Chapter 5. Compliance Monitoring for Drinking Water, Liquid Effluent, and WRP Site Performance

5. COMPLIANCE MONITORING FOR DRINKING WATER, LIQUID EFFLUENT, AND WASTEWATER REUSE PERMIT SITE PERFORMANCE

This chapter presents results from analyses of various water samples collected at both onsite and offsite locations. Results from sampling conducted by the Idaho National Laboratory (INL) and Idaho Cleanup Project (ICP) contractors are presented here. Results are compared to the appropriate and applicable regulatory limit for compliance standards to protect human health and the environment.

A general overview of the organizations responsible for the various types of water monitoring at the INL Site is presented in Section 5.1. Sections 5.2 describes liquid effluent and related groundwater monitoring as required by the city of Idaho Falls and Idaho Wastewater Reuse Permits (WRPs), and effluent monitoring that is done for surveillance activities only. Section 5.3 describes liquid effluent surveillance monitoring at the participating facilities at the INL Site. The INL Site drinking water programs are discussed in Section 5.4. Section 5.5 describes surface runoff monitoring conducted at the onsite waste management facility.

To improve the readability of this chapter, data tables are only included that compare monitoring results to specified discharge limits, permit limits, or maximum contaminant levels (MCLs). Data tables for other monitoring results are found in Appendix F.

5.1 Summary of Monitoring Programs

The INL Site contractors Battelle Energy Alliance (BEA) and CH2M-WG Idaho, LLC (CWI) monitor liquid effluent, groundwater, drinking water, and surface water runoff at the INL Site to comply with applicable laws and regulations, Department of Energy (DOE orders), and other requirements (e.g., WRP requirements).
In 2007, the INL Oversight Program collected split samples of groundwater with CWI and BEA. Results of the Oversight Program’s monitoring are presented in annual reports prepared by that organization and are not reported here.

Table 5-1 presents the various water-related monitoring activities performed on and around the INL Site.

5.2 Liquid Effluent and Related Groundwater Compliance Monitoring

The INL contractor and the ICP contractor monitor various constituents of concern in liquid waste influent, effluent, and groundwater. Wastewater is typically discharged to the ground surface and evaporation ponds. Discharges to the ground surface are through infiltration ponds and a sprinkler irrigation system at the following areas:

- Percolation ponds at the Idaho Nuclear Technology and Engineering Center (INTEC) New Percolation Ponds, Test Area North (TAN)/Technical Support Facility (TSF) Sewage Treatment Facility Disposal Pond, Materials and Fuels Complex (MFC), and the Reactor Technology Complex (RTC) Cold Waste Pond.

### Table 5-1. Water-related Monitoring at the INL Site and Surrounding Area.

<table>
<thead>
<tr>
<th>Area/Facilitya</th>
<th>Liquid Effluent (Permitted)</th>
<th>Liquid Effluent (Surveillance)</th>
<th>Groundwater (Permitted)</th>
<th>Drinking Water</th>
<th>Surface Runoff</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Idaho Cleanup Project: CH2M-WG Idaho, LLC (CWI)</strong></td>
<td></td>
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<tr>
<td>INTEC</td>
<td>•</td>
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<td>TAN/TSF</td>
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<td>RWMC</td>
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<tr>
<td><strong>INL Contractor: Battelle Energy Alliance (BEA)</strong></td>
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<tr>
<td>CFAb</td>
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<tr>
<td>IRC</td>
<td></td>
<td>•</td>
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<td></td>
</tr>
<tr>
<td>MFC</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>PBF</td>
<td></td>
<td>•</td>
<td>•</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>RTC</td>
<td>•c</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td></td>
</tr>
</tbody>
</table>

b. Includes Weapons Range, EBR-I (Experimental Breeder Reactor-I), and Main Gate.
c. The Idaho DEQ has not issued a Wastewater Land Application Permit (WLAP) for RTC. However, RTC follows WLAP regulations for total suspended solids and nitrogen.
• A sprinkler irrigation system at the Central Facilities Area (CFA) that is used during the summer months to apply industrial and treated sanitary wastewater.

Discharge of wastewater to the land surface is regulated under WRP rules (Idaho Administrative Procedures Act [IDAPA] 58.01.16 and .17). A WRP normally requires monitoring of nonradioactive parameters in the influent waste, effluent waste, and groundwater, as applicable. However, some facilities may have specified radiological parameters monitored for compliance or do so for surveillance purposes. The liquid effluent and groundwater monitoring programs support WRP requirements for INL Site facilities that generate liquid waste streams covered under WRP rules. Table 5-2 lists the current WRP status of each facility.

