/16	10/22/16 04:07	944064	945197	(EPA 505)	Chlordane	ND	ug/L	0.1	1
10/21/16	10/22/16 04:07	944064	945197	(EPA 505)	Dieldrin	ND	ug/L	0.01	1
10/21/16	10/22/16 04:07	944064	945197	(EPA 505)	Endrin	ND	ug/L	0.01	1
10/21/16	10/22/16 04:07	944064	945197	(EPA 505)	Heptachlor	ND	ug/L	0.01	1
10/21/16	10/22/16 04:07	944064	945197	(EPA 505)	Heptachlor Epoxide	ND	ug/L	0.01	1
10/21/16	10/22/16 04:07	944064	945197	(EPA 505)	Lindane (gamma-BHC)	ND	ug/L	0.01	1
10/21/16	10/22/16 04:07	944064	945197	(EPA 505)	Methoxychlor	ND	ug/L	0.05	1
10/21/16	10/22/16 04:07	944064	945197	(EPA 505)	PCB 1016 Aroclor	ND	ug/L	0.08	1
10/21/16	10/22/16 04:07	944064	945197	(EPA 505)	PCB 1221 Aroclor	ND	ug/L	0.1	1
10/21/16	10/22/16 04:07	944064	945197	(EPA 505)	PCB 1232 Aroclor	ND	ug/L	0.1	1
10/21/16	10/22/16 04:07	944064	945197	(EPA 505)	PCB 1242 Aroclor	ND	ug/L	0.1	1
10/21/16	10/22/16 04:07	944064	945197	(EPA 505)	PCB 1248 Aroclor	ND	ug/L	0.1	1
10/21/16	10/22/16 04:07	944064	945197	(EPA 505)	PCB 1254 Aroclor	ND	ug/L	0.1	1
10/21/16	10/22/16 04:07	944064	945197	(EPA 505)	PCB 1260 Aroclor	ND	ug/L	0.1	1
10/21/16	10/22/16 04:07	944064	945197	(EPA 505)	Total PCBs	ND	ug/L	0.1	1
10/21/16	10/22/16 04:07	944064	945197	(EPA 505)	Toxaphene	ND	ug/L	0.5	1
10/21/16	10/22/16 04:07	944064	945197	(EPA 505)	Tetrachlorometaxylene	114	%		1
		SM 6251B - Haloacetic Acids							
10/21/16	10/24/16 16:08	944240	945426	(SM 6251B)	Dibromoacetic acid	ND	ug/L	1	1
10/21/16	10/24/16 16:08	944240	945426	(SM 6251B)	Dichloroacetic acid	ND	ug/L	1	1
10/21/16	10/24/16 16:08	944240	945426	(SM 6251B)	Monobromoacetic acid	ND	ug/L	1	1
10/21/16	10/24/16 16:08	944240	945426	(SM 6251B)	Monochloroacetic acid	ND	ug/L	2	1
10/21/16	10/24/16 16:08	944240	945426	(SM 6251B)	Total Haloacetic Acids (HAA5)	ND	ug/L	2	1
10/21/16	10/24/16 16:08	944240	945426	(SM 6251B)	Trichloroacetic acid	ND	ug/L	1	1
10/21/16	10/24/16 16:08	944240	945426	(SM 6251B)	1,2,3-Trichloropropane	97	%		1
10/21/16	10/24/16 16:08	944240	945426	(SM 6251B)	2,3-Dibromopropionic acid	112	%		1
		EPA 551.1 - EDB/DBCP/HAN by EPA 551.1							
10/26/16	10/27/16 06:34	945176	945291	(EPA 551.1)	Dibromochloropropane (DBCP)	ND	ug/L	0.01	1
10/26/16	10/27/16 06:34	945176	945291	(EPA 551.1)	Ethylene Dibromide (EDB)	ND	ug/L	0.01	1
10/26/16	10/27/16 06:34	945176	945291	(EPA 551.1)	1,2-Dibromopropane	104	%		1
		EPA 625 - Base/Neutral/Acid Extractables							
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	1,2,4-Trichlorobenzene	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	1,2-Diphenylhydrazine	ND	ug/L	10	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	2,4,5-Trichlorophenol	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	2,4,6-Trichlorophenol	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	2,4-Dichlorophenol	ND	ug/L	5	1

Rounding on totals after summation.
(c) - indicates calculated results

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Laboratory Data
Report: 617466

Hemenway Groundwater Engineering, Inc
Courtney Hemenway
17011 Lincoln Avenue, PMB 416
Parker, CO 80134

Samples Received on:
10/18/2016 1240

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	2,4-Dimethylphenol	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	2,4-Dinitrophenol	ND	ug/L	50	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	2,4-Dinitrotoluene	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	2,6-Dinitrotoluene	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	2-Chloronaphthalene	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	2-Chlorophenol	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	2-Methylnaphthalene	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	2-Methylphenol	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	2-Nitroaniline	ND	ug/L	10	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	2-Nitrophenol	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	3,3-Dichlorobenzidine	ND	ug/L	50	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	3-Nitroaniline	ND	ug/L	20	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	4,6-Dinitro-o-cresol	ND	ug/L	50	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	4-Bromophenylphenylether	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	4-Chloroaniline	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	4-Chlorophenylphenylether	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	4-Methylphenol	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	4-Nitroaniline	ND	ug/L	20	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	4-Nitrophenol	ND	ug/L	10	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Acenaphthene	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Acenaphthylene	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Aniline	ND	ug/L	10	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Anthracene	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Benzidine	ND	ug/L	50	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Benzo(a)anthracene	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Benzo(a)pyrene	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Benzo(b)fluoranthene	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Benzo(g,h,i)perylene	ND	ug/L	10	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Benzo(k)fluoranthene	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Benzoic Acid	ND (R7)	ug/L	50	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Benzyl Alcohol	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	bis(2-Chloroethoxy)methane	ND	ug/L	10	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	bis(2-Chloroethyl)ether	ND	ug/L	10	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	bis(2-Chloroisopropyl)ether	ND	ug/L	10	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Butylbenzylphthalate	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Chrysene	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Dibenz(a,h)anthracene	ND	ug/L	10	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Dibenzofuran	ND	ug/L	5	1

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Laboratory Data
Report: 617466

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1 800 566 LABS (1 800 566 5227)

Hemenway Groundwater Engineering, Inc
Courtney Hemenway
17011 Lincoln Avenue, PMB 416
Parker, CO 80134

Samples Received on:
10/18/2016 1240

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Diethylphthalate	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Dimethylphthalate	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Di-n-butylphthalate	ND	ug/L	10	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Di-n-octylphthalate	ND	ug/L	10	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Fluoranthene	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Fluorene	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Hexachlorobenzene	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Hexachlorobutadiene	ND	ug/L	10	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Hexachlorocyclopentadiene	ND	ug/L	10	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Hexachloroethane	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Indeno(1,2,3-c,d)pyrene	ND	ug/L	10	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Isophorone	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Naphthalene	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Nitrobenzene	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	N-Nitrosodimethylamine	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	N-Nitrosodi-N-propylamine	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	N-Nitrosodiphenylamine	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	p-Chloro-m-cresol	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Pentachlorophenol	ND	ug/L	20	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Phenanthrene	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Phenol	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Pyrene	ND	ug/L	5	1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	2,4,6-Tribromophenol	66	%		1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	2-Fluorobiphenyl	68	%		1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	2-Fluorophenol	62	%		1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Nitrobenzene-d5	67	%		1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Phenol-d5	65	%		1
10/19/16	10/31/16 14:08	943604	946184	(EPA 625)	Terphenyl-d14	60	%		1
		EPA 521 - Nitrosamines by GCMS							
10/26/16	10/31/16 19:01	945345	946246	(EPA 521)	N-Nitrosodibutylamine (NDBA)	ND	ng/L	2	1
10/26/16	10/31/16 19:01	945345	946246	(EPA 521)	N-Nitrosodiethylamine (NDEA)	ND	ng/L	2	1
10/26/16	10/31/16 19:01	945345	946246	(EPA 521)	N-Nitroso-dimethylamine (NDMA)	ND	ng/L	2	1
10/26/16	10/31/16 19:01	945345	946246	(EPA 521)	N-Nitrosodi-n-propylamine (NDPA)	ND	ng/L	2	1
10/26/16	10/31/16 19:01	945345	946246	(EPA 521)	N-Nitrosomethylethylamine (NMEA)	ND	ng/L	2	1
10/26/16	10/31/16 19:01	945345	946246	(EPA 521)	N-Nitrosomorpholine	ND	ng/l	2	1
10/26/16	10/31/16 19:01	945345	946246	(EPA 521)	N-Nitrosopiperidine (NPIP)	ND	ng/L	2	1
10/26/16	10/31/16 19:01	945345	946246	(EPA 521)	N-Nitrosopyrollidine (NPYR)	ND	ng/L	2	1
10/26/16	10/31/16 19:01	945345	946246	(EPA 521)	NDMA-D6	103	%		1

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Laboratory Data Report: 617466

Hemenway Groundwater Engineering, Inc
Courtney Hemenway
17011 Lincoln Avenue, PMB 416
Parker, CO 80134

Samples Received on:
10/18/2016 1240

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
	EPA 531.2 - Aldicarbs								
	10/30/16 11:52		946091	(EPA 531.2)	3-Hydroxycarbofuran	ND	ug/L	0.5	1
	10/30/16 11:52		946091	(EPA 531.2)	Aldicarb (Temik)	ND	ug/L	0.5	1
	10/30/16 11:52		946091	(EPA 531.2)	Aldicarb sulfone	ND	ug/L	0.5	1
	10/30/16 11:52		946091	(EPA 531.2)	Aldicarb sulfoxide	ND	ug/L	0.5	1
	10/30/16 11:52		946091	(EPA 531.2)	Baygon	ND	ug/L	0.5	1
	10/30/16 11:52		946091	(EPA 531.2)	Carbaryl	ND	ug/L	0.5	1
	10/30/16 11:52		946091	(EPA 531.2)	Carbofuran (Furadan)	ND	ug/L	0.5	1
	10/30/16 11:52		946091	(EPA 531.2)	Methiocarb	ND	ug/L	0.5	1
	10/30/16 11:52		946091	(EPA 531.2)	Methomyl	ND	ug/L	0.5	1
	10/30/16 11:52		946091	(EPA 531.2)	Oxamyl (Vydate)	ND	ug/L	0.5	1
	10/30/16 11:52		946091	(EPA 531.2)	4-Bromo-3,5-dimethylphenyl-N-methylc arbamate	102	%		1
	EPA 300.0 - Nitrate, Nitrite by EPA 300.0								
	10/18/16 20:03		943562	(EPA 300.0)	Nitrate as Nitrogen by IC	ND	mg/L	0.1	1
	10/18/16 20:03		943562	(EPA 300.0)	Nitrite Nitrogen by IC	ND	mg/L	0.05	1
	EPA 300.0 - Chlorite by 300.0								
	10/20/16 21:37		944346	(EPA 300.0)	Chlorite by IC	ND	mg/L	0.01	1
	EPA 300.0 - Chloride, Sulfate by EPA 300.0								
	10/18/16 20:03		943563	(EPA 300.0)	Chloride	1.9	mg/L	1	1
	10/18/16 20:03		943563	(EPA 300.0)	Sulfate	21	mg/L	0.5	1
	EPA 900.0 - Gross Alpha/Beta Radiation								
10/20/16	10/25/16 11:27	944031	946373	(EPA 900.0)	Alpha, Gross	3.1	pCi/L	3	1
10/20/16	10/25/16 11:27	944031	946373	(EPA 900.0)	Alpha, Min Detectable Activity	1.8	pCi/L		1
10/20/16	10/25/16 11:27	944031	946373	(EPA 900.0)	Alpha, Two Sigma Error	0.73	pCi/L		1
10/20/16	10/25/16 11:27	944031	946373	(EPA 900.0)	Beta, Gross	ND	pCi/L	3	1
10/20/16	10/25/16 11:27	944031	946373	(EPA 900.0)	Beta, Min Detectable Activity	1.7	pCi/L		1
10/20/16	10/25/16 11:27	944031	946373	(EPA 900.0)	Beta, Two Sigma Error	0.58	pCi/L		1
10/20/16	10/25/16 11:27	944031	946373	(EPA 900.0)	Gross Alpha + adjusted error	3.7	pCi/L	3	1
	Ra-226 GA - Radium 226								
10/20/16	11/06/16 18:39	943946	945087	(Ra-226 GA)	Radium 226	ND	pCi/L	1	1
10/20/16	11/06/16 18:39	943946	945087	(Ra-226 GA)	Radium 226 Min Detect Activity	0.40	pCi/L		1
10/20/16	11/06/16 18:39	943946	945087	(Ra-226 GA)	Radium 226 Two Sigma Error	ND	pCi/L		1
	RA-228 GA - Radium 228								
10/20/16	11/06/16 18:39	943951	945091	(RA-228 GA)	Radium 228	ND (L1)	pCi/L	1	1
10/20/16	11/06/16 18:39	943951	945091	(RA-228 GA)	Radium 228 Min Detect Activity	0.85	pCi/L		1
10/20/16	11/06/16 18:39	943951	945091	(RA-228 GA)	Radium 228 Two Sigma Error	ND	pCi/L		1
	MWH/E 335MOD - Cyanogen Chloride Screen								
	10/28/16 15:27		946053	(MWH/E 335MOD)	Cyanogen Chloride Screen	ND	mg/L	0.035	1

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Report: 617466

Hemenway Groundwater Engineering, Inc
Courtney Hemenway
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Parker, CO 80134

Samples Received on:
10/18/2016 1240

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
		EPA 350.1 - Ammonia Nitrogen							
	10/26/16 12:31		945002	(EPA 350.1)	Ammonia Nitrogen	ND	mg/L	0.05	1
		EPA 100.2 - Asbestos (Subbed)							
	12/02/16 00:00			(EPA 100.2)	Asbestos (Subbed)	<0.18	MFL	0.18	1
		EPA 525.2 - EPA 525.2 Extended List							
10/28/16	10/31/16 14:28			(EPA 525.2)	1,2,4,5-Tetrachlorobenzene	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	1-Methylnaphthalene	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	2,2,3,3,4,4,6-Heptachlorobiphenyl	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	2,2,3,3,4,5,6,6-Octachlorobiphenyl	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	2,2,3,4,6-Pentachlorobiphenyl	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	2,2,4,4,5,6-Hexachlorobiphenyl	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	2,2,4,4-Tetrachlorobiphenyl	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	2,3-Dichlorobiphenyl	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	2,4,5-Trichlorobiphenyl	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	2,4-Dinitrotoluene	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	2,6-Dinitrotoluene	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	2-Chlorobiphenyl	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	2-methylnaphthalene	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	4,4-DDD	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	4,4-DDE	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	4,4-DDT	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	acenaphthene	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	acenaphthylene	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Acetochlor	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Alachlor	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Aldrin	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	alpha-BHC	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	alpha-Chlordane	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Ametryn	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Anilazine	ND	ug/L	1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	anthracene	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Aspon	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Atrazine	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Azinphos-ethyl	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Azinphos-methyl	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Bendiocarb	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Benfluralin	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	benzo(a)anthracene	ND	ug/L	0.1	1

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Samples Received on:
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Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
10/28/16	10/31/16 14:28			(EPA 525.2)	benzo(a)pyrene	ND	ug/L	0.02	1
10/28/16	10/31/16 14:28			(EPA 525.2)	benzo(b)fluoranthene	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Benzo(g,h,i)perylene	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	benzo(k)fluoranthene	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	beta-BHC	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Bolstar	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Bromacil	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Butachlor	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Butylate	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Butylbenzylphthalate	ND	ug/L	1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Carbophenothion	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Carboxin	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Chlorfenvinphos	ND	ug/L	5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Chlorobenzilate	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Chloroneb	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Chloropropylate	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Chlorothalonil	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Chlorpropham	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Chlorpyrifos	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Chlorpyrifos methyl	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	chrysene	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	cis-Nonachlor	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	cis-Permethrin	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Clomazone	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Clopyralid	ND	ug/L	10	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Coumaphos	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Crotoxyphos	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Cycloate	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	DCPA	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	delta-BHC	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Demeton O	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Demeton S	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Desethylatrazine	ND	ug/L	1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Desisopropylatrazine	ND	ug/L	1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Di(2-ethylhexyl)adipate	ND	ug/L	0.6	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Di(2-Ethylhexyl)phthalate	ND	ug/L	0.6	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Diazinon	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Dibenzo(a,h)anthracene	ND	ug/L	0.1	1

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Laboratory Data
Report: 617466

Hemenway Groundwater Engineering, Inc
Courtney Hemenway
17011 Lincoln Avenue, PMB 416
Parker, CO 80134

Samples Received on:
10/18/2016 1240

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
10/28/16	10/31/16 14:28			(EPA 525.2)	Dichlobenil	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Dichlofenthion	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Dichloran	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Dichlorvos	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Dicrotophos	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Dieldrin	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Diethylphthalate	ND	ug/L	1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Dimethoate	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Dimethylphthalate	ND	ug/L	1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Di-n-butylphthalate	ND	ug/L	2	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Di-N-octylphthalate	ND	ug/L	2	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Dioxathion	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Diphenamid	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Disulfoton	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Disulfoton Sulfone	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Disulfoton Sulfoxide	ND	ug/L	10	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Endosulfan I	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Endosulfan II	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Endosulfan Sulfate	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Endrin	ND	ug/L	0.0096	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Endrin Aldehyde	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	E-Phosphamidon	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	EPN	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	EPTC	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Erucylamide	ND	ug/L	5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Esfenvalerate	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Ethalfluralin	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Ethion	ND	ug/L	5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Ethofumesate	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Ethoprop	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Etridiazole	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Famphur	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Fenamiphos	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Fenarimol	ND	ug/L	1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Fenitrothion	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Fenoxaprop-ethyl	ND	ug/L	1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Fensulfothion	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Fenthion	ND	ug/L	0.1	1

