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# 2014 Annual Industrial Wastewater Reuse Report for the Idaho National Laboratory Site's Advanced Test Reactor Complex Cold Waste Pond

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February 2015

The INL is a U.S. Department of Energy National Laboratory
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INL/EXT-15-34083

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Idaho National Laboratory
Idaho Falls, Idaho 83415

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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, 2013–October 31, 2014. The report contains the following information:

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

During the 2014 permit year, approximately 238 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 are below the Ground Water Quality Rule Secondary Constituent Standards in the downgradient monitoring wells.

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# ACRONYMS

| | |
|---|---|
| Al | Aluminum |
| ATR | Advanced Test Reactor |
| CFR | Code of Federal Regulations |
| CWP | Cold Waste Pond |
| DEQ | Idaho Department of Environmental Quality |
| DOE-ID | U.S. Department of Energy Idaho Operations Office |
| EPA | U.S. Environmental Protection Agency |
| Fe | Iron |
| gpd | gallons per day |
| GW | groundwater sampling point serial number designation |
| IDAPA | Idaho Administrative Procedures Act |
| INL | Idaho National Laboratory |
| IWRP | Industrial Wastewater Reuse Permit |
| MG | Million gallons |
| Mn | Manganese |
| MU | Hydraulic Management Unit serial number designation |
| NA | Not Applicable |
| NAVD | North American Vertical Datum |
| PCS | Primary Constituent Standard |
| R&MS | Regulatory and Monitoring Services |
| SCS | Secondary Constituent Standard |
| SwRI | Southwest Research Institute |
| TDS | total dissolved solids |
| TKN | total Kjeldahl nitrogen |
| TN | total nitrogen |
| TSS | total suspended solids |
| WW | wastewater sampling point serial number designation |

# 2014 Annual Industrial Wastewater Reuse Report for the Idaho National Laboratory Site's Advanced Test Reactor Complex Cold Waste Pond

## 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 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 DEQ on August 21, 2012 (Stenzel 2012). The application was determined "substantially complete" with an effective date of October 12, 2012 (Rackow 2012a). The preliminary decision to prepare a draft permit (Rackow 2012b) was made by DEQ on October 12, 2012. On June 25, 2013, DEQ (Neher 2013) issued a draft Wastewater Reuse Permit (I-161-02) and a staff analysis for review and comment. Idaho National Laboratory submitted comments to DEQ on the draft permit on July 23, 2013 (Mascareñas 2013). DEQ addressed the comments and issued Draft Permit #2 on March 26, 2014 (Neher 2014) for review and comment. Included with Draft Permit #2 was a new requirement to identify a Responsible Official/s and Authorized Representative/s, and certify the renewal application. On September 15, 2014 (Miller 2014), INL submitted a comment on the Draft Permit #2 and the applicable DEQ forms for designating a Responsible Official and Authorized Representative, and certifying the renewal application.

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 2014 permit year (November 1, 2013–October 31, 2014).

## 2. FACILITY, SYSTEM DESCRIPTION, AND OPERATION

The ATR Complex (Figure 1) is located on approximately 100 acres in the southwestern portion of 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 (Figure 1) and approximately 3/4 of a mile northwest 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 June 24, 2014, the flow was switched from the north cell to the south cell.

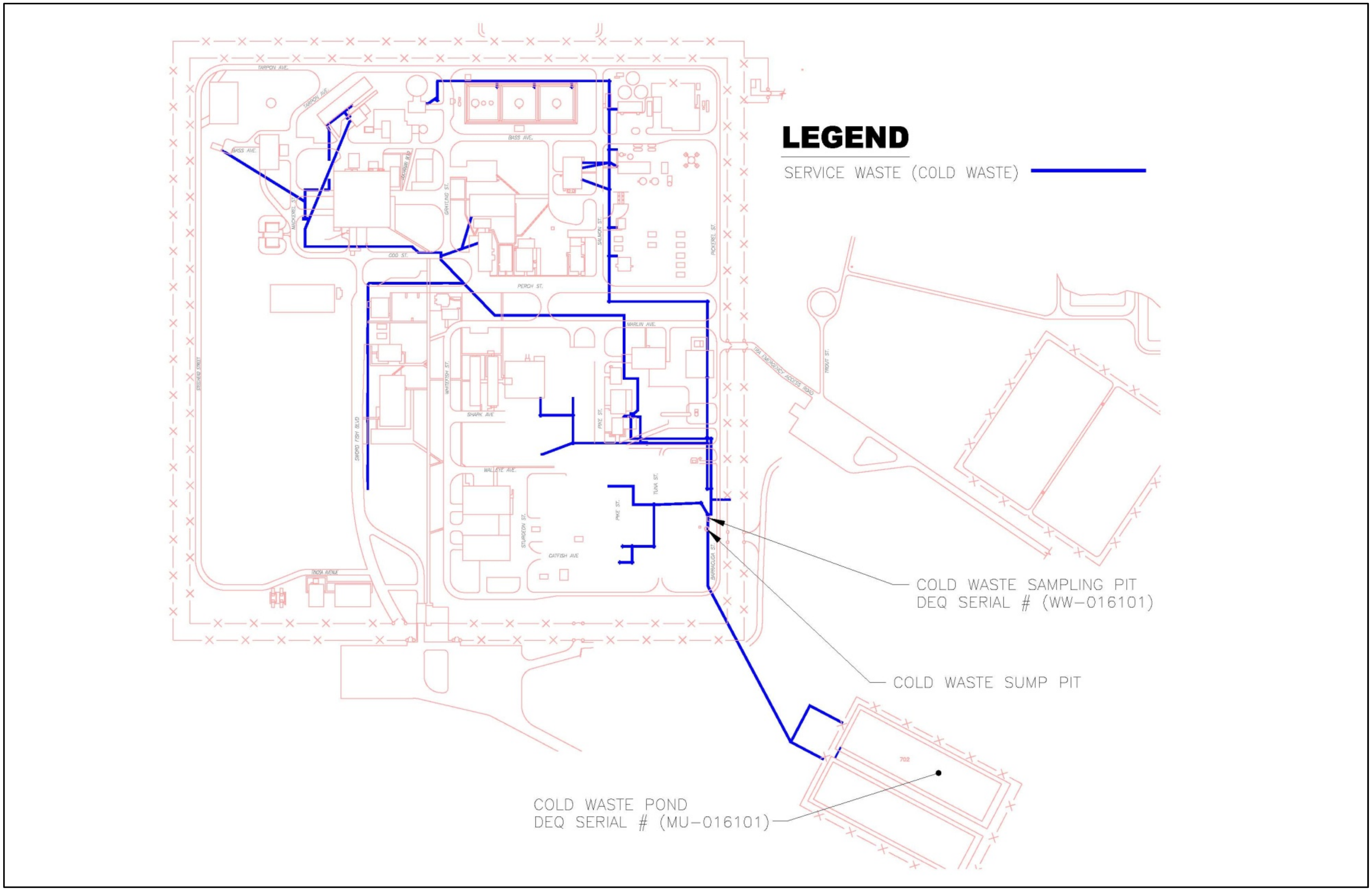


Figure 1. Advanced Test Reactor Complex Cold Waste system flow schematic.

# 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, Regulatory and Monitoring Services (R&MS) personnel monitor effluent discharges at the ATR Complex CWP. The R&MS program involves sampling, analysis, and data interpretation carried out under a quality assurance program.

Regulatory and Monitoring Services personnel conduct 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 are typically taken during a preselected week each month following a randomly generated sampling schedule to represent normal operating conditions. However, the September sampling event originally scheduled for September 8 and 9, 2014 was rescheduled for September 10 and 11 because of work on a Cold Waste service connection from building TRA-609. The pipeline was being cleaned so that it could be relined on September 9. Once-through cooling water from air compressors that is normally discharged to the pipeline was temporarily routed to the ATR Complex sewage lagoons. The sampling event was rescheduled to ensure a representative sample would be collected.

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 R&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 analysis.

## 3.2 Effluent Monitoring Results

The permit year covered in this report is November 1, 2013–October 31, 2014.

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 August 2014 sample at 3.189 mg/L (Table 1) with a low of <0.777 mg/L in the May 2014 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 TDS concentration in the effluent to the CWP ranged from 236 mg/L in the April 2014 sample to 1,080 mg/L in the June 2014 sample (Table 1). Concentrations of TDS in the effluent were above the SCS level in 6 out of the 12 months.

Similar to the TDS effluent levels, sulfate concentrations were above the SCS of 250 mg/L in 6 of the 12 monthly samples (Table 1). Sulfate ranged from a minimum of 22.8 mg/L in the April 2014 sample to a maximum of 547 mg/L in the June 2014 sample.

