INL/EXT-11-20765

2010 Annual Industrial Wastewater Reuse Report for the Idaho National Laboratory Site's Advanced Test Reactor Complex Cold Waste Pond

February 2011

The INL is a U.S. Department of Energy National Laboratory
operated by Battelle Energy Alliance

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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, 2009 through October 31, 2010. 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
- Discussion of the facility's environmental impacts

During the 2010 permit year, approximately 164 million gallons of wastewater were 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 were below the Ground Water Quality Rule Secondary Constituent Standards in the down gradient monitoring wells.

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TABLES

ACRONYMS

Al	Aluminum
ATR	Advanced Test Reactor
BEA	Battelle Energy Alliance, LLC
bgs	below ground surface
CFR	Code of Federal Regulations
CWP	Cold Waste Pond
DEQ	Idaho Department of Environmental Quality
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
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

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1. INTRODUCTION

The Advanced Test Reactor (ATR) Complex Cold Waste Pond (CWP) is an industrial wastewater reuse treatment facility operated by Battelle Energy Alliance, LLC (BEA) 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 and will expire on February 25, 2013 (Johnston 2008). The permit was modified (Modification B) on August 20, 2008 (Eager 2008).

Following the Section 2 CWP facility, system, and operation description, this report presents the status of effluent and groundwater monitoring data, compliance activities, non-compliances, and environmental impacts of the CWP operation during the 2010 permit year (beginning November 1, 2009 through October 31, 2010).

2. FACILITY, SYSTEM DESCRIPTION, AND OPERATION

The ATR Complex (Figure 1) is located on approximately 100 acres in the southwestern portion of the INL, approximately 47 mi. 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 (Figure 1) and approximately 1 mile west of the Big Lost River channel (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 (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 September 30, 2009, the valve to the north cell was opened and the south cell valve was closed. On September 21, 2010, the flow was diverted to the south cell where it continued through the remainder of the permit year.

During the permit year 2009, the cell conditions were evaluated and it was determined that the south cell needed tilling but that the north cell did not. In preparation, the south cell was mowed. On November 10, 2009, tilling of the south cell was completed.

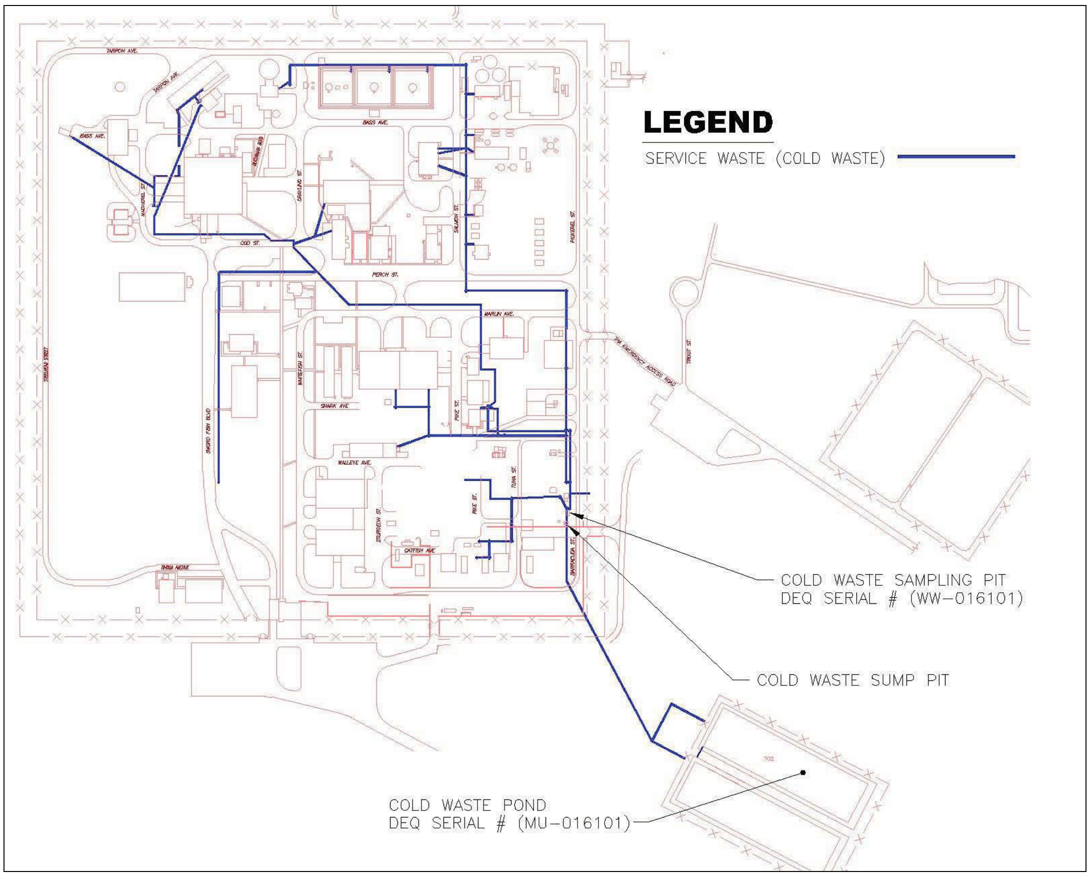

Figure 1. Advanced Test Reactor Complex Cold Waste system flow schematic.

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

Monitoring Services (MS) at the INL monitors 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 taken during a preselected week each month following a randomly generated sampling schedule to represent normal operating conditions. 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 from November 1, 2009 through October 31, 2010.

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 composite samples.

With the exception of conductivity, all samples were collected and analyzed as required by the permit. Table 1 summarizes the effluent sampling results.

It was discovered in April 2010 that the monthly analysis for conductivity was being performed on a grab sample collected by MS personnel at the time of sample collection instead of on the monthly 24-hour flow proportional sample as required by the IWRP. The laboratory was contacted and requested to perform a conductivity analysis on the March and April composite samples (Table 1). Beginning with the May 2010 sampling event, only composite sample conductivity results are reported in Table 1. Further discussion of this issue can be found in Section 5.2.3.

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 May at 4.081 mg/L (Table 1) with a low of 1.051 mg/L in April. All TSS results, other than the September result, were below the laboratory instrument detection limit of 4 mg/L. The September TSS sample result was slightly higher at 6.8 mg/L.

There are no effluent permit limits for total dissolved solids (TDS) or sulfate. A summary comparison of these parameters with the Ground Water Quality Rule Secondary Constituent Standards (SCS) found in the Idaho Administrative Procedures Act (IDAPA) 58.01.11.200.01.b. follows.

The TDS SCS is 500 mg/L. The concentration in the effluent to the CWP ranged from 241 mg/L in the April sample to 1,290 mg/L in the May sample (Table 1). Concentrations of TDS in the effluent were above the SCS level in six of the twelve samples.

Similar to the TDS effluent levels, sulfate concentrations were above the SCS of 250 mg/L in six of the twelve monthly samples (Table 1). Sulfate ranged from a minimum of 21.6 mg/L in the April sample to a maximum of 709 mg/L in the May 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 (Table 1). Concentrations of several metals in the effluent were consistently below the laboratory instrument detection levels.

In general, certain effluent constituent concentrations are dependent upon the operational status of the ATR. When the ATR is operating, the evaporative cooling process (cooling tower) concentrates constituents discharged to the CWP. For example: several Table 1 parameters are elevated in December and again in January (to approximately the same values for the respective constituents) when the ATR was operating during the effluent sampling activity. By contrast, November and June values are relatively low (and similar for the respective constituents) when the ATR was shut down during the effluent sampling activity.