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10/28/16	10/31/16 14:28			(EPA 525.2)	Fluazifop-butyl	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Fluchloralin	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Fluometuron	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	fluoranthene	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	fluorene	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Fluridone	ND	ug/L	1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Fonofos	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Gamma-BHC	ND	ug/L	0.02	1
10/28/16	10/31/16 14:28			(EPA 525.2)	gamma-Chlordane	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Heptachlor	ND	ug/L	0.04	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Heptachlor Epoxide	ND	ug/L	0.02	1
10/28/16	10/31/16 14:28			(EPA 525.2)	hexachlorobenzene	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	hexachlorocyclopentadiene	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Hexazinone	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Indeno(1,2,3,c,d)Pyrene	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Iprodione	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Isofenphos	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	isophorone	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Leptophos	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Malathion	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Metalaxyl	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Methoxychlor	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Methyl paraoxon	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Methyl Parathion	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Metolachlor	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Metribuzin	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Metsulfuron-methyl	ND	ug/L	10	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Mevinphos	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	MGK 264 isomer a	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	MGK 264 isomer b	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	MGK 326	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Mirex	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Molinate	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Monocrotophos	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Naled	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	naphthalene	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Napropamide	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Norflurazon	ND	ug/L	1	1

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Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
10/28/16	10/31/16 14:28			(EPA 525.2)	Oryzalin	ND	ug/L	10	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Oxadiazon	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Oxychlordane	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Oxyfluorfen	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Parathion	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Pebulate	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Pendimethalin	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Pentachlorobenzene	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Pentachloronitrobenzene	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	pentachlorophenol	ND	ug/L	1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	phenanthrene	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Phorate	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Phosmet	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Profluralin	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Prometryn	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Pronamide	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Propachlor	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Propanil	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Propazine	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Propiconazole isomer a	ND	ug/L	5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Propiconazole isomer b	ND	ug/L	5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Prothiofos	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	pyrene	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Simazine	ND	ug/L	0.07	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Simetryn	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Stirofos	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Sulfotep	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Tebuthiuron	ND	ug/L	10	1
10/28/16	10/31/16 14:28			(EPA 525.2)	TEPP	ND	ug/L	1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Terbacil	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Terbufos	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Terbutryn	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Thiabendazole	ND	ug/L	10	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Thiobencarb	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Thionazin	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	trans-Nonachlor	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	trans-Permethrin	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Triadimefon	ND	ug/L	0.5	1

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10/28/16	10/31/16 14:28			(EPA 525.2)	Tribufos	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Trichloronate	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Tricylazole	ND	ug/L	1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Trifluralin	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Vernolate	ND	ug/L	0.1	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Vinclozolin	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	Z-Phosphamidon	ND	ug/L	0.5	1
10/28/16	10/31/16 14:28			(EPA 525.2)	2,4,5,6-tetrachloro-m-xylene	90	%		1
10/28/16	10/31/16 14:28			(EPA 525.2)	4,4-dichlorobiphenyl	98	%		1
10/28/16	10/31/16 14:28			(EPA 525.2)	Triphenylphosphate	122	%		1
		EPA 524.2 - Volatile Organics by GCMS							
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	1,1,1,2-Tetrachloroethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	1,1,1-Trichloroethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	1,1,2,2-Tetrachloroethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	1,1,2-Trichloroethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	1,1-Dichloroethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	1,1-Dichloroethylene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	1,1-Dichloropropene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	1,2,3-Trichlorobenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	1,2,3-Trichloropropane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	1,2,4-Trichlorobenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	1,2,4-Trimethylbenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	1,2-Dichloroethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	1,2-Dichloropropane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	1,3,5-Trimethylbenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	1,3-Dichloropropane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	2,2-Dichloropropane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	2-Butanone (MEK)	ND	ug/L	5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	2-Hexanone	ND	ug/L	10	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	4-Methyl-2-Pentanone (MIBK)	ND	ug/L	5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Acetone	ND	ug/L	10	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Benzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Bromobenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Bromochloromethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Bromodichloromethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Bromoethane	ND (LK)	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Bromoform	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Bromomethane (Methyl Bromide)	ND (R7)	ug/L	0.5	1

Rounding on totals after summation.
(c) - indicates calculated results

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Tel: (626) 386-1100
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1 800 566 LABS (1 800 566 5227)

Laboratory Data
Report: 617466

Hemenway Groundwater Engineering, Inc
Courtney Hemenway
17011 Lincoln Avenue, PMB 416
Parker, CO 80134

Samples Received on:
10/18/2016 1240

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Carbon disulfide	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Carbon Tetrachloride	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Chlorobenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Chlorodibromomethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Chloroethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Chloroform (Trichloromethane)	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Chloromethane(Methyl Chloride)	ND (LK)	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	cis-1,2-Dichloroethylene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	cis-1,3-Dichloropropene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Dibromomethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Dichlorodifluoromethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Dichloromethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Di-isopropyl ether	ND	ug/L	3	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Ethyl benzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Hexachlorobutadiene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Isopropylbenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	m,p-Xylenes	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	m-Dichlorobenzene (1,3-DCB)	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Methyl Tert-butyl ether (MTBE)	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Naphthalene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	n-Butylbenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	n-Propylbenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	o-Chlorotoluene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	o-Dichlorobenzene (1,2-DCB)	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	o-Xylene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	p-Chlorotoluene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	p-Dichlorobenzene (1,4-DCB)	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	p-Isopropyltoluene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	sec-Butylbenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Styrene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	tert-amyl Methyl Ether	ND	ug/L	3	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	tert-Butyl Ethyl Ether	ND	ug/L	3	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	tert-Butylbenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Tetrachloroethylene (PCE)	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Toluene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Total 1,3-Dichloropropene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Total THM	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Total xylenes	ND	ug/L	0.5	1

Rounding on totals after summation.
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Laboratory Data Report: 617466

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17011 Lincoln Avenue, PMB 416
Parker, CO 80134

Samples Received on:
10/18/2016 1240

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	trans-1,2-Dichloroethylene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	trans-1,3-Dichloropropene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Trichloroethylene (TCE)	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Trichlorofluoromethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Trichlorotrifluoroethane(Freon 113)	ND	ug/L	0.5	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Vinyl chloride (VC)	ND	ug/L	0.3	1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	1,2-Dichloroethane-d4	119	%		1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	4-Bromofluorobenzene	96	%		1
10/27/16	10/28/16 11:19	945851	945855	(EPA 524.2)	Toluene-d8	90	%		1
		EPA 624 - Acrolein/Acrylonitrile by 624							
10/25/16	10/25/16 20:03	945224	945229	(EPA 624)	Acrolein	ND	ug/L	2	1
10/25/16	10/25/16 20:03	945224	945229	(EPA 624)	Acrylonitrile	ND	ug/L	2	1
10/25/16	10/25/16 20:03	945224	945229	(EPA 624)	1,2-Dichloroethane-d4	100	%		1
10/25/16	10/25/16 20:03	945224	945229	(EPA 624)	4-Bromofluorobenzene	106	%		1
10/25/16	10/25/16 20:03	945224	945229	(EPA 624)	Toluene-d8	96	%		1
		SM4500CN-F - Cyanide							
	10/25/16 12:07		944476	(SM4500CN-F)	Cyanide	ND	mg/L	0.025	1
		SM 4500F-C - Fluoride							
	10/19/16 14:13		943467	(SM 4500F-C)	Fluoride	1.2	mg/L	0.05	1
		SM 2320B - Alkalinity in CaCO3 units							
	10/22/16 17:15		944768	(SM 2320B)	Alkalinity in CaCO3 units	130	mg/L	2	1
		SM4500-HB - PH (H3=past HT not compliant)							
	10/22/16 17:15		944771	(SM4500-HB)	PH (H3=past HT not compliant)	8.2	Units	0.1	1
		SM 4500-CLO2-D/HACH - Chlorine Dioxide (H3=past HT not compliant)							
	10/16/16 19:45		943580	(SM 4500-CLO2-D/HACH)	Chlorine Dioxide (H3=past HT not compliant)	ND	mg/L	0.24	1
		SM 4500CL-G/HACH - Free Chlorine Residual (H3=past HT not compliant)							
	10/18/16 19:45		943581	(SM 4500CL-G/HACH)	Free Chlorine Residual (H3=past HT not compliant)	ND	mg/L	0.1	1

Travel Blank (201610180758) **Sampled on 10/17/2016 1100**

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
		EPA 551.1 - EDB/DBCP/HAN by EPA 551.1							
10/26/16	10/27/16 06:55	945176	945291	(EPA 551.1)	Dibromochloropropane (DBCP)	ND	ug/L	0.01	1
10/26/16	10/27/16 06:55	945176	945291	(EPA 551.1)	Ethylene Dibromide (EDB)	ND	ug/L	0.01	1
10/26/16	10/27/16 06:55	945176	945291	(EPA 551.1)	1,2-Dibromopropane	111	%		1
		EPA 524.2 - Volatile Organics by GCMS							
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	1,1,1,2-Tetrachloroethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	1,1,1-Trichloroethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	1,1,2,2-Tetrachloroethane	ND	ug/L	0.5	1

Rounding on totals after summation.
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Courtney Hemenway
17011 Lincoln Avenue, PMB 416
Parker, CO 80134

Samples Received on:
10/18/2016 1240

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	1,1,2-Trichloroethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	1,1-Dichloroethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	1,1-Dichloroethylene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	1,1-Dichloropropene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	1,2,3-Trichlorobenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	1,2,3-Trichloropropane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	1,2,4-Trichlorobenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	1,2,4-Trimethylbenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	1,2-Dichloroethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	1,2-Dichloropropane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	1,3,5-Trimethylbenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	1,3-Dichloropropane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	2,2-Dichloropropane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	2-Butanone (MEK)	ND	ug/L	5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	2-Hexanone	ND	ug/L	10	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	4-Methyl-2-Pentanone (MIBK)	ND	ug/L	5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Acetone	ND	ug/L	10	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Benzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Bromobenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Bromochloromethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Bromodichloromethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Bromoethane	ND (LK)	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Bromoform	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Bromomethane (Methyl Bromide)	ND (R7)	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Carbon disulfide	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Carbon Tetrachloride	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Chlorobenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Chlorodibromomethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Chloroethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Chloroform (Trichloromethane)	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Chloromethane(Methyl Chloride)	ND (LK)	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	cis-1,2-Dichloroethylene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	cis-1,3-Dichloropropene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Dibromomethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Dichlorodifluoromethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Dichloromethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Di-isopropyl ether	ND	ug/L	3	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Ethyl benzene	ND	ug/L	0.5	1

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Samples Received on:
10/18/2016 1240

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Hexachlorobutadiene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Isopropylbenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	m,p-Xylenes	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	m-Dichlorobenzene (1,3-DCB)	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Methyl Tert-butyl ether (MTBE)	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Naphthalene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	n-Butylbenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	n-Propylbenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	o-Chlorotoluene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	o-Dichlorobenzene (1,2-DCB)	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	o-Xylene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	p-Chlorotoluene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	p-Dichlorobenzene (1,4-DCB)	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	p-Isopropyltoluene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	sec-Butylbenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Styrene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	tert-amyl Methyl Ether	ND	ug/L	3	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	tert-Butyl Ethyl Ether	ND	ug/L	3	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	tert-Butylbenzene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Tetrachloroethylene (PCE)	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Toluene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Total 1,3-Dichloropropene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Total THM	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Total xylenes	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	trans-1,2-Dichloroethylene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	trans-1,3-Dichloropropene	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Trichloroethylene (TCE)	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Trichlorofluoromethane	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Trichlorotrifluoroethane(Freon 113)	ND	ug/L	0.5	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Vinyl chloride (VC)	ND	ug/L	0.3	1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	1,2-Dichloroethane-d4	118	%		1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	4-Bromofluorobenzene	102	%		1
10/27/16	10/28/16 11:41	945851	945855	(EPA 524.2)	Toluene-d8	87	%		1
		EPA 624 - Acrolein/Acrylonitrile by 624							
10/25/16	10/25/16 20:25	945224	945229	(EPA 624)	Acrolein	ND	ug/L	2	1
10/25/16	10/25/16 20:25	945224	945229	(EPA 624)	Acrylonitrile	ND	ug/L	2	1
10/25/16	10/25/16 20:25	945224	945229	(EPA 624)	1,2-Dichloroethane-d4	101	%		1
10/25/16	10/25/16 20:25	945224	945229	(EPA 624)	4-Bromofluorobenzene	108	%		1

Rounding on totals after summation.
(c) - indicates calculated results

eurofins | Eaton Analytical

Tel: (626) 386-1100
Fax: (626) 386-1101
1 800 566 LABS (1 800 566 5227)

Laboratory Data Report: 617466

Hemenway Groundwater Engineering, Inc
Courtney Hemenway
17011 Lincoln Avenue, PMB 416
Parker, CO 80134

Samples Received on:
10/18/2016 1240

Prepped	Analyzed	Prep Batch	Analytical Batch	Method	Analyte	Result	Units	MRL	Dilution
10/25/16	10/25/16 20:25	945224	945229	(EPA 624)	Toluene-d8	96	%		1

Rounding on totals after summation.
(c) - indicates calculated results

Denver Well DE-1R Information

Form No. GWS-25

OFFICE OF THE STATE ENGINEER
COLORADO DIVISION OF WATER RESOURCES

818 Centennial Bldg., 1313 Sherman St., Denver, Colorado 80203
(303) 866-3581

EXST

WELL PERMIT NUMBER 67832 -F -
DIV. 1 WD 8 DES. BASIN MD

APPLICANT

MERIDIAN METROPOLITAN DISTRICT
5750 DTC PARKWAY SUITE 200
GREENWOOD VILLAGE, CO 80111-

(303) 486-1384

CHANGE/EXPANSION OF USE OF AN EXISTING WELL

APPROVED WELL LOCATION
DOUGLAS COUNTY
SW 1/4 SW 1/4 Section 1
Township 6 S Range 67 W Sixth P.M.

DISTANCES FROM SECTION LINES
1300 Ft. from South Section Line
1300 Ft. from West Section Line

UTM COORDINATES (Meters,Zone:13,NAD83)
Easting: Northing:

ISSUANCE OF THIS PERMIT DOES NOT CONFER A WATER RIGHT

CONDITIONS OF APPROVAL

1) This well shall be used in such a way as to cause no material injury to existing water rights. The issuance of this permit does not ensure that no injury will occur to another vested water right or preclude another owner of a vested water right from seeking relief in a civil court action.
2) The construction of this well shall be in compliance with the Water Well Construction Rules 2 CCR 402-2, unless approval of a variance has been granted by the State Board of Examiners of Water Well Construction and Pump Installation Contractors in accordance with Rule 18
3) Approved pursuant to CRS 37-90-137(4) and the decree granted for well no. DE-1 in case no 2001CW257 Division 1 Water Court. The operation of this well is subject to the terms and conditions of said decree.
4) Approved for the expansion of use of an existing well constructed under permit no. 55005-F (originally decreed in case no. 79CW238). The issuance of this permit hereby cancels permit no. 55005-F.
5) The use of ground water from this well is limited to municipal, domestic, commercial, industrial, irrigation, power generation, mining, recreational including fishery and wildlife, manufacturing, mechanical, fire protection, stock watering, and the maintenance of adequate storage systems and reserve.
6) The pumping rate of this well shall not exceed 100 GPM.
7) The average annual amount of ground water to be withdrawn shall not exceed 160 acre-feet.
8) The average annual amount of ground water to be withdrawn by this well in combination with well nos DE-2 (permit no. 67833-F), DE-3 (permit no. 67834-F), and DE-4 (permit no. 67835-F) shall not exceed 258 acre-feet.
9) Production is limited to the Denver aquifer.
10) The owner shall mark the well in a conspicuous place with well permit number(s), name of the aquifer, and court case number(s) as appropriate. The owner shall take necessary means and precautions to preserve these markings.
11) A totalizing flow meter must be installed on this well and maintained in good working order. Permanent records of all diversions must be maintained by the well owner (recorded at least annually) and submitted to the Division Engineer upon request.
12) This well shall be located at least 600 feet from any existing well, completed in the same aquifer, that is not owned by the applicant.
13) This well shall be located not more than 200 feet from the location specified on this permit and not more than 200 feet from the location decreed for well no. DE-1 in case no. 2001CW257 (decreed location is 1,300 feet from the south section line and 1,300 feet from the west section line of said section 1).
14) This well is subject to administration by the Division Engineer in accordance with applicable decrees, statutes, rules, and regulations

NOTE: The ability of this well to withdraw its authorized amount of water from this non-renewable aquifer may be less than the 100 years upon which the amount of water in the aquifer is allocated, due to anticipated water level declines.

01.05.2009
I.O.C.

APPROVED
IDC

Dick Wolfe
State Engineer

Joanna Williams
By

Receipt No. 3635307D DATE ISSUED 01-05-2009 EXPIRATION DATE N/A

FORM NO. GWS-31 10/94

WELL CONSTRUCTION AND TEST REPORT
STATE OF COLORADO, OFFICE OF THE STATE ENGINEER

For Office Use only

1. WELL PERMIT NUMBER 055005-F

2. OWNER NAME(S) MERIDIAN METRO. DISTRICT
Mailing Address 8350 E. CRESCENT PKWY #100
City, St. Zip ENGLEWOOD, CO 80111
Phone (303) 773-1700

3. WELL LOCATION AS DRILLED: SW 1/4 SW 1/4, Sec. 1 Twp. 6 S, Range 67 W
DISTANCES FROM SEC. LINES:
1300 ft. from S (north or south) Sec. line. and 1300 ft. from W (east or west) Sec. line. OR
SUBDIVISION: ______ LOT ______ BLOCK ______ FILING(UNIT) ______
STREET ADDRESS AT WELL LOCATION: PEORIA & E-470

4. GROUND SURFACE ELEVATION 5900 ft. DRILLING METHOD REVERSE MUD ROTARY
DATE COMPLETED 8-20-1. TOTAL DEPTH 1285 ft. DEPTH COMPLETED 1254 ft.