The permits generally require that data acquired show compliance with the Idaho groundwater quality primary constituent standards (PCSs) and secondary constituent standards (SCSs) in groundwater monitoring wells at the INL Site. The permits specify annual discharge volumes, application rates,

<table>
<thead>
<tr>
<th>Facility</th>
<th>Permit Status at End of 2007</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFA Sewage Treatment Facility</td>
<td>WRP issued</td>
<td>Idaho Department of Environmental Quality (DEQ) issued WRP (#LA-000141-02) permit in January 2005. The permit was modified on 10/19/05.</td>
</tr>
<tr>
<td>INTEC New Percolation Ponds</td>
<td>WRP issued</td>
<td>WRP LA-000130-04 was issued on November 19, 2004 (Johnston 2004), revised on October 25, 2005 (Johnston 2005a) and March 16, 2007 (Rackow 2007a), and expires on November 18, 2009. The permit covers the combined effluent from the Sanitary and Service Waste Systems to the INTEC New Percolation Ponds.</td>
</tr>
<tr>
<td>MFC Industrial Waste Pond</td>
<td>WRP application submitted to Idaho DEQ</td>
<td>A Wastewater Land Application Permit was submitted to the Idaho DEQ on August 16, 2007.</td>
</tr>
<tr>
<td>TAN/TSF Sewage Treatment Facility</td>
<td>WRP issued</td>
<td>Idaho DEQ issued WRP (#LA-000153-02) permit in January 2005 (Johnston 2005b), and issued a minor modification in October 2005 (Johnston 2005c). A closure plan (ICP 2007b) was submitted to DEQ on November 2, 2007 (McNeel 2007c) and approved by DEQ on November 13, 2007 (Rackow 2007b). Termination of the permit will be requested from DEQ upon completion of closure activities in 2008.</td>
</tr>
<tr>
<td>RTC Cold Waste Pond</td>
<td>WRP application submitted to Idaho DEQ</td>
<td>Idaho DEQ has not issued a WRP. Idaho DEQ authorized INL to operate the wastewater land application facility under the conditions and terms of State of Idaho WRP rules and Idaho DEQ’s Handbook for Land Application of Municipal and Industrial Wastewater until a permit is issued (Johnston 2001).</td>
</tr>
</tbody>
</table>
and effluent quality limits. As required, for permitted facilities, annual reports (ICP 2008a, 2008b) were prepared and submitted to the Idaho Department of Environmental Quality (DEQ).

During 2007, the contractors (CWI and BEA) conducted monitoring as required by the permits for the following facilities (see Table 5-2):

- CFA Sewage Treatment Plant
- INTEC New Percolation Ponds
- TAN/TSF Sewage Treatment Facility.

The RTC Cold Waste Pond has not been issued a permit; however, samples for total nitrogen and total suspended solids (TSS) are collected to show compliance with the regulatory effluent limits for rapid infiltration systems. The following subsections present results of wastewater and groundwater monitoring for individual facilities conducted for permit compliance purposes.

Additional parameters are also monitored in the effluent to comply with DOE Orders 450.1 and 5400.5 (DOE 2003, DOE 1993) environmental protection objectives. Section 5.3 discusses the results of liquid effluent surveillance monitoring.

**Idaho Falls Facilities**

**Description** – The city of Idaho Falls is authorized by the Clean Water Act (CWA), National Pollutant Discharge Elimination System (NPDES) to set pretreatment standards for non-domestic wastewater discharges to publicly owned treatment works. The INL contractor facilities in Idaho Falls are required to comply with the applicable regulations in Chapter 1, Section 8 of the Municipal Code of the city of Idaho Falls.

The Industrial Wastewater Acceptance Permits for the INL Research Center (IRC) specifies special conditions and compliance schedules, prohibited discharge standards, reporting requirements, monitoring requirements, and effluent concentration limits for specific parameters.

**Wastewater Monitoring Results** – Table 5-3 summarizes the semiannual monitoring results conducted at the IRC in March and August of 2007. As the table reports, most values for all of the constituents monitored were below laboratory method detection limits (U flagged) and therefore, in compliance with the applicable effluent discharge limits. The values reported for monitored constituents that were not U flagged were significantly below the set permit limits.