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

Sample Month	November	December[a]	January	February	March	April	May	June	July	August	September	October
Sample Date	11/12/09	12/10/09	01/19/10	02/17/10	03/11/10	04/14/10	05/12/10	06/02/10	07/07/10	08/17/10	09/21/10	10/14/10
Nitrite + nitrate as nitrogen (mg/L)	0.909	2.97 [2.97]	3.03	1.07	3.04	0.851	3.55	1.09	3.03	1.1	2.91	1.01
Total Kjeldahl nitrogen (mg/L)	0.161	0.403 [0.366]	0.397	0.193	0.47	0.2	0.531	0.157	0.361	0.308	0.432	0.214
Total nitrogen[b] (mg/L)	1.07	3.373 [3.336]	3.427	1.263	3.51	1.051	4.081	1.247	3.391	1.408	3.342	1.224
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	6.8	4.0 U
Total dissolved solids (mg/L)	267	980 [989]	1,060	329	1,020	241	1,290	323	1,070	343	1,090	307
Chloride (mg/L)	11	32.4 [32.9]	34.2	13.1	31.8	10.4	40.9	12.8	35.2	13.6	35.7	13
Electrical conductivity (µS/cm)	218	1,178	1,219	436	1,238[d] (1,169)[e]	397[d] (413)[e]	1,549[f]	487	1,296	542	1304	485
Arsenic (mg/L)	0.005 U	0.005 U [0.0067]	0.005 U	0.005 U	0.0063	0.005 U	0.0075	0.005 U	0.0058	0.005 U	0.005 U	0.005 U
Barium (mg/L)	0.0487	0.134 [0.133]	0.138	0.0503	0.147	0.0479	0.171	0.0512	0.154	0.0596	0.151	0.055
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)	0.0037	0.009 [0.009]	0.0067	0.0034	0.0099	0.0034	0.0102	0.0043	0.0093	0.0041	0.0091	0.0037
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)	0.0011	0.0046 [0.0047]	0.002	0.001 U	0.0028	0.001 U	0.0029	0.001 U	0.0026	0.0012	0.004	0.001 U
Fluoride (mg/L)	0.204	0.453 [0.46]	0.453	0.205	0.466	0.149	0.484	0.191	0.486	0.211	0.473	0.178
Iron (mg/L)	0.025 U	0.0506 [0.0501]	0.025 U	0.025 U	0.0618	0.025 U	0.0521	0.0477	0.199	0.0938	0.163	0.0627
Manganese (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	0.0025 U

Sample Month	November	December[a]	January	February	March	April	May	June	July	August	September	October
Sample Date	11/12/09	12/10/09	01/19/10	02/17/10	03/11/10	04/14/10	05/12/10	06/02/10	07/07/10	08/17/10	09/21/10	10/14/10
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)	0.0013	0.0035 [0.0034]	0.0044	0.0012	0.0042	0.001	0.0052	0.0013	0.0042	0.0015	0.0042	0.0013
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)	36.2	516 [517]	537	67.9	593	21.6	709	64.1	536	88.9	545	62.9

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

b. Total nitrogen is calculated as the sum of the TKN and nitrite + nitrate nitrogen.

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

d. SwRI laboratory performed analysis on composite sample. Although the holding time for the March sample was exceeded, the data is being reported for informational purposes.

e. MS personnel performed analysis on grab sample.

f. MS personnel performed analysis on composite sample. From this date forward, conductivity analyses are only performed on the composite samples.

3.3 Flow Volumes and Hydraulic Loading Rates

Daily flow readings were taken by ATR Complex CWP Operations during the 2010 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 2009	611,608	231,520	924,850	18.35
December 2009	397,932	292,600	907,650	12.34
January 2010	469,935	304,160	876,120	14.57
February 2010	509,546	295,070	934,650	14.27
March 2010	351,970	277,110	438,300	10.91
April 2010	549,087	182,700	872,500	16.47
May 2010	373,765	219,010	750,100	11.59
June 2010	608,809	230,800	1,043,990	18.26
July 2010	342,855	181,240	693,230	10.63
August 2010	475,323	224,700	724,000	14.74
September 2010	270,339	126,950	349,300	8.11
October 2010	429,585	196,600	777,000	13.32
Yearly summary	448,068	126,950	1,043,990	163.54

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 448,068 gpd. Daily flow ranged from a low of 126,950 gpd and a high of 1,043,990 gpd for the permit year.

Total effluent flow volume was 163.54 MG for the 2010 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 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. The flow meter was calibrated on July 12, 2010 by the ATR Complex maintenance organization (work order #141656). The calibration was performed to +/- 2% of full scale.

4. GROUNDWATER MONITORING

The groundwater monitoring sections provide information concerning the INL sampling program, analytical methods used, monitoring results, and water table information. Non-compliance issues concerning groundwater are discussed in Section 5.2.

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 2010 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 for SCS metals analyses were also collected.

Changes (July 1, 2009) to the Ground Water Quality Rule allow 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 SCS sample results will be used to demonstrate compliance with the IWRP.

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).

