INL/EXT-13-30962

2013 Annual Industrial Wastewater Reuse Report for the Idaho National Laboratory Site's Advanced Test Reactor Complex Cold Waste Pond

February 2014

Idaho National Laboratory

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Michael G. Lewis

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Idaho National Laboratory
Idaho Falls, Idaho 83415

http://www.inl.gov

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ABSTRACT

This report describes conditions, as required by the state of Idaho Industrial Wastewater Reuse Permit (#LA-000161-01, Modification B), for the wastewater land application site at the Idaho National Laboratory Site's Advanced Test Reactor Complex Cold Waste Pond from November 1, 2012–October 31, 2013. The report contains the following information:

- Facility and system description
- Permit required effluent monitoring data and loading rates
- Groundwater monitoring data
- Status of compliance activities
- Noncompliance issues
- Discussion of the facility's environmental impacts.

During the 2013 permit year, approximately 238 million gallons of wastewater was discharged to the Cold Waste Pond. This is well below the maximum annual permit limit of 375 million gallons. As shown by the groundwater sampling data, sulfate and total dissolved solids concentrations are highest near the Cold Waste Pond and decrease rapidly as the distance from the Cold Waste Pond increases. Although concentrations of sulfate and total dissolved solids are elevated near the Cold Waste Pond, both parameters are below the Ground Water Quality Rule Secondary Constituent Standards in the down gradient monitoring wells.

CONTENTS

FIGURES

TABLES

ACRONYMS

Al	Aluminum
ATR	Advanced Test Reactor
CFR	Code of Federal Regulations
CWP	Cold Waste Pond
DEQ	Idaho Department of Environmental Quality
DOE	U.S. Department of Energy
DOE-ID	U.S. Department of Energy Idaho Operations Office
EPA	U.S. Environmental Protection Agency
Fe	Iron
gpd	gallons per day
IDAPA	Idaho Administrative Procedures Act
INL	Idaho National Laboratory
IWRP	Industrial Wastewater Reuse Permit
MG	Million gallons
Mn	Manganese
MS	Monitoring Services
MS/MSD	matrix spike/matrix spike duplicate
NA	Not Applicable
PCS	Primary Constituent Standard
SCS	Secondary Constituent Standard
SwRI	Southwest Research Institute
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TN	total nitrogen
TSS	total suspended solids
USGS	United States Geological Survey
WRP	Wastewater Reuse Permit

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1. INTRODUCTION

The Advanced Test Reactor (ATR) Complex Cold Waste Pond (CWP) is an industrial wastewater reuse facility operated by Battelle Energy Alliance, LLC at the Idaho National Laboratory (INL) under Industrial Wastewater Reuse Permit (IWRP) #LA-000161-01 issued by the State of Idaho Department of Environmental Quality (DEQ) on February 26, 2008 (Johnston 2008). The permit was modified (Modification B) on August 20, 2008 (Eager 2008).

The IWRP expired on February 25, 2013. However, the Idaho Administrative Procedures Act (IDAPA) 58.01.17.400.10.a (Continuation of Expiring Permits) allows continued coverage under the existing permit provided the permittee submits a "timely and sufficient" application. A "timely and sufficient" application is one where the DEQ has determined the application is complete and the applications effective date (date application was determined complete) is prior to the expiration date of the permit. The paragraph below provides the timeline and associated documents to show the application was "timely and sufficient".

An application for renewal of the IWRP was submitted to the DEQ on August 21, 2012 (Stenzel 2012). The application was determined "substantially complete" with an effective date of October 12, 2012 (Rackow 2012). The preliminary decision to prepare a draft permit (Rackow 2012a) was made by the DEQ on October 12, 2012. On June 25, 2013, the DEQ (Neher 2013) issued a draft Wastewater Reuse Permit (#I-161-02) and a staff analysis for review and comment. The INL submitted comments to the DEQ on the draft permit on July 23, 2013 (Mascareñas 2013).

Following the Section 2 CWP facility, system, and operation description, this report presents the effluent and groundwater monitoring data, compliance activities, noncompliances, and environmental impacts of the CWP operation during the 2013 permit year (November 1, 2012–October 31, 2013).

2. FACILITY, SYSTEM DESCRIPTION, AND OPERATION

The ATR Complex (see Figure 1) is located on approximately 100 acres in the southwestern portion of the INL, approximately 47 miles west of Idaho Falls, Idaho, in Butte County. The ATR Complex consists of buildings and structures utilized to conduct research associated with developing, testing, and analyzing materials used in nuclear and reactor applications and both radiological and nonradiological laboratory analyses.

The CWP is located approximately 450 ft from the southeast corner of the ATR Complex compound (see Figure 1) and approximately 3/4 of a mile northwest of the Big Lost River channel (see Figure 2). The existing CWP was excavated in 1982. It consists of two cells, each with dimensions of 180 × 430 ft across the top of the berms, and a depth of 10 ft. Total surface area for the two cells at the top of the berms is approximately 3.55 acres. Maximum capacity is approximately 10,220,000 gal (31.3 acre ft).

Wastewater discharged to the CWP consists primarily of noncontact cooling tower blowdown, once-through cooling water for air conditioning units, coolant water from air compressors, secondary system drains, and other nonradioactive drains throughout the ATR Complex. The wastewater flows through collection piping to the TRA-764 Cold Waste Sample Pit (see Figure 1) where the flow rate is recorded and compliance monitoring samples are collected. The wastewater then flows to the Cold Waste Sump Pit (TRA-703). The sump pit contains submersible pumps that route the water to the appropriate CWP cell through 8 in. valves.

Wastewater enters the pond through concrete inlet basins located near the west end of each cell. Most of the water percolates into the porous ground within a short distance from the inlet basins. The entire floor of a cell is rarely submerged. If the water level rises significantly in a cell (e.g., 5 ft) the flow would be diverted to the adjacent cell, allowing the first cell to dry out. An overflow pipe connects the two cells at the 9-ft level.

Normal operation is to route the wastewater to one cell at a time. On July 1, 2013, the flow was switched from the south cell to the north cell.

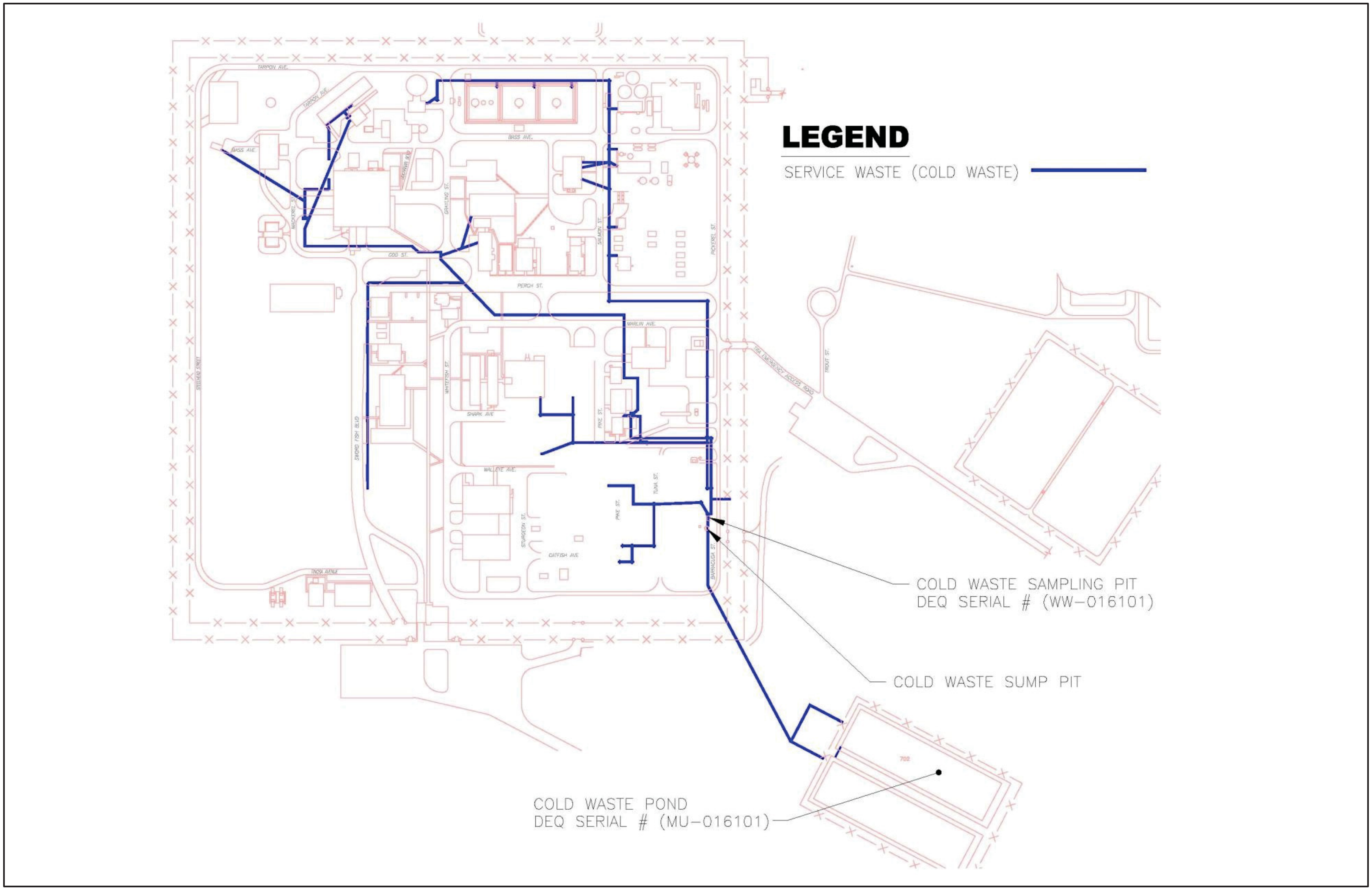

Figure 1. Advanced Test Reactor Complex Cold Waste system flow schematic.

3. COLD WASTE POND EFFLUENT MONITORING

This section describes the sampling and analytical methods used in the ATR Complex CWP effluent monitoring program. Effluent monitoring and flow data of wastewater discharged to the ATR Complex CWP is provided.

3.1 Sampling Program and Analytical Methods

Battelle Energy Alliance, LLC Monitoring Services (MS) personnel monitor effluent discharges at the ATR Complex CWP. The MS program involves sampling, analysis, and data interpretation carried out under a quality assurance program.

MS conducts monthly effluent monitoring as required in Section G of the permit. Effluent samples were collected from the TRA-764 Cold Waste Sample Pit (sampling location WW-016101) prior to discharge to the CWP. All samples were collected according to established programmatic sampling procedures.