5. GEOLOGIC LOG:

Depth	Description of Material (Type, Size, Color, Water Location)
	SEE ATTACHED GEOLOGIC LOG

6. HOLE DIAM. (in.)

HOLE DIAM. (in.)	From (ft)	To (ft)
22	0	40
14 3/4	40	1285

7. PLAIN CASING

OD (in)	Kind	Wall Size	From(ft)	To(ft)
18	A53B STL	.250	0	40
8 5/8	A53B STL	.365		
(SEE ATTACHED DIAGRAM)				

PERF. CASING: Screen Slot Size: 0.035
8 5/8 304 SS WIRE-WRAPPED
(SEE ATTACHED DIAGRAM)

8. FILTER PACK:
Material CSSI
Size 10-20
Interval 375-1285

9. PACKER PLACEMENT:
Type N/A
Depth N/A

10. GROUTING RECORD:

Material	Amount	Density	Interval	Placement
CEMENT	250 SKS	13.5	0-375	TREMIE

REMARKS: WELL NO. DE-1

11. DISINFECTION: Type CALCIUM HYPOCHLORITE 70% Amt. Used 5#

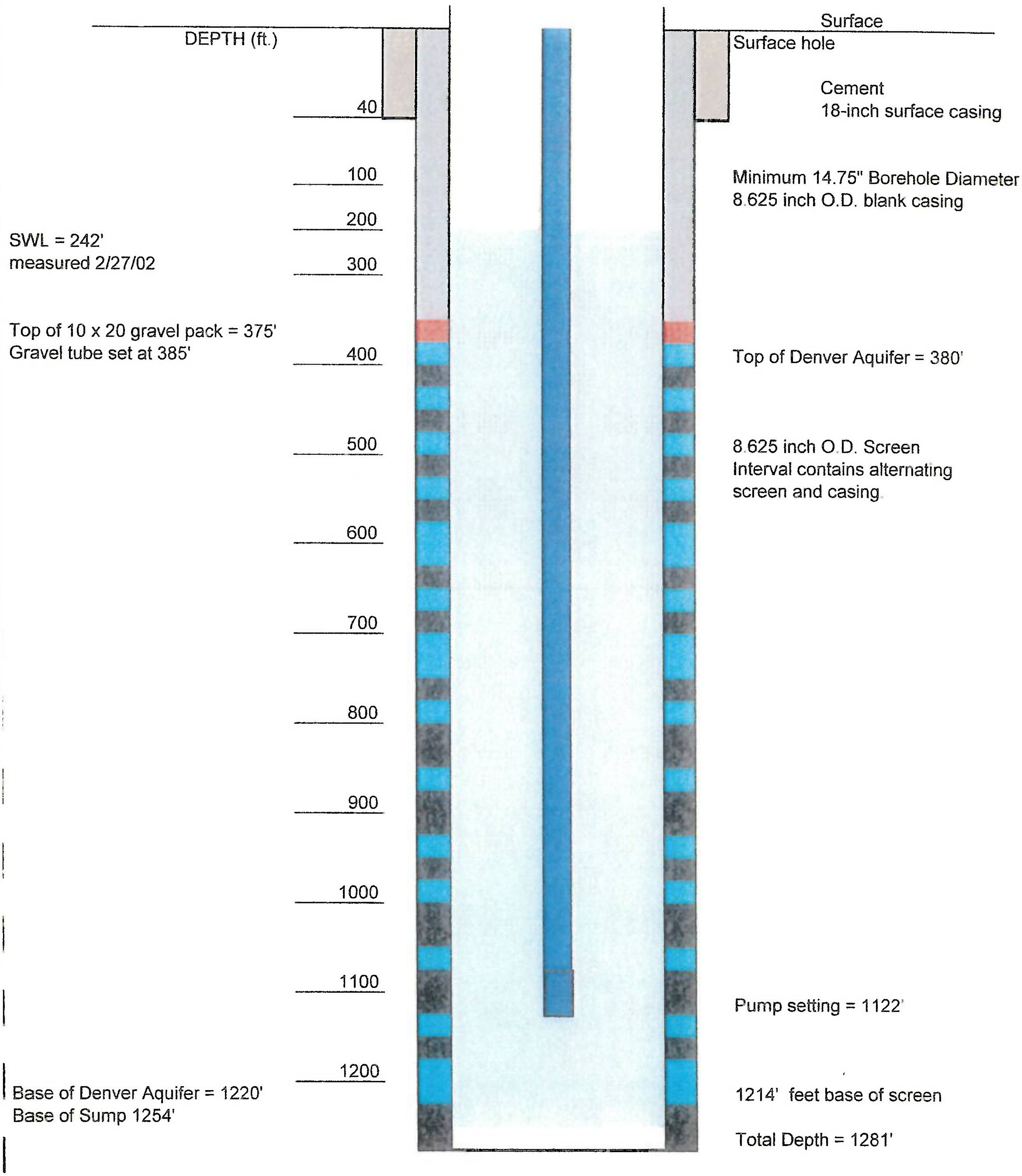
12. WELL TEST DATA: ☐ Check box if Test Data is submitted on Form No. GWS 39 Supplemental Well Test.
TESTING METHOD SUBMERSIBLE TEST PUMP.
Static Level 221 ft. Date/Time measured 8-13-1 @ 1:30 PM, Production Rate 100 gpm.
Pumping level 533 ft. Date/Time measured 8-14-1 @ 1:30 PM, Test length (hrs.) 24
Remarks

13. I have read the statements made herein and know the contents thereof, and that they are true to my knowledge. [Pursuant to Section 24-4-104 (13)(a) C.R.S., the making of false statements herein constitutes perjury in the second degree and is punishable as a class 1 misdemeanor.]

CONTRACTOR LAYNE-WESTERN Phone (303) 755-1281 Lic. No. 1200
Mailing Address 17800 E. 22ND AVE., AURORA, CO 80011

Name/Title (Please type or print) | Signature | Date

FIGURE 2
MERIDIAN METROPOLITAN DISTRICT
WELL DIAGRAM
De-1R



Jehn Water Consultants, Inc. *Job No. 109.44*

TABLE 1: LITHOLOGY LOG
DENVER DE-1R
MERIDIAN METRO DISTRICT

DEPTH (ft)	DESCRIPTION
0-50	Alternating Sandstone: v.c.sand (qtz,feld,mica) + Shale: green brn, clay-rich
50-80	Shale: med gray, laminated, clay-rich
80-120	Sandstone: m.grained, well sorted, rnd (qtz,feld,mica) + silt; coarsens w/ depth
120-170	Shale to siltstone: dk gray to blk, silt to f.grained sand size; coarsens w/depth
170-200	Sandstone: dk gray, v.c.grained (qtz,feld,biotite), clay matrix
200-270	Alternating Shale: dk gray, laminated + Sandstone: fine-grained
270-300	Sandstone: v.c.grained consisting of qtz, feld, and biotite
300-340	Shale: gray, laminated, clay-rich
340-360	Sandstone: fine to med. grained
340-380	Shale: dk black, clay-rich
	TOP OF DENVER FORMATION
380-470	Alternating Shale: dk gray, laminated + Sandstone: andesitic, med to coarse grained
470-540	Shale: dk gray blk to dk brn, laminated, clay-rich
540-560	Sandstone: fine to med. Grained, andesitic in origin
560-620	Shale: dk gray to grn
620-690	Alternating Sandstone: m-c.grained (qtz) + shale: dk gray to blk
690-710	Sandstone: grayish color, c to v.c. grained; very clean for Denver
710-790	Shale: dk gray to grn; silty
790-800	SA 690-710 ft
800-810	50% shale and 50% sandstone: fine to med. Grained
810-860	Shale: dk gray to grn; silty
860-870	SA 800
870-940	Shale: grayish grn blk w/ some brn; clay-rich
940-950	Sandstone: grayish color, c to v.c. grained; very clean for Denver
950-980	Shale: dk grayish blk, well laminated, carbonaceous lens
980-990	Sandstone: dk gray, fine grained, clay lens
990-1050	Shale: grayish grn, clay-rich
1050-1060	Sandstone: m.-c. grained w/ some clay lens
1060-1090	Shale
1090-1160	Sandstone/ shale mix- dk gray; mostly shale
1160-1170	Sandstone: dk gray, fine to med grained
1170-1180	Sandstone/ shale mix- dk gray
1180-1200	Shale: blk, well laminated
1200-1220	Sandstone: dk gray, fine to med grained
	END OF DENVER FORMATION
1220-1285	Shale: blk, well laminated

Table 3
Denver Aquifer Parameters
Meridian Metropolitan District

Well	Surface Elevation (ft)	Top Depth (ft b/s)	Bottom Depth (ft b/s)	Total Thickness (ft)	Saturated Thickness (ft)	Static Water Level (ft b/s)	Transmissivity Pumping (gpd/ft)	Transmissivity Recovery (gpd/ft)	Hydraulic Conductivity (gpd/ft2)	Specific Capacity
De-1	5889.9	360	1225	865	140	109.5	713.5	747.2	5.1	0.65
De-2	5928.9	400	1210	810	140	219.1	330	341.4	2.35	0.297
De-3	5931.3	440	1260	820	140	148.6	258.8	249.1	1.84	0.25
De-4	5896.7	380	1220	840	140	107.6	384.5	476	2.75	0.4
De-1R	5900	380	1220	840	138	221.4	281.2	354.6	2.04	0.32

Table 2
De-1R Well Design
150 ft of screen available
Well Casing and Screen Schedule

Depth Interval (ft)	type	screen length	blank length
0 - 385	blank		385+1.5
385 - 410	screen	25	
410 - 466	blank		56
466 - 476	screen	10	
476 - 629	blank		153
629 - 634	screen	5	
634 - 661	blank		27
661 - 666	screen	5	
666 - 692	blank		26
692 - 712	screen	20	
712 - 807	blank		95
807 - 812	screen	5	
812 - 868	blank		56
868 - 888	screen	20	
888 - 947	blank		59
947 - 952	screen	5	
952 - 961	blank		9
961 - 966	screen	5	
966 - 980	blank		14
980 - 990	screen	10	
990 - 1092	blank		102
1092 - 1102	screen	10	
1102 - 1144	blank		42
1144 - 1154	screen	10	
1154 - 1168	blank		14
1168 - 1178	screen	10	
1178 - 1204	blank		26
1204 - 1214	screen	10	
1214 - 1254	blank		40

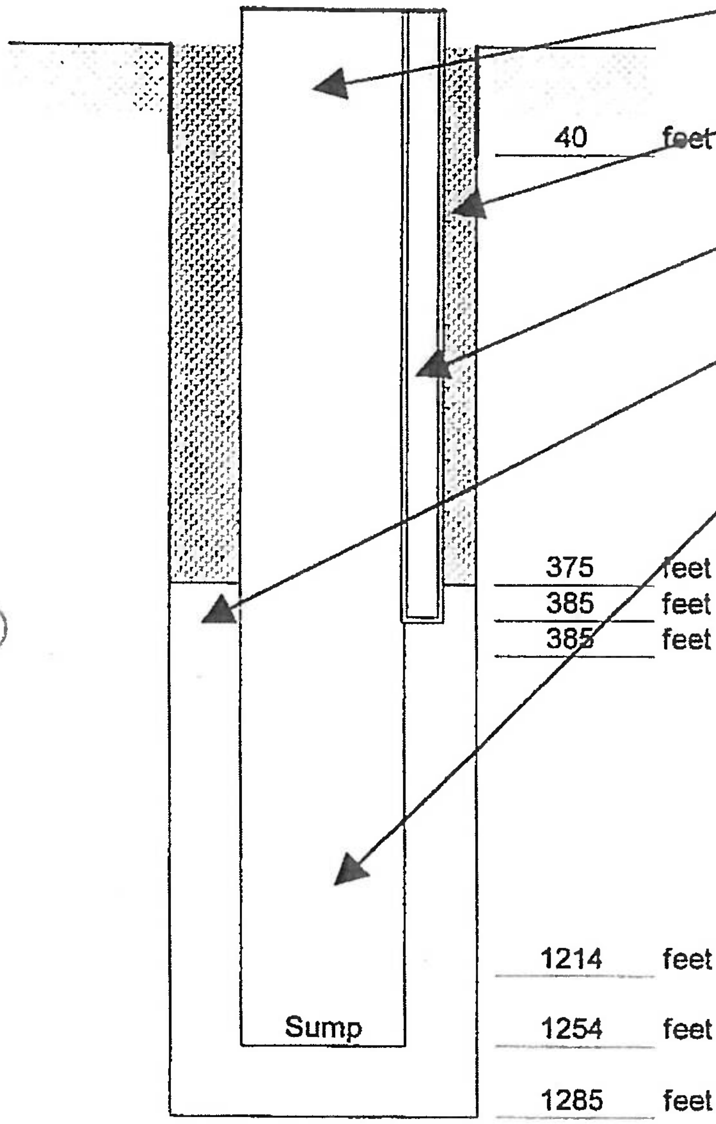
Gravel Tube to 385

Gravel Pack to 375

Well Number: Meridian Metro. DE-1

Permit Number: 055005-F

Date: August 2001



Casing
8-5/8" X .365 A53 Grade B Steel

Cement
(Lite) Portland Cement

Gravel Tube
1-1/2" Schedule 40 Steel

Gravel Pack
CSSI 10-20

Screen
8-5/8" 304 SS Wire Wrap .035"

Screen Placement

385	to	410	25
466	to	476	10
629	to	634	5
661	to	666	5
692	to	712	20
807	to	812	5
868	to	888	20
947	to	952	5
961	to	966	5
980	to	990	10
1092	to	1102	10
1144	to	1154	10
1168	to	1178	10
1204	to	1214	10
	to		0
	to		0
	to		0
	to		0
Total Screen Length	=		150

Casing

Screen

Sand

Cement

Layne-Western,
a division of Layne Christensen Company

Meridian Metropolitan District
8350 E. Crescent Pkwy #100
Englewood, Colorado 80111

17800 E. 22nd Avenue, Aurora, CO

PHOENIX SURVEYS, INC.

DUAL INDUCTION GUARD LOG GAMMA RAY

Company	Layne Western
Well	Meridian DE 1R
Field	Permit # 055005 - F
County	Douglas
State	Colorado

Company Well Field County State/Prv

Location: 1300' FSL & 1300' FWL
SW SW
Sec - 1, Twp - 6S, Rge - 67W

Other Services: CDL/CNL/ML

Permanent Datum	GL	Elevation	5900
Log Measured From	GL		
Drilling Measured From	GL		

Elevation: K.B. 5910 / D.F. 5909 / G.L. 5900

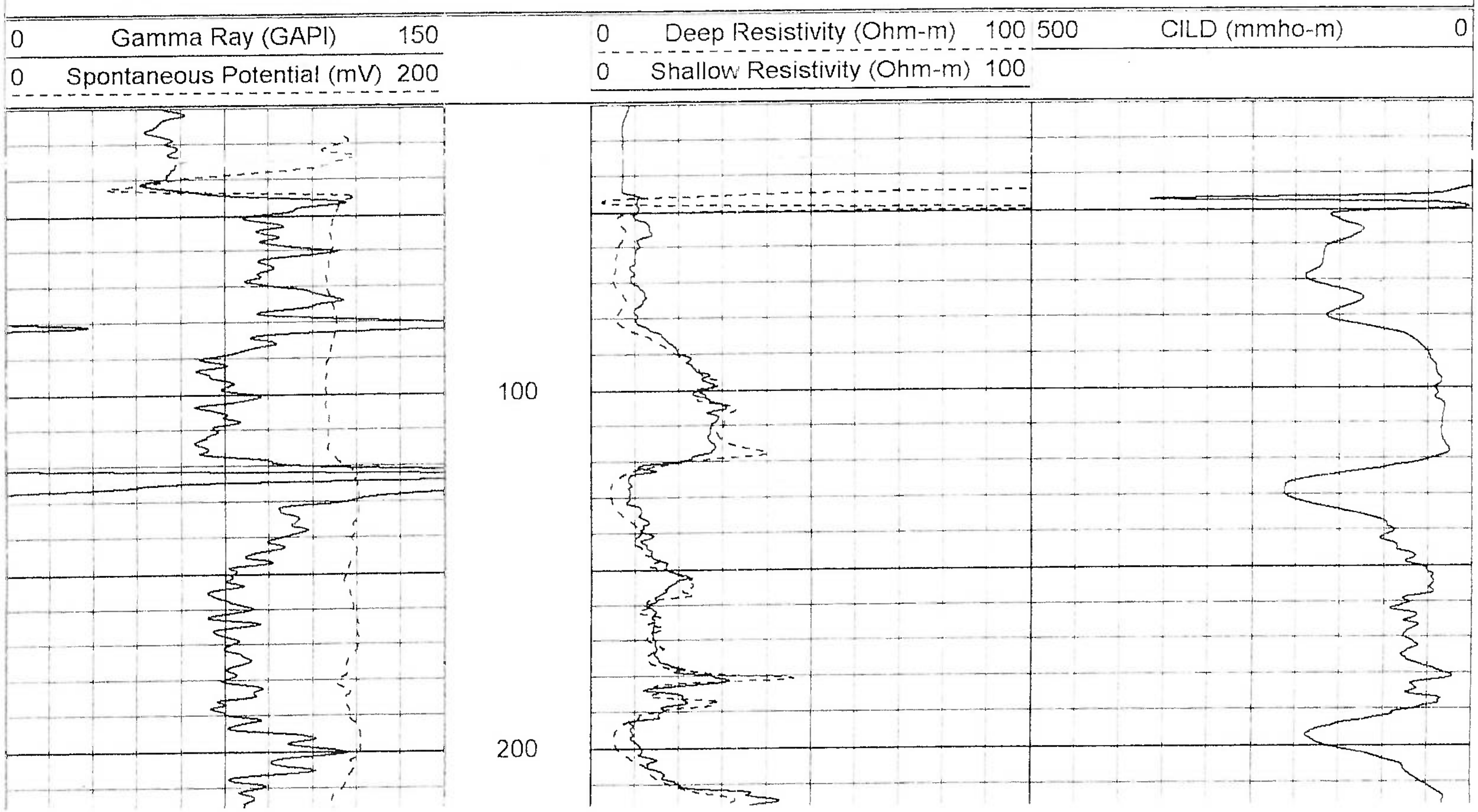
Date	July 29, 2001		
Run Number	1		
Depth Driller	1285		
Depth Logger	1281		
Bottom Logged Interval	1281		
Top Log Interval	Casing		
Casing Driller	40		
Casing Logger	40		
Bit Size	14-3/4"		
Type Fluid in Hole	Chem Gel		
Density / Viscosity	8.6 / 28		
pH / Fluid Loss	8.0 / 12.0		
Source of Sample	Flowline		
Rm @ Meas. Temp			
Rmf @ Meas. Temp			
Rmc @ Meas. Temp			
Source of Rmf / Rmc			
Rm @ BHT			
Time Circulation Stopped			
Time Logger on Bottom	0230		
Maximum Recorded Temperature	<100° F		
Equipment Number	4057		
Location	Brighton, CO		
Recorded By	Cox/Grissom		
Witnessed By	Theresa Jehn	Kim Edwards	