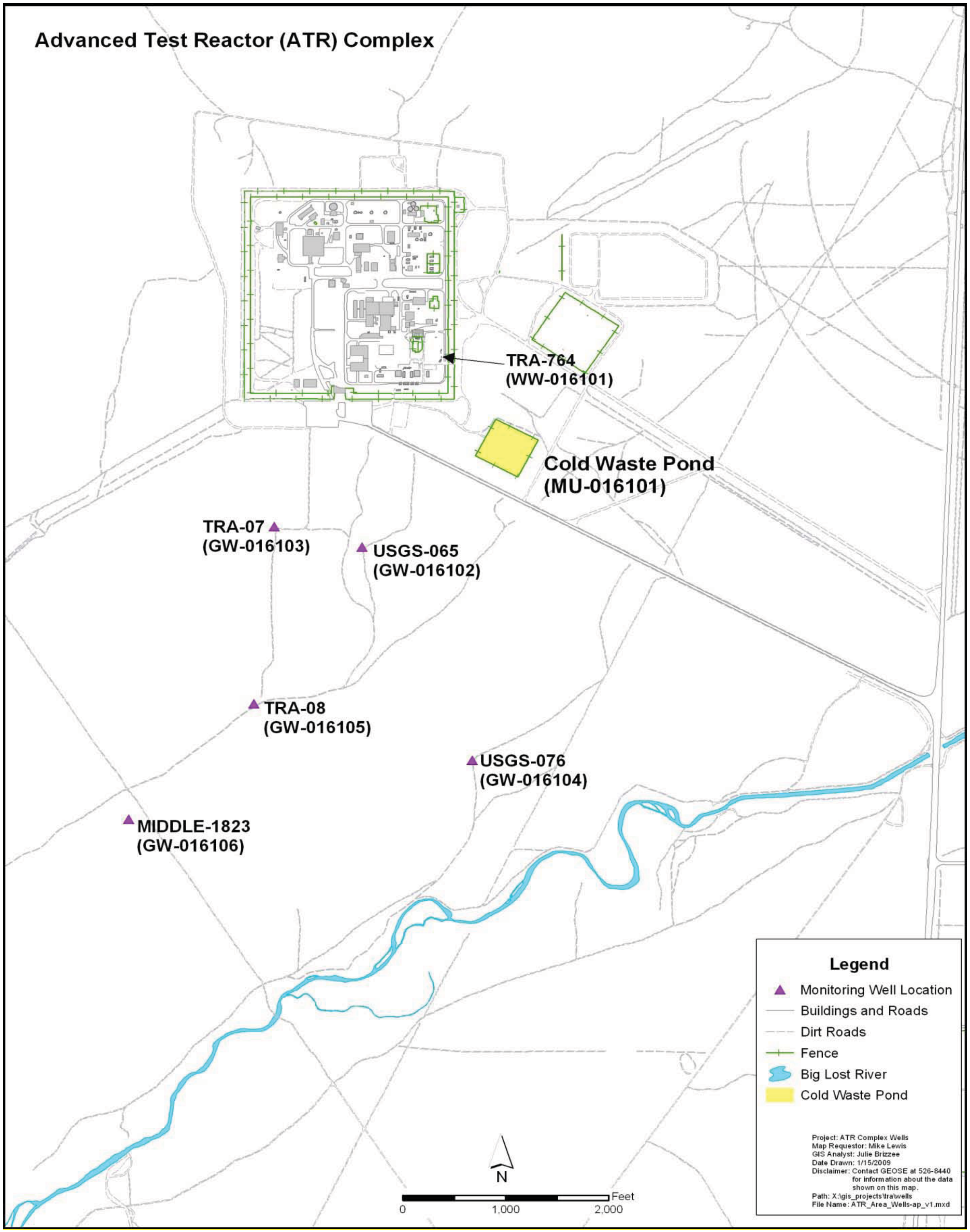

Figure 2. Locations of the Advanced Test Reactor Complex Cold Waste Pond Industrial Wastewater Reuse Permit monitoring wells.

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 the 2010, all five wells yielded enough water to allow samples to be collected in April and October.

4.3.1 Modification to Well TRA-08

In previous sampling events, well TRA-08 would not always produce enough water to allow for sample collection. Work began on April 6, 2010 to drill the well deeper. Work was completed on April 21, 2010.

Prior to the modification, TRA-08 had a total depth of 499.7 ft below ground surface (bgs). Upon completion, TRA-08 now has a total depth of 530 ft bgs (Figure 3). Water level measured on April 14, 2010 was 488.8 ft bgs. The well is screened with stainless steel screen from 489 ft bgs to 529 ft bgs. A new 5 horse power Grundfos submersible pump with an inlet depth of 522 ft was installed in the well.

4.4 Groundwater Monitoring Results

Table 3 shows the 2010 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. Samples were collected from all five wells in both April and October.

As the table shows, 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 2010 reporting year for all wells associated with the ATR Complex CWP.

However, both aluminum (Al) and iron (Fe) were above their respective SCSs in the unfiltered samples collected from wells TRA-07 and TRA-08 during the April and October sampling events. In comparison, the April and October filtered Al and Fe sample results, those used for determining permit compliance, were well below their SCSs in the two wells.

The SCS for manganese in well TRA-07 was exceeded in the October sample but not in the April sample. The manganese SCS was also exceeded in the April sample from well TRA-08. The filtered sample results for manganese, used for determining permit compliance, in both wells were below the SCS.

The unfiltered concentrations for Al, Fe, and Mn in well TRA-08 were significantly lower in the October sample when compared to the concentrations in the April sample. There may have been some impact on the concentrations of these parameters when the well was deepened in April 2010 and development was completed in August. See Section 6 for further discussion concerning well TRA-08 and these parameters.

Monitoring well USGS-065 and TRA-07 are located southwest of the CWP. Both wells show similar elevated levels of sulfate and TDS in the April and October 2010 samples (Table 3). The SCS for sulfate and TDS are 250 mg/L and 500 mg/L, respectively. The April and October 2010 sample results from both wells were below the SCS limits. Sulfate and TDS concentrations in the two wells for April and October 2010 were similar to the April and October 2009 sample results.

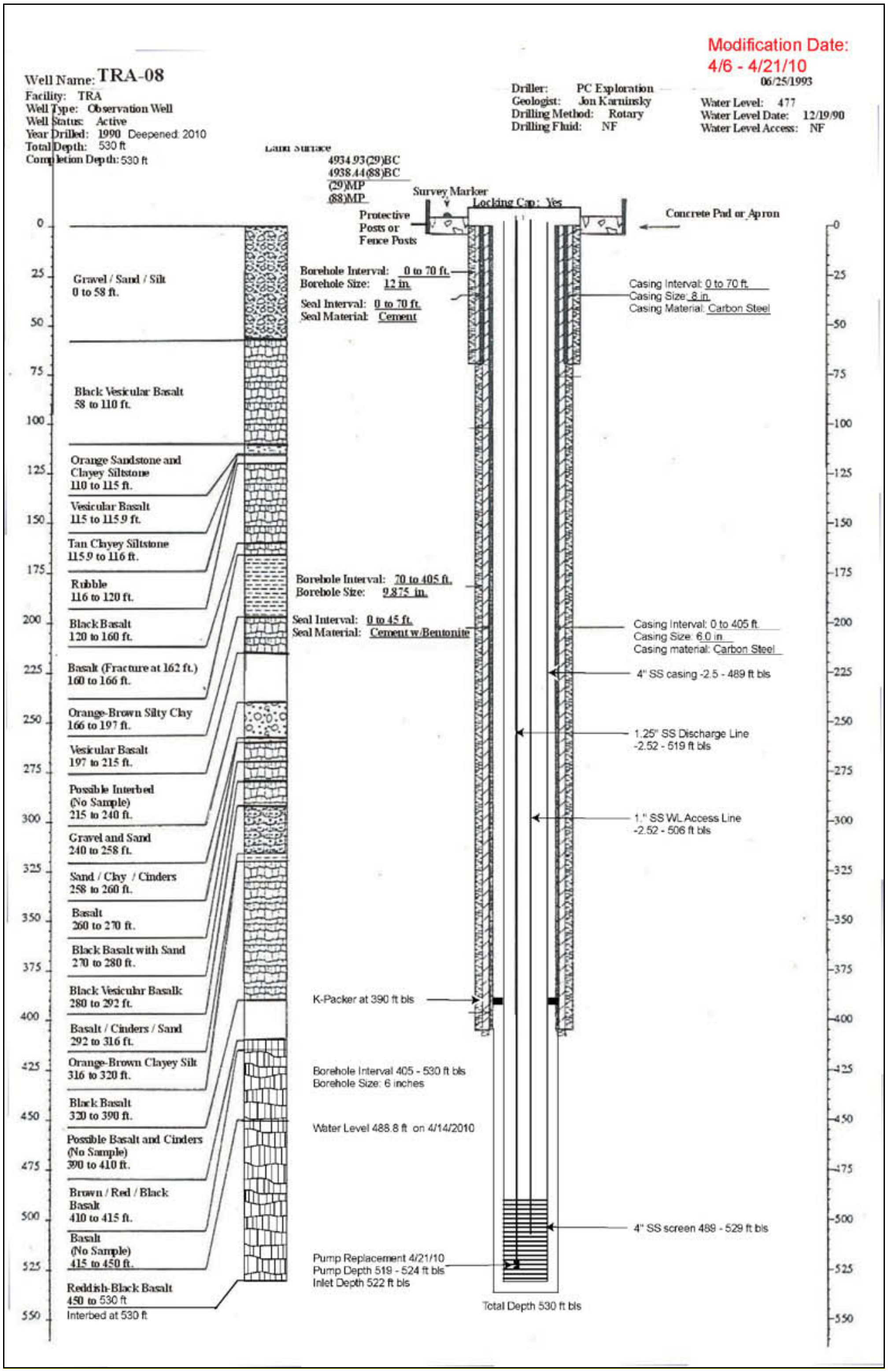

Figure 3. Diagram showing current construction of well TRA-08 following modifications.