The ATR evaporative cooling process evaporates approximately one-half of the water volume and concentrates naturally occurring dissolved solids and additives 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.

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

| Sample Month | November | December | January | February | March | April | May | June[a] | July | August | September | October |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date | 11/19/13 | 12/17/13 | 01/07/14 | 02/18/14 | 03/20/14 | 04/17/14 | 05/20/14 | 06/04/14 | 07/17/14 | 08/20/14 | 09/11/14 | 10/02/14 |
| Nitrite + nitrate as nitrogen (mg/L) | 0.946 | 2.47 | 2.58 | 2.35 | 2.43 | 0.843 | 0.677 | 2.98<br>[3.01] | 0.887 | 2.62 | 0.896 | 0.844 |
| Total Kjeldahl nitrogen (mg/L) | 0.1 U[b] | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U<br>[0.1 U] | 0.189 | 0.569 | 0.161 | 0.1 U |
| Total nitrogen[c] (mg/L) | <1.046 | <2.57 | <2.68 | <2.45 | <2.53 | <0.943 | <0.777 | <3.08<br>[<3.11] | 1.076 | 3.189 | 1.057 | <0.944 |
| Total suspended solids (mg/L) | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U<br>[4.0 U] | 4.0 U | 4.0 U | 4.0 U | 4.0 U |
| Total dissolved solids (mg/L) | 315 | 923 | 856 | 906 | 897 | 236 | 256 | 1,080<br>[1,080] | 251 | 928 | 274 | 258 |
| Chloride (mg/L) | 13.3 | 33.2 | 31.2 | 40.5 | 31.3 | 9.87 | 10.5 | 40.5<br>[40.6] | 12 | 33.5 | 11.3 | 11.5 |
| Electrical conductivity (µS/cm) | 518 | 1,154 | 1,181 | 1,297 | 1,294 | 430 | 438 | 1,349 | 455 | 1,169 | 457 | 436 |
| Arsenic (mg/L) | 0.005 U | 0.005 U | 0.0067 | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U<br>[0.005 U] | 0.005 U | 0.00532 | 0.005 U | 0.005 U |
| Barium (mg/L) | 0.052 | 0.107 | 0.116 | 0.124 | 0.104 | 0.0475 | 0.0447 | 0.141<br>[144] | 0.0476 | 0.107 | 0.0489 | 0.0463 |
| 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<br>[0.001 U] | 0.001 U | 0.001 U | 0.001 U | 0.001 U |
| Chromium (mg/L) | 0.0041 | 0.0081 | 0.0093 | 0.0078 | 0.00821 | 0.00357 | 0.00418 | 0.0117<br>[0.0119] | 0.00384 | 0.00964 | 0.00438 | 0.0045 |
| 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<br>[0.0025 U] | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U |
| Copper (mg/L) | 0.0023 | 0.0043 | 0.0046 | 0.0057 | 0.00238 | 0.00313 | 0.0035 | 0.0041<br>[0.00498] | 0.00388 | 0.00546 | 0.00316 | 0.00485 |
| Fluoride (mg/L) | 0.183 | 0.409 | 0.417 | 0.382 | 0.383 | 0.154 | 0.179 | 0.549<br>[0.553] | 0.183 | 0.378 | 0.186 | 0.179 |
| Iron (mg/L) | 0.0364 | 0.0939 | 0.141 | 0.131 | 0.116 | 0.0646 | 0.214 | 0.248<br>[0.242] | 0.0771 | 0.143 | 0.0894 | 0.0942 |
| Manganese (mg/L) | 0.0025 U | 0.0032 | 0.0025 U | 0.0037 | 0.0025 U | 0.0025 U | 0.0037 | 0.0071<br>[0.00775] | 0.0025 U | 0.0031 | 0.0025 U | 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<br>0.0002 U | 0.0002 U | 0.0002 U | 0.0002 U | 0.0002 U |
| Selenium (mg/L) | 0.0014 | 0.0038 | 0.0039 | 0.0031 | 0.00385 | 0.00119 | 0.000823 | 0.003<br>0.00315 | 0.00113 | 0.00393 | 0.00143 | 0.00122 |
| 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<br>[0.005 U] | 0.005 U | 0.005 U | 0.005 U | 0.005 U |
| Sulfate (mg/L) | 64.6 | 429 | 429 | 425 | 422 | 22.8 | 27.5 | 547<br>[549] | 35.5 | 428 | 40.2 | 30.6 |

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

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

c. 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.

## 3.3 Flow Volumes and Hydraulic Loading Rates

Daily flow readings were taken by ATR Complex CWP Operations during the 2014 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 2013 | 696,184 | 352,490 | 1,029,680 | 20.89 |
| December 2013 | 437,048 | 404,110 | 529,170 | 13.55 |
| January 2014 | 661,069 | 359,560 | 1,030,960 | 20.49 |
| February 2014 | 634,729 | 324,550 | 1,083,950 | 17.77 |
| March 2014 | 536,734 | 317,910 | 1,013,900 | 16.64 |
| April 2014 | 685,426 | 379,880 | 1,007,500 | 20.56 |
| May 2014 | 765,527 | 284,200 | 938,600 | 23.73 |
| June 2014 | 706,183 | 432,470 | 1,032,760 | 21.19 |
| July 2014 | 687,742 | 276,600 | 872,000 | 21.32 |
| August 2014 | 456,718 | 323,780 | 810,500 | 14.16 |
| September 2014 | 779,054 | 580,360 | 942,800 | 23.37 |
| October 2014 | 794,670 | 666,120 | 881,700 | 24.63 |
| Yearly summary | 652,884 | 276,600 | 1,083,950 | 238.30 |

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 652,884 gpd. Daily flow ranged from a low of 276,600 gpd and a high of 1,083,950 gpd for the permit year (Table 2).

Total effluent flow volume was 238.30 MG for the 2014 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 and continuing into the 2014 permit year, the flow meter calibration frequency was increased from annually to quarterly. The more frequent calibrations were performed to assess potential instrumentation drift. For the 2014 permit year, the flow meter was calibrated on December 3, 2013, February 26, 2014, and May 27, 2014, by the ATR Complex maintenance organization. The calibrations were performed to +/- 2% of full scale (full scale = 1400 gpm). The as-found calibration of the flow meter was determined to be satisfactory. With the completion of the May 27, 2014, calibration, the planned frequency of the flow meter calibration was returned to annual.

# 4. GROUNDWATER MONITORING

The groundwater monitoring sections provide information concerning the INL sampling program, analytical methods used, and 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 R&MS personnel performed the April and October 2014 groundwater sampling. The R&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 for other situations authorized by the DEQ in writing. Idaho National Laboratory 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 R&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 analysis.

## 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 (Figure 2):

- USGS-065 (GW-016102)
- TRA-07 (GW-016103)
- USGS-076 (GW-016104)

- TRA-08 (GW-016105)
- Middle-1823 (GW-016106).

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.

Samples could not be collected from Well TRA-07 during the scheduled sampling event on October 6, 2014, due to insufficient water volume. A second attempt to sample this well on October 16, 2014, was successful. Regulatory and Monitoring Services personnel reduced the pumping rate to approximately 1 gpm, which allowed enough water to purge the well, and collected the required samples. For 2014, all five wells yielded enough water to allow samples to be collected in April and October.