Effluent samples were typically taken during a preselected week each month following a randomly generated sampling schedule to represent normal operating conditions. The sampling event scheduled for January 23 was moved to January 16 to accommodate staff schedules. Analytical methods specified in 40 Code of Federal Regulations (CFR) 141, "National Primary Drinking Water Regulations"; 40 CFR 143, "National Secondary Drinking Water Regulations"; 40 CFR 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants"; or those approved by DEQ were used for analysis of all permit-required parameters.

Permit required effluent conductivity analyses are performed at the time of sample collection by MS personnel using a calibrated meter. All other permit required samples are submitted under full chain of custody to Southwest Research Institute's (SwRI) Analytical and Environmental Chemistry Department located in San Antonio, Texas, for analyses.

3.2 Effluent Monitoring Results

The permit year covered in this report is November 1, 2012–October 31, 2013.

Effluent samples were collected monthly from the TRA-764 Cold Waste Sample Pit (prior to discharge to the CWP) during the permit year. Effluent samples were collected as 24-hour flow proportional composite samples.

All samples were collected and analyzed as required by the permit. Table 1 summarizes the effluent sampling results.

Section F of the IWRP specifies effluent permit limits based on a 30-day average for total nitrogen (TN) and total suspended solids (TSS) of 20 mg/L and 100 mg/L, respectively. Total nitrogen is calculated as the sum of total Kjeldahl nitrogen (TKN) and nitrate plus nitrite nitrogen. The high for TN occurred in the December 2012 sample at 3.377 mg/L (see Table 1) with a low of 0.927 mg/L in the November 2012 sample. All TSS results were below the laboratory instrument detection limit of 4 mg/L.

There are no effluent permit limits for total dissolved solids (TDS) or sulfate. However, a summary comparison of these parameters with the Ground Water Quality Rule Secondary Constituent Standards (SCS) found in IDAPA 58.01.11.200.01.b. is provided in the following paragraphs:

The TDS SCS is 500 mg/L. The concentration in the effluent to the CWP ranged from 246 mg/L in the July 2013 sample to 1,060 mg/L in the April 2013 sample (see Table 1). Concentrations of TDS in the effluent were above the SCS level in six out of the twelve months.

Similar to the TDS effluent levels, sulfate concentrations were above the SCS of 250 mg/L in six of the twelve monthly samples (see Table 1). Sulfate ranged from a minimum of 24 mg/L in the July 2013 sample to a maximum of 535 mg/L in the December 2012 sample.

The ATR evaporative cooling process evaporates approximately one-half of the water volume and concentrates naturally occurring dissolved solids in the blowdown discharged to the CWP. Elevated sulfate levels are generated by reactions between sulfuric acid additives placed in the cooling water and calcium and magnesium carbonates in the water.

The metals concentrations in the CWP effluent remained at low levels (see Table 1). Concentrations of several metals in the effluent were consistently below the laboratory instrument detection levels.

Table 1. Advanced Test Reactor Complex Cold Waste Pond effluent data (WW-016101).

Sample Month	November	December	January	February[a]	March	April	May	June	July	August	September	October
Sample Date	11/14/12	12/18/12	01/16/13	02/12/13	03/13/13	04/10/13	05/16/13	06/04/13	07/17/13	08/06/13	09/24/13	10/03/13
Nitrite + nitrate as nitrogen (mg/L)	0.814	2.93	3.06	0.971 [0.959]	0.864	2.89	0.848	2.32	0.834	0.796	2.27	2.27
Total Kjeldahl nitrogen (mg/L)	0.113	0.447	0.247	0.128 [0.121]	0.159	0.144	0.251	0.338	0.206	0.519	0.258	0.207
Total nitrogen[b] (mg/L)	0.927	3.377	3.307	1.099 [1.08]	1.023	3.034	1.099	2.658	1.04	1.315	2.528	2.477
Total suspended solids (mg/L)	4.0 U[c]	4.0 U	4.0 U	4.0 U 4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
Total dissolved solids (mg/L)	281	1,040	885	269 264	275	1,060	254	895	246	275	915	864
Chloride (mg/L)	12.1	36.8	39.1	12.9 12.9	13.4	36.9	10.3	32.1	11.1	11.9	30.3	35.3
Electrical conductivity (µS/cm)	477	1,374	1,163	465	448	1,306	460	1,147	473	473	1,147	1,119
Arsenic (mg/L)	0.005	0.0066	0.005 U	0.005 U [0.005 U]	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.0067	0.0056
Barium (mg/L)	0.0474	0.145	0.110	0.0511 [0.0513]	0.0461	0.147	0.0766	0.114	0.046	0.0432	0.119	0.116
Cadmium (mg/L)	0.001 U	0.001 U	0.001 U	0.001 U [0.001 U]	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chromium (mg/L)	0.0033	0.0076	0.0082	0.0043 [0.004]	0.0033	0.0116	0.0056	0.0071	0.0029	0.0044	0.0086	0.0102
Cobalt (mg/L)	0.0025 U	0.0025 U	0.0025 U	0.0025 U [0.0025 U]	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U
Copper (mg/L)	0.0024	0.004	0.0014	0.0035 [0.0036]	0.0033	0.0015	0.0045	0.0067	0.001 U	0.0036	0.0061	0.007
Fluoride (mg/L)	0.185	0.477	0.498	0.196 0.202	0.189	0.495	0.184	0.402	0.179	0.188	0.414	0.418
Iron (mg/L)	0.0801	0.168	0.025 U	0.0335 0.034	0.0349	0.167	0.0984	0.108	0.0941	0.175	0.025 U	0.025 U
Manganese (mg/L)	0.0025 U	0.0052	0.0025 U	0.0025 U [0.0025 U]	0.0025 U	0.0044	0.0025 U	0.0034	0.0025 U	0.0027	0.0029	0.0025 U
Mercury (mg/L)	0.0002 U	0.0002 U	0.0002 U	0.0002 U [0.0002 U]	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Selenium (mg/L)	0.0012	0.005	0.0044	0.0015 [0.0015]	0.0013	0.0041	0.0014	0.0036	0.0013	0.0012	0.0039	0.0039

Sample Month	November	December	January	February[a]	March	April	May	June	July	August	September	October
Sample Date	11/14/12	12/18/12	01/16/13	02/12/13	03/13/13	04/10/13	05/16/13	06/04/13	07/17/13	08/06/13	09/24/13	10/03/13
Silver (mg/L)	0.005 U	0.005 U	0.005 U	0.005 U [0.005 U]	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Sulfate (mg/L)	29.7	535	392	39.7 [39.3]	38.3	509	24.5	413	24	41.4	418	407

a. Values in brackets are the result from analyses performed on the field duplicate sample.

b. Total nitrogen is calculated as the sum of the TKN, nitrite nitrogen, and nitrate nitrogen. For results reported below the instrument detection limit, the detection limit for that parameter is used in the calculation. The resulting total nitrogen is then reported as a less than (<) number.

c. U flag indicates that the result was reported as below the instrument detection limit by the analytical laboratory.

3.3 Flow Volumes and Hydraulic Loading Rates

Daily flow readings were taken by ATR Complex CWP Operations during the 2013 permit year, as required by Section G of the permit, at the TRA-764 Cold Waste Sample Pit (WW-016101). All flow readings were recorded in gallons per day (gpd).

Table 2 summarizes monthly and annual flow data. Daily effluent flow data is provided in Appendix A.

Table 2. Cold Waste Pond flow summaries.

	Effluent to Cold Waste Pond (WW-016101)			
Month	Average (gpd[a])	Minimum (gpd)	Maximum (gpd)	Total (MG[b])
November 2012	783,777	338,210	1,002,930	23.51
December 2012	459,045	339,600	611,710	14.23
January 2013	615,563	365,120	1,031,310	19.08
February 2013	831,754	586,000	1,033,770	23.29
March 2013	809,723	346,060	1,029,970	25.10
April 2013	716,619	436,850	941,340	21.50
May 2013	700,654	381,590	957,990	21.72
June 2013	449500	398,620	493,820	13.49
July 2013	651,503	323,350	1,038,990	20.20
August 2013	673,712	374,960	895,090	20.89
September 2013	486,131	356,760	640,500	14.58
October 2013	650,306	437,620	1,178,520	20.16
Yearly summary	651,358	323,350	1,178,520	237.75

a. gpd—gallons per day.
b. MG—million gallons.

The permit (Section F) specifies the following:

Application season is year round.

Maximum hydraulic loading rate is 300 million gallons (MG) as a 5-year annual average, not to exceed 375 MG annually.

Daily influent flow averaged 651,358 gpd. Daily flow ranged from a low of 323,350 gpd and a high of 1,178,520 gpd for the permit year (Table 2).

Total effluent flow volume was 237.75 MG for the 2013 permit year and significantly less than the maximum permit limit of 375 MG annually.

3.3.1 Flow Meter Calibration

Section G of the IWRP requires an annual calibration of all flow meters and pumps used directly or indirectly to measure all wastewater applied to the CWP. The flow meter used to measure the flow volume to the CWP is located in the TRA-764 Cold Waste Sample Pit. Although not required by the permit, beginning in 2013 the flow meter calibration frequency was increased from annually to quarterly. The more frequent calibrations are being performed to assess potential instrumentation drift. For the 2013 permit year, the flow meter was calibrated on February 25, 2013, June 12, 2013, and September 4, 2013 by the ATR Complex maintenance organization. The calibrations were performed to +/- 2% of full scale (full scale = 1400 gpm).

4. GROUNDWATER MONITORING

The groundwater monitoring sections provide information concerning the INL sampling program, analytical methods used, monitoring results, and water table information.

4.1 Sampling Program

The ATR Complex CWP IWRP identifies five INL compliance wells. The permit requires that groundwater samples be collected from these five compliance wells semiannually during April and October.

The MS personnel performed the April and October 2013 groundwater sampling. The MS personnel use project-specific sampling and analysis plans and procedures that govern sampling activities and quality control protocols. The permit identifies a specified list of parameters that are to be analyzed in the groundwater samples. Constituent concentrations in the compliance wells are limited by primary constituent standards (PCS) and SCS specified in IDAPA 58.01.11, "Ground Water Quality Rule."

Permit-required samples were collected as unfiltered samples. In addition, filtered samples were collected for aluminum (Al), iron (Fe), and manganese (Mn).

The Ground Water Quality Rule allows the use of dissolved (filtered) concentrations for SCS to be used for permit compliance provided the requestor demonstrates that doing so will not adversely affect human health and the environment or other situations authorized by the DEQ in writing. The INL submitted a request on October 8, 2009 (Stenzel 2009). The DEQ (Rackow 2010) responded with the following statement: "Filtered ground water samples may be collected for secondary constituents and the dissolved concentration results from those filtered samples will be used to determine compliance with the Ground Water Quality Rule numerical standards for those secondary constituents listed in Table III, IDAPA 58.01.11.200.01.b." Therefore, filtered sample results for Al, Fe, and Mn will be used to demonstrate compliance with the SCS when these parameters are exceeded in the unfiltered samples.