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. The 2010 water table depths were similar to the 2009 water table depths.

Table 3. Advanced Test Reactor Complex Cold Waste Pond aquifer monitoring well unfiltered and filtered (values are in parentheses) data for the 2010 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	04/06/10	10/14/10	04/20/10	10/12/10	04/07/10	10/12/10	04/29/10	10/14/10	04/07/10	10/12/10	
Water Table Depth (ft bgs)	475.32	476.7	483.97	484.93	483.19	484.17	488.63	489.69	492.9	493.86	NA[b]
Water Table Elevation (above mean sea level in ft)[c]	4453.2	4451.82	4451.11	4450.15	4450.02	4449.04	4449.81	4448.75	4449.97	4449.01	NA
pH	8.22	8.05	8.03	8.02	8.1	8.0	8.22	8.11	8.09	8.05	6.5 to 8.5
Total Kjeldahl nitrogen (mg/L)	0.119 [0.116][d]	0.1 U	0.154	0.17	0.162	0.138	0.35	0.119	0.157	0.179	NA
Nitrite nitrogen (mg/L)	0.05 U[e] [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
Nitrate nitrogen (mg/L)	1.43 [1.42]	1.39	1.04	1.05	1.05	1.04	0.84	0.985	0.958	0.952	10
Total nitrogen[f] (mg/L)	1.574 [1.561]	1.465	1.219	1.245	1.237	1.203	1.215	1.129	1.14	1.156	NA
Total dissolved solids (mg/L)	434 [437]	431	420	443	276	283	273	290	269	282	500
Aluminum (mg/L)	0.0043 [0.0042] (0.0038)[g] [0.004]	0.0153 (0.0152)	**1.280**[h] (0.0088)	**1.580** (0.0136)	0.0043 (0.0032)	0.003 (0.0026)	**94.9** (0.0418)	**1.080** (0.0042)	0.0509 (0.0025)	0.126 (0.0016)	0.2
Antimony (mg/L)	0.0005 U [0.0005 U] (0.0005 U) [0.0005 U]	0.0004 U (0.0004 U)	0.0004 U (0.0004 U)	0.0004 U (0.0004 U)	0.0005 U (0.0005 U)	0.0004 U (0.0004 U)	0.0004 U (0.0004 U)	0.0004 U (0.0004 U)	0.0005 U (0.0005 U)	0.0004 U (0.0004 U)	0.006
Arsenic (mg/L)	0.0012 [0.00082] (0.00052) [0.00097]	0.0013 (0.001)	0.0005 U (0.00093)	0.00076 (0.0012)	0.0013 (0.0015)	0.0012 (0.0015)	0.0005 U (0.0015)	0.0015 (0.0017)	0.0016 (0.0016)	0.0013 (0.00096)	0.05

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	04/06/10	10/14/10	04/20/10	10/12/10	04/07/10	10/12/10	04/29/10	10/14/10	04/07/10	10/12/10	
Barium (mg/L)	0.0475 [0.0479] (0.047) [0.0477]	0.0457 (0.0452)	0.0845 (0.0622)	0.113 (0.0595)	0.0741 (0.0732)	0.0721 (0.0724)	0.816 (0.0343)	0.0699 (0.0514)	0.065 (0.0644)	0.0662 (0.0648)	2
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 (0.00025 U)	0.00025 U (0.00025 U)	0.0005 U (0.00025 U)	0.00025 U (0.00025 U)	0.00025 U (0.00025 U)	0.00025 U (0.00025 U)	0.005
Chloride (mg/L)	19.6 [19.5]	19	19.4	20.2	14.0	14.1	11.8	12.4	11.9	11.9	250
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)	0.0027 (0.0025 U)	0.0025 U (0.0025 U)	0.0025 U (0.0025 U)	0.0383 (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) [0.0025 U]	0.0025 U (0.0025 U)	0.0281 (0.0025 U)	0.038 (0.0026)	0.0999 (0.0025 U)	0.0065 (0.0025 U)	0.194 (0.0025 U)	0.0032 (0.0025 U)	0.0025 U (0.0025 U)	0.0025 U (0.0025 U)	1.3
Fluoride (mg/L)	0.237 [0.212]	0.207	0.201	0.188	0.195	0.152	0.191	0.18	0.197	0.155	4
Iron (mg/L)	0.050 U [0.050 U] (0.050 U) [0.050 U]	0.0539 (0.050 U)	**1.570** (0.050 U)	**3.850** (0.051)	0.050 U (0.050 U)	0.0863 (0.0536)	**87.5** (0.050 U)	**0.644** (0.0502)	0.050 U (0.050 U)	0.0838 (0.050 U)	0.3
Manganese (mg/L)	0.0025 U [0.0025 U] (0.0025 U) [0.0025 U]	0.0025 U (0.0025 U)	0.0239 (0.0025 U)	**0.0614** (0.0025 U)	0.0025 U (0.0025 U)	0.0025 U (0.0025 U)	**1.170** (0.0121)	0.0117 (0.0025 U)	0.0036 (0.0025 U)	0.0037 (0.0027)	0.05

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	04/06/10	10/14/10	04/20/10	10/12/10	04/07/10	10/12/10	04/29/10	10/14/10	04/07/10	10/12/10	
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 (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
Selenium (mg/L)	0.0015 [0.0016] (0.0014) [0.0014]	0.0014 (0.0016)	0.00095 (0.0011)	0.00092 (0.0011)	0.00096 (0.001)	0.001 (0.0011)	0.002 (0.00099)	0.00099 (0.0011)	0.00096 (0.00096)	0.0009 (0.0011)	0.05
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 (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
Sulfate (mg/L)	158 [162]	160	155	155	33.2	32.4	47.1	51.4	35.1	34.3	250

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. Values shown in brackets are the results from field duplicate samples. Each bracketed value is the field duplicate for the sample value reported immediately above the respective bracketed value.

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

f. Total nitrogen is calculated as the sum of the TKN, nitrite nitrogen, and nitrate nitrogen. For results reported below the instrument detection limit, half the detection limit for that parameter is used in the calculation.

g. Results shown in parentheses are from filtered samples.

h. Concentrations shown in bold are above the Ground Water Quality Rule SCS. Filtered sample results, shown in parentheses, are used for permit compliance determinations for these constituents and the results are below the SCS.