**Central Facilities Area Sewage Treatment Facility**

**Description** – The CFA Sewage Treatment Facility (STF) serves all major buildings at CFA. The treatment facility is southeast of CFA, approximately 671 m (2,200 ft) downgradient of the nearest drinking water well.
A 1500-L/min (400-gal/min) pump applies wastewater from a 0.2-ha (0.5-acre) lined, polishing pond to approximately 30 ha (74 acres) of desert rangeland through a computerized center pivot irrigation system. The permit limits wastewater application to 23 acre-inches/acre/year from April 1 through October 31.

**WRP Wastewater Monitoring Results** – The permit requires influent and effluent monitoring, as well as soil sampling in the application area (see Chapter 7 for results pertaining to soils). Influent samples were collected monthly from the lift station at CFA (prior to Lagoon No. 1) during 2007. Effluent samples were collected from the pump pit (prior to the pivot irrigation system) in June and August, the only two months of wastewater reuse permit in 2007. All samples collected were 24-hour flow proportional composites, except pH and coliform samples, which were collected as grab samples. Tables F-1 and F-2 in Appendix F summarize the results.

Wastewater was intermittently applied via the center pivot irrigation system in June and August 2007. On the days it was operational, discharge to the pivot irrigation system averaged 575,621 liters per day (152,063 gallons per day).

A total of 3.16 million gallons (MG) of wastewater was applied to the land application area in 2007, which is equivalent to a loading rate of 1.59 acre-inch/acre/year. This is significantly less than the
permit limit of 46 MG (23.0 acre-inch/acre/year). The nitrogen loading rate (0.83 lb/acre/yr) was significantly lower than the projected maximum loading rate of 32 lb/acre/yr. As a general rule, nitrogen loading should not exceed the amount necessary for crop utilization plus 50 percent. However, wastewater is applied to rangeland without nitrogen removal via crop harvest. To estimate nitrogen buildup in the soil under this condition, a nitrogen balance was prepared by Cascade Earth Science, Ltd., which estimated it would take 20 to 30 years to reach normal nitrogen agricultural levels in the soil (based on a loading rate of 32 lb/acre/year) (CES 1993). The low 2007 nitrogen loading rate had a negligible effect on nitrogen accumulation.

The 2007 annual total chemical oxygen demand (COD) loading rate at the CFA Sewage Treatment Facility (14.16 lb/acre/year) was less than state guidelines of 50 lb/acre/day (which is equivalent to 18,250 lb/acre/year).

The annual total phosphorus loading rate (0.06 lb/acre/year) was below the projected maximum loading rate of 4.5 lb/acre/year. The amount of phosphorus applied was probably removed by sorption reactions in the soil and utilized by vegetation, rather than lost to groundwater.

The INL contractor tracks operating parameters for the CFA lagoon for information only. For example, removal efficiencies (REs) were calculated to gauge treatment. The REs for biochemical oxygen demand (BOD) and TSS were above the design criterion of 80 percent, and the RE for COD was above the projected efficiency of 70 percent. The RE for total nitrogen was 98.7 percent.

WRP Groundwater Monitoring Results — The WRP does not require groundwater monitoring at the CFA Sewage Treatment Plant.

Idaho Nuclear Technology and Engineering Center New Percolation Ponds and the Sewage Treatment Plant

Description — The INTEC New Percolation Ponds are a rapid infiltration system and comprised of two ponds excavated into the surficial alluvium and surrounded by bermed alluvial material. Each pond is 305 ft × 305 ft at the top of the berm and is approximately 10 ft deep. Each pond is designed to accommodate a continuous wastewater discharge rate of 3 MG per day.

The INTEC Sewage Treatment Plant (STP) is east of INTEC, outside the INTEC security fence. It treats and disposes of sanitary and other related waste at INTEC.

The STP depends on natural biological and physical processes (digestion, oxidation, photosynthesis, respiration, aeration, and evaporation) to treat the wastewater in four lagoons. After treatment in the lagoons, the effluent is gravity fed to lift station CPP-2714 where it is pumped to the service waste system. For the STP, automatic flow-proportional composite samplers are located at control stations CPP-769 (influent) and CPP-773 (wastewater effluent from the STP to the service waste system).

WRP Wastewater Monitoring Results — Monthly samples were collected from:

- CPP-769—influent to STP
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- CPP-773—effluent from STP prior to combining with service waste
- CPP-797—combined effluent prior to discharge to the INTEC New Percolation Ponds.