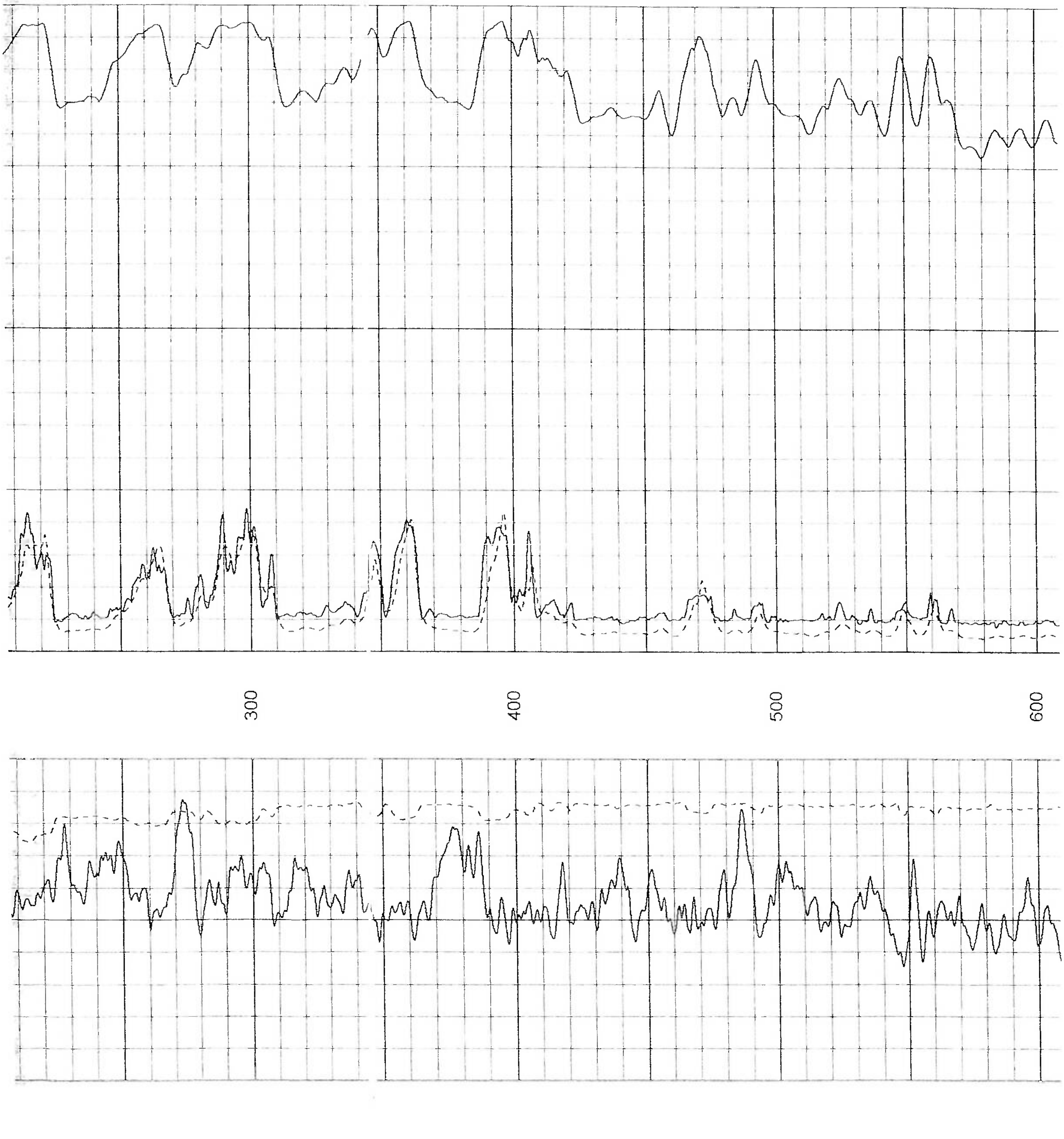
<<< Fold Here >>>

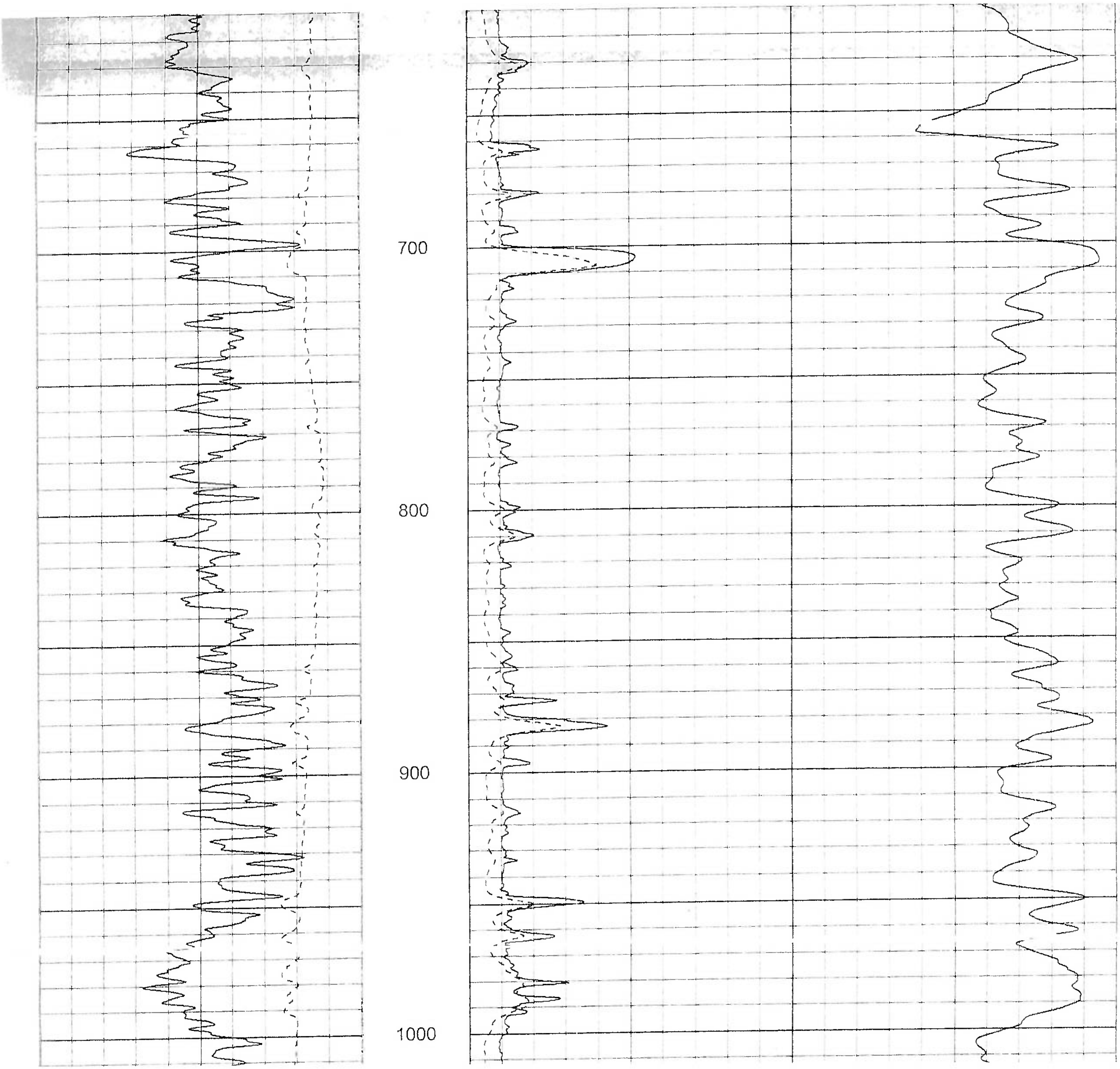
Comments

Thank you for using Phoenix Surveys.

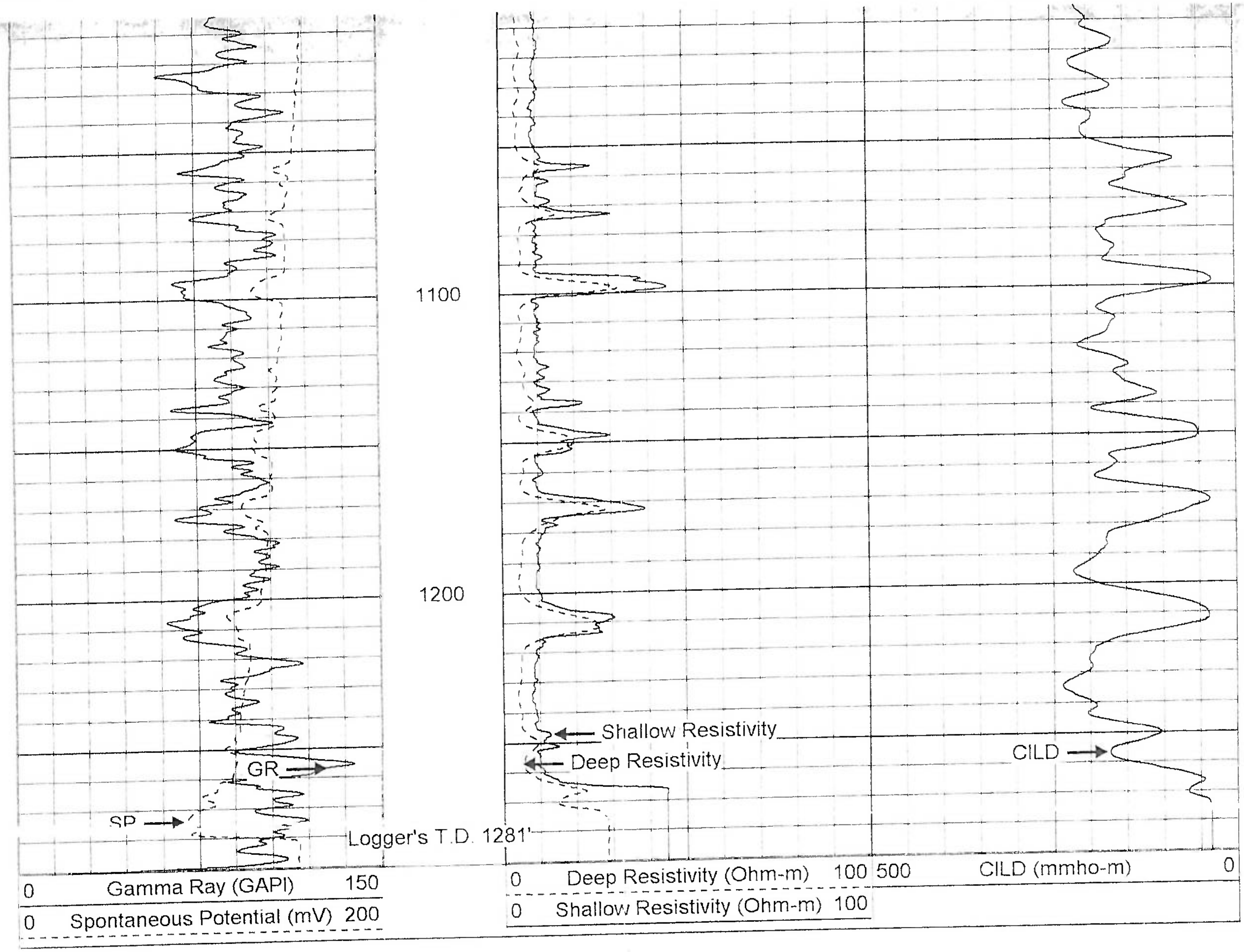
Database File:	2875.db
Dataset Pathname:	pass3
Presentation Format:	dilin4w.prs
Dataset Creation:	Sun Jul 29 02:22:31 2001 by Log VER_5.4
Charted by:	Depth in Feet scaled 1:600




300
400
500
600



700
800
900
1000



Database File: 2875.db
Dataset Pathname: pass3
Presentation Format: dilin4w.prs
Dataset Creation: Sun Jul 29 02:22:31 2001 by Log VER_5.4
Charted by: Depth in Feet scaled 1:240

0 Gamma Ray (GAPI) 150
0 Spontaneous Potential (mV) 200

0 Deep Resistivity (Ohm-m) 100
0 Shallow Resistivity (Ohm-m) 100

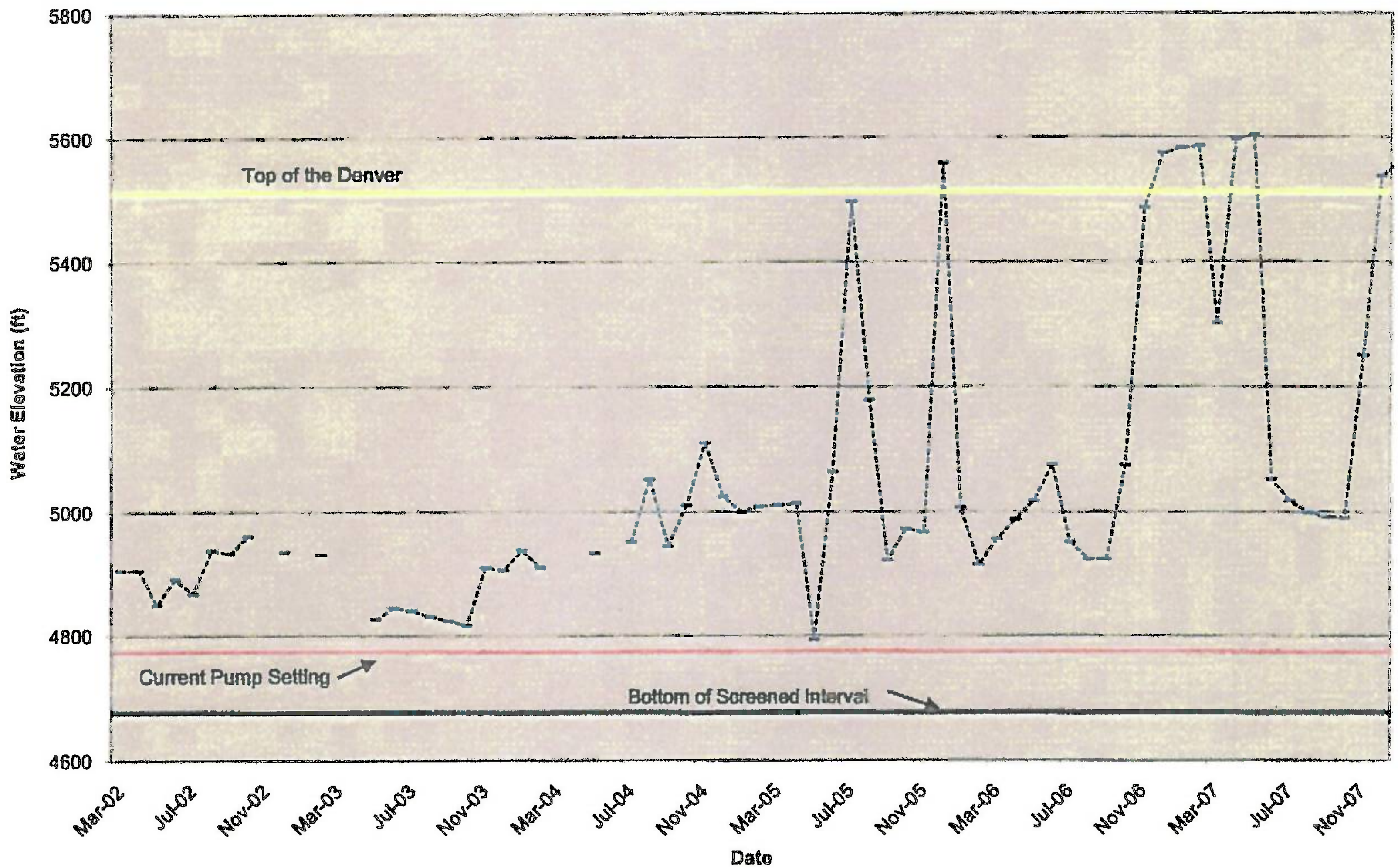
500 CILD (mmho-m) 0

CUSTOMER		meridian metro		Job No.				
	Well No.	DE-1R	Data By	Jeremy/JOSH	Start witness		Install Date	2/14/2011
Site							Start up Date	3/31/2011
	Well TD	1254	Casing ID	8"	Casing Mat	steel	Reduct. Elev.	none
	Reduct. ID		Building	no	STATIC W.L.			
Pipe								
	Pitless Mfg	Baski	Model	E/H/D	S/N or Model#			
	Pitless Depth		Joint length	Range 2	Drop pipe OD		Pull pipe thrd.	4.5"
	Wt/Ft	9.3 lbs	Pipe tally	1087 FT	Check Dia.		API/ASTM	EUE J55 TC
	Check Depths		Drain KO	yes	Pup pipe Thrd.	3in npt	Check Thrd.	8 RND
							TOTALTALLY	
Cable								
	AWG	2ott round	CODE		Cable Cond.	old had shorts when pulled		
	Airline Lgth.	1097	Airline Cond.	old	PVC Dia.	1-1/4" 2ea	PVC Length	1097
Pump								
	Type	SUB	Pump Mfg	SULZER	SERIES/MOD	M# SG166	Stages	18
	Design GPM	125	Design TDH		Pump Cond.	NEW	Pump part #	
	Disch Thrd/Dia	3in npt	Pump S/N	299111	TYPE		HSG	
	LENGTH	7.61 FT	Shaft Size					
Motor								
	Type	SUB	Mfg.	FRANKLIN	Mod.TYPE	2766186020	VR HP	50
	RPM.	3450	Volts	460	Phase	3PH	VR Amps	68.1
	SFA	78.1	PT#		Motor Cond.	NEW	LENGTH	4.68 FT
	Date Code	10H	Motor S/N	10H19-19-800218	SERIES		Resistance	
	Stator Code		Winding code		T Brg Type			
	Shroud Lgth.	19.6 FT	Shroud OD	6 5/8	Shroud ID	6"	Material	STEEL
Seal								
	MFG	N/A	S/N		TYPE		PART /N	
	SHAFT SIZE		T BRG Type		SERIES		LENGTH	
	Oil type							
	NOTES:							