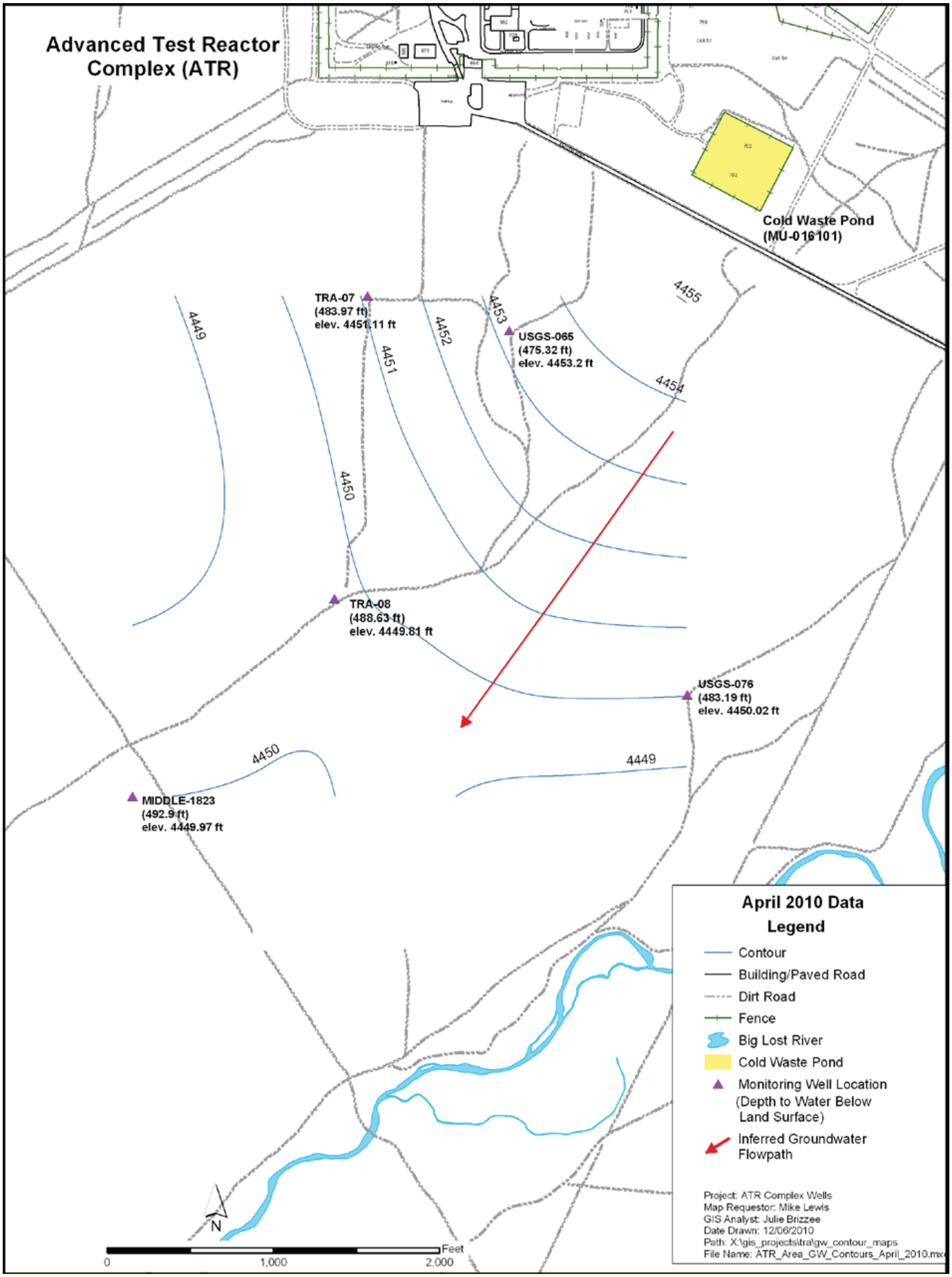

Figure 4. Groundwater contour map based on the April 2010 water level measurements.

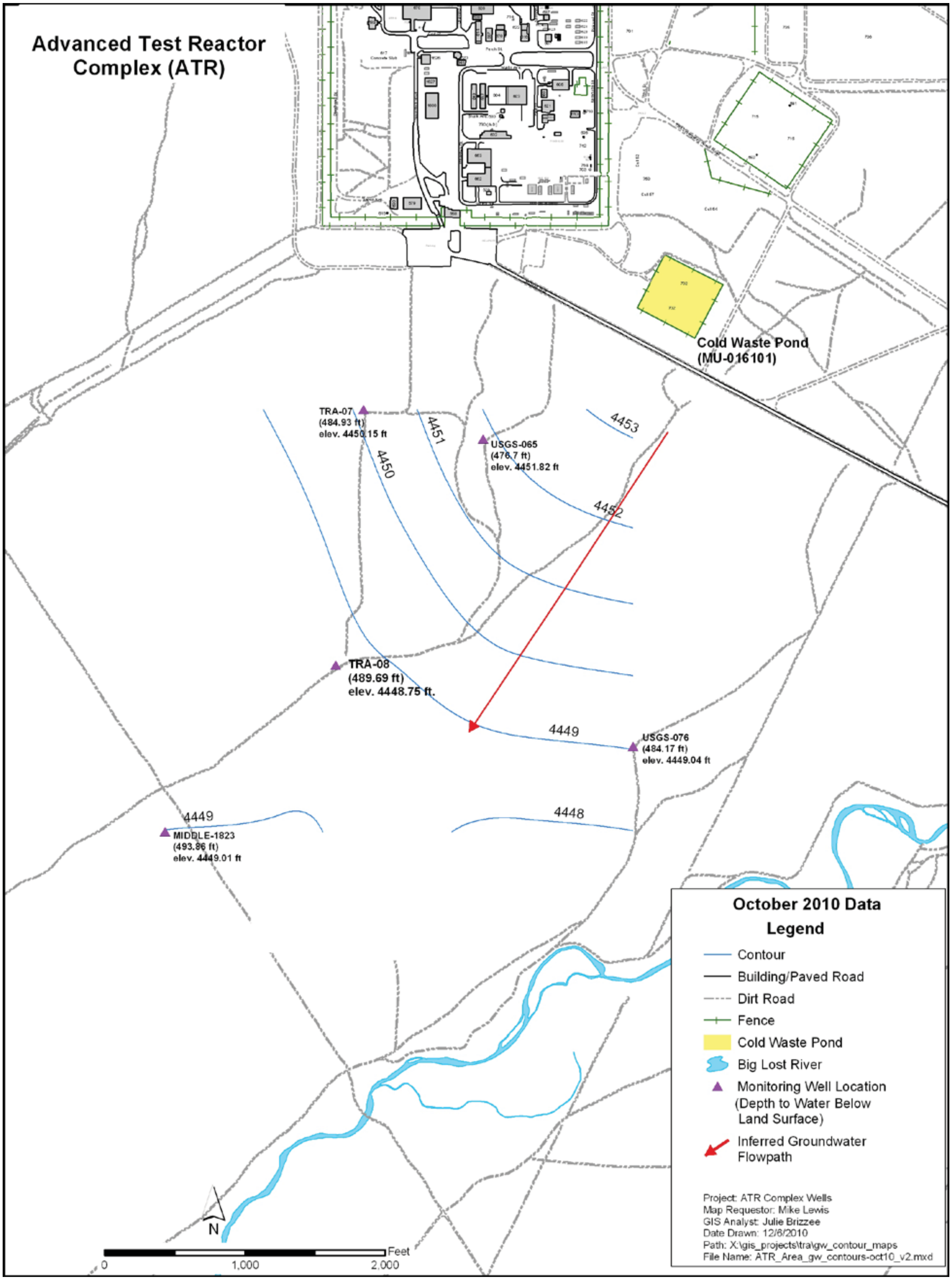

Figure 5. Groundwater contour map based on the October 2010 water level measurements.

5. PERMIT YEAR SUMMARIES

This section provides information and status associated with permit required compliance activities. Non-compliance issues are also addressed in this section. Section 5.3 discusses issues that were not considered non-compliances but were not typical operational or reporting events.