Groundwater pH analyses are performed at the time of sample collection by MS personnel using a calibrated meter. All other permit required groundwater samples are submitted under full chain of custody to SwRI's Analytical and Environmental Chemistry Department located in San Antonio, Texas, for analyses.

4.2 Analytical Methods

Analytical methods specified in 40 CFR 141, "National Primary Drinking Water Regulations"; 40 CFR 143, "National Secondary Drinking Water Regulations"; 40 CFR 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants"; or those approved by DEQ were used for analysis of all permit-required parameters.

4.3 Monitoring Wells

To measure potential impacts to groundwater from the ATR Complex CWP, the permit requires that groundwater samples be collected from five monitoring wells located in the Snake River Plain Aquifer (see Figure 2):

- USGS-065 (GW-016102)
- TRA-07 (GW-016103)
- USGS-076 (GW-016104)
- TRA-08 (GW-016105)
- Middle-1823 (GW-016106).

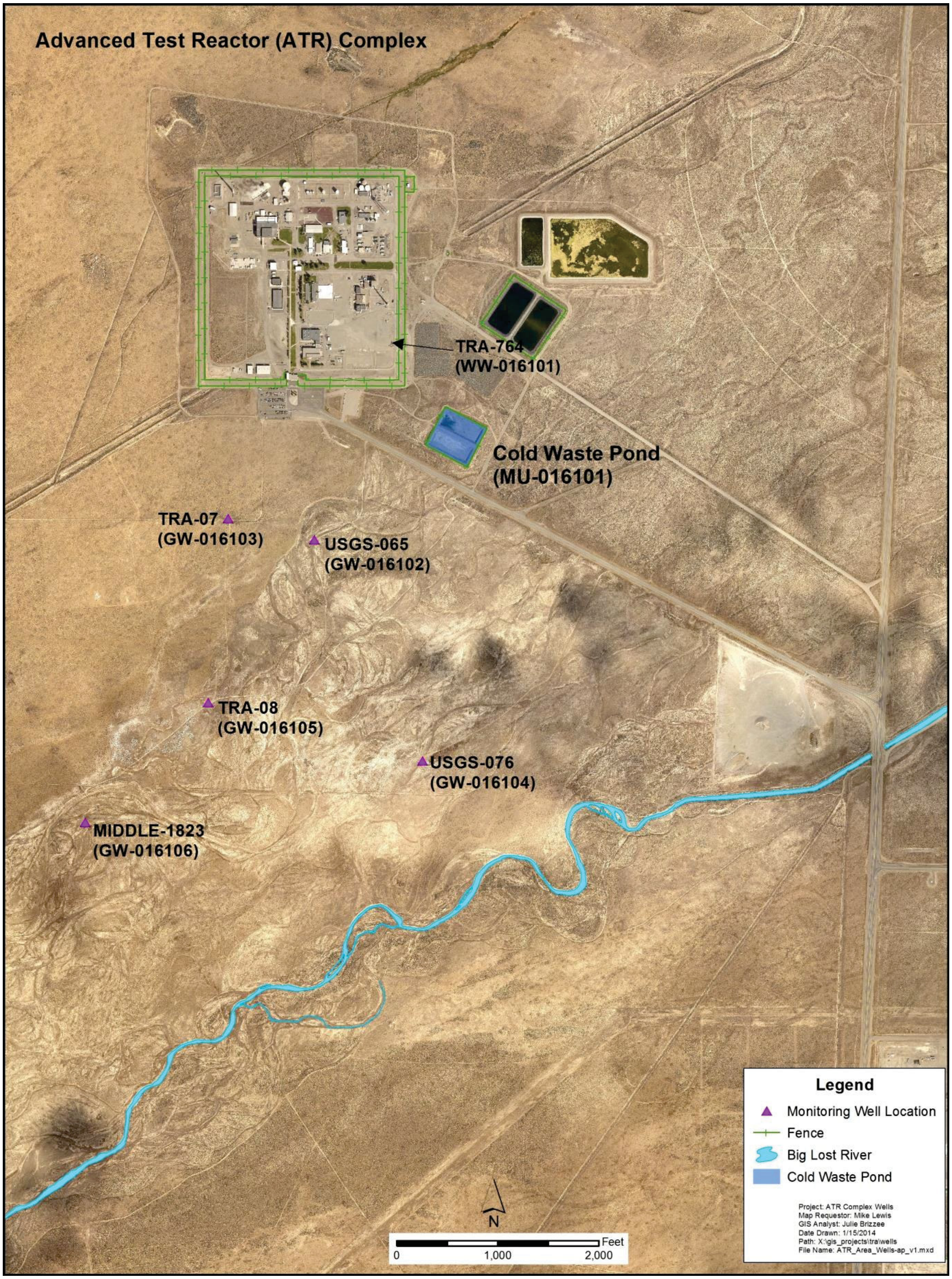

Figure 2. Locations of the Advanced Test Reactor Complex Cold Waste Pond Industrial Wastewater Reuse Permit monitoring wells.

All five wells are IWRP compliance points. Wells with sufficient water volume are purged to a minimum of three casing volumes or one well volume, provided the field measurements meet the conditions specified in Section G.5 of the IWRP. For 2013, all five wells yielded enough water to allow samples to be collected in April and October.

The pump, water level access pipe, and water discharge pipe were replaced in well USGS-076 in August 2013 (Figure 3). The old pump was replaced with a new 5 horsepower pump with an approximate flow rate of 16 gpm. The existing galvanized water level access pipe and water discharge pipe were replaced with stainless steel pipes. The new pump was installed approximately 20 feet lower than the previous installation depth.

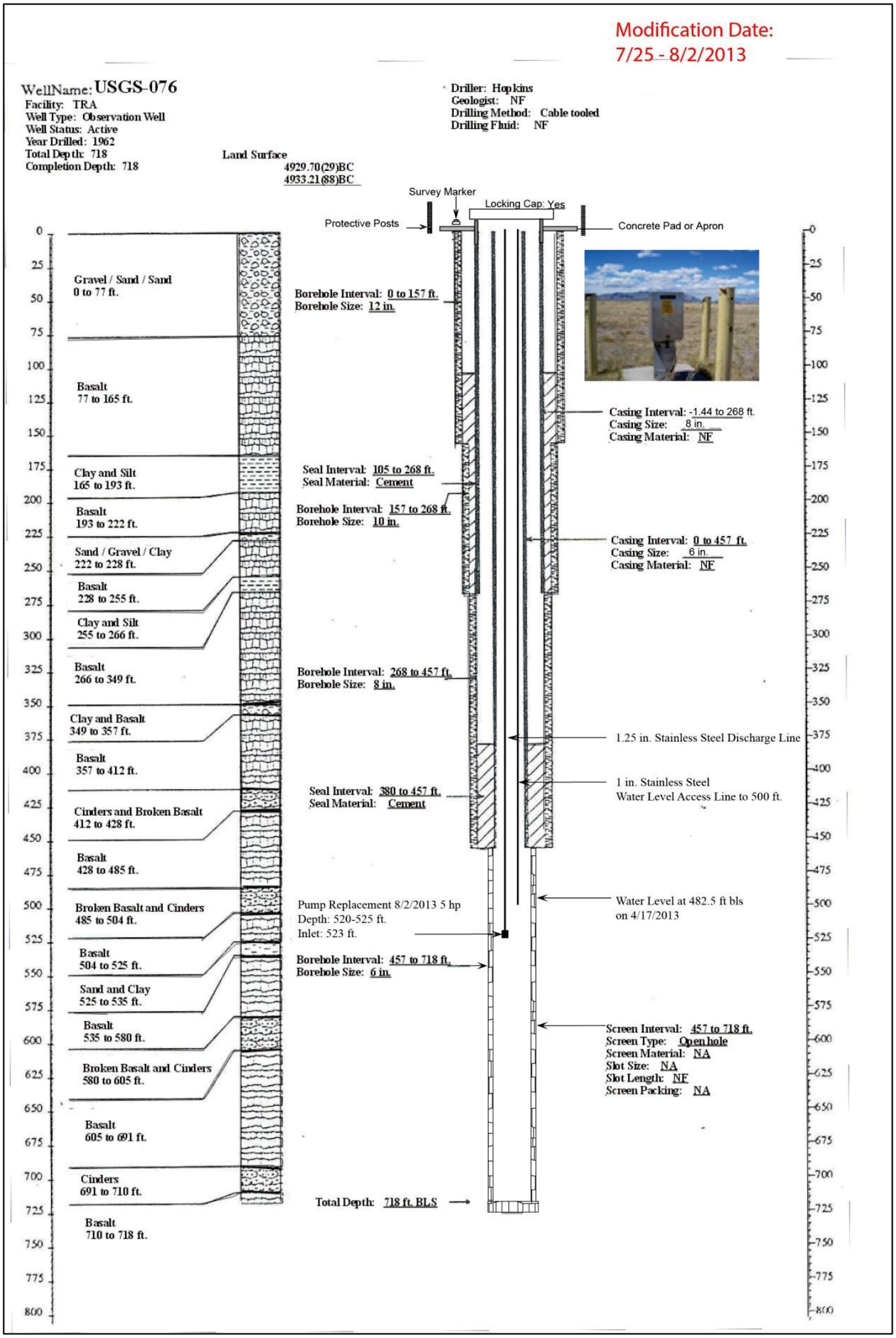

Figure 3. Well USGS-076 well construction and modification diagram.

4.4 Groundwater Monitoring Results

Table 3 shows the 2013 reporting year water table elevations and depth to water table, determined prior to purging and sampling, and the analytical results for all parameters specified by the permit for the five aquifer wells.

As shown in Table 3, the permit-required parameters were below their respective Ground Water Quality Rule (IDAPA 58.01.11) PCSs or SCSs (permit compliance unfiltered and/or filtered concentrations) during the 2013 reporting year for all five wells. For Al, Fe, and Mn, filtered sample results are used for compliance when the unfiltered sample results exceed their respective SCSs.

A reanalysis was performed on the October Al samples because of a high recovery in the matrix spike/matrix spike duplicate (MS/MSD). The results of the reanalyses (Table 4) were comparable to the original analyses demonstrating that the interference in the MS/MSD of the original analyses was from the spiking standard and not the sample matrix (groundwater). The original analysis results are considered valid.

The Al April and October unfiltered sample results for wells TRA-07 and TRA-08 were above the SCS of 0.2 mg/L. The respective filtered sample results were significantly below the SCS (Tables 3 and 4).

The Fe April and October unfiltered sample results for wells TRA-07 and TRA-08, and the April unfiltered sample result for well USGS-076 were above the SCS of 0.3 mg/L (Table 3). The respective filtered sample results were significantly below the SCS, which included results below the laboratory instrument detection level of 0.05 mg/L for the April and October TRA-07 and TRA-08 samples and the April USGS-076 sample.