FLOW MTR								
	MFG	SENSUS	MODEL	3" W-350	SIZE & ENDS	3" 4 BOLT	TOTAL GAL.	99938817
	SERIAL NO	58698406						
POWER SUPPLY								
	PWR SERV CO		METER NO		KVA EA.		TRANS QTY	
	LINE VOLTAGE							
	STEP TRANS MFG		TRANS KVA		TRANS. TYPE			
	INPUT WYE/DELTA		OUT WYE/DELT		Ser. #			
	TAP SETTINGS		SERFACE VOLTS					
CONTROL								
	CONTROL MFG		NEMA CLASS		STARTER SIZE		Contact kit	
	STARTER MFG		STARTER MOD		HEATER SIZE		AMP RATING	
	BREAKER MFG		BREAKER MOD		BREAKER SIZE		FUSE SIZE	
	GROUNDING?		PROTECTION		OVERLOAD SET		UNDERLOAD SET	
	CT RATIO		RESTART TIME		ARRESTOR			
	NOTES							
ELECTRONICS								
	SOFT START MFG		SF MODEL		START TIME		CURRENT RANGE	
	CURRENT %		VOLTAGE LIMIT					
	VFD MFG	ABB	VFD MODEL	ACS-550	VFD HP	75HP/55KW	MAX AMP	
	VFD S/N	2092901553	CRITICAL FREQ	1 TO 30				
	MIN FRQ	47.5HZ 80GPM	MAX VOLT	480	RESTARTS			
	MAX FRQ	60	MIN VOLT	N/A				
	OVER CURRENT		RAMP UP TIME	25				
	Low current trip		RAMP DOWN	20				
	VFD NOTES	OUTPUT FILTER	TCI PERFORMANCE AND PROTECTION FOR DRIVES KTR TUNING REACTOR KTRM65V					
		3PH,60HZ,600VMAX,40DEGC AMB TEMP 155C RISE						
	LEVEL SENS MFG	DYNOTEK	MODEL		LENGTH			
	S/N		PSI rating	500	ma	4 TO 20	Extra	
	PROBE ELEVATION		ON		OFF			

Pre-start Up								
	@ Meg ohms		@ VOLT	500			Motor HP	50
	L1	2000MEG	L2	2000MEG	L3	2000MEG	Volt	480
							Amps	68.1
	OHM L1-L2	0.3	OHM L1-L3	0.3	OHM L2-L3	0.3	Airline PSI	
							RTM HRS.	
no load	VOLT L1-L2	485	L1-L3	486	L2-L3	484		
no load	VOLT L1		L2		L3			
	PRESTART NOTES							
START UP								
Time	Amps	HZ	VOLTS	GPM	DYNO O/PUMP	SYSTEM PSI	SAND PPM	
		53		83	740	40		
		56		95	100	40		
	64	60		130	608	40		
		54		110	612	40		
		50		100	620	40		
		45		78	650	40		
	RUN AMPS A-B		A-C		B-C		HZ	
	RUN VOLT A-B		RV A-C		RV B-C		HZ	
	NOTES							

Meridian Metropolitan District
Well De-1R Water Levels - 2002 to Present



Jehn Water Consultants, Inc.

4/26/2011
Job No. 109.1

Arapahoe Well A-4 Information

FORM NO. GWS-31 10/94

WELL CONSTRUCTION AND TEST REPORT

STATE OF COLORADO, OFFICE OF THE STATE ENGINEER

For Office Use only

1. WELL PERMIT NUMBER 056744-F

2. OWNER NAME(S) MERIDIAN METRO. DISTRICT
Mailing Address 8350 E. CRESCENT PKWY #100
City, St. Zip ENGLEWOOD, CO 80111
Phone (303) 773-1700

3. WELL LOCATION AS DRILLED: NE 1/4 SW 1/4, Sec. 1 Twp. 6 S, Range 67 W
DISTANCES FROM SEC. LINES:
2780 ft. from N (north or south) Sec. line. and 2470 ft. from W (east or west) Sec. line. OR
SUBDIVISION: LOT BLOCK FILING(UNIT)
STREET ADDRESS AT WELL LOCATION:

4. GROUND SURFACE ELEVATION 5840 ft. DRILLING METHOD REVERSE MUD ROTARY.
DATE COMPLETED 1-31-2. TOTAL DEPTH 1812 ft. DEPTH COMPLETED 1780 ft.

5. GEOLOGIC LOG:
Depth / Description of Material (Type, Size, Color, Water Location)
SEE ATTACHED GEOLOGIC LOG

6. HOLE DIAM. (in.)

HOLE DIAM. (in.)	From (ft)	To (ft)
36	0	40
20	40	1812

7. PLAIN CASING

OD (in)	Kind	Wall Size	From(ft)	To(ft)
24	A53BSTL	.250	0	40
12 3/4	A53BSTL	.375		
	(SEE ATTACHED DIAGRAM)			

PERF. CASING: Screen Slot Size: 0.040
12 3/4 304 SS WIRE-WRAPPED
(SEE ATTACHED DIAGRAM)

8. FILTER PACK:
Material CSSI
Size 8-12
Interval 1285-1812

9. PACKER PLACEMENT:
Type N/A
Depth N/A

10. GROUTING RECORD:

Material	Amount	Density	Interval	Placement
LT. CEMENT	1070 SKS	13.2	0-1285	TREMIE

REMARKS: WELL NO. A-1R
2 3/8" STEEL GRAVEL TUBE INSTALLED
FROM SURFACE TO 1300' BGS

11. DISINFECTION: Type SODIUM HYPOCHLORITE 10% Amt. Used 55 GALLONS

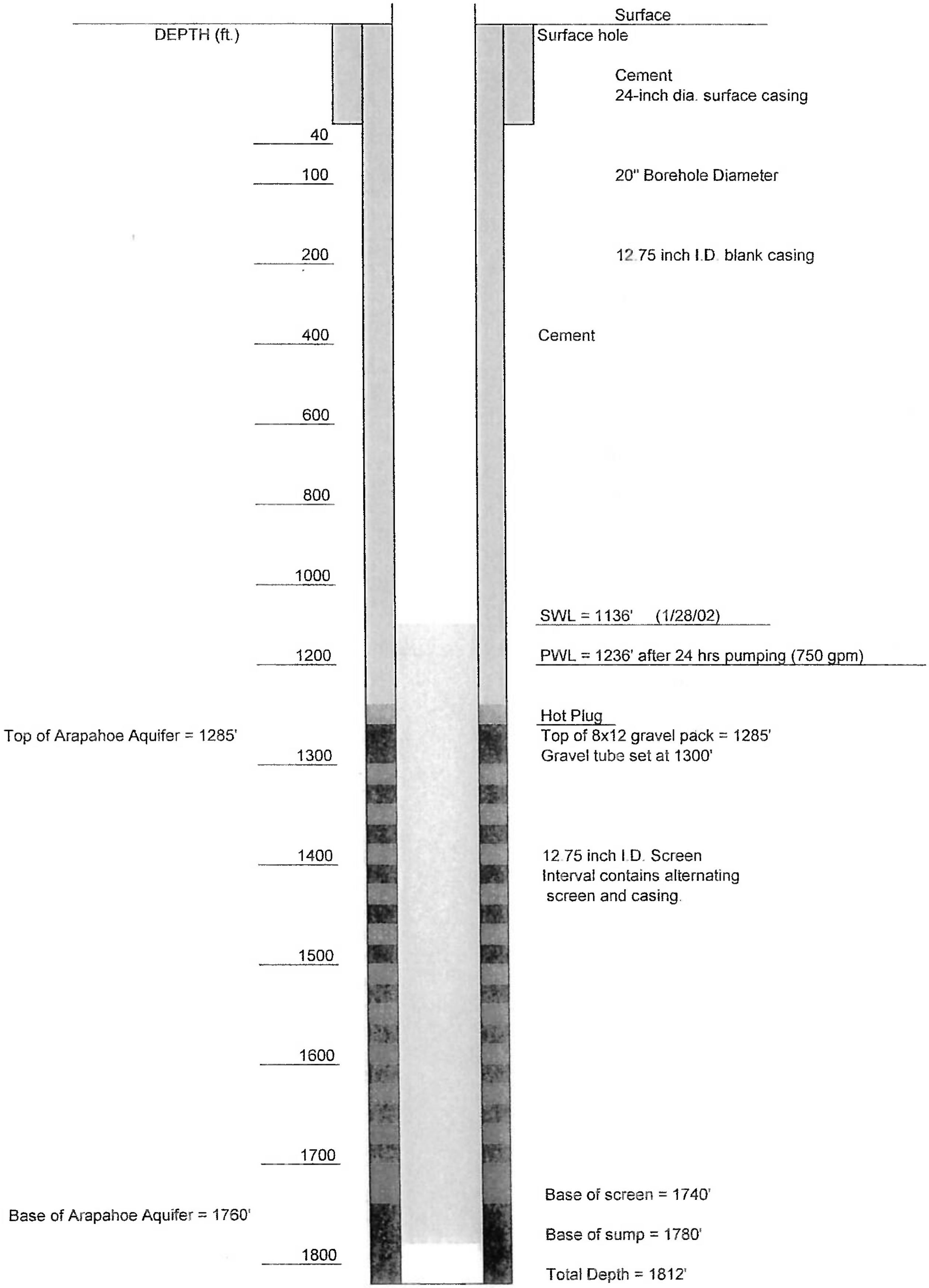
12. WELL TEST DATA: ☐ Check box if Test Data is submitted on Form No. GWS 39 Supplemental Well Test.
TESTING METHOD SUBMERSIBLE TEST PUMP
Static Level 1136 ft. Date/Time measured 1-28-2 @ 9:00 AM Production Rate 748 gpm.
Pumping level 1236 ft. Date/Time measured 1-29-2 @ 9:00 AM Test length (hrs.) 24
Remarks

13. I have read the statements made herein and know the contents thereof, and that they are true to my knowledge. [Pursuant to Section 24-4-104 (13)(a) C.R.S., the making of false statements herein constitutes perjury in the second degree and is punishable as a class 1 misdemeanor.]

CONTRACTOR LAYNE-WESTERN Phone (303) 755-1281 Lic. No. 1200
Mailing Address 17800 E. 22ND AVENUE AURORA, CO 80011

Name/Title (Please type or print) DAVID A. TORMOEHLEN
Signature David A. T
Date 3-1-2

FIGURE 2
MERIDIAN METROPOLITIAN DISTRICT
WELL DIAGRAM
A-4



Jehn Water Consultants, Inc. *Job No. 109.1*

TABLE 1
Meridian Metro District Well A-4
Lithologic Log

DEPTH (ft)	DESCRIPTION
0-8	Overburden- sandy clay loam
8-70	Sandy claystone with iron staining and plant fragments
70-90	Sandstone: fine to med grained, gray and white colored- abundant dk of a meta origin
90-100	Shale: blk, laminated and clay rich
100-290	Alternating SS and shale: c to vc grained sandstone; dk brn sticky claystone
290-300	Sandstone: fine grained, gray color
300-350	Claystone: gray grn brn, very sticky and plastic
	TOP OF DENVER FORMATION
350-360	Sandstone: fine grained, andesitic origin (gray, white and black color)
360-440	Claystone/shale: gray grn, very sticky
440-470	Sandstone: v.c.grained, arkosic (feld, qtz), pink and white in color
470-490	Sandstone: fine to vc grained, poorly sorted, andestic in origin w/ abundant dk material
490-510	Sandstone SA 440
510-580	Claystone: gray grn, very sticky and plastic
580-680	Shale: gray blk, clay rich and laminated
680-890	Alternating SS/shale: c.grained sandstone, qtz rich, well-sorted: dk gray blk shale, lam
890-920	Sandstone: f. grained
920-960	Shale: dk blk, laminated with carbonaceous frag
960-1080	Siltstone: clay rich and silty
1080-1100	Shale: dk gray blk, laminated and clay-rich
1100-1280	Alternating SS/shale: fine to med grained, well sorted, andesitic: dk gray blk shale,silty
	TOP OF ARAPAHOE FORMATION
1280-1290	Sandstone: fine grained, well sorted, arkosic
1290-1320	Silty to sandy mudstone
1320-1360	Sandstone: c to vc grained, qtz and feld rich, congl. sandstone
1360-1370	Sandstone: fine grained, well sorted, arkosic
1370-1420	Sandstone: c to vc grained, qtz and feld rich, congl. sandstone
1420-1530	Sandstone: fine grained, well sorted, arkosic
1530-1560	Sandstone: c to vc grained, qtz and feld rich, congl. sandstone
1560-1580	Sandstone: fine to med grained, arkosic
1580-1620	Shale: gray grn, clay rich
1620-1670	Sandstone: fine to med grained, arkosic- qtz rich
1670-1710	Shale: gray grn, clay rich forms sticky clay balls
1710-1720	Sandstone: fine grained with a muddy matrix
1720-1740	Shale: gray grn color, sticky clay rich matrix
1740-1760	Sandstone: c grained, qtz rich, well sorted
	TOP OF LARAMIE FORMATION
1760-1770	Shale: grayish blk, weathered grn color
1770-1790	Mudstone: grayish blk color, very dense
1790-1800	Shale and coal seam
1800-1820	Shale/mudstone: gray blk color, sections are laminated, carbonaceous material

NOTE: All measurements are from Kelly Bushing which is 8 ft above ground surface

Table 3
Arapahoe Aquifer Parameters
Meridian Metropolitan District

	Surface	Top	Bottom	Total	Saturated	Static Water	Transmissivity	Transmissivity	Hydraulic	Specific
Well	Elevation (ft)	Depth (ft b/s)	Depth (ft b/s)	Thickness (ft)	Thickness (ft)	Level (ft b/s)	Pumping (gpd/ft)	Recovery (gpd/ft)	Conductivity (gpd/ft2)	Capacity (gpm/ft
A-2R	5910	1285	1842	557	337	1037.6	13500	14180	41.1	7.29
A-1	5840	1285	1745	460	261	na	10278	11743	84.37	na
A-4	5840	1285	1745	460	261	1136.4	11230	10399	41.4	7.5