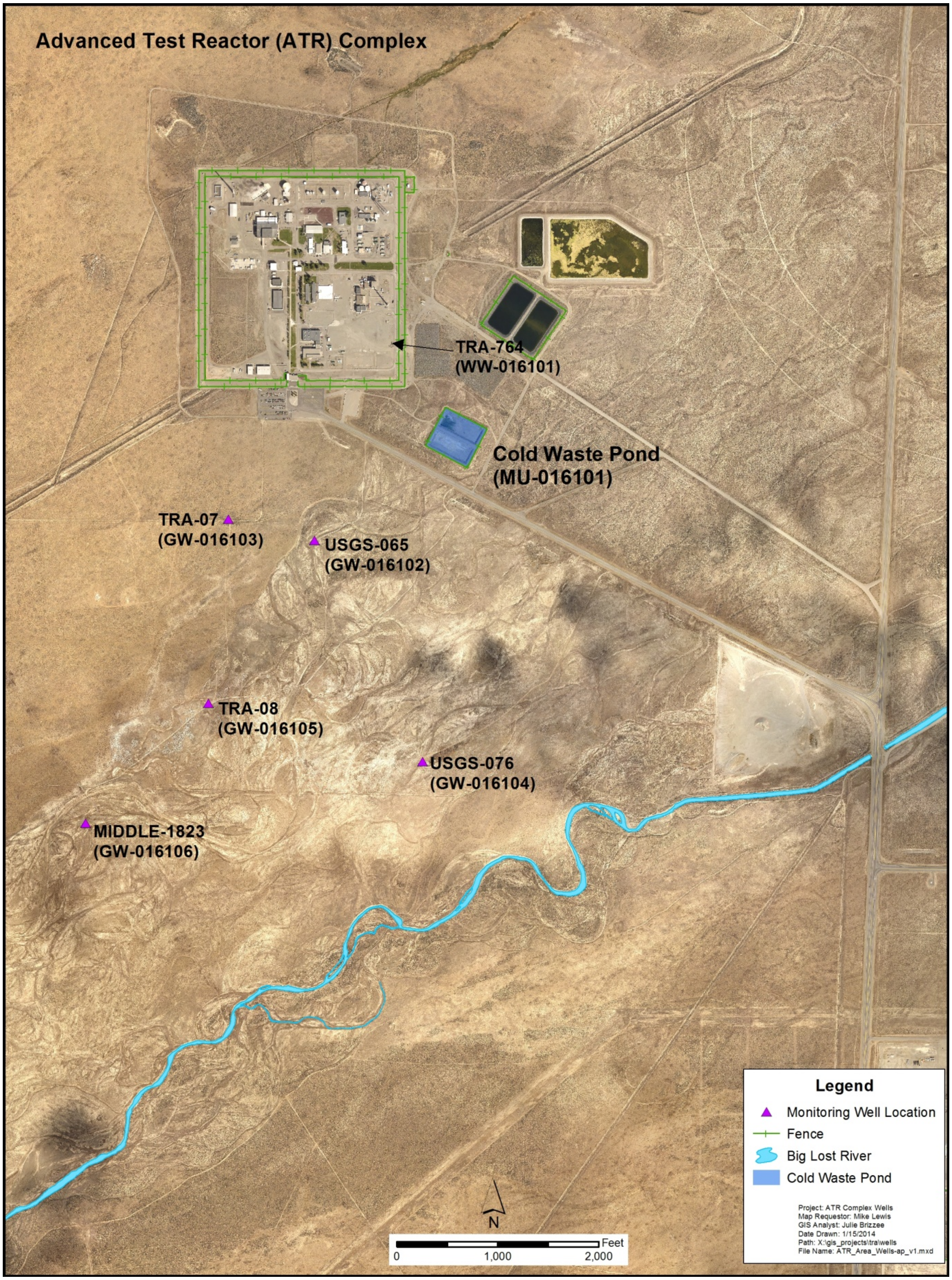


Figure 2. Locations of the Advanced Test Reactor Complex Cold Waste Pond Industrial Wastewater Reuse Permit monitoring wells.

## 4.4 Groundwater Monitoring Results

Table 3 shows the 2014 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 2014 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.

The Al concentrations in the April and October unfiltered sample results for Well TRA-07 were above the SCS of 0.2 mg/L (Table 3). Well TRA-08 October sample result was above the SCS for Al. The respective filtered sample results for both wells were significantly below the SCS (Table 3).

The Fe concentratons in the April and October unfiltered samples for Wells TRA-07 and TRA-08 were above the SCS of 0.3 mg/L (Table 3). The respective filtered sample results were significantly below the SCS for both wells (Table 3).

Monitoring wells USGS-065 and TRA-07 are located southwest of the CWP. April and October sample results in both of these wells show similar elevated levels of sulfate and TDS relative to the downgradient 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. All five wells were below the respective TDS and sulfate SCSs.

## 4.5 Water Table Information

Depth to water and water table elevations for the April and October sampling events are shown in Figure 3 and Figure 4, 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 2014 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 | 04/09/14 | 10/07/14 | 04/09/14 | 10/16/14 | 04/08/14 | 10/07/14 | 04/07/14 | 10/06/14 | 04/08/14 | 10/06/14 | |
| Water Table Depth (ft below ground surface) | 475.6 | 477.04 | 484.13 | 485.74 {485.62}[b] | 483.85 | 485.22 | 489.7 | 491.06 | 493.54 | 494.92 | NA[c] |
| Water Table Elevation (above mean sea level in ft)[d] | 4452.92 | 4451.48 | 4451.01 | 4449.4 {4449.52}[b] | 4449.39 | 4447.99 | 4449.36 | 4448 | 4449.33 | 4447.95 | NA |
| Borehole Correction Factor (ft)[e] | NA | NA | 0.06 | 0.06 | NA | NA | 0.63 | 0.63 | NA | NA | NA |
| pH | 7.31 | 7.47 | 7.38 | 7.61 | 7.33 | 7.75 | 7.52 | 7.86 | 7.34 | 7.52 | 6.5 to 8.5 (SCS) |
| Total Kjeldahl nitrogen (mg/L) | 0.1 U[f] | 0.1 U | 0.1 U | 0.1 U | 0.1 U [0.1 U][g] | 0.1 U | 0.1 U | 0.121 | 0.1 U | 0.131 | 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) | 1.46 | 1.40 | 1.0 | 0.958 | 1.01 [1.01] | 0.996 | 0.968 | 0.925 | 0.96 | 0.922 | 10 (PCS) |
| Total nitrogen[h] (mg/L) | <1.61 | <1.55 | <1.15 | <1.108 | <1.16 [<1.16] | <1.146 | <1.118 | <1.096 | <1.11 | <1.103 | NA |
| Total dissolved solids (mg/L) | 410 | 443 | 424 | 449 | 241 [243] | 267 | 254 | 259 | 249 | 270 | 500 (SCS) |
| Aluminum (mg/L) | 0.0113 (0.00957)[i] | 0.0194 (0.0159) | **0.568**[j] (0.0174) | **1.980** (0.0105) | 0.00656 [0.00647] (0.00774) [(0.0631)] | 0.00626 (0.00596) | 0.0855 (0.016) | **0.350** (0.00669) | 0.124 (0.00377) | 0.0853 (0.0033) | 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) | 0.00138 | 0.00115 | 0.00141 | 0.00136 | 0.00173 [0.00176] | 0.00147 | 0.00186 | 0.0016 | 0.00186 | 0.00159 | 0.05 (PCS) |
| Barium (mg/L) | 0.0423 | 0.0427 | 0.0621 | 0.0944 | 0.0667 [0.0667] | 0.0677 | 0.0765 | 0.054 | 0.0599 | 0.0626 | 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) | 19.8 | 20.0 | 21.1 | 20.8 | 13.7 [13.7] | 13.0 | 11.6 | 11.5 | 12.1 | 11.4 | 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 | 04/09/14 | 10/07/14 | 04/09/14 | 10/16/14 | 04/08/14 | 10/07/14 | 04/07/14 | 10/06/14 | 04/08/14 | 10/06/14 | |
| 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 | 0.0228 | 0.0121 | 0.0025 U [0.0025 U] | 0.0025 U | 0.00944 | 0.00315 | 0.00896 | 0.0025 U | 1.3 (PCS) |
| Fluoride (mg/L) | 0.234 | 0.221 | 0.212 | 0.213 | 0.158 [0.155] | 0.185 | 0.175 | 0.203 | 0.156 | 0.197 | 4 (PCS) |
| Iron (mg/L) | 0.260 (0.0589) | 0.163 (0.0860) | **0.575** (0.0941) | **2.030** (0.0789) | 0.050 U [0.0588] (0.0519) [(0.0583)] | 0.149 (0.0785) | **0.534** (0.0657) | **0.563** (0.0773) | 0.141 (0.0506) | 0.154 (0.0743) | 0.3 (SCS) |
| Manganese (mg/L) | 0.0025 U (0.0025 U) | 0.0025 U (0.0025 U) | 0.00784 (0.0025 U) | 0.0285 (0.0025 U) | 0.0025 U [0.0025 U] (0.0025 U) [(0.0025 U)] | 0.00311 (0.0025 U) | 0.0125 (0.0025 U) | 0.00954 (0.0025 U) | 0.00348 (0.0025 U) | 0.00516 (0.00296) | 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) | 0.00197 | 0.00163 | 0.00153 | 0.00122 | 0.00134 [0.00137] | 0.00102 | 0.00137 | 0.00116 | 0.00124 | 0.00102 | 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) | 161 | 155 | 160 | 151 | 33.6 [33.8] | 33.6 | 49 | 47.8 | 35.8 | 34.0 | 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. Water level recorded on October 6, 2014 while attempting to collect a groundwater sample. Because of insufficient water volume, the groundwater sample could not be collected.

c. NA- Not applicable.

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

e. 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 table elevations for these two wells have been adjusted using the borehole correction factors that were determined from the gyroscopic surveys.

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.