5.1 Status of Permit Required Compliance Activity

Section E of the current ATR Complex IWRP identified one compliance activity with a specified the completion date. The compliance activity was to submit an Operation and Maintenance (O&M) Manual within 6 months after permit issuance (February 26, 2008). This compliance activity was reported as complete in the 2009 Annual Report.

5.2 Non-compliance Issues

Discussed below are three non-compliance issues. The first two issues were identified and reported during the 2009 permit year but were not closed out until the 2010 permit year. The third issue was discovered, reported, and closed out during the 2010 permit year.

5.2.1 Aluminum, Iron, and Manganese Concentrations in samples Collected from Wells TRA-07 and TRA-08

The following non-compliance was initially reported in the 2009 Annual Report but closed out during the 2010 reporting year:

> Well TRA-07 was sampled on April 20, 2009 and again on October 14, 2009. Well TRA-08 was sampled on April 20, 2009. An attempt was made to sample TRA-08 in October 2009 but there was insufficient water to collect samples and therefore, the well was reported as "dry."
>
> Filtered and unfiltered samples for metals analyses were collected from all five IWRP monitoring wells. Concentrations of Al and Fe in the April and October unfiltered samples collected from well TRA-07 were above their respective SCSs. Concentrations of Al, Fe, and Mn in the April unfiltered samples collected from well TRA-08 were above the respective SCS. All filtered sample results were below their respective SCSs.
>
> The IWRP (Section F) requires compliance with the Ground Water Quality Rule (IDAPA 58.01.11) in the five CWP monitoring wells. Because the SCSs were exceeded in wells TRA-07 and TRA-08, the information for April 2009 was originally submitted in the June 2009 (Stenzel 2009a) disclosure log to the DEQ. A disclosure log (Stenzel 2009b) was submitted in December 2009 disclosing the October 2009, TRA-07, Al and Fe sample results.

The use of dissolved concentrations of SCSs for compliance purposes is allowed under IDAPA 58.01.11.400.05.d. This section states "The Department may allow the use of dissolved concentrations for secondary constituents if the requesting person demonstrates that doing so will not adversely affect human health and the environment." A letter (Stenzel 2009) requesting a modification to the ATR Complex CWP IWRP allowing the use of dissolved concentrations to show compliance with applicable SCSs in the five CWP monitoring wells was submitted to the DEQ on October 8, 2009.

The DEQ (Rackow 2010) indicated that a permit modification was not necessary and that dissolved concentrations for SCSs could be used for demonstrating compliance with the IWRP. This non-compliance issue was proposed for closure in the January 2010 "disclosure log" (Stenzel 2010).

5.2.2 Insufficient Purge Volume for Well USGS-076

The following non-compliance was initially reported in the 2009 Annual Report but closed out during the 2010 reporting year:

> Section G.5 of the IWRP requires, "each well to be purged three casing volumes or one casing volume with three successive field measurements, taken not less than one minute apart, for pH, specific conductance, and temperature and meet the following conditions: temperature must be within one degree Celsius of each other, and specific conductance values must be within 10% of each other."
>
> On October 15, 2009, it was discovered that a transcription error had been made when entering the height of the water column in the logbook for well USGS-076. The column height is used to calculate the volume of water needed to meet the Section G.5 purging requirements. The calculation error resulted in 40 gallons less than the minimum one well volume being purged during the April 21, 2009 and October 12, 2009 sampling events of USGS-076. However, the field measurements did stabilize as required by the IWRP.
>
> The error was discovered in time to allow a second set of samples to be collected on October 21, 2009. The October 21, 2009 results were used to meet the IWRP groundwater sampling requirement for October. In addition, the October 12 and October 21 analysis results were compared to determine the impact purging of less than one well volume had on the final results. The comparison showed there were no significant differences between the two sets of samples.
>
> Based on the close correlation between samples collected from USGS-076 in October, the April 21, 2009 data is considered representative of the groundwater conditions at the time of sampling. However, the April 21, 2009 sampling event was still considered a non-compliance and a disclosure log was submitted to the DEQ (Stenzel 2009c) with the corrective action to compare the October results from USGS-076.
>
> To ensure that transcription errors do not occur in the future, it was identified that the groundwater sampling procedure would be changed by January 30, 2010 to require a second MS team member to confirm the calculation and the data measurements to be used prior to the collection and submission of the samples.

The procedure change was completed by January 30, 2010 and the issue was proposed for closure as documented in the January 2010 disclosure log (Stenzel 2010).

5.2.3 Discrepancy in Electrical Conductivity Analysis

Historically, the sampling procedure for the effluent to the ATR Complex CWP required the measurement of electrical conductivity on grab samples. The IWRP for the ATR Complex CWP, issued on February 26, 2008, required the electrical conductivity analysis to be performed on a 24-hour flow proportional composite sample and not a grab sample. This new requirement was not incorporated into the sampling procedure, resulting in the conductivity analysis being performed on monthly grab samples.

Upon discovery in April 2010, the laboratory was immediately requested to analyze the April composite sample for conductivity. In addition, the laboratory was requested to analyze the remaining March composite sample for conductivity, although the holding time had been exceeded.

The March and April grab sample results were 1,169 μS/cm and 413 μS/cm, respectively. These results were compared with the March and April composite sample results of 1,238 μS/cm and 397 μS/cm, respectively (Table 1). The differences between the respective grab and composite conductivity analyses were less than 10%.

The sampling procedure was revised to specify that conductivity analysis shall be performed on the composite samples. These composite samples will be analyzed by MS personnel at the time of sample collection.

This issue was proposed for closure in the April 2010 disclosure log (Carlson 2010).

5.3 Other Issues

This section discusses other issues for the ATR Complex Cold Waste system that occurred during the permit year. Only one issue was identified for the 2010 permit year.

5.3.1 Incorrect Report Information

As discussed in Section 5.2.3, the effluent electrical conductivity analyses had been performed on grab samples prior to the issuance of the IWRP and continued until it was discovered in April 2010 that the IWRP required the analysis to be performed on 24-hour flow proportional samples.

The 2008 and 2009 Annual Reports stated that the conductivity samples were collected and analyzed in accordance with the IWRP. These statements are incorrect based on Section G.4 of the IWRP. In accordance with Section I.7.e of the IWRP for reporting incorrect information found in a report, a letter was submitted to the DEQ on May 25, 2010 (Carlson 2010).

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, 2009 through October 31, 2010) was 163.54 MG. The average daily flow during the 2010 permit year was 448,068 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 and/or well below the permit limit (Table 1). The September sample result was the highest detectable result and only slightly above the laboratory instrument detection limit at 6.8 mg/L. 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 1.051 mg/L to 4.081 mg/L (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 1.574 mg/L and 1.465 mg/L in the April and October 2010 samples, respectively (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 2010 nitrate sample results were slightly higher than the October 2010 results from well USGS-065. The April 2010 sample results from well USGS-065 had a nitrate concentration of 1.43 mg/L and a nitrite concentration of less than 0.05 mg/L (undetected). Both were significantly less than their respective groundwater quality standards.

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 2010 permit year effluent monthly samples ranged from a low of 21.6 mg/L to a high of 709 mg/L. The TDS concentrations ranged from a low of 241 mg/L to a high of 1,290 mg/L. There are no IWRP effluent limits for sulfate and TDS. However, there are groundwater quality standards for these two parameters.