As required by the permit, all samples are collected as 24-hour flow proportional composites, except pH and total coliform, which are taken as grab samples. The permit specifies the parameters that must be monitored for each location but the permit does not set limits for any of the parameters monitored at CPP-769 or CPP-773. The results for CPP-769 and CPP-773 are presented in Appendix F, Tables F-3 and F-4.

The permit sets monthly concentration limits for TSS (100 mg/L) and total nitrogen (20 mg/L) at the combined effluent (CPP-797), and the results of those permit-limited parameters are shown in Table 5-4. The complete results of all parameters monitored at the combined effluent are presented in Table F-5. As Table 5-4 shows, during 2007, neither TSS nor total nitrogen exceeded the permit limit in the combined effluent.

The permit specifies maximum daily and yearly hydraulic loading rates for the INTEC New Percolation Ponds. Table 5-5 shows the maximum daily flow and the yearly total flow to the INTEC New Percolation Ponds. As the table shows, during 2007, the maximum daily flow and the yearly total flow to the INTEC New Percolation Ponds were below the permit limits.

WRP Groundwater Monitoring Results—To measure potential impacts to groundwater from the INTEC New Percolation Ponds, the permit requires that groundwater samples be collected from six monitoring wells (Figure 5-1 [Note: The Weapons Range Facility depicted in Figure 5-1 is for location reference only and is not part of the INTEC WRP]):

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Average</th>
<th>Permit Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total nitrogen</td>
<td>1.459</td>
<td>2.470</td>
<td>1.893</td>
<td>20</td>
</tr>
<tr>
<td>Total suspended solids</td>
<td>2.0(^d)</td>
<td>5.5</td>
<td>2.3</td>
<td>100</td>
</tr>
</tbody>
</table>

\(^a\) Duplicate samples were collected in June for nitrogen and in July for total suspended solids. Duplicate results are included in the summaries.

\(^b\) Annual average is determined from the average of the monthly values. Half the reported detection limit was used in the yearly average calculation for those data reported as below the detection limit.

\(^c\) Total nitrogen is calculated as the sum of total Kjeldahl nitrogen and nitrate+nitrite, as nitrogen.

\(^d\) Sample result was less than the detection limit; value shown is half the detection limit.

<table>
<thead>
<tr>
<th></th>
<th>2007 Flow (MG)</th>
<th>Permit Limit (MG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum daily</td>
<td>1.640</td>
<td>3</td>
</tr>
<tr>
<td>Yearly total</td>
<td>448.546</td>
<td>1,095</td>
</tr>
</tbody>
</table>

Figure 5-1. Wastewater Reuse Permit Monitoring Locations at INTEC.
• One background aquifer well (ICPP-MON-A-167) upgradient of the INTEC New Percolation Ponds.
• One background perched water well (ICPP-MON-V-191) north of the INTEC New Percolation Ponds and just south of the Big Lost River.
• Two aquifer wells (ICPP-MON-A-165 and ICPP-MON-A-166) downgradient of the INTEC New Percolation Ponds.
• Two perched water wells (ICPP-MON-V-200 and ICPP-MON-V-212) adjacent to the INTEC New Percolation Ponds. Well ICPP-MON-V-200 is north of the INTEC New Percolation Ponds, and well ICPP-MON-V-212 is between the two ponds.

Aquifer wells ICPP-MON-A-165 and ICPP-MON-A-166 and perched water wells ICPP-MON-V-200 and ICPP-MON-V-212 are the permit compliance points. Aquifer well ICPP-MON-A-167 and perched water well ICPP-MON-V-191 are listed in the permit as upgradient, noncompliance points.

The permit requires that groundwater samples be collected semiannually during April and October and lists which parameters must be analyzed. Contaminant concentrations in the compliance wells are limited by PCS and SCS specified in IDAPA 58.01.11, “Ground Water Quality Rule.” All permit-required samples are collected as unfiltered samples.