TABLE 2
Meridian Metro District
Well A-4
Screen and Casing Schedule

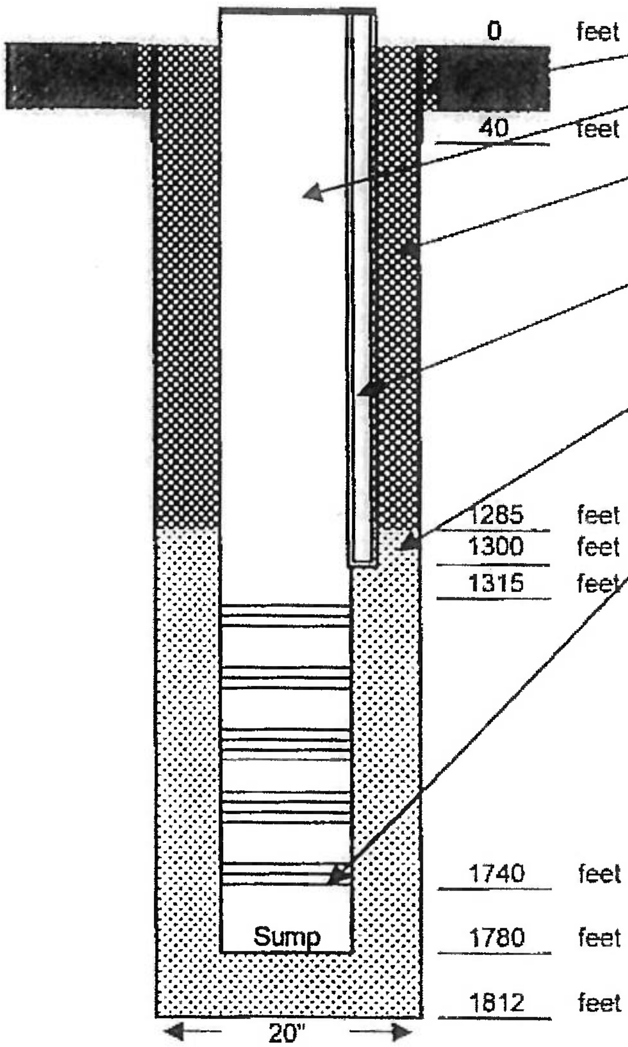
Interval		Length	Blank/screen
0	1315	1315	Blank
1315	1355	40	Screen
1355	1362	7	Blank
1362	1407	45	Screen
1407	1430	23	Blank
1430	1460	30	Screen
1460	1465	5	Blank
1465	1480	15	Screen
1480	1490	10	Blank
1490	1565	75	Screen
1565	1610	45	Blank
1610	1655	45	Screen
1655	1700	45	Blank
1700	1740	40	Screen
1740	1780	40	Sump/Blank

Layne

Well Number: A1-R

Permit Number: 056744-F

Date: Feb-02



Casing
24" X .250" A53 Grade B Steel
12-3/4" X .375" A53 Grade B Steel

Cement
(Lite) Portland Cement

Gravel Tube
2-3/8" Schedule 40 Steel

Gravel Pack
CSSI 8-12

Screen
12-3/4" 304 SS Wire Wrapped .040"

Screen Placement

1315	to	1355	40
1362	to	1407	45
1430	to	1460	30
1465	to	1480	15
1490	to	1565	75
1610	to	1655	45
1700	to	1740	40
	to		0
	to		0
	to		0
	to		0
	to		0
	to		0
	to		0
	to		0

Total Screen Length = 290

Casing
Screen
Sand
Cement

No Scale

Layne-Western,
a division of Layne Christensen Company

Meridian Metropolitan District
8350 E. Crescent Parkway, Suite 100
Englewood, Colorado 80111

17800 E. 22nd Avenue, Aurora, Colorado 80011

Telephone: 303-755-1281 E-Mail: 1031@laynechristensen.com FAX: 303-755-1236

Baseline Injection Water Quality Data

Wemlinger Water Treatment Plant

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
			Meridian Metropolitan Districts WISE Water Wemlinger WTP Baseline Water Quality Sample
Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Total Metals (Inorganics) and Miscellaneous Parameters			
Alkalinity, Total	mg/l as CaCO3	0.006	NA
Aluminum	µg/l	200	NA
Ammonia Nitrogen	mg/l as N	0.01	0.29[b]
Antimony	µg/l	6	<1
Arsenic	µg/l	10	<1
Asbestos	MFL	7	<0.2[b]
Barium	µg/l	2,000	36
Beryllium	µg/l	4	<1
Bicarbonate	mg/l as CaCO3	NS	NA
Carbonate	mg/l as CO3	NS	NA
Boron	mg/l	6	<0.05
Cadmium	µg/l	5	<0.5
Calcium	mg/l	NS	NA
Chlorine Dioxide	mg/l	0.8	<0.24
Chloride	mg/l	250	NA
Chlorite	mg/l	1.0	0.56
Chromium	µg/l	100	<1
Copper	µg/l	1,300	<2.0
Cyanide	mg/l	0.2	<0.025[b]
Cyanogen Chloride	mg/l	0.4	<0.35
Fluoride	mg/l	4.0 (2.0 Secondary MCL)	0.91[b]
Free Chlorine	mg/l	4	0.20
Iron	mg/l	0.3	<0.02
Lead	µg/l	15	<0.5
Magnesium	mg/l	NS	NA
Manganese	µg/l	300	<2
Mercury	µg/l	2	<0.2
Molybdenum	µg/l	40	7.6
Nitrate	mg/l as N	10	<0.1[b]
Nitrite	mg/l as N	1	<0.05[b]
Nickel	µg/l	100	<5
Laboratory pH	pH units	6.5 – 8.5	NA
Potassium	mg/l	NS	NA
Selenium	µg/l	50	<5
Silver	µg/l	100	<0.5
Sodium	mg/l	NS	NA
Strontium	mg/l	4	0.24
Sulfate	mg/l	250	NA
Thallium	µg/l	2	<1
Uranium	µg/l	30	1.8
Zinc	µg/l	2000	<20

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
			Meridian Metropolitan Districts WISE Water Wemlinger WTP Baseline Water Quality Sample
Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	Units	Primary/Secondary Drinking Water Limits[a]	Results
Radio Chemistry			
Gross Alpha, Total	pCi/l	15	6.2
Gross Beta, Total	pCi/l	50 pCi/l Trigger Level	<3
Radium-226, Total	pCi/l	(5 for 226 + 228)	<1
Radium-228, Total	pCi/l	(5 for 226 + 228)	<1
Organochlorine Pesticides/PCBs (EPA 505)			
Alachlor (Alanex)	μg/l	2	<0.1
Aldrin	μg/l	0.2	<0.01
Chlordane	μg/l	2	<0.1
Dieldrin	μg/l	0.2	<0.01
Endrin	μg/l	2	<0.01
Heptachlor	μg/l	0.4	<0.01
Heptachlor Epoxide	μg/l	0.2	<0.01
Lindane (gamma-BHC)	μg/l	0.2	<0.01
Methoxychlor	μg/l	40	<0.05
PCB 1016 Aroclor	μg/l	0.5	<0.08
PCB 1221 Aroclor	μg/l	0.5	<0.1
PCB 1232 Aroclor	μg/l	0.5	<0.1
PCB 1242 Aroclor	μg/l	0.5	<0.1
PCB 1248 Aroclor	μg/l	0.5	<0.1
PCB 1254 Aroclor	μg/l	0.5	<0.1
PCB 1260 Aroclor	μg/l	0.5	<0.1
Total PCBs	μg/l	0.5	<0.1
Toxaphene	μg/l	3	<0.5
Haloacetic Acids (SM 6251B)			
Dibromoacetic acid	μg/l	NS	1.5
Dichloroacetic acid	μg/l	NS	12
Monobromoacetic acid	μg/l	NS	<1
Monochloroacetic acid	μg/l	NS	<2
Total Haloacetic acids (HAA5)	μg/l	60	21
Trichloroacetic acid	μg/l	NS	7.5
EDB/DBCP/HAN (EPA 551.1)			
Dibromochloropropane (DBCP)	μg/l	NS	<0.01
Ethylene Dibromide (EDB)	μg/l	NS	<0.01
Base/Neutral/Acid Extractables (EPA 625)			
1,2,4-Trichlorobenzene	μg/l	70	<5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
			Meridian Metropolitan Districts WISE Water Wemlinger WTP Baseline Water Quality Sample
Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
1,2-Diphenyhydrazine	µg/l	NS	<10
2,4,5-Trichlorophenol	µg/l	NS	<5
2,4,6-Trichlorophenol	µg/l	2	<5
2,4-Dichlorophenol	µg/l	20	<5
2,4-Dimethylphenol	µg/l	NS	<5
2,4-Dinitrophenol	µg/l	NS	<50
2,4-Dinitrotoluene	µg/l	5	<5
2,6-Dinitrotoluene	µg/l	5	<5
2-Chloronapthalene	µg/l	NS	<5
2-Chlorophenol	µg/l	40	<5
2-Methylnaphtalene	µg/l	NS	<5
2-Methyphenol	µg/l	NS	<5
2-Nitroaniline	µg/l	NS	<10
2-Nitrophenol	µg/l	NS	<5
3,3-Dichlorobenzidine	µg/l	NS	<50
3-Nitroaniline	µg/l	NS	<20
4,6-Dintro-o-cresol	µg/l	NS	<50
4-Bromophenylphenylether	µg/l	NS	<5
4-Chloroaniline	µg/l	NS	<5
4-Chlorophenylphenylether	µg/l	NS	<5
4-Methylphenol	µg/l	NS	<5
4-Nitroaniline	µg/l	NS	<20
4-Nitrophenol	µg/l	60	<10
Acenaphthene	µg/l	400	<5
Acenaphtylene	µg/l	NS	<5
Aniline	µg/l	NS	<10
Anthracene	µg/l	2000	<5
Benzidine	µg/l	NS	<50
Benzo(a)anthracene	µg/l	NS	<5
Benzo(a)pyrene	µg/l	0.2	<5
Benzo(b)fluoranthene	µg/l	NS	<5
Benzo(g,h,i)perylene	µg/l	NS	<10
Benzo(k)fluoranthene	µg/l	NS	<5
Benzoic Acid	µg/l	NS	<50
Benzyl Alcohol	µg/l	NS	<5
bis(2-Chloroethoxy)methane	µg/l	NS	<10
bis(2-Chloroethyl)ether	µg/l	NS	<10
bis(2-Chloroisopropyl)ether	µg/l	NS	<10
Butylbenzylphthalate	µg/l	1000	<5
Chrysene	µg/l	NS	<5
Dibenz(a,h)anthracene	µg/l	NS	<10
Dibenzofuran	µg/l	NS	<5
Diethylphthalate	µg/l	6000	<5

Table 4-1			
Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
			Meridian Metropolitan Districts WISE Water Wemlinger WTP Baseline Water Quality Sample
Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Dimethylphthalate	µg/l	NS	<5
Di-n-butylphthalate	µg/l	800	<10
Di-n-octylphthalate	µg/l	NS	<10
Fluoranthene	µg/l	NS	<5
Fluorene	µg/l	200	<5
Hexachlorobenzene	µg/l	1	<5
Hexachlorobutadiene	µg/l	2	<10
Hexachlorocyclopentadiene	µg/l	50	<10
Hexachloroethane	µg/l	1	<5
Indeno(1,2,3-c,d)pyrene	µg/l	NS	<10
Isophorone	µg/l	100	<5
Naphthalene	µg/l	100	<5
Nitrobenzene	µg/l	NS	<5
N-Nitroso-dimethylamine	µg/l	NS	<5
N-Nitrosodi-n-propylamine	µg/l	NS	<5
N-Nitrosodiphenylamine	µg/l	NS	<5
p-Chloro-m-cresol	µg/l	NS	<5
Pentachlorophenol	µg/l	1	<20
Phenanthrene	µg/l	NS	<5
Phenol	µg/l	2000	<5
Pyrene	µg/l	200	<5
Nitrosamines (EPA 521)			
N-Nitrosodibutylamine (NDBA)	ng/l	NS	<2
N-Nitrosodiethylamine (NDEA)	ng/l	NS	<2
N-Nitroso-dimethylamine (NDMA)	ng/l	NS	<2
N-Nitrosodi-n-propylamine (NDPA)	ng/l	NS	<2
N-Nitrosomethylethylamine (NMEA)	ng/l	NS	<2
N-Nitrosomorpholine	ng/l	NS	<2
N-Nitrosopiperidine (NPIP)	ng/l	NS	<2
N-Nitrosopyrollidine (NPYR)	ng/l	NS	<2
Aldicarbs (EPA 531.2)			
3-Hyroxycarbofuran	µg/l	NS	<0.5
Aldicarb (Temik)	µg/l	3	<0.5
Aldicarb sulfone	µg/l	2	<0.5
Aldicarb sulfoxide	µg/l	4	<0.5
Baygon	µg/l	NS	<0.5
Carbaryl	µg/l	NS	<0.5
Carbofuran (Furadan)	µg/l	NS	<0.5
Methiocarb	µg/l	NS	<0.5
Methomyl	µg/l	200	<0.5
Oxamyl (Vydate)	µg/l	7	<0.5

Table 4-1			
Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
			Meridian Metropolitan Districts WISE Water Wemlinger WTP Baseline Water Quality Sample
Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
EPA 525.2 Extended List			
1,2,4,5-Tetrachlorobenzene	µg/l	NS	<0.5
1-Methylnaphthalene	µg/l	NS	<0.1
2,2,3,3,4,4,6-Heptachlorobiphenyl	µg/l	NS	<0.5
2,2,3,3,4,5,6,6-Octachlorobiphenyl	µg/l	NS	<0.5
2,2,3,4,6-Pentachlorobiphenyl	µg/l	NS	<0.1
2,2,4,4,5,6-Hexachlorobiphenyl	µg/l	NS	<0.1
2,2,4,4-Tetrachlorobiphenyl	µg/l	NS	<0.1
2,3-Dichlorobiphenyl	µg/l	NS	<0.1
2,4,5-Trichlorbiphenyl	µg/l	NS	<0.1
2,4-Dinitrotoluene	µg/l	5	<0.5
2,6-Dinitrotoluene	µg/l	5	<0.5
2-Chlorobiphenyl	µg/l	NS	<0.1
2-methylnaphthalene	µg/l	NS	<0.1
4,4-DDD	µg/l	NS	<0.1
4,4-DDE	µg/l	NS	<0.1
4,4-DDT	µg/l	NS	<0.1
Acenaphthene	µg/l	400	<0.1
acenapthylene	µg/l	NS	<0.1
Acetochlor	µg/l	NS	<0.1
Alachlor	µg/l	2	<0.1
Aldrin	µg/l	0.2	<0.1
Alpha-BHC	µg/l	NS	<0.1
Alpha-Chlordane	µg/l	2	<0.1
Ametryn	µg/l	NS	<0.1
Anilazine	µg/l	NS	<1
Anthracene	µg/l	2000	<0.1
Aspon	µg/l	NS	<0.1
Atrazine	µg/l	3	<0.1
Azinphos-ethyl	µg/l	NS	<0.5
Azinphos-methyl	µg/l	NS	<0.5
Bendiocarb	µg/l	NS	<0.5
Benfluralin	µg/l	NS	<0.1
Benzo(a)anthracene	µg/l	NS	<0.1
Benzo(a)pyrene	µg/l	0.2	<0.02
Benzo(b)fluoranthene	µg/l	NS	<0.1
Benzo(g,h,i)perylene	µg/l	NS	<0.1
Benzo(k)fluoranthene	µg/l	NS	<0.1
beta-BHC	µg/l	NS	<0.1
Bolstar	µg/l	NS	<0.1
Bromacil	µg/l	NS	<0.1
Butachlor	µg/l	NS	<0.1
Butylate	µg/l	NS	<0.1

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
			Meridian Metropolitan Districts WISE Water Wemlinger WTP Baseline Water Quality Sample
Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Butylbenzylphthalate	µg/l	1000	<1
Carbophenothion	µg/l	NS	<0.5
Carboxin	µg/l	700	<0.1
Chlorfenvinphos	µg/l	NS	<5
Chlorbenzilate	µg/l	NS	<0.1
Chloroneb	µg/l	NS	<0.1
Chlorpropylate	µg/l	NS	<0.1
Chlorothalonil	µg/l	100	<0.1
Chlorpropham	µg/l	NS	<0.1
Chlorpyrifos	µg/l	NS	<0.1
Chlorpyifos methyl	µg/l	NS	<0.5
Chrysene	µg/l	NS	<0.1
cis-Noachlor	µg/l	NS	<0.1
cis-Permethrin	µg/l	NS	<0.1
Clomazone	µg/l	NS	<0.1
Clopyralid	µg/l	NS	<10
Coumaphos	µg/l	NS	<0.1
Crotoxyphos	µg/l	NS	<0.5
Cycloate	µg/l	NS	<0.1
DCPA	µg/l	70	<0.1
delta-BHC	µg/l	NS	<0.1
Demeton O	µg/l	NS	<0.5
Demeton S	µg/l	NS	<0.5
Desethylatrazine	µg/l	NS	<1
Desisopropylatrazine	µg/l	NS	<1
Di(2-ethylhexyl)adipate	µg/l	400	<0.6
Di(2-Ethylhexy)phthalate	µg/l	6	<0.6
Diazinon	µg/l	1	<0.1
Dibenzo(a,h)anthracene	µg/l	NS	<0.1
Dichlobenil	µg/l	NS	<0.1
Dichlofenthion	µg/l	NS	<0.1
Dichloran	µg/l	NS	<0.5
Dichlorvos	µg/l	NS	<0.1
Dicrotophos	µg/l	NS	<0.5
Dieldrin	µg/l	0.2	<0.1
Diethylphthalate	µg/l	6000	<1
Dimethoate	µg/l	NS	<0.5
Dimethylphthalate	µg/l	NS	<1
Di-n-butylphthalate	µg/l	800	<2
Di-n-octylphthalate	µg/l	NS	<2
Dioxathion	µg/l	NS	<0.5
Diphenamid	µg/l	200	<0.1
Disulfoton	µg/l	0.7	<0.1