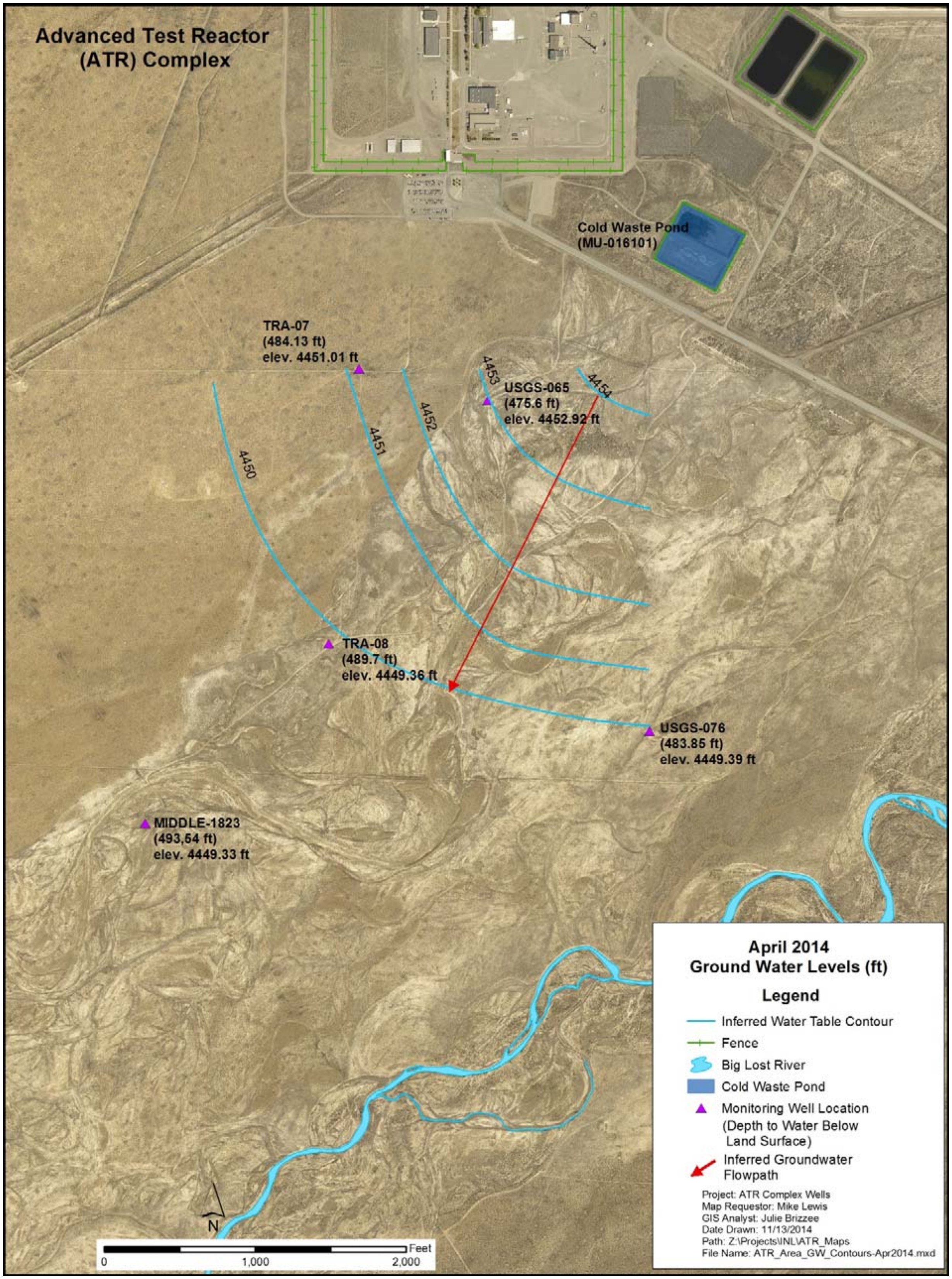

Figure 3. Groundwater contour map based on the April 2014 water level measurements.

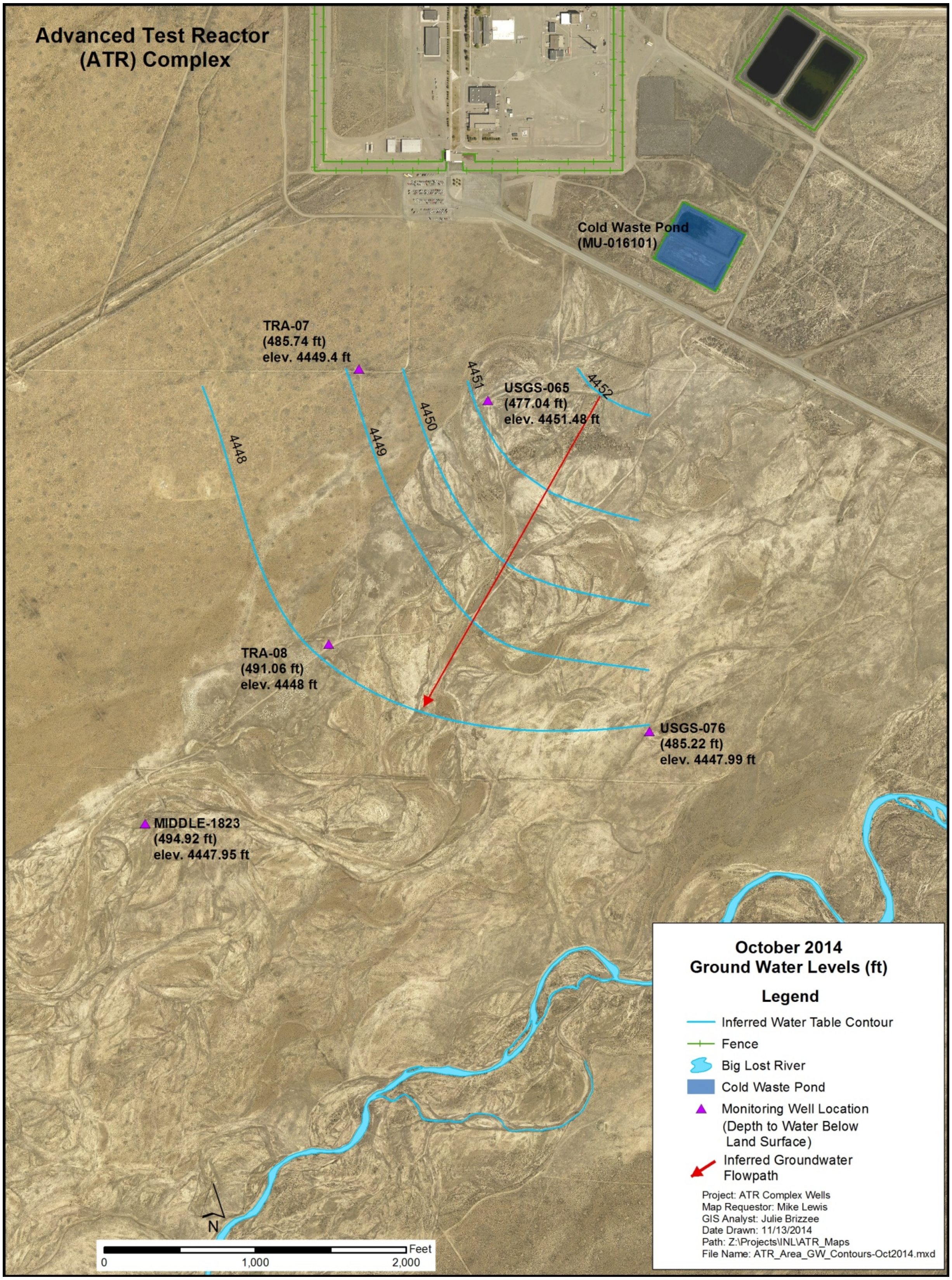


Figure 4. Groundwater contour map based on the October 2014 water level measurements.

# 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 2014 reporting year.

# 6. ENVIRONMENTAL IMPACTS

The IWRP allows 300 MG/year as a 5-year annual average, not to exceed 375 MG annually. The total volume discharged to the CWP for this period (November 1, 2013–October 31, 2014) was 238.30 MG. The average daily flow during the 2014 permit year was 652,884 gallons. The 5-year annual average was 198 MG. 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 (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 <0.777 mg/L to 3.189 mg/L (Table 1). Nitrogen can be lost or removed from the soil by leaching, ammonia volatilization, and denitrification. Total nitrogen in the nearest downgradient well (USGS-065) from the CWP was <1.61 mg/L and <1.55 mg/L in the April and October 2014 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 and October 2014 USGS-065 nitrate sample results were 1.46 mg/L and 1.40 mg/L, 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 (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 2014 permit year effluent monthly samples ranged from a low of 22.8 mg/L to a high of 547 mg/L. The TDS effluent concentrations ranged from a low of 236 mg/L to a high of 1,080 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 5 and 6 show the sulfate and TDS concentrations in samples collected from the IWRP CWP monitoring wells over the last 5 years. Sulfate and TDS data were 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 5, the sulfate concentrations in the two wells have remained stable at approximately 160 mg/L and below the SCS of 250 mg/L.