The Mn October unfiltered sample result for well TRA-07 was above the SCS of 0.05 mg/L. The respective filtered sample result was below the SCS and the laboratory instrument detection level of 0.0025 mg/L.

Monitoring wells USGS-065 and TRA-07 are located southwest of the CWP. April and October sample results in both wells show similar elevated levels of sulfate and TDS below the respective SCS limits, relative to the down gradient wells TRA-08 and Middle-1823 and cross gradient well USGS-076 (Table 3). The SCS for sulfate and TDS are 250 mg/L and 500 mg/L, respectively.

4.5 Water Table Information

Depth to water and water table elevations for the April and October sampling events are shown in Figure 4 and Figure 5, respectively. The elevations are presented in North American Vertical Datum of 1988 (NAVD 88). In addition, the figures show the inferred general groundwater flow direction in the vicinity of the ATR Complex. In this area, the flow is in a south to southwest direction. The general groundwater flow direction at the INL Site is to the southwest.

Table 3. Advanced Test Reactor Complex Cold Waste Pond aquifer monitoring well unfiltered and filtered data for the 2013 reporting year.

WELL NAME	USGS-065 (GW-016102)		TRA-07 (GW-016103)		USGS-076 (GW-016104)		TRA-08 (GW-016105)		Middle-1823 (GW-016106)		PCS/SCS[a]
Sample Date	04/17/13	10/08/13	04/18/13	10/08/13	04/17/13	10/07/13	04/18/13	10/07/13	04/17/13	10/07/13	
Water Table Depth (ft below ground surface)	474.14	475.78	483.05	484.31	482.52	483.82	488.46	489.71	492.26	493.61	NA[b]
Water Table Elevation (above mean sea level in ft)[c]	4454.38	4452.74	4452.09	4450.83	4450.69	4449.39	4450.6	4449.35	4450.61	4449.26	NA
Borehole Correction Factor (ft)[d]	NA	NA	0.06	0.06	NA	NA	0.63	0.63	NA	NA	NA
pH	7.81	7.18 7.94[e]	7.79	7.4 7.91[e]	7.86	7.93	7.82	7.73	7.86	7.86	6.5 to 8.5 (SCS)
Total Kjeldahl nitrogen (mg/L)	0.1 U[f]	0.1 U [0.1 U][g]	0.142	0.1 U	0.127	0.1 U	0.145	0.1 U	0.144	0.1 U	NA
Nitrite nitrogen (mg/L)	0.05 U	0.05 U [0.05 U]	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	1 (PCS)
Nitrate nitrogen (mg/L)	1.43	1.41 [1.4]	1.04	0.985	1.02	0.983	0.982	0.942	0.937	0.929	10 (PCS)
Total nitrogen[h] (mg/L)	<1.58	<1.56 [<1.55]	<1.232	<1.135	<1.197	<1.133	<1.177	<1.092	<1.131	<1.079	NA
Total dissolved solids (mg/L)	431	451 [440]	413	445	256	273	266	279	262	257	500 (SCS)
Aluminum (mg/L)	0.0095 (0.0049)[i]	0.004 [0.0095] (0.0076) [(0.007)]	**0.993**[j] (0.016)	**3.320** (0.0069)	0.021 (0.0045)	0.0101 (0.0066)	**1.190** (0.0152)	**2.000** (0.0285)	0.189 (0.0032)	0.0787 (0.0018)	0.2 (SCS)
Antimony (mg/L)	0.0004 U	0.0004 U [0.0004 U]	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.006 (PCS)
Arsenic (mg/L)	0.0013	0.0015 [0.0015]	0.0015	0.002	0.0019	0.0018	0.0019	0.0021	0.0019	0.002	0.05 (PCS)
Barium (mg/L)	0.0455	0.0443 [0.044]	0.0728	0.111	0.0773	0.0713	0.0663	0.0969	0.066	0.0621	2 (PCS)
Cadmium (mg/L)	0.00025 U	0.00025 U [0.00025 U]	0.00025 U	0.00025 U	0.00025 U	0.00025 U	0.00025 U	0.00025 U	0.00025 U	0.00025 U	0.005 (PCS)
Chloride (mg/L)	19	20.2 [20.2]	21.6	22.1	14	13.8	12.8	12.3	12.1	11.7	250 (SCS)

WELL NAME	USGS-065 (GW-016102)		TRA-07 (GW-016103)		USGS-076 (GW-016104)		TRA-08 (GW-016105)		Middle-1823 (GW-016106)		PCS/SCS[a]
Sample Date	04/17/13	10/08/13	04/18/13	10/08/13	04/17/13	10/07/13	04/18/13	10/07/13	04/17/13	10/07/13	
Cobalt (mg/L)	0.0025 U	0.0025 U [0.0025 U]	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	NA
Copper (mg/L)	0.0025 U	0.0025 U [0.0025 U]	0.0072	0.0194	0.0954	0.0025 U	0.0781	0.0062	0.0025 U	0.0025 U	1.3 (PCS)
Fluoride (mg/L)	0.236	0.221 [0.225]	0.222	0.225	0.186	0.185	0.211	0.203	0.191	0.181	4 (PCS)
Iron (mg/L)	0.215 (0.0982)	0.050 U [0.050 U] (0.050 U) [(0.050 U)]	**0.744** (0.0754)	**3.490** (0.050 U)	**1.530** (0.0852)	0.050 U (0.050 U)	**0.775** (0.0759)	**0.878** (0.050 U)	0.147 (0.0668)	0.050 U (0.050 U)	0.3 (SCS)
Manganese (mg/L)	0.0025 U (0.0025 U)	0.0025 U [0.0025 U] (0.0025 U) [(0.0025 U)]	0.0106 (0.0025 U)	**0.0595** (0.0025 U)	0.0122 (0.0025 U)	0.0025 U (0.0025 U)	0.0117 (0.0025 U)	0.0199 (0.0025 U)	0.0049 (0.0027)	0.0031 (0.0025 U)	0.05 (SCS)
Mercury (mg/L)	0.0002 U	0.0002 U [0.0002 U]	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.002 (PCS)
Selenium (mg/L)	0.0022	0.0024 [0.0022]	0.0018	0.0022	0.0014	0.0015	0.0014	0.0017	0.0012	0.0013	0.05 (PCS)
Silver (mg/L)	0.005 U	0.005 U [0.005 U]	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.1 (SCS)
Sulfate (mg/L)	164	160 [161]	155	154	33.3	33.9	50.4	48.7	34.7	35.9	250 (SCS)

a. Primary constituent standards (PCS) and secondary constituent standards (SCS) in groundwater referenced in the Ground Water Quality Rule, IDAPA 58.01.11.200.01.a and b.

b. NA- Not applicable.

c. Elevation data provided using the North American Vertical Datum of 1988 (NAVD 88).

d. The United States Geological Survey performed gyroscopic surveys on wells TRA-07 and TRA-08 circa 2002 to 2005. The surveys revealed these two wells were not perfectly straight or vertical which can cause the water level measurements to be greater than the true distance from the measuring point on the well to the water table. The water level measurements for these two wells have been adjusted using the borehole correction factors that were determined from the gyroscopic surveys.

e. This pH result was taken by a different contractor using a different pH meter on October 8, 2013. This data is being presented due to a concern the pH meter being used by MS personnel was providing low readings at the time of sampling.

f. U flag indicates that the result was reported as below the instrument detection limit by the analytical laboratory.

g. Results shown in brackets are the results from field duplicate samples.

h. Total nitrogen is calculated as the sum of the TKN, nitrite nitrogen, and nitrate nitrogen. For results reported below the instrument detection limit, the detection limit for that parameter is used in the calculation. The resulting total nitrogen is then reported as a less than (<) number.

i. Filtered sample results for aluminum, iron, and manganese, shown in parentheses, are used for permit compliance determinations.

j. Concentrations shown in bold are above the Ground Water Quality Rule SCS.

Table 4. Monitoring well aluminum reanalysis results from the October 2013 sampling event.

Well Name	Sample Date	Filtered Result (mg/L)	Unfiltered Result (mg/L)
USGS-065	10/08/13	0.0069 [0.0066][a]	0.0047 [0.0061][a]
TRA-07	10/08/13	0.0046	3.650
USGS-076	10/07/13	0.0056	0.0111
TRA-08	10/07/13	0.0223	2.630
Middle-1823	10/07/13	0.0027	0.0803

a. Results shown in brackets are the results from field duplicate samples.

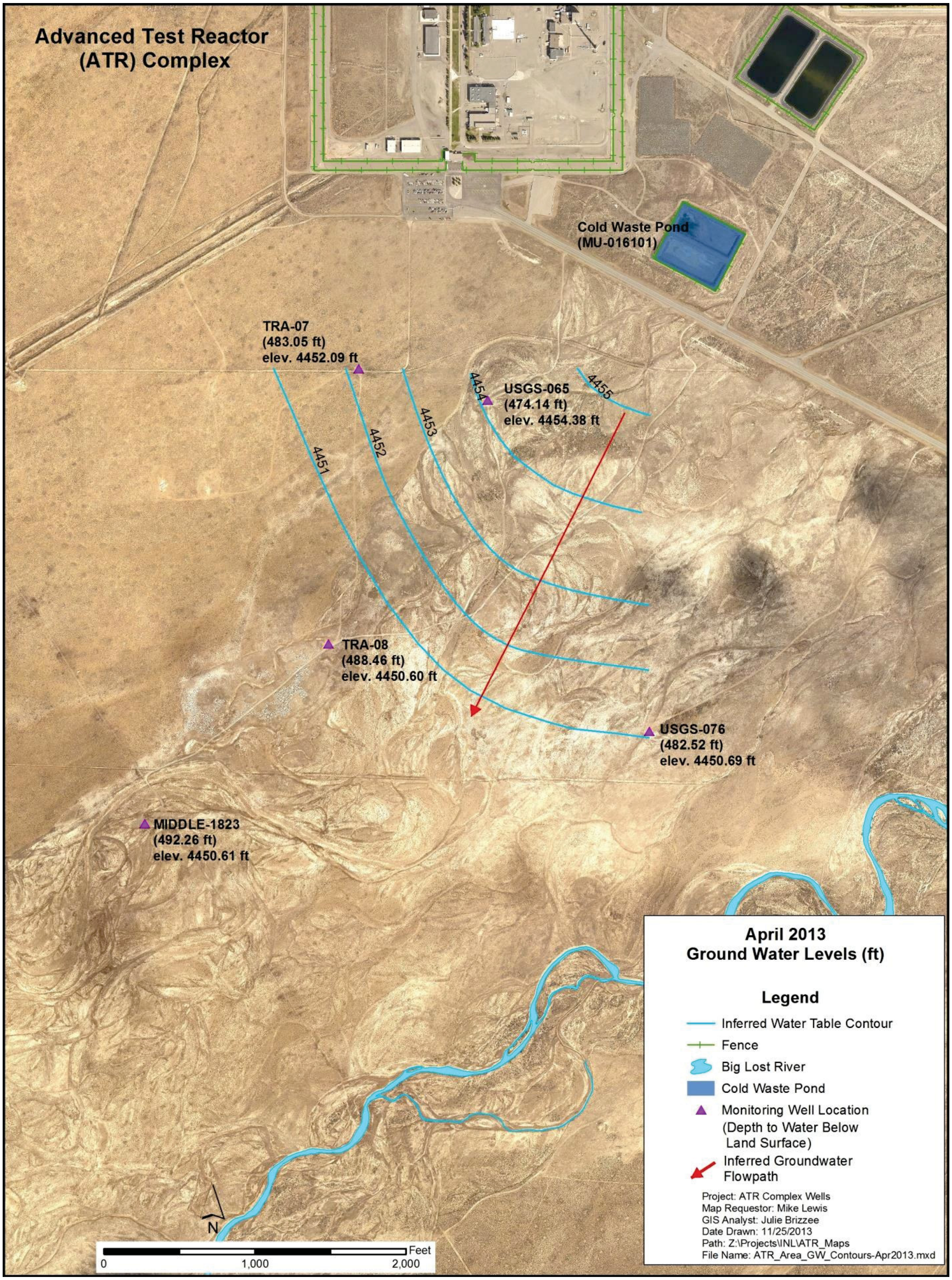

Figure 4. Groundwater contour map based on the April 2013 water level measurements.