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
			Meridian Metropolitan Districts WISE Water Wemlinger WTP Baseline Water Quality Sample
Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Disulfoton Sulfone	µg/l	NS	<0.1
Disulfoton Sulfoxide	µg/l	NS	<10
Endosulfan I	µg/l	NS	<0.1
Endosulfan II	µg/l	NS	<0.1
Endosulfan Sulfate	µg/l	NS	<0.1
Endrin	µg/l	2	<0.0099
Endrin Aldehyde	µg/l	NS	<0.5
E-Phosphamidon	µg/l	NS	<0.5
EPN	µg/l	NS	<0.5
EPTC	µg/l	NS	<0.1
Erucylamide	µg/l	NS	<5
Esfenvalerate	µg/l	NS	<0.5
Ethalfluralin	µg/l	NS	<0.1
Ethion	µg/l	NS	<5
Ethofumesate	µg/l	NS	<0.5
Ethoprop	µg/l	NS	<0.1
Etridiazole	µg/l	NS	<0.1
Famphur	µg/l	NS	<0.1
Fenamiphos	µg/l	0.7	<0.1
Fenarimol	µg/l	NS	<1
Fenitrothion	µg/l	NS	<0.5
Fenoxaprop-ethyl	µg/l	NS	<1
Fensulfothion	µg/l	NS	<0.5
Fenthion	µg/l	NS	<0.1
Fluazifop-butyl	µg/l	NS	<0.1
Fluchloralin	µg/l	NS	<0.1
Fluometuron	µg/l	NS	<0.5
Fluoranthene	µg/l	NS	<0.1
Fluorene	µg/l	200	<0.1
Fluridone	µg/l	NS	<1
Fonofos	µg/l	NS	<0.1
Gamma-BHC	µg/l	0.2	<0.02
Gamma-Chlordane	µg/l	2	<0.1
Heptachlor	µg/l	0.4	<0.04
Heptachlor Epoxide	µg/l	0.2	<0.02
Hexachlorobenzene	µg/l	1	<0.1
Hexachlorocyclopentadiene	µg/l	50	<0.1
Hexazinone	µg/l	400	<0.1
Indeno(1,2,3,c,d)Pyrene	µg/l	NS	<0.1
Iprodione	µg/l	NS	<0.5
Isofenphos	µg/l	NS	<0.5
Isphorone	µg/l	NS	<0.1
Leptophos	µg/l	NS	<0.5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
			Meridian Metropolitan Districts WISE Water Wemlinger WTP Baseline Water Quality Sample
Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	Units	Primary/Secondary Drinking Water Limits[a]	Results
Malathion	µg/l	NS	<0.1
Metalaxyl	µg/l	NS	<0.5
Methoxychlor	µg/l	40	<0.1
Methyl paraoxon	µg/l	NS	<0.5
Methyl Parathion	µg/l	NS	<0.5
Metolachlor	µg/l	700	<0.1
Metribuzin	µg/l	70	<0.1
Metsulfuron-methyl	µg/l	NS	<10
Mevinphos	µg/l	NS	<0.1
MGK 264 isomer a	µg/l	NS	<0.1
MGK 264 isomer b	µg/l	NS	<0.1
MGK 326	µg/l	NS	<0.1
Mirex	µg/l	NS	<0.5
Molinate	µg/l	NS	<0.1
Monocrotophos	µg/l	NS	<0.5
Naled	µg/l	NS	<0.5
Naphthalene	µg/l	100	<0.1
Napropamide	µg/l	NS	<0.1
Norflurazon	µg/l	NS	<1
Oryzalin	µg/l	NS	<10
Oxadiazon	µg/l	NS	<0.1
Oxyxhlordane	µg/l	NS	<0.1
Oxyfluorfen	µg/l	NS	<0.5
Parathion	µg/l	NS	<0.5
Pebulate	µg/l	NS	<0.1
Pendimethalin	µg/l	NS	<0.1
Pentachlorobenzene	µg/l	NS	<0.5
Pentachloronitrobenzene	µg/l	NS	<0.5
Pentachlorophenol	µg/l	1	<1
Phenanthrene	µg/l	NS	<0.1
Phorate	µg/l	NS	<0.1
Phosmet	µg/l	NS	<0.5
Profluralin	µg/l	NS	<0.1
Prometryn	µg/l	NS	<0.1
Pronamide	µg/l	100	<0.1
Propachlor	µg/l	100	<0.1
Propanil	µg/l	NS	<0.5
Propazine	µg/l	10	<0.1
Propiconazole isomer a	µg/l	NS	<5
Propiconazole isomer	µg/l	NS	<5
Prothiofos	µg/l	NS	<0.5
Pyrene	µg/l	200	<0.1
Simazine	µg/l	4	<0.07

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
			Meridian Metropolitan Districts WISE Water Wemlinger WTP Baseline Water Quality Sample
Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	Units	Primary/Secondary Drinking Water Limits[a]	Results
Simetryn	µg/l	NS	<0.1
Stirofos	µg/l	NS	<0.1
Sulfotep	µg/l	NS	<0.5
Tebuthiuron	µg/l	500	<10
TEPP	µg/l	NS	<1
Terbacil	µg/l	90	<0.1
Terbufos	µg/l	0.4	<0.5
Terbutryn	µg/l	NS	<0.1
Thiabendazole	µg/l	NS	<10
Thiobencarb	µg/l	NS	<0.1
Thionazin	µg/l	NS	<0.5
trans-Nonachlor	µg/l	NS	<0.1
trans-Permethrin	µg/l	NS	<0.1
Triadimefon	µg/l	NS	<0.5
Tribufos	µg/l	NS	<0.1
Trichloronate	µg/l	NS	<0.5
Tricylazole	µg/l	NS	<1
Trifluralin	µg/l	10	<0.1
Vernolate	µg/l	NS	<0.1
Vinclozolin	µg/l	NS	<0.5
Z-Phosphamidon	µg/l	NS	<0.5
Volatile Organics (EPA 524.2)			
1,1,1,2-Tetrachloroethane	µg/l	70	<0.5
1,1,1-Trichloroethane	µg/l	200	<0.5
1,1,2,2-Tetrachloroethane	µg/l	40	<0.5
1,1,2-Trichloroethane	µg/l	5	<0.5
1,1-Dichloroethane	µg/l	NS	<0.5
1,1-Dichloroethylene	µg/l	7	<0.5
1,1-Dichloropropene	µg/l	NS	<0.5
1,2,3-Trichlorobenzene	µg/l	NS	<0.5
1,2,3-Trichloropropane	µg/l	20	<0.5
1,2,4-Trichlorobenzene	µg/l	70	<0.5
1,2,4-Trimethylbenzene	µg/l	NS	<0.5
1,2-Dichloroethane	µg/l	5	<0.5
1,2-Dichloropropane	µg/l	5	<0.5
1,3,5-Trimethylbenzene	µg/l	NS	<0.5
1,3-Dichloropropane	µg/l	NS	<0.5
2,2-Dichloropropane	µg/l	NS	<0.5
2-Butanone (MEK)	µg/l	4000	<5
2-Hexanone	µg/l	NS	<10
4-Methyl-2-Pentanone (MIBK)	µg/l	NS	<5
Acetone	µg/l	6000	<10

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
			Meridian Metropolitan Districts WISE Water Wemlinger WTP Baseline Water Quality Sample
Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Benzene	µg/l	5	<0.5
Bromobenzene	µg/l	60	<0.5
Bromochloromethane	µg/l	90	<0.5
Bromodichloromethane	µg/l	20	5.2
Bromoethane	µg/l	10	<0.5
Bromoform	µg/l	200	<0.5
Bromomethane (Methyl Bromide)	µg/l	NS	<0.5
Carbon disulfide	µg/l	NS	<0.5
Carbon Tetrachloride	µg/l	5	<0.5
Chlorobenzene	µg/l	100	<0.5
Chlorodibromomethane	µg/l	60	1.7
Chloroethane	µg/l	NS	<0.5
Chloroform (Trichloromethane)	µg/l	70	22
Chloromethane (Methyl Chloride)	µg/l	400	<0.5
cis-1,2-Dichloroethylene	µg/l	70	<0.5
cis-1,3-Dichloropropene	µg/l	NS	<0.5
Dibromomethane	µg/l	NS	<0.5
Dichlorodifluoromethane	µg/l	1000	<0.5
Dichloromethane	µg/l	5	<0.5
Di-isopropyl ether	µg/l	NS	<3
Ethyl benzene	µg/l	700	<0.5
Hexachlorobutadiene	µg/l	2	<0.5
Isopropylbenzene	µg/l	800	<0.5
m,p-Xylenes	µg/l	10,000 (Total Xylenes)	<0.5
m-Dichlorobenzene (1,3-DCB)	µg/l	600	<0.5
Methyl Tert-butyl ether (MTBE)	µg/l	NS	<0.5
Naphthalene	µg/l	100	<0.5
n-Butylbenzene	µg/l	NS	<0.5
n-Propylbenzene	µg/l	NS	<0.5
o-Chlorotoluene	µg/l	100	<0.5
o-Dichlorobenzene (1,2-DCB)	µg/l	600	<0.5
o-Xylene	µg/l	10,000 (Total Xylenes)	<0.5
p-Chlorotoluene	µg/l	100	<0.5
p-Dichlorobenzene (1,4-DCB)	µg/l	75	<0.5
p-Isopropyltoluene	µg/l	NS	<0.5
sec-Butylbenzene	µg/l	NS	<0.5
Styrene	µg/l	100	<0.5
tert-amyl Methyl Ether	µg/l	NS	<3
tert-Butyl Ethyl Ether	µg/l	NS	<3
tert-Butylbenzene	µg/l	NS	<0.5
Tetrachloroethylene (PCE)	µg/l	5	<0.5
Toluene	µg/l	1000	<0.5
Total 1,3-Dichloropropene	µg/l	NS	<0.5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
			Meridian Metropolitan Districts WISE Water Wemlinger WTP Baseline Water Quality Sample
Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Total THM	µg/l	80	29
Total xylenes	µg/l	10000	<0.5
trans 1,2-Dichloroethylene	µg/l	100	<0.5
trans 1,3-Dichloropropene	µg/l	NS	<0.5
Trichloroethylene (TCE)	µg/l	5	<0.5
Trichlorofluoromethane	µg/l	2000	<0.5
Trichlorotrifluoroethane (Freon 113)	µg/l	NS	<0.5
Vinyl chloride (VC)	µg/l	2	<0.3
Acrolein/Acrylonitrile (EPA 624)			
Acrolein	µg/l	NS	<2
Acrylonitrile	µg/l	6	<2

[a]Standards are based on Colorado Department of Public Health and Environment, Water Quality Control Division Drinking Water Standards dated January 19, 2005, U.S. EPA National Safe Drinking Water Standards, and U.S. EPA Region 8 Baseline Water Sampling Criteria

[b]Sample for parameter collected in a separate collection at 14:10 on October 19, 2016

Notes:
NS = No Standard Available
ml = milliliter
mg/l = milligrams per liter or parts per million (ppm)
pCi/l = picocuries per liter
NA = No Analysis
CaCO3 = Calcium carbonate
ug/l = micrograms per liter or parts per billion (ppb)

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
			Meridian Metropolitan Districts WISE Water Wemlinger WTP Baseline Water Quality Sample
Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Total Metals (Inorganics) and Miscellaneous Parameters			
Alkalinity, Total	mg/l as CaCO3	0.006	NA
Aluminum	µg/l	200	NA
Ammonia Nitrogen	mg/l as N	0.01	0.29[b]
Antimony	µg/l	6	<1
Arsenic	µg/l	10	<1
Asbestos	MFL	7	<0.2[b]
Barium	µg/l	2,000	36
Beryllium	µg/l	4	<1
Bicarbonate	mg/l as CaCO3	NS	NA
Carbonate	mg/l as CO3	NS	NA
Boron	mg/l	6	<0.05
Cadmium	µg/l	5	<0.5
Calcium	mg/l	NS	NA
Chlorine Dioxide	mg/l	0.8	<0.24
Chloride	mg/l	250	NA
Chlorite	mg/l	1.0	0.56
Chromium	µg/l	100	<1
Copper	µg/l	1,300	<2.0
Cyanide	mg/l	0.2	<0.025[b]
Cyanogen Chloride	mg/l	0.4	<0.35
Fluoride	mg/l	4.0 (2.0 Secondary MCL)	0.91[b]
Free Chlorine	mg/l	4	0.20
Iron	mg/l	0.3	<0.02
Lead	µg/l	15	<0.5
Magnesium	mg/l	NS	NA
Manganese	µg/l	300	<2
Mercury	µg/l	2	<0.2
Molybdenum	µg/l	40	7.6
Nitrate	mg/l as N	10	<0.1[b]
Nitrite	mg/l as N	1	<0.05[b]
Nickel	µg/l	100	<5
Laboratory pH	pH units	6.5 – 8.5	NA
Potassium	mg/l	NS	NA
Selenium	µg/l	50	<5
Silver	µg/l	100	<0.5
Sodium	mg/l	NS	NA
Strontium	mg/l	4	0.24
Sulfate	mg/l	250	NA
Thallium	µg/l	2	<1
Uranium	µg/l	30	1.8
Zinc	µg/l	2000	<20

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
			Meridian Metropolitan Districts WISE Water Wemlinger WTP Baseline Water Quality Sample
Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	Units	Primary/Secondary Drinking Water Limits[a]	Results
Radio Chemistry			
Gross Alpha, Total	pCi/l	15	6.2
Gross Beta, Total	pCi/l	50 pCi/l Trigger Level	<3
Radium-226, Total	pCi/l	(5 for 226 + 228)	<1
Radium-228, Total	pCi/l	(5 for 226 + 228)	<1
Organochlorine Pesticides/PCBs (EPA 505)			
Alachlor (Alanex)	µg/l	2	<0.1
Aldrin	µg/l	0.2	<0.01
Chlordane	µg/l	2	<0.1
Dieldrin	µg/l	0.2	<0.01
Endrin	µg/l	2	<0.01
Heptachlor	µg/l	0.4	<0.01
Heptachlor Epoxide	µg/l	0.2	<0.01
Lindane (gamma-BHC)	µg/l	0.2	<0.01
Methoxychlor	µg/l	40	<0.05
PCB 1016 Aroclor	µg/l	0.5	<0.08
PCB 1221 Aroclor	µg/l	0.5	<0.1
PCB 1232 Aroclor	µg/l	0.5	<0.1
PCB 1242 Aroclor	µg/l	0.5	<0.1
PCB 1248 Aroclor	µg/l	0.5	<0.1
PCB 1254 Aroclor	µg/l	0.5	<0.1
PCB 1260 Aroclor	µg/l	0.5	<0.1
Total PCBs	µg/l	0.5	<0.1
Toxaphene	µg/l	3	<0.5
Haloacetic Acids (SM 6251B)			
Dibromoacetic acid	µg/l	NS	1.5
Dichloroacetic acid	µg/l	NS	12
Monobromoacetic acid	µg/l	NS	<1
Monochloroacetic acid	µg/l	NS	<2
Total Haloacetic acids (HAA5)	µg/l	60	21
Trichloroacetic acid	µg/l	NS	7.5
EDB/DBCP/HAN (EPA 551.1)			
Dibromochloropropane (DBCP)	µg/l	NS	<0.01
Ethylene Dibromide (EDB)	µg/l	NS	<0.01
Base/Neutral/Acid Extractables (EPA 625)			
1,2,4-Trichlorobenzene	µg/l	70	<5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
			Meridian Metropolitan Districts WISE Water Wemlinger WTP Baseline Water Quality Sample
Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
1,2-Diphenyhydrazine	µg/l	NS	<10
2,4,5-Trichlorophenol	µg/l	NS	<5
2,4,6-Trichlorophenol	µg/l	2	<5
2,4-Dichlorophenol	µg/l	20	<5
2,4-Dimethylphenol	µg/l	NS	<5
2,4-Dinitrophenol	µg/l	NS	<50
2,4-Dinitrotoluene	µg/l	5	<5
2,6-Dinitrotoluene	µg/l	5	<5
2-Chloronapthalene	µg/l	NS	<5
2-Chlorophenol	µg/l	40	<5
2-Methylnaphtalene	µg/l	NS	<5
2-Methyphenol	µg/l	NS	<5
2-Nitroaniline	µg/l	NS	<10
2-Nitrophenol	µg/l	NS	<5
3,3-Dichlorobenzidine	µg/l	NS	<50
3-Nitroaniline	µg/l	NS	<20
4,6-Dintro-o-cresol	µg/l	NS	<50
4-Bromophenylphenylether	µg/l	NS	<5
4-Chloroaniline	µg/l	NS	<5
4-Chlorophenylphenylether	µg/l	NS	<5
4-Methylphenol	µg/l	NS	<5
4-Nitroaniline	µg/l	NS	<20
4-Nitrophenol	µg/l	60	<10
Acenaphthene	µg/l	400	<5
Acenaphtylene	µg/l	NS	<5
Aniline	µg/l	NS	<10
Anthracene	µg/l	2000	<5
Benzidine	µg/l	NS	<50
Benzo(a)anthracene	µg/l	NS	<5
Benzo(a)pyrene	µg/l	0.2	<5
Benzo(b)fluoranthene	µg/l	NS	<5
Benzo(g,h,i)perylene	µg/l	NS	<10
Benzo(k)fluoranthene	µg/l	NS	<5
Benzoic Acid	µg/l	NS	<50
Benzyl Alcohol	µg/l	NS	<5
bis(2-Chloroethoxy)methane	µg/l	NS	<10
bis(2-Chloroethyl)ether	µg/l	NS	<10
bis(2-Chloroisopropyl)ether	µg/l	NS	<10
Butylbenzylphthalate	µg/l	1000	<5
Chrysene	µg/l	NS	<5
Dibenz(a,h)anthracene	µg/l	NS	<10
Dibenzofuran	µg/l	NS	<5
Diethylphthalate	µg/l	6000	<5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
			Meridian Metropolitan Districts WISE Water Wemlinger WTP Baseline Water Quality Sample
Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	Units	Primary/Secondary Drinking Water Limits[a]	Results
Dimethylphthalate	µg/l	NS	<5
Di-n-butylphthalate	µg/l	800	<10
Di-n-octylphthalate	µg/l	NS	<10
Fluoranthene	µg/l	NS	<5
Fluorene	µg/l	200	<5
Hexachlorobenzene	µg/l	1	<5
Hexachlorobutadiene	µg/l	2	<10
Hexachlorocyclopentadiene	µg/l	50	<10
Hexachloroethane	µg/l	1	<5
Indeno(1,2,3-c,d)pyrene	µg/l	NS	<10
Isophorone	µg/l	100	<5
Naphthalene	µg/l	100	<5
Nitrobenzene	µg/l	NS	<5
N-Nitroso-dimethylamine	µg/l	NS	<5
N-Nitrosodi-n-propylamine	µg/l	NS	<5
N-Nitrosodiphenylamine	µg/l	NS	<5
p-Chloro-m-cresol	µg/l	NS	<5
Pentachlorophenol	µg/l	1	<20
Phenanthrene	µg/l	NS	<5
Phenol	µg/l	2000	<5
Pyrene	µg/l	200	<5
Nitrosamines (EPA 521)			
N-Nitrosodibutylamine (NDBA)	ng/l	NS	<2
N-Nitrosodiethylamine (NDEA)	ng/l	NS	<2
N-Nitroso-dimethylamine (NDMA)	ng/l	NS	<2
N-Nitrosodi-n-propylamine (NDPA)	ng/l	NS	<2
N-Nitrosomethylethylamine (NMEA)	ng/l	NS	<2
N-Nitrosomorpholine	ng/l	NS	<2
N-Nitrosopiperidine (NPIP)	ng/l	NS	<2
N-Nitrosopyrollidine (NPYR)	ng/l	NS	<2
Aldicarbs (EPA 531.2)			
3-Hyroxycarbofuran	µg/l	NS	<0.5
Aldicarb (Temik)	µg/l	3	<0.5
Aldicarb sulfone	µg/l	2	<0.5
Aldicarb sulfoxide	µg/l	4	<0.5
Baygon	µg/l	NS	<0.5
Carbaryl	µg/l	NS	<0.5
Carbofuran (Furadan)	µg/l	NS	<0.5
Methiocarb	µg/l	NS	<0.5
Methomyl	µg/l	200	<0.5
Oxamyl (Vydate)	µg/l	7	<0.5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
			Meridian Metropolitan Districts WISE Water Wemlinger WTP Baseline Water Quality Sample
Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	Units	Primary/Secondary Drinking Water Limits[a]	Results
EPA 525.2 Extended List			
1,2,4,5-Tetrachlorobenzene	µg/l	NS	NA
1-Methylnaphthalene	µg/l	NS	NA
2,2,3,3,4,4,6-Heptachlorobiphenyl	µg/l	NS	NA
2,2,3,3,4,5,6,6-Octachlorobiphenyl	µg/l	NS	NA
2,2,3,4,6-Pentachlorobiphenyl	µg/l	NS	NA
2,2,4,4,5,6-Hexachlorobiphenyl	µg/l	NS	NA
2,2,4,4-Tetrachlorobiphenyl	µg/l	NS	NA
2,3-Dichlorobiphenyl	µg/l	NS	NA
2,4,5-Trichlorbiphenyl	µg/l	NS	NA
2,4-Dinitrotoluene	µg/l	5	NA
2,6-Dinitrotoluene	µg/l	5	NA
2-Chlorobiphenyl	µg/l	NS	NA
2-methylnaphthalene	µg/l	NS	NA
4,4-DDD	µg/l	NS	NA
4,4-DDE	µg/l	NS	NA
4,4-DDT	µg/l	NS	NA
Acenaphthene	µg/l	400	NA
acenapthylene	µg/l	NS	NA
Acetochlor	µg/l	NS	NA
Alachlor	µg/l	2	<0.1
Aldrin	µg/l	0.2	<0.1
Alpha-BHC	µg/l	NS	NA
Alpha-Chlordane	µg/l	2	NA
Ametryn	µg/l	NS	NA
Anilazine	µg/l	NS	<0.1
Anthracene	µg/l	2000	NA
Aspon	µg/l	NS	NA
Atrazine	µg/l	3	<0.1
Azinphos-ethyl	µg/l	NS	NA
Azinphos-methyl	µg/l	NS	NA
Bendiocarb	µg/l	NS	NA
Benfluralin	µg/l	NS	NA
Benzo(a)anthracene	µg/l	NS	NA
Benzo(a)pyrene	µg/l	0.2	<0.02
Benzo(b)fluoranthene	µg/l	NS	NA
Benzo(g,h,i)perylene	µg/l	NS	NA
Benzo(k)fluoranthene	µg/l	NS	NA
beta-BHC	µg/l	NS	NA
Bolstar	µg/l	NS	NA
Bromacil	µg/l	NS	NA
Butachlor	µg/l	NS	<0.1
Butylate	µg/l	NS	NA