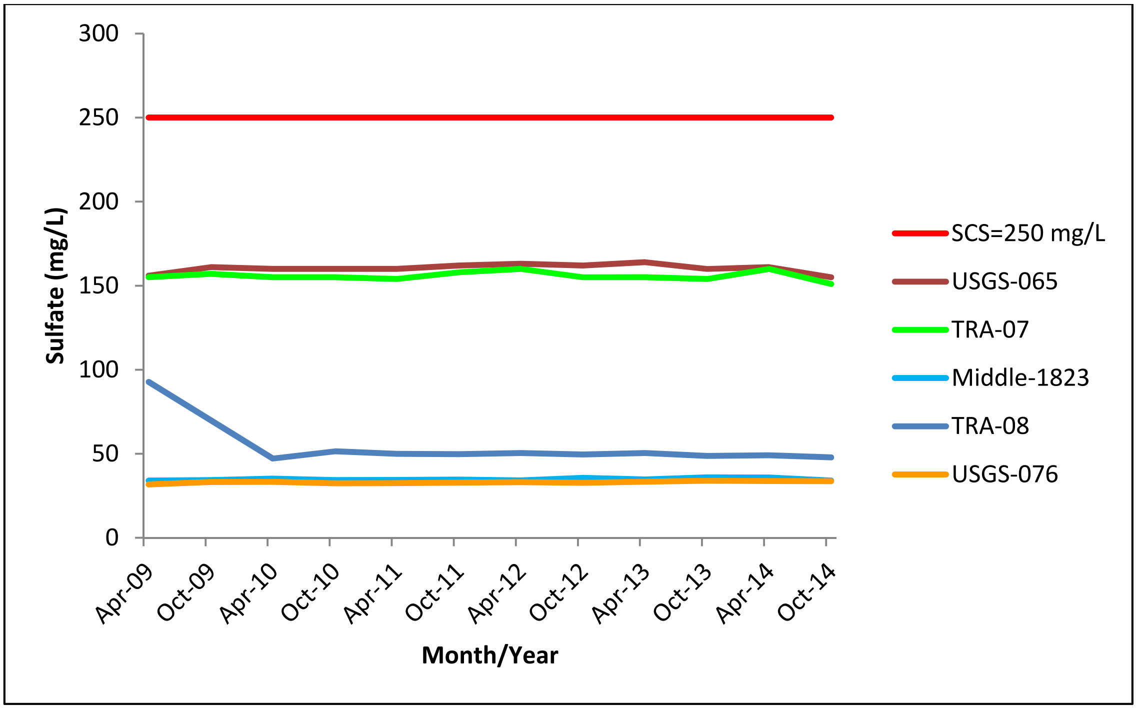


Figure 5. Sulfate concentrations in the Cold Waste Pond monitoring wells.

Similar to sulfate, TDS concentrations are the highest in Wells USGS-065 and TRA-07 (Figure 6). 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 5 years.

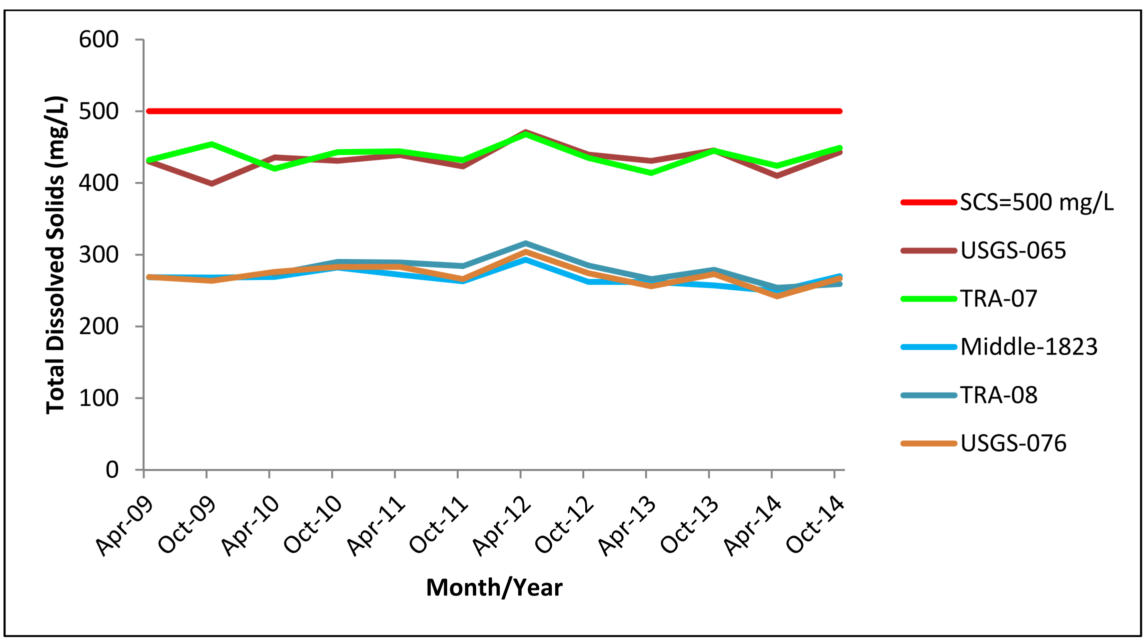


Figure 6. Total dissolved solids concentrations in the Cold Waste Pond monitoring wells.

Elevated sulfate and TDS concentrations in the groundwater (Figures 5 and 6) are found in wells (USGS-065 and TRA-07) closest to the CWP. The sulfate and TDS quickly dissipate with distance from the pond. This can be seen when comparing the 2014 permit year sulfate and TDS concentrations found in Wells USGS-065 and Middle-1823 (Figures 5 and 6). Well USGS-065, located approximately 1,200 ft downgradient of the CWP, had a maximum sulfate concentration of 161 mg/L and a TDS concentration of 443 mg/L. Well Middle-1823, located approximately 4,000 ft downgradient from the CWP, had maximum sulfate and TDS concentrations of 35.8 mg/L and 270 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 5 and 6).

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 downgradient 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.

Figures 7, 8, and 9 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 2014. 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.

For the April and October 2014 groundwater sampling events, unfiltered sample results for Al in Well TRA-07 were above the respective SCS (Figure 7). Well TRA-08 exceeded the Al SCS in the October 2014 sample. Unfiltered sample results for Fe were above the respective SCS in the April and October samples in Wells TRA-07 and TRA-08 (Figure 8). The April and October 2014 Mn concentrations in Wells TRA-07 and TRA-08 were below the SCS in the unfiltered samples (Figure 9). All filtered sample results for these parameters were well below the applicable SCSs.

As shown in Figure 7, 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. The Al concentration in Well TRA-08 dropped below the SCS in the April 2014 sample but exceeded the SCS again in the October 2014 sample. All filtered Al sample concentrations in all three wells were significantly less than the SCS.

Similar to Al concentrations, Fe was above the SCS in the unfiltered samples collected from Wells TRA-07 and TRA-08 (Figure 8). 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 9). 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 9 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.