Table F-6 shows the April and October 2007 analytical results for all parameters specified by the permit for the aquifer wells. Table F-6 also depicts the depth to water table and water table elevations determined before purging and sampling. Table F-7 presents similar information for the perched water wells. The majority of the permit-required monitoring parameters remained below their respective PCS or SCS during 2007 for all wells associated with the INTEC New Percolation Ponds. Table 5-6 shows permit noncompliances (SCS) related to groundwater exceedances identified during 2007. No other permit noncompliances occurred. As required by the permit, Idaho DEQ was notified of the noncompliances (McNeel 2007a, 2007b). The 2007 Wastewater Land Application

### Table 5-6. Permit Noncompliances.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>ICPP-MON-V-200 (GW-013009)</th>
<th>ICPP-MON-V-212 (GW-013010)</th>
<th>SCSs&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>—</td>
<td>—</td>
<td>1.04</td>
</tr>
<tr>
<td>Chloride</td>
<td>—</td>
<td>253</td>
<td>—</td>
</tr>
<tr>
<td>Iron</td>
<td>—</td>
<td>—</td>
<td>1.19</td>
</tr>
<tr>
<td>Total dissolved solids</td>
<td>517</td>
<td>626</td>
<td>—</td>
</tr>
</tbody>
</table>

<sup>a</sup> Sample recollected because analytical laboratory failed to analyze April 2007 sample for total dissolved solids.

<sup>b</sup> Secondary constituent standard (SCS) in groundwater referenced in Idaho Administrative Procedures Act 58.01.11.
Report for the INTEC New Percolation Ponds [ICP 2008a]) discusses the causes, corrective actions implemented to reduce or eliminate each noncompliance, and status of each noncompliance.

Upgradient aquifer well ICPP-MON-A-167 was dry during the April and October 2007 sampling events. This well was last sampled in April 2005. The pump in well ICPP-MON-A-167 is currently near the bottom of the well and cannot be lowered any farther because of well construction limitations. Unless the water level rises above the pump intake, future samples cannot be collected from this well.

**Aluminum and Iron Concentrations** - Aluminum and iron concentrations in unfiltered samples from permitted aquifer and perched water monitoring wells for the INTEC New Percolation Ponds have exceeded the associated groundwater quality standards in the past. Elevated concentrations were detected in preoperational unfiltered groundwater samples taken downgradient (aquifer well ICPP-MON-A-166) and upgradient (aquifer well ICPP-MON-A-167) of the INTEC New Percolation Ponds. For aquifer wells, the preoperational concentrations (see Table 5-7) in the upgradient aquifer well (ICPP-MON-A-167) are considered the natural background level (IDAPA 58.01.11) and are used for determining compliance with the permit and the “Ground Water Quality Rule.” If concentrations of aluminum, iron, or manganese in aquifer wells exceed an SCS, yet are below the preoperational upgradient concentrations, they are considered in compliance with the permit and the “Ground Water Quality Rule.”

Unlike the aquifer wells, preoperational samples could not be collected from the perched water wells because of insufficient water volumes. Therefore, the PCSs and SCSs from the “Ground Water Quality Rule” (IDAPA 58.01.11) are used for determining compliance for the perched water wells.

Iron concentrations in the unfiltered samples from well ICPP-MON V-212 were first detected above the SCS in October 2004. Iron concentrations remained above the SCS in well ICPP-MON-V-212 in April 2007 (see Table 5-6) and dropped below the standard in October 2007 (see Table F-7). In addition, the April aluminum concentration exceeded the SCS in well ICPP-MON-V-212 (see Table 5-6).

**Table 5-7. Preoperational Concentrations and Secondary Constituent Standard.**

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<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>32.8</td>
<td>27.2</td>
<td>17.7</td>
<td>23.7</td>
<td>14.9</td>
<td>0.2</td>
</tr>
<tr>
<td>Iron</td>
<td>19.2</td>
<td>16.6</td>
<td>10.2</td>
<td>14.2</td>
<td>10.4</td>
<td>0.3</td>
</tr>
<tr>
<td>Manganese</td>
<td>0.355</td>
<td>0.3</td>
<td>0.218</td>
<td>0.205</td>
<td>0.165</td>
<td>0.05</td>
</tr>
</tbody>
</table>

a. Preoperational concentrations from INEEL (2004); secondary constituent standard (SCS) from Idaho Administrative Procedures Act 58.01.11.
Past investigations of exceedances of aluminum, iron, manganese, and other constituents in permitted wells at INTEC have been reviewed and are summarized in the 2007 Wastewater Land Application Report for the INTEC New Percolation Ponds [ICP 2008a]). Until the 2006 reporting year, concentrations of iron and aluminum in all filtered samples from perched water wells had been below the associated groundwater quality standards, indicating that the elevated metals are not in solution, but are associated with the sediment in the unfiltered samples being dissolved during the analytical process (e.g., acidification). It is being recommended that during the permit renewal process, a modification be made to require collecting both filtered and unfiltered metals samples and to base compliance on filtered samples. Continuing semiannual monitoring of the permitted wells is also recommended.