Monitoring well USGS-065 and TRA-07 are located southwest of the CWP. Both wells show similar elevated levels of sulfate and TDS in the April and October 2010 samples. The SCS for sulfate and TDS are 250 mg/L and 500 mg/L, respectively. Maximum sulfate concentrations in USGS-065 and TRA-07 were 162 mg/L and 155 mg/L, respectively. The maximum TDS concentration for well USGS-065 was 437 mg/L in the April 2010 sample. Well TRA-07 had a maximum TDS concentration of 443 mg/L in the October 2010 sample. The 2010 sulfate and TDS results were similar to the April and October 2009 sulfate and TDS concentrations in these wells. The maximum 2009 sulfate concentration in well USGS-065 was 161 mg/L and 157 mg/L in well TRA-07. The maximum 2009 TDS concentration in well USGS-065 was 430 mg/L and 454 mg/L in well TRA-07. In the 2009 report, well TRA-07 sulfate concentrations appeared to have increased as compared to 2008. The 2010 well TRA-07 sulfate concentrations appear to have stabilized as compared to 2009, with both April and October 2010 concentrations at 155 mg/L.

Elevated sulfate and TDS concentrations in the groundwater can be seen near the CWP which 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. Well Middle-1823, located approximately 4,000 ft down gradient from the CWP had a maximum 2010 sulfate and TDS concentration of 35.1 mg/L and 282 mg/L, respectively. Well USGS-065, located approximately 1,200 ft down gradient of the CWP had a maximum 2010 sulfate concentration of 162 mg/L and a TDS concentration of 437 mg/L. The concentrations of sulfate and TDS in well Middle-1823 are similar to the concentrations in the up/cross gradient well USGS-076.

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 3 miles down gradient of the CWP. Since these contaminants remain, and are expected to continue to remain, localized near the CWP and since they are regulated because of their aesthetic qualities, impacts to human health and the environment are expected to be minimal.

The April and October 2010 unfiltered sample results for Al and Fe in well TRA-07 were above their respective SCSs, whereas, the filtered (used for permit compliance) sample results for these two metals were all below the SCS (Table 4). The unfiltered October manganese result for well TRA-07 was above the SCS. All other April and October filtered and unfiltered manganese sample results for well TRA-07 were below the SCS.

Table 4. Comparison of 2010 results from unfiltered and filtered (values are in parentheses) samples collected from wells TRA-07 and TRA-08.

WELL NAME	TRA-07 (GW-016103)		TRA-08 (GW-016105)		SCS[a]
Sample Date	04/20/10	10/12/10	04/29/10	10/14/10	
Aluminum (mg/L)	**1.280**[b]	**1.580**	**94.9**	**1.080**	0.2
	(0.0088)[c]	(0.0136)	(0.0418)	(0.0042)	
Iron (mg/L)	**1.570**	**3.850**	**87.5**	**0.644**	0.3
	(0.050 U[d])	(0.051)	(0.050 U)	(0.0502)	
Manganese (mg/L)	0.0239	**0.0614**	**1.170**	0.0117	0.05
	(0.0025 U)	(0.0025 U)	(0.0121)	(0.0025 U)	

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

Table 4 also compares the April and October 2010 Al, Fe, and Mn filtered and unfiltered results from samples collected from well TRA-08. The table shows that the unfiltered Al and Fe results were above the SCSs and the filtered results for these same parameters were below the SCSs. The unfiltered April manganese sample result was above the SCS while the unfiltered October result was below. Both the April and October filtered manganese results were below the SCSs.

Concentrations of Al, Fe, and Mn in samples from the effluent to the CWP and from well USGS-065 indicate that discharges to the CWP are not expected to be the direct cause of the high Al, Fe, and Mn in wells TRA-07 and TRA-08. It is likely that the higher concentrations of these metals in wells TRA-07 and TRA-08 are due to suspended solids found within the well. The high levels of metals appear to be confined to wells TRA-07 and TRA-08 since the concentrations of these metals in the other two down gradient wells (USGS-065 and Middle-1823) were at very low levels or below the laboratory instrument detection limits (Table 3).

All three metals have an impact on color of the water. Both iron and manganese cause staining and also cause the water to have a metallic taste. However, similar to the sulfate and TDS concentrations in the groundwater near the CWP, impacts to human health and the environment from concentrations of Al, Fe, and Mn in wells TRA-07 and TRA-08 are expected to be minimal.

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 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.

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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 2010.

Date	Daily Discharge Volume (gallons)	Date	Daily Discharge Volume (gallons)
11/01/2009	399,520	12/07/2009	432,300
11/02/2009	371,030	12/08/2009	295,770
11/03/2009	393,960	12/09/2009	387,640
11/04/2009	286,400	12/10/2009	411,200
11/05/2009	432,270	12/11/2009	352,000
11/06/2009	791,890	12/12/2009	321,680
11/07/2009	763,000	12/13/2009	393,000
11/08/2009	705,000	12/14/2009	292,600
11/09/2009	691,720	12/15/2009	352,510
11/10/2009	769,860	12/16/2009	343,630
11/11/2009	818,770	12/17/2009	407,840
11/12/2009	869,900	12/18/2009	298,960
11/13/2009	770,220	12/19/2009	360,640
11/14/2009	855,310	12/20/2009	339,340
11/15/2009	924,850	12/21/2009	345,010
11/16/2009	603,750	12/22/2009	353,410
11/17/2009	726,400	12/23/2009	357,360
11/18/2009	804,310	12/24/2009	379,390
11/19/2009	866,300	12/25/2009	378,090
11/20/2009	745,100	12/26/2009	354,520
11/21/2009	823,400	12/27/2009	354,580
11/22/2009	871,280	12/28/2009	344,670
11/23/2009	814,600	12/29/2009	343,000
11/24/2009	281,600	12/30/2009	359,170
11/25/2009	344,460	12/31/2009	348,650
11/26/2009	231,520	01/01/2010	372,140
11/27/2009	369,400	01/02/2010	337,830
11/28/2009	322,220	01/03/2010	304,160
11/29/2009	411,530	01/04/2010	341,680
11/30/2009	288,660	01/05/2010	347,200
12/01/2009	704,430	01/06/2010	351,340
12/02/2009	761,400	01/07/2010	351,370
12/03/2009	907,650	01/08/2010	359,380
12/04/2009	424,310	01/09/2010	383,860
12/05/2009	298,700	01/10/2010	318,850
12/06/2009	332,440	01/11/2010	413,400

Date	Daily Discharge Volume (gallons)
01/12/2010	311,800
01/13/2010	333,000
01/14/2010	352,100
01/15/2010	364,890
01/16/2010	330,910
01/17/2010	367,000
01/18/2010	398,540
01/19/2010	309,750
01/20/2010	349,500
01/21/2010	324,720
01/22/2010	461,520
01/23/2010	766,400
01/24/2010	860,000
01/25/2010	606,500
01/26/2010	747,120
01/27/2010	768,680
01/28/2010	824,690
01/29/2010	613,760
01/30/2010	876,120
01/31/2010	719,770
02/01/2010	824,570
02/02/2010	626,470
02/03/2010	709,320
02/04/2010	741,210
02/05/2010	758,320
02/06/2010	934,650
02/07/2010	624,930
02/08/2010	416,750
02/09/2010	373,730
02/10/2010	384,010
02/11/2010	445,010
02/12/2010	295,070
02/13/2010	429,100
02/14/2010	730,500
02/15/2010	601,300
02/16/2010	811,010
02/17/2010	607,000
02/18/2010	352,090
02/19/2010	376,740