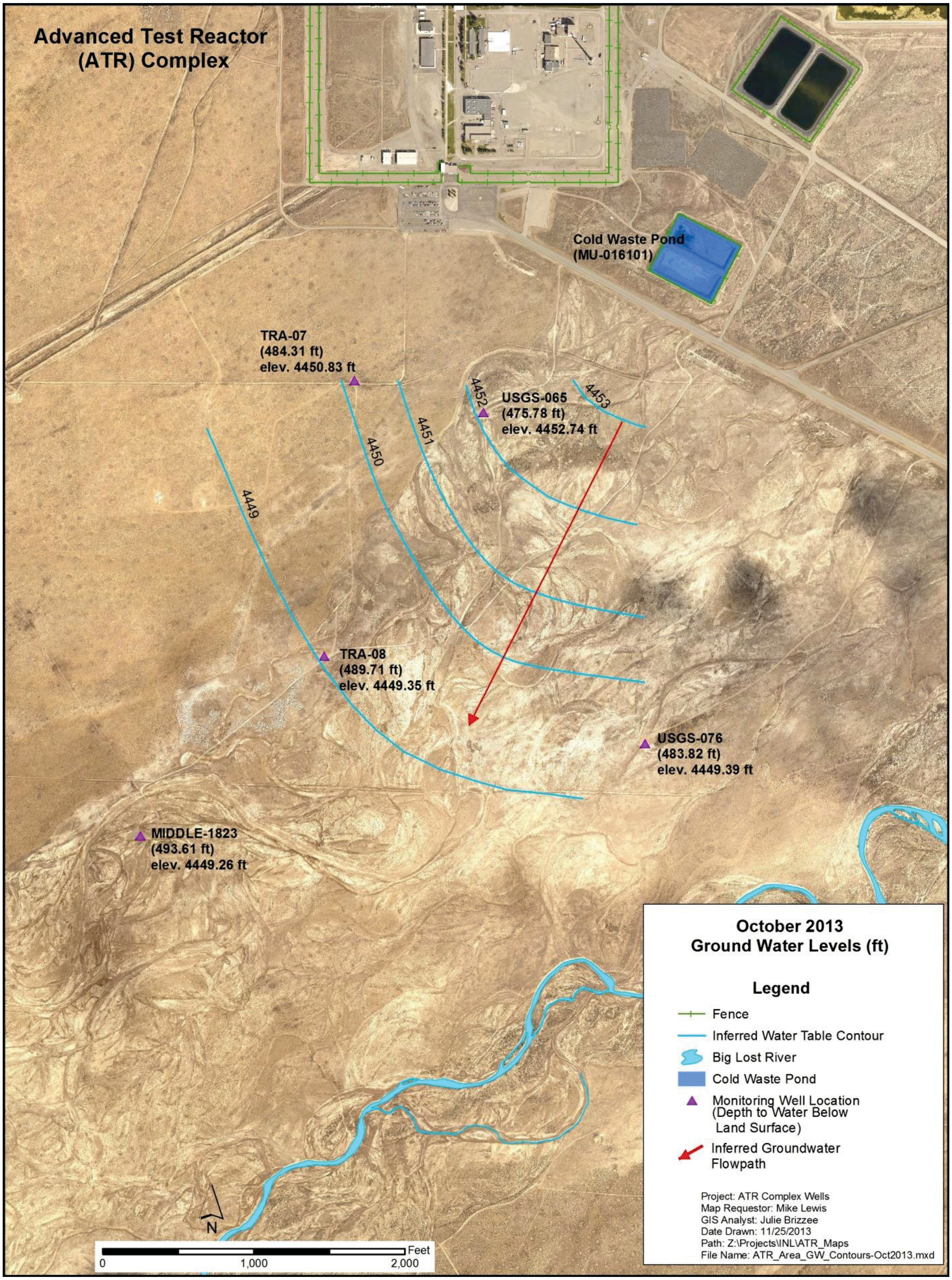

Figure 5. Groundwater contour map based on the October 2013 water level measurements.

5. PERMIT YEAR SUMMARIES

This section provides information and status associated with permit required compliance activities. Noncompliance issues are also addressed in this section.

5.1 Status of Permit Required Compliance Activity

Section E of the current ATR Complex IWRP identified one compliance activity (CA-161-01) and specified the completion date. This compliance activity, to submit a Plan of Operation, was reported as complete in the 2009 Annual Report.

5.2 Noncompliance Issues

There were no permit noncompliance issues for the 2013 reporting year.

6. ENVIRONMENTAL IMPACTS

The IWRP allows 300 MG/year as a five-year annual average, not to exceed 375 MG annually. The total volume discharged to the CWP for this period (November 1, 2012–October 31, 2013) was 237.75 MG. The average daily flow during the 2013 permit year was 651,358 gallons. No runoff occurred from the application area.

High effluent concentrations of TSS have the potential to reduce the infiltration capacity of the soil. Section F of the IWRP specifies a TSS effluent limit of 100 mg/L. All effluent monthly TSS concentrations were below the laboratory instrument detection limit of 4 mg/L (see Table 1). No negative impacts to the soil infiltration capacity from TSS loading are expected.

The IWRP effluent limit for TN is 20 mg/L. The monthly effluent TN concentrations were below the permit limit ranging from 0.927 mg/L to 3.377 mg/L (see Table 1). Nitrogen can be lost or removed from the soil by leaching, ammonia volatilization, and denitrification. Total nitrogen in the nearest down gradient well (USGS-065) from the CWP was <1.58 mg/L and <1.56 mg/L (1.55 mg/L for duplicate sample) in the April and October 2013 samples, respectively (see Table 3). Although there is not a groundwater quality standard for TN, there is a standard for nitrate (10 mg/L) and nitrite (1 mg/L). The April and October 2013 USGS-065 nitrate sample results were 1.43 mg/L and 1.41 mg/L (1.4 mg/L for duplicate sample), respectively. Both the April and October nitrite sample results were below the laboratory instruments detection limit of 0.05 mg/L.

Sulfate and TDS concentrations (see Table 1) in the effluent have the potential to impact groundwater. Sulfate has high solubility and tends to move at a similar velocity as the groundwater (DEQ 2007). Sulfate concentrations in the 2013 permit year effluent monthly samples ranged from a low of 24 mg/L to a high of 535 mg/L. The TDS concentrations ranged from a low of 246 mg/L to a high of 1,060 mg/L. There are no IWRP effluent limits for sulfate and TDS. However, as discussed below, there are groundwater quality standards for these two parameters.

Figures 6 and 7 show the sulfate and TDS concentrations in samples collected from the IWRP CWP monitoring wells over the last five years. Sulfate and TDS data was not available for well TRA-08 for October 2009 due to insufficient water available to collect a representative sample. Where a duplicate sample was collected, the average of the original sample and the duplicate sample were used in generating the graphs.

Wells USGS-065 and TRA-07 have the highest sulfate concentrations of the five monitoring wells. Of the five wells, USGS-065 and TRA-07 are the closest to the CWP. As shown in Figure 6, the sulfate concentrations in the two wells have remained stable at approximately 160 mg/L and below the SCS of 250 mg/L.

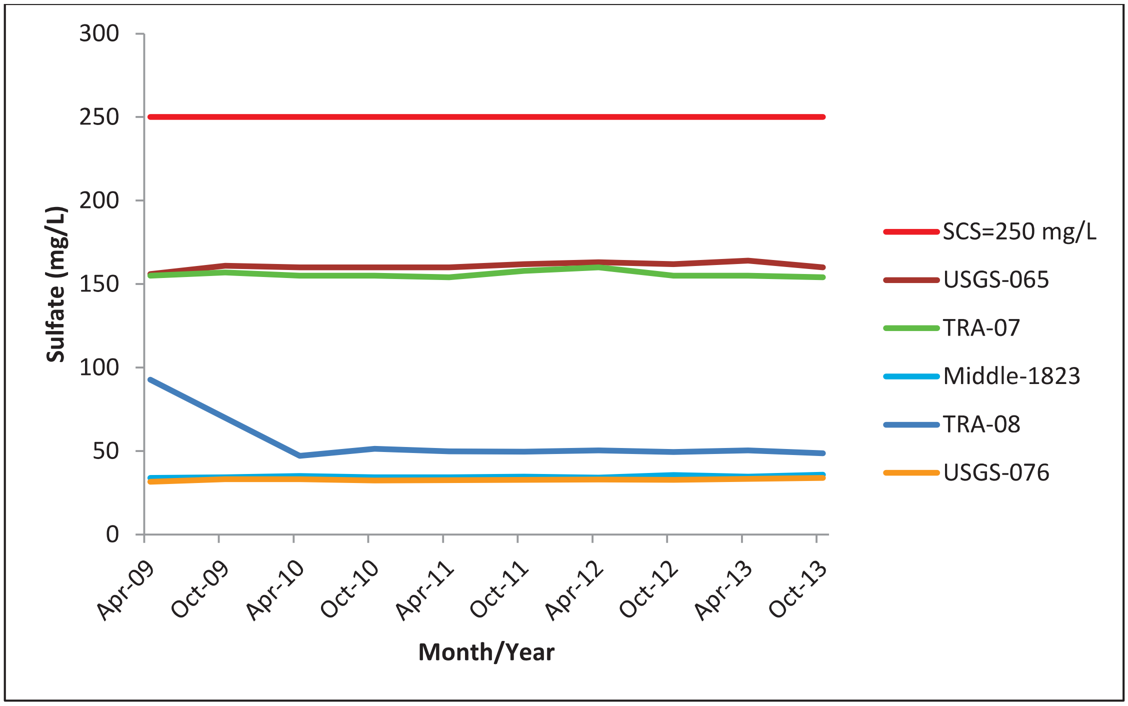

Figure 6. Sulfate concentrations in the Cold Waste Pond monitoring wells.