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
			Meridian Metropolitan Districts WISE Water Wemlinger WTP Baseline Water Quality Sample
Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Butylbenzylphthalate	µg/l	1000	NA
Carbophenothion	µg/l	NS	NA
Carboxin	µg/l	700	NA
Chlorfenvinphos	µg/l	NS	NA
Chlorbenzilate	µg/l	NS	NA
Chloroneb	µg/l	NS	NA
Chlorpropylate	µg/l	NS	NA
Chlorothalonil	µg/l	100	NA
Chlorpropham	µg/l	NS	NA
Chlorpyrifos	µg/l	NS	NA
Chlorpyifos methyl	µg/l	NS	NA
Chrysene	µg/l	NS	NA
cis-Noachlor	µg/l	NS	NA
cis-Permethrin	µg/l	NS	NA
Clomazone	µg/l	NS	NA
Clopyralid	µg/l	NS	NA
Coumaphos	µg/l	NS	NA
Crotoxyphos	µg/l	NS	NA
Cycloate	µg/l	NS	NA
DCPA	µg/l	70	NA
delta-BHC	µg/l	NS	NA
Demeton O	µg/l	NS	NA
Demeton S	µg/l	NS	NA
Desethylatrazine	µg/l	NS	NA
Desisopropylatrazine	µg/l	NS	NA
Di(2-ethylhexyl)adipate	µg/l	400	<0.6
Di(2-Ethylhexy)phthalate	µg/l	6	<0.6
Diazinon	µg/l	1	NA
Dibenzo(a,h)anthracene	µg/l	NS	NA
Dichlobenil	µg/l	NS	NA
Dichlofenthion	µg/l	NS	NA
Dichloran	µg/l	NS	NA
Dichlorvos	µg/l	NS	NA
Dicrotophos	µg/l	NS	NA
Dieldrin	µg/l	0.2	<0.1
Diethylphthalate	µg/l	6000	NA
Dimethoate	µg/l	NS	NA
Dimethylphthalate	µg/l	NS	NA
Di-n-butylphthalate	µg/l	800	NA
Di-n-octylphthalate	µg/l	NS	NA
Dioxathion	µg/l	NS	NA
Diphenamid	µg/l	200	NA
Disulfoton	µg/l	0.7	NA

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
			Meridian Metropolitan Districts WISE Water Wemlinger WTP Baseline Water Quality Sample
Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	Units	Primary/Secondary Drinking Water Limits[a]	Results
Disulfoton Sulfone	µg/l	NS	NA
Disulfoton Sulfoxide	µg/l	NS	NA
Endosulfan I	µg/l	NS	NA
Endosulfan II	µg/l	NS	NA
Endosulfan Sulfate	µg/l	NS	NA
Endrin	µg/l	2	<0.01
Endrin Aldehyde	µg/l	NS	NA
E-Phosphamidon	µg/l	NS	NA
EPN	µg/l	NS	NA
EPTC	µg/l	NS	NA
Erucylamide	µg/l	NS	NA
Esfenvalerate	µg/l	NS	NA
Ethalfluralin	µg/l	NS	NA
Ethion	µg/l	NS	NA
Ethofumesate	µg/l	NS	NA
Ethoprop	µg/l	NS	NA
Etridiazole	µg/l	NS	NA
Famphur	µg/l	NS	NA
Fenamiphos	µg/l	0.7	NA
Fenarimol	µg/l	NS	NA
Fenitrothion	µg/l	NS	NA
Fenoxaprop-ethyl	µg/l	NS	NA
Fensulfothion	µg/l	NS	NA
Fenthion	µg/l	NS	NA
Fluazifop-butyl	µg/l	NS	NA
Fluchloralin	µg/l	NS	NA
Fluometuron	µg/l	NS	NA
Fluoranthene	µg/l	NS	NA
Fluorene	µg/l	200	NA
Fluridone	µg/l	NS	NA
Fonofos	µg/l	NS	NA
Gamma-BHC	µg/l	0.2	<0.02
Gamma-Chlordane	µg/l	2	NA
Heptachlor	µg/l	0.4	<0.04
Heptachlor Epoxide	µg/l	0.2	<0.02
Hexachlorobenzene	µg/l	1	<0.1
Hexachlorocyclopentadiene	µg/l	50	<0.1
Hexazinone	µg/l	400	NA
Indeno(1,2,3,c,d)Pyrene	µg/l	NS	NA
Iprodione	µg/l	NS	NA
Isofenphos	µg/l	NS	NA
Isphorone	µg/l	NS	NA
Leptophos	µg/l	NS	NA

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Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
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Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Malathion	µg/l	NS	NA
Metalaxyl	µg/l	NS	NA
Methoxychlor	µg/l	40	<0.1
Methyl paraoxon	µg/l	NS	NA
Methyl Parathion	µg/l	NS	NA
Metolachlor	µg/l	700	<0.1
Metribuzin	µg/l	70	<0.1
Metsulfuron-methyl	µg/l	NS	NA
Mevinphos	µg/l	NS	NA
MGK 264 isomer a	µg/l	NS	NA
MGK 264 isomer b	µg/l	NS	NA
MGK 326	µg/l	NS	NA
Mirex	µg/l	NS	NA
Molinate	µg/l	NS	NA
Monocrotophos	µg/l	NS	NA
Naled	µg/l	NS	NA
Naphthalene	µg/l	100	NA
Napropamide	µg/l	NS	NA
Norflurazon	µg/l	NS	NA
Oryzalin	µg/l	NS	NA
Oxadiazon	µg/l	NS	NA
Oxyxhlordane	µg/l	NS	NA
Oxyfluorfen	µg/l	NS	NA
Parathion	µg/l	NS	NA
Pebulate	µg/l	NS	NA
Pendimethalin	µg/l	NS	NA
Pentachlorobenzene	µg/l	NS	NA
Pentachloronitrobenzene	µg/l	NS	NA
Pentachlorophenol	µg/l	1	NA
Phenanthrene	µg/l	NS	NA
Phorate	µg/l	NS	NA
Phosmet	µg/l	NS	NA
Profluralin	µg/l	NS	NA
Prometryn	µg/l	NS	NA
Pronamide	µg/l	100	NA
Propachlor	µg/l	100	<0.1
Propanil	µg/l	NS	NA
Propazine	µg/l	10	NA
Propiconazole isomer a	µg/l	NS	NA
Propiconazole isomer	µg/l	NS	NA
Prothiofos	µg/l	NS	NA
Pyrene	µg/l	200	NA
Simazine	µg/l	4	<0.07

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
			Meridian Metropolitan Districts WISE Water Wemlinger WTP Baseline Water Quality Sample
Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	Units	Primary/Secondary Drinking Water Limits[a]	Results
Simetryn	µg/l	NS	NA
Stirofos	µg/l	NS	NA
Sulfotep	µg/l	NS	NA
Tebuthiuron	µg/l	500	NA
TEPP	µg/l	NS	NA
Terbacil	µg/l	90	NA
Terbufos	µg/l	0.4	NA
Terbutryn	µg/l	NS	NA
Thiabendazole	µg/l	NS	NA
Thiobencarb	µg/l	NS	NA
Thionazin	µg/l	NS	NA
trans-Nonachlor	µg/l	NS	NA
trans-Permethrin	µg/l	NS	NA
Triadimefon	µg/l	NS	NA
Tribufos	µg/l	NS	NA
Trichloronate	µg/l	NS	NA
Tricylazole	µg/l	NS	NA
Trifluralin	µg/l	10	NA
Vernolate	µg/l	NS	NA
Vinclozolin	µg/l	NS	NA
Z-Phosphamidon	µg/l	NS	NA
Volatile Organics (EPA 524.2)			
1,1,1,2-Tetrachloroethane	µg/l	70	<0.5
1,1,1-Trichloroethane	µg/l	200	<0.5
1,1,2,2-Tetrachloroethane	µg/l	40	<0.5
1,1,2-Trichloroethane	µg/l	5	<0.5
1,1-Dichloroethane	µg/l	NS	<0.5
1,1-Dichloroethylene	µg/l	7	<0.5
1,1-Dichloropropene	µg/l	NS	<0.5
1,2,3-Trichlorobenzene	µg/l	NS	<0.5
1,2,3-Trichloropropane	µg/l	20	<0.5
1,2,4-Trichlorobenzene	µg/l	70	<0.5
1,2,4-Trimethylbenzene	µg/l	NS	<0.5
1,2-Dichloroethane	µg/l	5	<0.5
1,2-Dichloropropane	µg/l	5	<0.5
1,3,5-Trimethylbenzene	µg/l	NS	<0.5
1,3-Dichloropropane	µg/l	NS	<0.5
2,2-Dichloropropane	µg/l	NS	<0.5
2-Butanone (MEK)	µg/l	4000	<5
2-Hexanone	µg/l	NS	<10
4-Methyl-2-Pentanone (MIBK)	µg/l	NS	<5
Acetone	µg/l	6000	<10

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
			Meridian Metropolitan Districts WISE Water Wemlinger WTP Baseline Water Quality Sample
Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Benzene	µg/l	5	<0.5
Bromobenzene	µg/l	60	<0.5
Bromochloromethane	µg/l	90	<0.5
Bromodichloromethane	µg/l	20	5.2
Bromoethane	µg/l	10	<0.5
Bromoform	µg/l	200	<0.5
Bromomethane (Methyl Bromide)	µg/l	NS	<0.5
Carbon disulfide	µg/l	NS	<0.5
Carbon Tetrachloride	µg/l	5	<0.5
Chlorobenzene	µg/l	100	<0.5
Chlorodibromomethane	µg/l	60	1.7
Chloroethane	µg/l	NS	<0.5
Chloroform (Trichloromethane)	µg/l	70	22
Chloromethane (Methyl Chloride)	µg/l	400	<0.5
cis-1,2-Dichloroethylene	µg/l	70	<0.5
cis-1,3-Dichloropropene	µg/l	NS	<0.5
Dibromomethane	µg/l	NS	<0.5
Dichlorodifluoromethane	µg/l	1000	<0.5
Dichloromethane	µg/l	5	<0.5
Di-isopropyl ether	µg/l	NS	<3
Ethyl benzene	µg/l	700	<0.5
Hexachlorobutadiene	µg/l	2	<0.5
Isopropylbenzene	µg/l	800	<0.5
m,p-Xylenes	µg/l	10,000 (Total Xylenes)	<0.5
m-Dichlorobenzene (1,3-DCB)	µg/l	600	<0.5
Methyl Tert-butyl ether (MTBE)	µg/l	NS	<0.5
Naphthalene	µg/l	100	<0.5
n-Butylbenzene	µg/l	NS	<0.5
n-Propylbenzene	µg/l	NS	<0.5
o-Chlorotoluene	µg/l	100	<0.5
o-Dichlorobenzene (1,2-DCB)	µg/l	600	<0.5
o-Xylene	µg/l	10,000 (Total Xylenes)	<0.5
p-Chlorotoluene	µg/l	100	<0.5
p-Dichlorobenzene (1,4-DCB)	µg/l	75	<0.5
p-Isopropyltoluene	µg/l	NS	<0.5
sec-Butylbenzene	µg/l	NS	<0.5
Styrene	µg/l	100	<0.5
tert-amyl Methyl Ether	µg/l	NS	<3
tert-Butyl Ethyl Ether	µg/l	NS	<3
tert-Butylbenzene	µg/l	NS	<0.5
Tetrachloroethylene (PCE)	µg/l	5	<0.5
Toluene	µg/l	1000	<0.5
Total 1,3-Dichloropropene	µg/l	NS	<0.5

Table 4-1

Baseline Laboratory Water Quality Data for Meridian Metropolitan Districts WISE Water – Wemlinger WTP			
			Meridian Metropolitan Districts WISE Water Wemlinger WTP Baseline Water Quality Sample
Sample ID			Wemlinger
Sample Date			September 20, 2016
Sample Time			7:26 am
Test Description	**Units**	**Primary/Secondary Drinking Water Limits[a]**	**Results**
Total THM	µg/l	80	29
Total xylenes	µg/l	10000	<0.5
trans 1,2-Dichloroethylene	µg/l	100	<0.5
trans 1,3-Dichloropropene	µg/l	NS	<0.5
Trichloroethylene (TCE)	µg/l	5	<0.5
Trichlorofluoromethane	µg/l	2000	<0.5
Trichlorotrifluoroethane (Freon 113)	µg/l	NS	<0.5
Vinyl chloride (VC)	µg/l	2	<0.3
Acrolein/Acrylonitrile (EPA 624)			
Acrolein	µg/l	NS	<2
Acrylonitrile	µg/l	6	<2

[a]Standards are based on Colorado Department of Public Health and Environment, Water Quality Control Division Drinking Water Standards dated January 19, 2005, U.S. EPA National Safe Drinking Water Standards, and U.S. EPA Region 8 Baseline Water Sampling Criteria

[b]Sample for parameter collected in a separate collection at 14:10 on October 19, 2016

Notes:
NS = No Standard Available
ml = milliliter
mg/l = milligrams per liter or parts per million (ppm)
pCi/l = picocuries per liter
NA = No Analysis
CaCO3 = Calcium carbonate
ug/l = micrograms per liter or parts per billion (ppb)