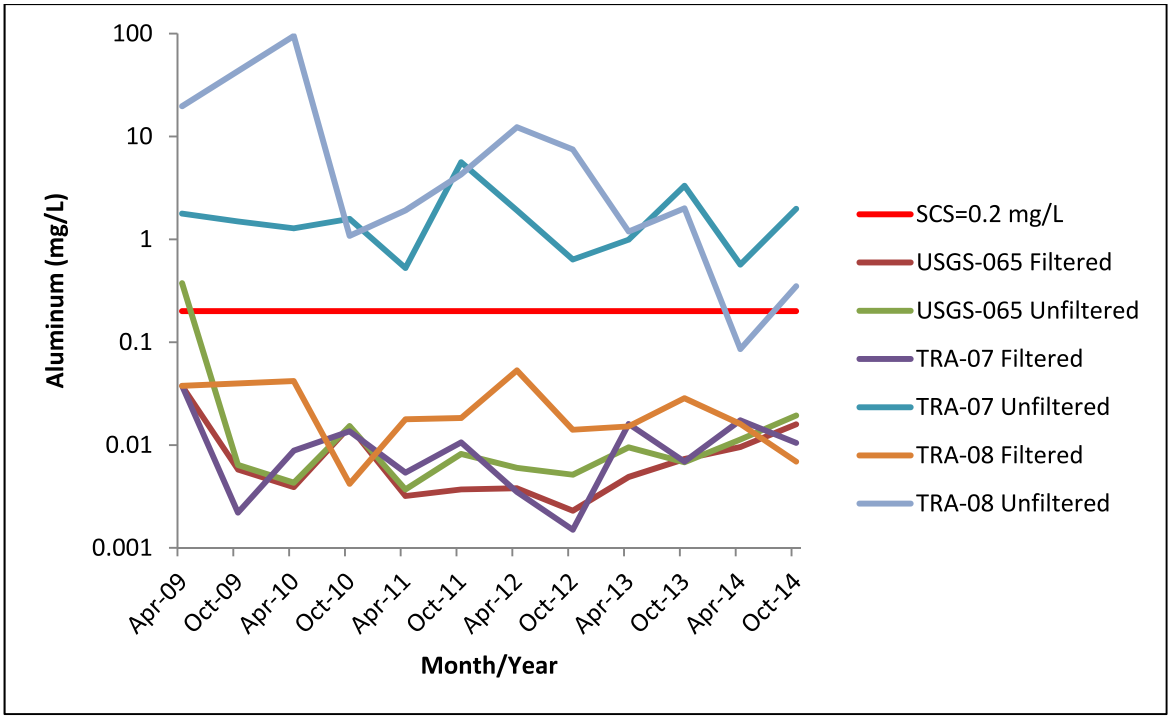


Figure 7. Aluminum concentrations in filtered and unfiltered samples from Wells USGS-065, TRA-07, and TRA-08 from April 2009 through October 2014.

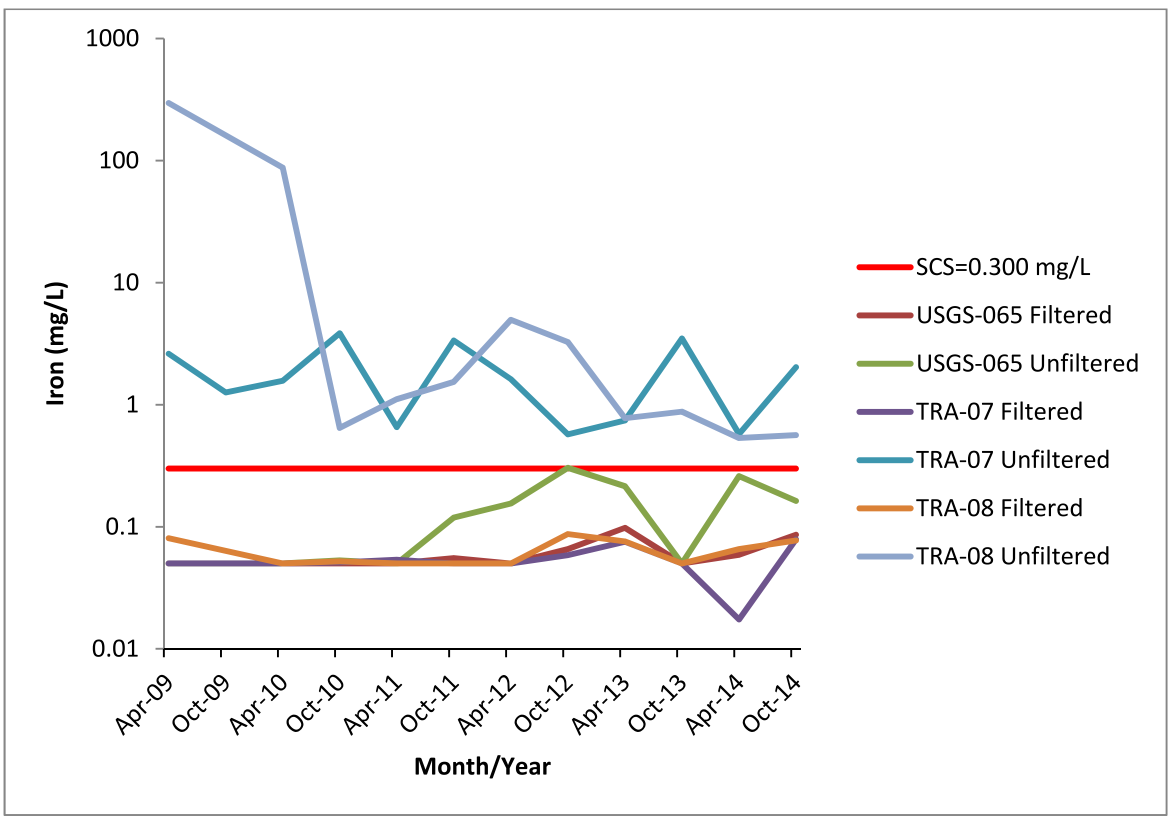


Figure 8. Iron concentrations in filtered and unfiltered samples from Wells USGS-065, TRA-07, and TRA-08 from April 2009 through October 2014.

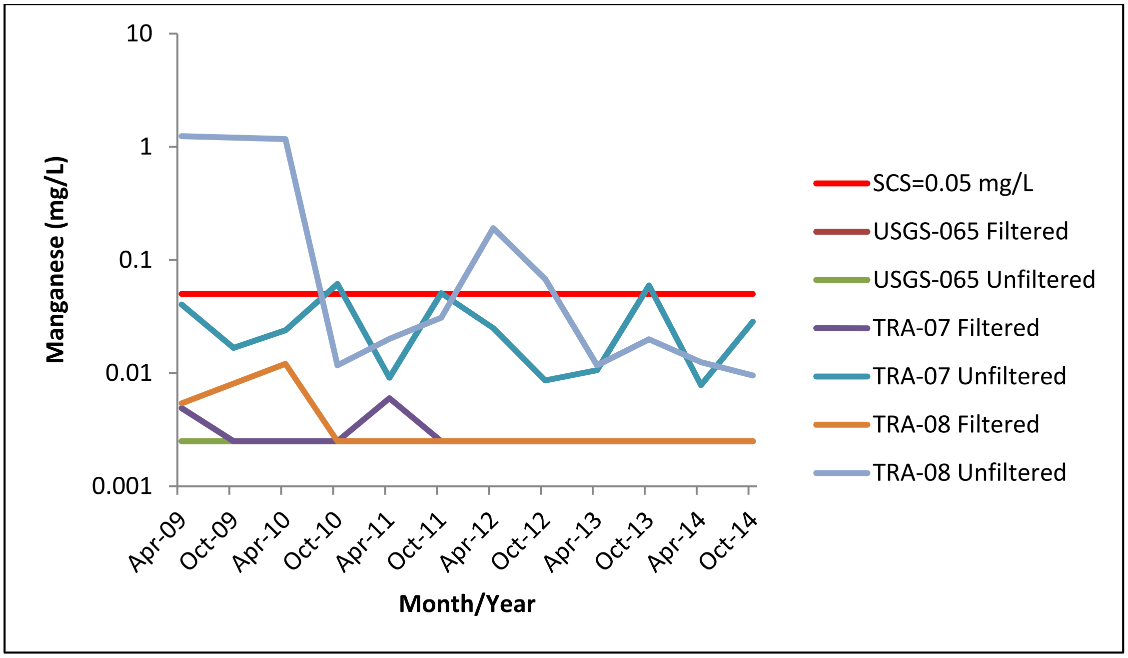


Figure 9. Manganese concentrations in filtered and unfiltered samples from Wells USGS-065, TRA-07, and TRA-08 from April 2009 through October 2014.

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 2012 sample than in the April sample. Iron is a common element in the minerals in the basalt that comprises the major rock formation of the Eastern Snake River Plain aquifer. The unfiltered sample result from the April 2014 sampling event was below the SCS at 0.260 mg/L and the October 2014 unfiltered sample results was 0.163 mg/L. Aluminum and Mn concentrations remain at low levels in this well.

The DEQ staff analysis dated June 25, 2013, for the draft IWRP 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.

Figure 10 shows the Al, Fe, and Mn concentrations in samples collected from the effluent to the CWP for the 2009 through 2014 permit years compared to the applicable groundwater SCSs. Although not a permit required parameter in the effluent, Al sample results are presented in Figure 10 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.