Similar to sulfate, TDS concentrations are the highest in wells USGS-065 and TRA-07 (Figure 7). The highest TDS concentrations in both wells occurred in April 2012 at 471 mg/L for USGS-065 and 468 mg/L for TRA-07. The TDS in these two wells has remained below the SCS of 500 mg/L and relatively stable over the last five years.

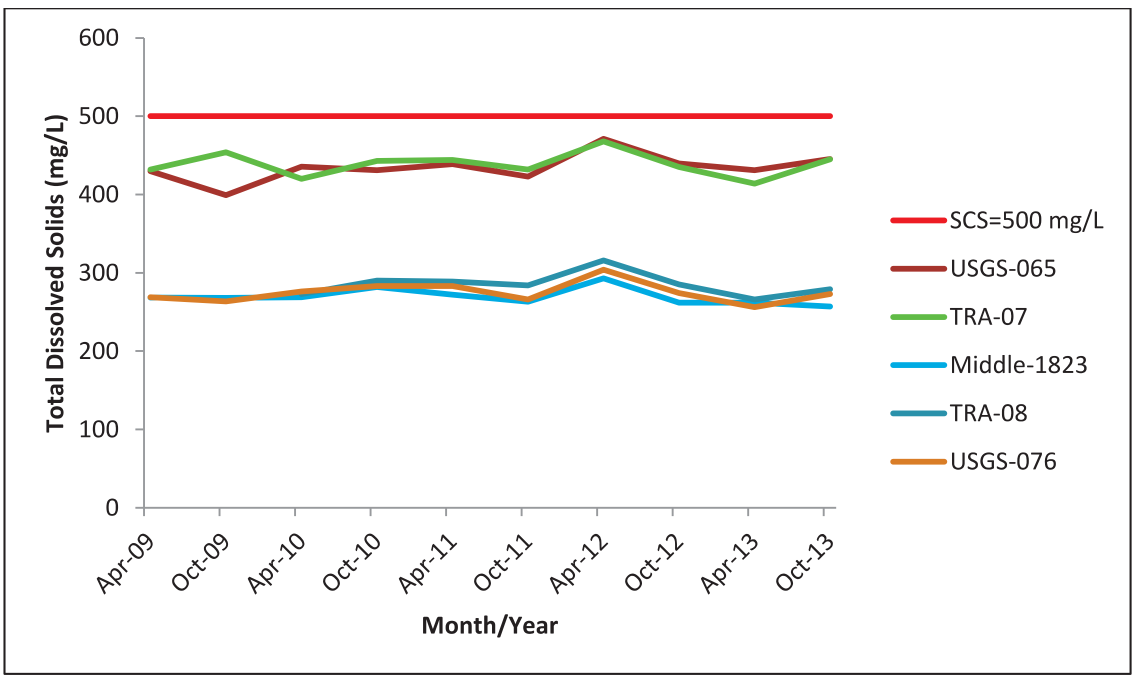

Figure 7. Total dissolved solids concentrations in the Cold Waste Pond monitoring wells.

Elevated sulfate and TDS concentrations in the groundwater (Figures 6 and 7) are found in wells (USGS-065 and TRA-07) closest to the CWP. The sulfate and TDS quickly dissipates with distance from the pond. This can be seen when comparing the sulfate and TDS concentrations found in well USGS-065 and Middle-1823 (Figures 6 and 7). Well USGS-065, located approximately 1,200 ft down gradient of the CWP had a maximum 2013 sulfate concentration of 164 mg/L and a TDS concentration of 451 mg/L. Well Middle-1823, located approximately 4,000 ft down gradient from the CWP had a maximum 2013 sulfate and TDS concentration of 35.9 mg/L and 262 mg/L, respectively. The concentrations of sulfate and TDS in well Middle-1823 are similar to the concentrations in the up/cross gradient well USGS-076 (Figures 6 and 7).

As stated above, sulfate and TDS have SCSs for groundwater quality. The SCSs are generally based on aesthetic qualities including odor, taste, color, and foaming (EPA 1992). Sulfate is listed for causing a "salty taste" in drinking water. Total dissolved solids are listed for "hardness, deposits, colored water, staining, and salty taste." The nearest drinking water well is located approximately three miles down gradient of the CWP. Because the higher levels of sulfate and TDS are localized near the CWP and their SCSs are based on aesthetics, impacts to human health and the environment are expected to be minimal.

For the April and October 2013 groundwater sampling events, unfiltered sample results for Al in wells TRA-07 and TRA-08 were above their respective SCSs (Table 5). Unfiltered sample results for Fe were above the respective SCS in one April sample from well USGS-076 and in wells TRA-07 and TRA-08 in April and October. In addition, the Mn concentration in well TRA-07 was above the SCS in the October sample (Table 5). All filtered sample results for these parameters were well below the applicable SCSs.

Table 5. Comparison of 2013 aluminum, iron, and manganese results from unfiltered and filtered samples collected from wells TRA-07, TRA-08, and USGS-065.

WELL NAME	TRA-07 (GW-016103)		TRA-08 (GW-016105)		USGS-065 (GW-016102)		SCS[a]
Sample Date	04/18/13	10/08/13	04/18/13	10/07/13	04/17/13	10/08/13	
Aluminum (mg/L)	**0.933**[b] (0.016)[c]	**3.320** (0.0069)	**1.190** (0.0152)	**2.000** (0.0285)	0.0095 (0.0049)	0.004 [0.0095][d] (0.0076) [(0.007)]	0.2
Iron (mg/L)	**0.744** (0.0754)	**3.490** (0.050 U[e])	**0.775** (0.0759)	**0.878** (0.050 U)	0.215 (0.0982)	0.050 U [0.050 U] (0.050 U) [(0.050 U)]	0.3
Manganese (mg/L)	0.0106 (0.0025 U)	**0.0595** (0.0025 U)	0.0117 (0.0025 U)	0.0199 (0.0025 U)	0.0025 U (0.0025 U)	0.0025 U [0.0025 U] (0.0025 U) [(0.0025 U)]	0.05

a. Secondary constituent standards (SCS) in groundwater referenced in the Ground Water Quality Rule, IDAPA 58.01.11.200.01.b.
b. Concentrations shown in bold are above the Ground Water Quality Rule SCS.
c. Results shown in parentheses are from filtered samples and are used for permit compliance determination with SCS.
d. Results shown in brackets are the results from field duplicate samples.
e. U flag indicates that the result was reported as below the instrument detection limit by the analytical laboratory.

Figures 8, 9, and 10 show the Al, Fe, and Mn concentrations in monitoring wells USGS-065, TRA-07, and TRA-08 for the period of April 2009 through October 2013. For sampling events where a sample and duplicate sample were collected and analyzed, the average of the two samples was used. The October

2013 aluminum reanalysis results were not used. Where a sample result was below the laboratory instruments detection level, the detection level was used. October 2009 data was not available for well TRA-08 because of insufficient water available to collect a representative sample.

As shown in Figure 8, unfiltered Al concentrations in wells TRA-07 and TRA-08 were consistently above the SCS. The unfiltered Al concentrations in samples collected from well USGS-065 were typically below the SCS with the exception of the April 2009 sample result. All filtered Al sample concentrations in all three wells were significantly less than the SCS.

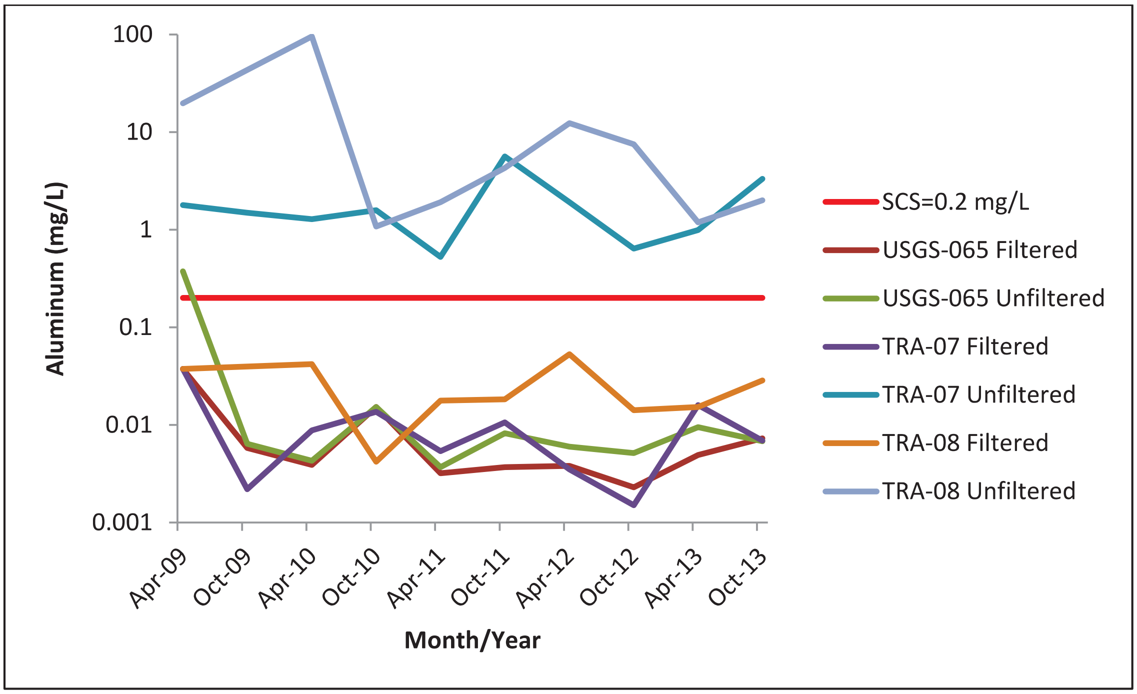

Figure 8. Aluminum concentrations in filtered and unfiltered samples from wells USGS-065, TRA-07, and TRA-08 from April 2009 through October 2013.

Similar to Al concentrations, Fe was above the SCS in the unfiltered samples collected from wells TRA-07 and TRA-08 (Figure 9). Well USGS-065 had one sample collected in October 2012 that was above the SCS at 0.304 mg/L. All filtered sample results in the three wells were below the SCS. Many of the filtered results were below the laboratory instruments minimum detection levels.