Date	Daily Discharge Volume (gallons)
02/20/2010	361,020
02/21/2010	339,220
02/22/2010	368,210
02/23/2010	417,840
02/24/2010	395,790
02/25/2010	343,900
02/26/2010	344,210
02/27/2010	342,000
02/28/2010	313,310
03/01/2010	383,300
03/02/2010	277,110
03/03/2010	338,740
03/04/2010	344,750
03/05/2010	396,060
03/06/2010	297,770
03/07/2010	383,400
03/08/2010	326,050
03/09/2010	428,590
03/10/2010	291,590
03/11/2010	366,420
03/12/2010	347,700
03/13/2010	323,530
03/14/2010	420,000
03/15/2010	301,220
03/16/2010	338,600
03/17/2010	363,360
03/18/2010	352,570
03/19/2010	429,930
03/20/2010	352,650
03/21/2010	338,300
03/22/2010	293,610
03/23/2010	342,740
03/24/2010	431,340
03/25/2010	296,890
03/26/2010	418,830
03/27/2010	347,210
03/28/2010	293,800
03/29/2010	351,890
03/30/2010	438,300

Date	Daily Discharge Volume (gallons)
03/31/2010	294,810
04/01/2010	374,030
04/02/2010	352,640
04/03/2010	780,810
04/04/2010	839,740
04/05/2010	872,500
04/06/2010	719,000
04/07/2010	596,930
04/08/2010	700,860
04/09/2010	618,550
04/10/2010	429,510
04/11/2010	563,040
04/12/2010	494,510
04/13/2010	609,200
04/14/2010	753,400
04/15/2010	807,320
04/16/2010	669,330
04/17/2010	743,660
04/18/2010	791,000
04/19/2010	744,710
04/20/2010	611,160
04/21/2010	182,700
04/22/2010	233,450
04/23/2010	259,620
04/24/2010	354,480
04/25/2010	424,770
04/26/2010	315,480
04/27/2010	388,420
04/28/2010	368,550
04/29/2010	465,400
04/30/2010	407,840
05/01/2010	298,260
05/02/2010	399,650
05/03/2010	430,000
05/04/2010	377,880
05/05/2010	306,310
05/06/2010	383,050
05/07/2010	364,510
05/08/2010	383,860

Date	Daily Discharge Volume (gallons)
05/09/2010	382,770
05/10/2010	349,000
05/11/2010	219,010
05/12/2010	262,160
05/13/2010	343,720
05/14/2010	258,630
05/15/2010	243,440
05/16/2010	277,630
05/17/2010	293,010
05/18/2010	380,160
05/19/2010	410,170
05/20/2010	384,400
05/21/2010	436,390
05/22/2010	344,760
05/23/2010	368,000
05/24/2010	359,420
05/25/2010	375,210
05/26/2010	381,090
05/27/2010	384,030
05/28/2010	416,150
05/29/2010	324,030
05/30/2010	750,100
05/31/2010	699,910
06/01/2010	777,690
06/02/2010	722,110
06/03/2010	1,043,990
06/04/2010	843,610
06/05/2010	733,420
06/06/2010	623,470
06/07/2010	516,400
06/08/2010	515,700
06/09/2010	796,640
06/10/2010	640,580
06/11/2010	709,890
06/12/2010	679,090
06/13/2010	690,640
06/14/2010	698,000
06/15/2010	656,040
06/16/2010	617,000

Date	Daily Discharge Volume (gallons)
06/17/2010	822,020
06/18/2010	857,020
06/19/2010	655,000
06/20/2010	635,800
06/21/2010	970,480
06/22/2010	417,010
06/23/2010	230,800
06/24/2010	288,150
06/25/2010	336,750
06/26/2010	369,770
06/27/2010	383,880
06/28/2010	367,100
06/29/2010	328,000
06/30/2010	338,220
07/01/2010	403,270
07/02/2010	361,230
07/03/2010	375,300
07/04/2010	370,930
07/05/2010	369,970
07/06/2010	380,220
07/07/2010	371,550
07/08/2010	389,160
07/09/2010	418,920
07/10/2010	362,400
07/11/2010	368,470
07/12/2010	343,560
07/13/2010	331,340
07/14/2010	341,810
07/15/2010	258,480
07/16/2010	256,510
07/17/2010	332,510
07/18/2010	235,600
07/19/2010	286,830
07/20/2010	347,240
07/21/2010	247,520
07/22/2010	325,210
07/23/2010	693,230
07/24/2010	536,380
07/25/2010	181,240

Date	Daily Discharge Volume (gallons)
07/26/2010	344,780
07/27/2010	248,680
07/28/2010	282,080
07/29/2010	281,820
07/30/2010	298,420
07/31/2010	283,850
08/01/2010	343,000
08/02/2010	224,700
08/03/2010	281,390
08/04/2010	295,330
08/05/2010	327,110
08/06/2010	273,000
08/07/2010	244,000
08/08/2010	253,170
08/09/2010	281,700
08/10/2010	275,610
08/11/2010	335,400
08/12/2010	257,300
08/13/2010	255,600
08/14/2010	618,550
08/15/2010	554,510
08/16/2010	660,450
08/17/2010	716,350
08/18/2010	466,370
08/19/2010	562,110
08/20/2010	623,870
08/21/2010	581,900
08/22/2010	674,300
08/23/2010	684,080
08/24/2010	724,000
08/25/2010	547,850
08/26/2010	643,830
08/27/2010	635,160
08/28/2010	549,300
08/29/2010	644,730
08/30/2010	619,140
08/31/2010	581,200
09/01/2010	126,950
09/02/2010	179,100

Date	Daily Discharge Volume (gallons)
09/03/2010	312,850
09/04/2010	207,610
09/05/2010	349,300
09/06/2010	205,470
09/07/2010	328,680
09/08/2010	222,350
09/09/2010	278,210
09/10/2010	321,850
09/11/2010	249,550
09/12/2010	268,100
09/13/2010	265,610
09/14/2010	336,490
09/15/2010	236,350
09/16/2010	265,990
09/17/2010	283,100
09/18/2010	308,920
09/19/2010	259,460
09/20/2010	337,460
09/21/2010	290,530
09/22/2010	226,020
09/23/2010	278,530
09/24/2010	283,100
09/25/2010	274,420
09/26/2010	282,290
09/27/2010	293,510
09/28/2010	282,190
09/29/2010	286,230
09/30/2010	269,960
10/01/2010	271,320
10/02/2010	287,270

Date	Daily Discharge Volume (gallons)
10/03/2010	338,000
10/04/2010	233,360
10/05/2010	281,160
10/06/2010	291,100
10/07/2010	293,800
10/08/2010	300,330
10/09/2010	292,000
10/10/2010	239,370
10/11/2010	297,510
10/12/2010	425,710
10/13/2010	670,560
10/14/2010	574,080
10/15/2010	715,060
10/16/2010	606,300
10/17/2010	319,700
10/18/2010	196,600
10/19/2010	306,000
10/20/2010	287,000
10/21/2010	314,760
10/22/2010	356,350
10/23/2010	518,590
10/24/2010	600,100
10/25/2010	572,100
10/26/2010	777,000
10/27/2010	518,000
10/28/2010	648,500
10/29/2010	642,680
10/30/2010	553,620
10/31/2010	589,200