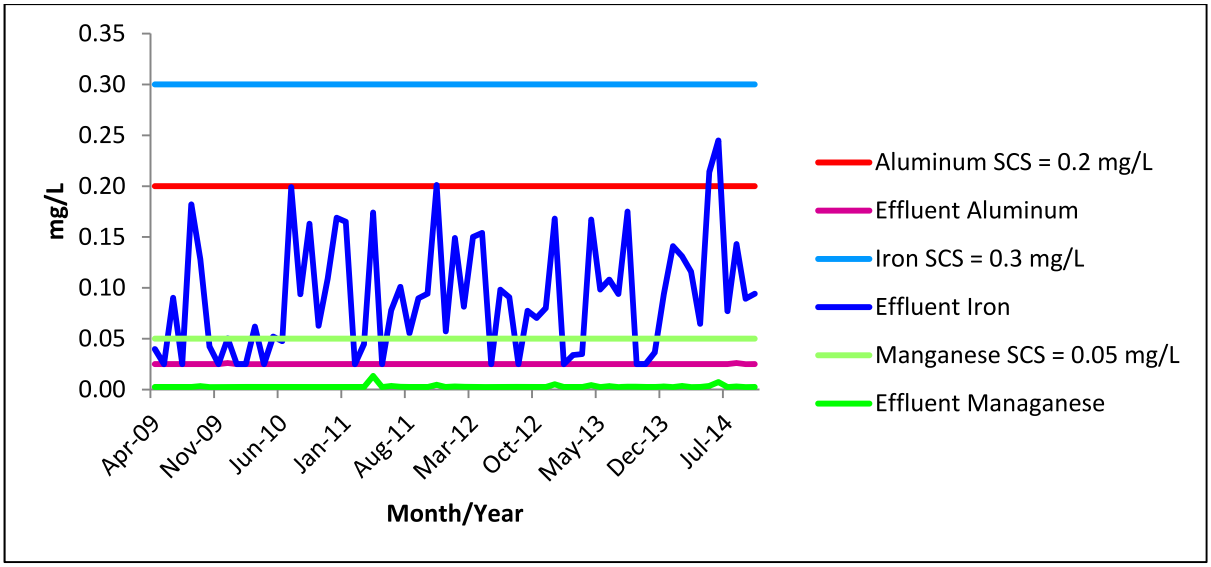


Figure 10. Effluent aluminum, iron, and manganese concentrations compared to the groundwater secondary constituent standards.

Concentrations of Al, Fe, and Mn in samples from the effluent (Figure 10) 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 of 0.0025 mg/L. Iron concentrations in the effluent ranged from below the minimum detection level (0.025 mg/L) to a maximum of 0.245 mg/L but still 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.

All three metals (Al, Fe, and Mn) can influence the color of the water (Table 4). 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 4. Noticeable effects of selected metals in drinking water (EPA 2014).

| **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.

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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 2014 permit year.

| Date | Daily Discharge Volume (gallons) |
|---|---|
| 11/01/13 | 722,710 |
| 11/02/13 | 803,300 |
| 11/03/13 | 862,630 |
| 11/04/13 | 763,360 |
| 11/05/13 | 774,500 |
| 11/06/13 | 784,400 |
| 11/07/13 | 698,730 |
| 11/08/13 | 387,330 |
| 11/09/13 | 377,460 |
| 11/10/13 | 352,490 |
| 11/11/13 | 406,420 |
| 11/12/13 | 433,610 |
| 11/13/13 | 736,420 |
| 11/14/13 | 780,820 |
| 11/15/13 | 676,790 |
| 11/16/13 | 718,330 |
| 11/17/13 | 687,810 |
| 11/18/13 | 790,830 |
| 11/19/13 | 775,600 |
| 11/20/13 | 687,370 |
| 11/21/13 | 885,300 |
| 11/22/13 | 905,000 |
| 11/23/13 | 919,500 |
| 11/24/13 | 949,780 |
| 11/25/13 | 935,510 |
| 11/26/13 | 913,740 |
| 11/27/13 | 1,029,680 |
| 11/28/13 | 374,890 |
| 11/29/13 | 378,750 |
| 11/30/13 | 372,450 |
| 12/01/13 | 529,170 |
| 12/02/13 | 436,010 |
| 12/03/13 | 481,370 |
| 12/04/13 | 482,820 |
| 12/05/13 | 418,380 |
| 12/06/13 | 450,030 |

| Date | Daily Discharge Volume (gallons) |
|---|---|
| 12/07/13 | 446,760 |
| 12/08/13 | 428,600 |
| 12/09/13 | 480,790 |
| 12/10/13 | 414,720 |
| 12/11/13 | 406,060 |
| 12/12/13 | 465,270 |
| 12/13/13 | 439,390 |
| 12/14/13 | 416,100 |
| 12/15/13 | 404,110 |
| 12/16/13 | 432,070 |
| 12/17/13 | 432,800 |
| 12/18/13 | 409,620 |
| 12/19/13 | 447,630 |
| 12/20/13 | 426,700 |
| 12/21/13 | 409,850 |
| 12/22/13 | 433,900 |
| 12/23/13 | 415,130 |
| 12/24/13 | 447,860 |
| 12/25/13 | 414,760 |
| 12/26/13 | 431,960 |
| 12/27/13 | 412,340 |
| 12/28/13 | 416,200 |
| 12/29/13 | 422,100 |
| 12/30/13 | 432,400 |
| 12/31/13 | 463,600 |
| 01/01/14 | 424,880 |
| 01/02/14 | 523,990 |
| 01/03/14 | 408,250 |
| 01/04/14 | 543,330 |
| 01/05/14 | 361,150 |
| 01/06/14 | 438,500 |
| 01/07/14 | 405,610 |
| 01/08/14 | 431,060 |
| 01/09/14 | 454,980 |
| 01/10/14 | 384,790 |
| 01/11/14 | 473,440 |
| 01/12/14 | 359,560 |

| Date | Daily Discharge Volume (gallons) |
|---|---|
| 01/13/14 | 439,590 |
| 01/14/14 | 428,070 |
| 01/15/14 | 394,460 |
| 01/16/14 | 454,300 |
| 01/17/14 | 787,540 |
| 01/18/14 | 859,530 |
| 01/19/14 | 955,710 |
| 01/20/14 | 823,060 |
| 01/21/14 | 1,030,960 |
| 01/22/14 | 861,110 |
| 01/23/14 | 1,014,500 |
| 01/24/14 | 855,190 |
| 01/25/14 | 862,570 |
| 01/26/14 | 954,560 |
| 01/27/14 | 935,350 |
| 01/28/14 | 953,910 |
| 01/29/14 | 879,430 |
| 01/30/14 | 975,720 |
| 01/31/14 | 818,050 |
| 02/01/14 | 846,030 |
| 02/02/14 | 902,410 |
| 02/03/14 | 902,110 |
| 02/04/14 | 932,900 |
| 02/05/14 | 911,150 |
| 02/06/14 | 1,083,950 |
| 02/07/14 | 773,770 |
| 02/08/14 | 967,780 |
| 02/09/14 | 937,990 |
| 02/10/14 | 739,600 |
| 02/11/14 | 942,160 |
| 02/12/14 | 936,110 |
| 02/13/14 | 579,290 |
| 02/14/14 | 324,550 |
| 02/15/14 | 343,700 |
| 02/16/14 | 407,490 |
| 02/17/14 | 431,120 |
| 02/18/14 | 449,870 |
| 02/19/14 | 417,640 |
| 02/20/14 | 449,300 |
| 02/21/14 | 403,630 |
| 02/22/14 | 431,000 |
| 02/23/14 | 429,660 |
| 02/24/14 | 435,270 |
| 02/25/14 | 447,430 |

| Date | Daily Discharge Volume (gallons) |
|---|---|
| 02/26/14 | 407,040 |
| 02/27/14 | 497,310 |
| 02/28/14 | 442,150 |
| 03/01/14 | 367,320 |
| 03/02/14 | 413,110 |
| 03/03/14 | 447,460 |
| 03/04/14 | 447,340 |
| 03/05/14 | 422,860 |
| 03/06/14 | 471,460 |
| 03/07/14 | 430,250 |
| 03/08/14 | 415,320 |
| 03/09/14 | 440,750 |
| 03/10/14 | 418,730 |
| 03/11/14 | 450,180 |
| 03/12/14 | 409,050 |
| 03/13/14 | 401,310 |
| 03/14/14 | 427,000 |
| 03/15/14 | 466,000 |
| 03/16/14 | 369,660 |
| 03/17/14 | 411,080 |
| 03/18/14 | 431,130 |
| 03/19/14 | 429,670 |
| 03/20/14 | 397,270 |
| 03/21/14 | 1,013,900 |
| 03/22/14 | 829,510 |
| 03/23/14 | 987,440 |
| 03/24/14 | 754,100 |
| 03/25/14 | 882,500 |
| 03/26/14 | 963,910 |
| 03/27/14 | 923,230 |
| 03/28/14 | 767,540 |
| 03/29/14 | 317,910 |
| 03/30/14 | 393,560 |
| 03/31/14 | 338,210 |
| 04/01/14 | 435,220 |
| 04/02/14 | 379,880 |
| 04/03/14 | 425,090 |
| 04/04/14 | 461,530 |
| 04/05/14 | 432,840 |
| 04/06/14 | 458,540 |
| 04/07/14 | 383,330 |
| 04/08/14 | 432,200 |
| 04/09/14 | 453,580 |
| 04/10/14 | 470,400 |