Manganese concentrations were the highest in the unfiltered samples from wells TRA-07 and TRA-08 (Figure 10). The unfiltered concentrations in TRA-07 and TRA-08 fluctuated above and below the SCS. All filtered and unfiltered Mn concentrations in samples collected from well USGS-065 were below the SCS and also below the laboratory instruments minimum detection level of 0.0025 mg/L. For well USGS-065, the filtered and unfiltered manganese values used in Figure 10 were the detection levels of 0.0025 mg/L. All filtered sample concentrations from wells TRA-07 and TRA-08 were below the SCS for manganese.

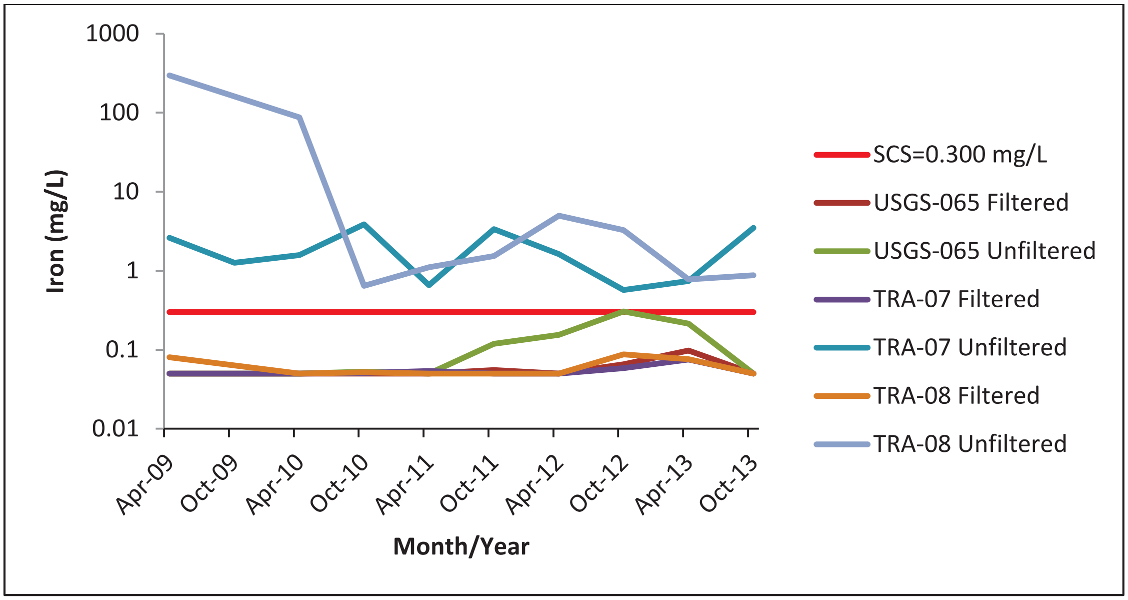

Figure 9. Iron concentrations in filtered and unfiltered samples from wells USGS-065, TRA-07, and TRA-08 from April 2009 through October 2013.

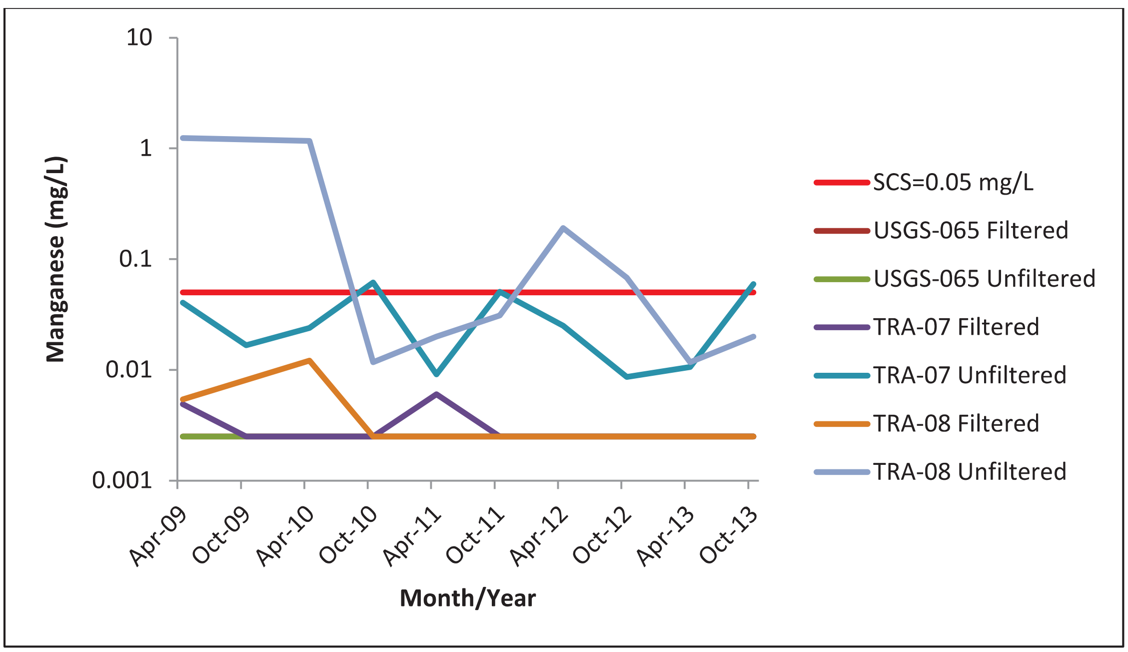

Figure 10. Manganese concentrations in filtered and unfiltered samples from wells USGS-065, TRA-07, and TRA-08 from April 2009 through October 2013.

Figure 11 shows the Al, Fe, and Mn concentrations in samples collected from the effluent to the CWP for permit years 2009 through 2013 compared to the applicable groundwater SCSs. Although not a permit required parameter in the effluent, Al sample results are presented in Figure 11 for comparison purposes. When duplicate samples were collected, the value used in the figure is the average of the original and duplicate samples. For sample results reported as below the laboratory instruments minimum detection level, the detection level value was used in the figure.

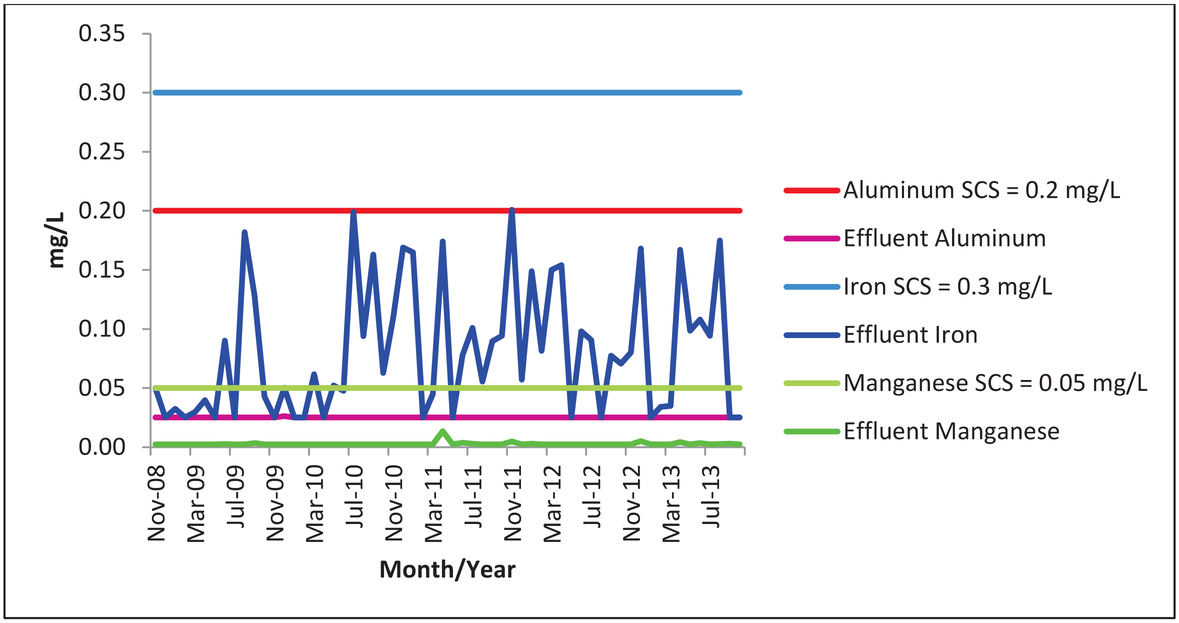

Figure 11. Effluent aluminum, iron, and manganese concentrations compared to the groundwater secondary constituent standards.

Concentrations of Al, Fe, and Mn in samples from the effluent (Figure 11) that are discharged to the CWP indicate that discharges to the CWP are not expected to be the direct cause of the elevated Al, Fe, and Mn in wells TRA-07 and TRA-08 because of the low concentrations. All but one Al effluent sample result was below the minimum detection level (0.025 mg/L). The majority of Mn effluent sample results were below the minimum detection level. Iron concentrations in the effluent ranged from below the minimum detection level (0.025 mg/L) to approximately 0.2 mg/L but still well below the SCS value of 0.3 mg/L. It is believed that the higher concentrations of these metals in TRA-07 and TRA-08 may be due to suspended solids found within the wells.

The October 2012 unfiltered Fe result of 0.304 mg/L from well USGS-065 was the first and only time the concentration of this parameter was above the SCS. Information in the sampling logbook for well USGS-065 indicates there was more particulate matter observed in the unfiltered October sample than in the April sample. Iron is a common element in the minerals in the basalt which comprises the major rock formation of the Eastern Snake River Plain aquifer. The unfiltered sample result from the April 2013 sampling event was below the SCS at 0.215 mg/L and the October 2013 unfiltered sample results was below the laboratory instruments minimum detection level of 0.05 mg/L. Aluminum and Mn concentrations remain at low levels in this well.

The DEQ staff analysis dated June 25, 2013, for the draft Wastewater Reuse Permit (WRP) for the CWP, states that hydraulic overloading may be contributing to the higher Al, Fe, and Mn in wells TRA-07 and TRA-08 by "causing a reduction of iron and manganese (and aluminum) in the soil to mobile forms that can leach" (Neher 2013). There may be some impact to the wells from the reduction of Al, Fe, and Mn into more mobile forms. However, the Al, Fe, and Mn concentrations are lowest in the well (USGS-065) that is closest to the CWP instead of being higher as might be expected. In addition, if the metals were converted to more mobile forms, higher concentrations of these three metals would be expected in the filtered samples, which is not the case. The filtered results are significantly less than the SCS for the three metals and often near the laboratory instruments minimum detection levels.

All three metals (Al, Fe, and Mn) can influence the color of the water (see Table 6). At high concentrations, both Fe and Mn can cause staining and a metallic taste. However, similar to the sulfate and TDS concentrations in the groundwater near the CWP, effects should be limited to the aesthetic properties of the water and impacts to human health and the environment are expected to be minimal.

Table 6. Noticeable effects of selected metals in drinking water (EPA 2013).