| Date | Daily Discharge Volume (gallons) |
|---|---|
| 04/11/14 | 634,370 |
| 04/12/14 | 979,900 |
| 04/13/14 | 1,007,500 |
| 04/14/14 | 890,490 |
| 04/15/14 | 763,650 |
| 04/16/14 | 818,350 |
| 04/17/14 | 814,190 |
| 04/18/14 | 770,320 |
| 04/19/14 | 838,000 |
| 04/20/14 | 790,750 |
| 04/21/14 | 776,250 |
| 04/22/14 | 809,640 |
| 04/23/14 | 788,860 |
| 04/24/14 | 833,650 |
| 04/25/14 | 958,150 |
| 04/26/14 | 594,950 |
| 04/27/14 | 740,610 |
| 04/28/14 | 820,050 |
| 04/29/14 | 794,690 |
| 04/30/14 | 805,790 |
| 05/01/14 | 765,830 |
| 05/02/14 | 872,280 |
| 05/03/14 | 862,210 |
| 05/04/14 | 721,870 |
| 05/05/14 | 748,500 |
| 05/06/14 | 900,880 |
| 05/07/14 | 751,230 |
| 05/08/14 | 798,710 |
| 05/09/14 | 877,290 |
| 05/10/14 | 785,500 |
| 05/11/14 | 778,060 |
| 05/12/14 | 816,270 |
| 05/13/14 | 784,350 |
| 05/14/14 | 630,480 |
| 05/15/14 | 738,910 |
| 05/16/14 | 714,110 |
| 05/17/14 | 818,000 |
| 05/18/14 | 790,730 |
| 05/19/14 | 800,280 |
| 05/20/14 | 838,800 |
| 05/21/14 | 879,050 |
| 05/22/14 | 720,270 |
| 05/23/14 | 773,150 |
| 05/24/14 | 718,480 |

| Date | Daily Discharge Volume (gallons) |
|---|---|
| 05/25/14 | 792,420 |
| 05/26/14 | 799,060 |
| 05/27/14 | 825,840 |
| 05/28/14 | 777,130 |
| 05/29/14 | 938,600 |
| 05/30/14 | 284,200 |
| 05/31/14 | 428,860 |
| 06/01/14 | 563,670 |
| 06/02/14 | 432,470 |
| 06/03/14 | 560,470 |
| 06/04/14 | 763,440 |
| 06/05/14 | 869,760 |
| 06/06/14 | 623,000 |
| 06/07/14 | 748,700 |
| 06/08/14 | 809,300 |
| 06/09/14 | 870,930 |
| 06/10/14 | 897,400 |
| 06/11/14 | 498,580 |
| 06/12/14 | 586,530 |
| 06/13/14 | 487,800 |
| 06/14/14 | 511,900 |
| 06/15/14 | 536,550 |
| 06/16/14 | 578,840 |
| 06/17/14 | 544,140 |
| 06/18/14 | 631,490 |
| 06/19/14 | 1,032,760 |
| 06/20/14 | 577,330 |
| 06/21/14 | 893,500 |
| 06/22/14 | 705,000 |
| 06/23/14 | 828,250 |
| 06/24/14 | 878,440 |
| 06/25/14 | 723,450 |
| 06/26/14 | 881,200 |
| 06/27/14 | 764,330 |
| 06/28/14 | 843,640 |
| 06/29/14 | 773,360 |
| 06/30/14 | 769,270 |
| 07/01/14 | 853,880 |
| 07/02/14 | 830,510 |
| 07/03/14 | 815,370 |
| 07/04/14 | 872,000 |
| 07/05/14 | 759,500 |
| 07/06/14 | 782,000 |
| 07/07/14 | 788,270 |

| Date | Daily Discharge Volume (gallons) |
|---|---|
| 07/08/14 | 868,600 |
| 07/09/14 | 738,830 |
| 07/10/14 | 835,240 |
| 07/11/14 | 822,230 |
| 07/12/14 | 843,000 |
| 07/13/14 | 785,300 |
| 07/14/14 | 754,830 |
| 07/15/14 | 806,720 |
| 07/16/14 | 862,630 |
| 07/17/14 | 809,820 |
| 07/18/14 | 719,560 |
| 07/19/14 | 802,400 |
| 07/20/14 | 723,120 |
| 07/21/14 | 748,850 |
| 07/22/14 | 794,700 |
| 07/23/14 | 483,990 |
| 07/24/14 | 276,600 |
| 07/25/14 | 398,340 |
| 07/26/14 | 433,340 |
| 07/27/14 | 371,330 |
| 07/28/14 | 441,710 |
| 07/29/14 | 427,280 |
| 07/30/14 | 445,700 |
| 07/31/14 | 424,350 |
| 08/01/14 | 447,250 |
| 08/02/14 | 463,210 |
| 08/03/14 | 488,720 |
| 08/04/14 | 323,780 |
| 08/05/14 | 433,330 |
| 08/06/14 | 423,350 |
| 08/07/14 | 440,110 |
| 08/08/14 | 411,010 |
| 08/09/14 | 435,000 |
| 08/10/14 | 453,700 |
| 08/11/14 | 394,110 |
| 08/12/14 | 439,540 |
| 08/13/14 | 463,200 |
| 08/14/14 | 460,870 |
| 08/15/14 | 465,870 |
| 08/16/14 | 374,190 |
| 08/17/14 | 412,600 |
| 08/18/14 | 457,910 |
| 08/19/14 | 404,790 |
| 08/20/14 | 435,780 |

| Date | Daily Discharge Volume (gallons) |
|---|---|
| 08/21/14 | 425,900 |
| 08/22/14 | 448,340 |
| 08/23/14 | 373,850 |
| 08/24/14 | 451,850 |
| 08/25/14 | 471,200 |
| 08/26/14 | 404,040 |
| 08/27/14 | 450,810 |
| 08/28/14 | 409,950 |
| 08/29/14 | 476,580 |
| 08/30/14 | 806,920 |
| 08/31/14 | 810,500 |
| 09/01/14 | 863,090 |
| 09/02/14 | 720,160 |
| 09/03/14 | 751,210 |
| 09/04/14 | 892,180 |
| 09/05/14 | 758,600 |
| 09/06/14 | 794,500 |
| 09/07/14 | 753,530 |
| 09/08/14 | 580,360 |
| 09/09/14 | 597,210 |
| 09/10/14 | 758,400 |
| 09/11/14 | 845,420 |
| 09/12/14 | 780,840 |
| 09/13/14 | 910,960 |
| 09/14/14 | 738,520 |
| 09/15/14 | 757,290 |
| 09/16/14 | 764,740 |
| 09/17/14 | 793,450 |
| 09/18/14 | 762,130 |
| 09/19/14 | 942,800 |
| 09/20/14 | 752,390 |
| 09/21/14 | 723,190 |
| 09/22/14 | 812,950 |
| 09/23/14 | 762,490 |
| 09/24/14 | 792,600 |
| 09/25/14 | 878,450 |
| 09/26/14 | 712,140 |
| 09/27/14 | 836,040 |
| 09/28/14 | 684,200 |
| 09/29/14 | 837,310 |
| 09/30/14 | 814,460 |
| 10/01/14 | 798,770 |
| 10/02/14 | 790,940 |
| 10/03/14 | 823,180 |

| Date | Daily Discharge Volume (gallons) |
|---|---|
| 10/04/14 | 741,000 |
| 10/05/14 | 804,170 |
| 10/06/14 | 796,120 |
| 10/07/14 | 761,910 |
| 10/08/14 | 850,330 |
| 10/09/14 | 769,240 |
| 10/10/14 | 801,760 |
| 10/11/14 | 809,030 |
| 10/12/14 | 797,240 |
| 10/13/14 | 666,120 |
| 10/14/14 | 833,720 |
| 10/15/14 | 740,000 |
| 10/16/14 | 842,700 |
| 10/17/14 | 772,790 |
| 10/18/14 | 760,450 |

| Date | Daily Discharge Volume (gallons) |
|---|---|
| 10/19/14 | 833,330 |
| 10/20/14 | 778,430 |
| 10/21/14 | 808,130 |
| 10/22/14 | 801,400 |
| 10/23/14 | 881,700 |
| 10/24/14 | 784,610 |
| 10/25/14 | 823,200 |
| 10/26/14 | 781,040 |
| 10/27/14 | 838,920 |
| 10/28/14 | 764,550 |
| 10/29/14 | 791,410 |
| 10/30/14 | 770,480 |
| 10/31/14 | 818,100 |