Contaminant	**Secondary Maximum Contaminant Levels**[a]	**Noticeable Effects Above the Secondary Maximum Contaminant Levels**
Aluminum	0.05 to 0.2 mg/L	colored water
Iron	0.3 mg/L	rusty color; sediment; metallic taste; reddish or orange staining
Manganese	0.05 mg/L	black to brown color; black staining; bitter metallic taste
a. The U.S. Environmental Protection Agency (EPA) established Secondary Maximum Contaminant Levels to assist public water systems manage their drinking water for aesthetic purposes. The Secondary Constituent Standards (IDAPA 58.01.11. 200.b) concentrations are similar to the Secondary Maximum Contaminant Levels.		

There are positive impacts to the environment associated with the operation of the CWP. These include returning a significant portion of the industrial wastewater to the aquifer and providing needed water for several native animal species in an otherwise semi-arid environment.

7. REFERENCES

40 CFR 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants," *Code of Federal Regulations*, Office of the Federal Register.

40 CFR 141, "National Primary Drinking Water Regulations," *Code of Federal Regulations*, Office of the Federal Register.

40 CFR 143, "National Secondary Drinking Water Regulations," *Code of Federal Regulations*, Office of the Federal Register.

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Appendix A

Daily Discharge Volumes to the Advanced Test Reactor Complex Cold Waste Pond

Appendix A

Daily Discharge Volumes to the Advanced Test Reactor Complex Cold Waste Pond

Table A-1. Daily discharge volumes to the ATR Complex CWP for the 2013 permit year.

Date	Daily Discharge Volume (gallons)
11/01/12	885,100
11/02/12	769,550
11/03/12	844,060
11/04/12	803,200
11/05/12	704,570
11/06/12	875,780
11/07/12	947,760
11/08/12	662,130
11/09/12	880,000
11/10/12	717,620
11/11/12	771,500
11/12/12	878,000
11/13/12	723,530
11/14/12	813,000
11/15/12	978,510
11/16/12	673,950
11/17/12	808,810
11/18/12	818,840
11/19/12	746,090
11/20/12	852,800
11/21/12	833,690
11/22/12	869,700
11/23/12	780,550
11/24/12	785,900
11/25/12	756,720
11/26/12	1,002,930
11/27/12	681,910
11/28/12	894,700
11/29/12	414,200
11/30/12	338,210
12/01/12	476,000
12/02/12	339,600
12/03/12	472,390
12/04/12	428,350
12/05/12	486,600
12/06/12	611,710

Date	Daily Discharge Volume (gallons)
12/07/12	385,520
12/08/12	443,320
12/09/12	481,700
12/10/12	463,020
12/11/12	460,680
12/12/12	464,000
12/13/12	516,340
12/14/12	473,240
12/15/12	461,410
12/16/12	454,200
12/17/12	425,200
12/18/12	355,500
12/19/12	447,500
12/20/12	461,700
12/21/12	470,410
12/22/12	491,500
12/23/12	424,200
12/24/12	523,300
12/25/12	437,660
12/26/12	454,720
12/27/12	565,130
12/28/12	398,320
12/29/12	453,180
12/30/12	529,890
12/31/12	374,110
01/01/13	397,950
01/02/13	449,110
01/03/13	454,320
01/04/13	475,700
01/05/13	436,210
01/06/13	536,370
01/07/13	365,740
01/08/13	439,070
01/09/13	464,530
01/10/13	465,090
01/11/13	456,400
01/12/13	480,760

Date	Daily Discharge Volume (gallons)
01/13/13	428,820
01/14/13	538,040
01/15/13	365,120
01/16/13	452,700
01/17/13	553,090
01/18/13	777,650
01/19/13	791,230
01/20/13	735,300
01/21/13	881,300
01/22/13	755,020
01/23/13	808,350
01/24/13	783,900
01/25/13	826,830
01/26/13	886,000
01/27/13	643,990
01/28/13	829,000
01/29/13	750,200
01/30/13	1,031,310
01/31/13	823,340
02/01/13	681,630
02/02/13	830,020
02/03/13	798,500
02/04/13	785,970
02/05/13	820,670
02/06/13	798,940
02/07/13	887,700
02/08/13	755,520
02/09/13	827,600
02/10/13	783,300
02/11/13	863,200
02/12/13	847,200
02/13/13	754,500
02/14/13	1,008,410
02/15/13	821,000
02/16/13	586,000
02/17/13	797,910
02/18/13	745,410
02/19/13	1,033,770
02/20/13	711,600
02/21/13	897,100
02/22/13	859,930
02/23/13	965,590
02/24/13	723,510
02/25/13	947,590

Date	Daily Discharge Volume (gallons)
02/26/13	866,880
02/27/13	903,130
02/28/13	986,540
03/01/13	794,410
03/02/13	909,010
03/03/13	797,580
03/04/13	854,040
03/05/13	817,430
03/06/13	862,210
03/07/13	901,820
03/08/13	844,570
03/09/13	1,029,970
03/10/13	611,290
03/11/13	869,210
03/12/13	820,280
03/13/13	850,230
03/14/13	821,700
03/15/13	850,910
03/16/13	766,160
03/17/13	887,250
03/18/13	792,490
03/19/13	869,010
03/20/13	806,220
03/21/13	831,800
03/22/13	846,950
03/23/13	811,400
03/24/13	746,590
03/25/13	802,330
03/26/13	886,270
03/27/13	764,470
03/28/13	913,120
03/29/13	878,270
03/30/13	518,370
03/31/13	346,060
04/01/13	436,850
04/02/13	505,720
04/03/13	563,590
04/04/13	607,750
04/05/13	545,310
04/06/13	552,980
04/07/13	543,710
04/08/13	573,770
04/09/13	486,080
04/10/13	590,440

Date	Daily Discharge Volume (gallons)
04/11/13	558,920
04/12/13	732,500
04/13/13	831,000
04/14/13	754,160
04/15/13	846,930
04/16/13	826,140
04/17/13	941,340
04/18/13	780,270
04/19/13	801,290
04/20/13	831,170
04/21/13	815,610
04/22/13	916,780
04/23/13	774,460
04/24/13	864,840
04/25/13	819,460
04/26/13	712,160
04/27/13	882,680
04/28/13	783,230
04/29/13	796,600
04/30/13	822,830
05/01/13	814,850
05/02/13	917,100
05/03/13	740,400
05/04/13	818,300
05/05/13	839,770
05/06/13	802,640
05/07/13	811,660
05/08/13	957,990
05/09/13	762,660
05/10/13	878,780
05/11/13	723,170
05/12/13	783,210
05/13/13	833,310
05/14/13	875,730
05/15/13	818,080
05/16/13	710,750
05/17/13	767,650
05/18/13	826,400
05/19/13	671,760
05/20/13	402,840
05/21/13	829,190
05/22/13	807,650
05/23/13	660,840
05/24/13	431,720

Date	Daily Discharge Volume (gallons)
05/25/13	381,590
05/26/13	473,580
05/27/13	427,370
05/28/13	497,700
05/29/13	486,350
05/30/13	517,840
05/31/13	449,390
06/01/13	482,840
06/02/13	471,100
06/03/13	489,290
06/04/13	473,310
06/05/13	493,820
06/06/13	484,420
06/07/13	468,300
06/08/13	489,900
06/09/13	488,100
06/10/13	458,120
06/11/13	440,080
06/12/13	454,850
06/13/13	487,860
06/14/13	435,930
06/15/13	419,070
06/16/13	414,780
06/17/13	453,740
06/18/13	415,900
06/19/13	469,250
06/20/13	411,670
06/21/13	431,560
06/22/13	454,250
06/23/13	411,400
06/24/13	423,520
06/25/13	435,620
06/26/13	413,300
06/27/13	469,300
06/28/13	413,650
06/29/13	431,450
06/30/13	398,620
07/01/13	550,210
07/02/13	323,350
07/03/13	472,860
07/04/13	441,750
07/05/13	426,320
07/06/13	405,410
07/07/13	454,630

Date	Daily Discharge Volume (gallons)
07/08/13	430,240
07/09/13	449,800
07/10/13	417,630
07/11/13	475,810
07/12/13	500,670
07/13/13	754,100
07/14/13	1,038,990
07/15/13	821,040
07/16/13	742,470
07/17/13	767,800
07/18/13	844,550
07/19/13	739,120
07/20/13	788,200
07/21/13	727,050
07/22/13	740,800
07/23/13	844,660
07/24/13	788,850
07/25/13	766,460
07/26/13	773,000
07/27/13	784,930
07/28/13	764,360
07/29/13	792,620
07/30/13	654,270
07/31/13	714,630
08/01/13	717,600
08/02/13	697,600
08/03/13	734,500
08/04/13	758,500
08/05/13	794,750
08/06/13	748,520
08/07/13	785,980
08/08/13	758,620
08/09/13	715,150
08/10/13	721,200
08/11/13	827,580
08/12/13	771,500
08/13/13	895,090
08/14/13	811,530
08/15/13	629,770
08/16/13	753,310
08/17/13	747,690
08/18/13	771,280
08/19/13	795,060
08/20/13	759,690

Date	Daily Discharge Volume (gallons)
08/21/13	761,160
08/22/13	838,070
08/23/13	496,660
08/24/13	383,540
08/25/13	374,960
08/26/13	417,590
08/27/13	462,950
08/28/13	471,620
08/29/13	506,040
08/30/13	503,080
08/31/13	474,490
09/01/13	502,270
09/02/13	407,950
09/03/13	460,100
09/04/13	542,350
09/05/13	477,350
09/06/13	559,100
09/07/13	453,600
09/08/13	640,500
09/09/13	362,300
09/10/13	522,300
09/11/13	592,150
09/12/13	404,820
09/13/13	481,780
09/14/13	441,080
09/15/13	469,930
09/16/13	472,700
09/17/13	504,530
09/18/13	465,940
09/19/13	549,170
09/20/13	505,180
09/21/13	356,760
09/22/13	451,620
09/23/13	535,270
09/24/13	456,080
09/25/13	514,740
09/26/13	469,550
09/27/13	512,800
09/28/13	479,100
09/29/13	508,250
09/30/13	484,650
10/01/13	515,880
10/02/13	534,940
10/03/13	549,910

Date	Daily Discharge Volume (gallons)
10/04/13	453,260
10/05/13	492,890
10/06/13	449,500
10/07/13	485,110
10/08/13	511,530
10/09/13	437,620
10/10/13	460,930
10/11/13	460,260
10/12/13	451,720
10/13/13	458,440
10/14/13	456,610
10/15/13	510,930
10/16/13	754,630
10/17/13	781,040
10/18/13	768,130

Date	Daily Discharge Volume (gallons)
10/19/13	883,760
10/20/13	750,140
10/21/13	799,130
10/22/13	805,680
10/23/13	819,140
10/24/13	777,680
10/25/13	790,030
10/26/13	772,610
10/27/13	719,270
10/28/13	757,880
10/29/13	850,470
10/30/13	1,178,520
10/31/13	721,850