**Total Dissolved Solids and Chloride Concentrations in Groundwater** - During 2007, total dissolved solids (TDS) concentrations exceeded the SCS in perched water wells ICPP-MON-V-200 (April and October 2007) and ICPP-MON-V-212 (May and October 2007) (see Table 5-6).

TDS concentrations in the downgradient aquifer monitoring well ICPP-MON-A-165 also have been steadily increasing since the INTEC New Percolation Ponds were placed into service in August 2002. The concentration of TDS in well ICPP-MON-A-165 in October 2002 was 234 mg/L, compared to 363 mg/L in October 2007 (see Table F-6). Similar increases in the chloride and sodium concentrations also have been noted. However, significant increases in TDS, chloride, and sodium concentrations have not been identified in downgradient aquifer monitoring well ICPP-MON-A-166.

The chloride concentration exceeded the SCS in perched water well ICPP-MON-V-200 in October 2007 (see Table 5-6).

The concentrations of TDS, as well as chloride and sodium, in the groundwater near the INTEC New Percolation Ponds are influenced by the wastewater discharges from the CPP-606 Treated Water System (ICP 2007a). The following corrective actions are being implemented to reduce or eliminate concentrations of TDS, chloride, and sodium in the groundwater:

- A new water treatment system was installed at INTEC. The project is planned to be completed in January 2008. The new water treatment system is expected to reduce TDS and chloride concentrations in the effluent to the INTEC New Percolation Ponds to below groundwater quality standards. Semiannual monitoring of permitted wells will continue for the constituents of concern for compliance standards.

**TAN/TSF Sewage Treatment Facility**

**Description** – The TAN/TSF Sewage Treatment Facility (TAN-623) was constructed and designed to treat raw wastewater by biologically digesting the majority of the organic waste and other major contaminants, then applying it to the land surface for infiltration and evaporation. The Sewage Treatment Facility consists of:

- Wastewater-collection manhole
- Imhoff tank
• Sludge drying beds
• Trickle filter and settling tank
• Contact basin (chlorination not performed)
• Infiltration disposal pond.

The TAN/TSF Disposal Pond was constructed in 1971 and consists of a primary disposal area and an overflow section, both of which are located within an unlined, fenced 14-ha (35-acre) area (see Figure 5-2). The Overflow Pond is rarely used; it is used only when the water is diverted to it for brief periods of cleanup and maintenance. The TAN/TSF Disposal Pond and Overflow Pond areas are approximately 0.4 ha (0.9 acres) and 0.13 ha (0.330 acres), respectively, for a combined area of approximately 0.5 ha (1.23 acres). In addition to receiving treated sewage wastewater, the TAN/TSF Disposal Pond also receives process wastewater, which enters the facility at the TAN-655 lift station.
The TSF sewage primarily consists of spent water containing waste from restrooms, sinks, and showers. The sanitary wastewater goes to the TAN-623 Sewage Treatment Facility, and then to the TAN-655 lift station, which pumps to the TAN/TSF Disposal Pond.

The process drain system collects wastewater from process drains and building sources originating from various TAN facilities. The process wastewater consists of liquid effluent, such as steam condensate; water softener and demineralizer discharges; fire water discharges; and cooling, heating, and air conditioning water. The process wastewater is transported directly to the TAN-655 lift station, where it is mixed with sanitary wastewater before being pumped to the TAN/TSF Disposal Pond.

**Decommissioning and Demolition Activities** – Most office buildings and plant facilities that discharged into the TAN/TSF Sewage Treatment Facility have been decommissioned and demolished. Temporary office trailers have been brought onsite and will be in use until approximately the end of 2008. Decommissioning and demolition workers will use comfort stations and porta potties for their personal hygiene needs. A licensed septic tank pumper will collect the septage from these units and transport it to the INTEC Sewage Treatment Plant for disposal.

General decommissioning and demolition of the TAN/TSF Sewage Treatment Facility began in November 2007. The ICP contractor submitted the Closure Plan (ICP 2007b) to Idaho DEQ on November 2, 2007 (McNeel 2007c). The Closure Plan identifies specific closure, site characterization, and site restoration tasks, with scheduled task completion dates. The Closure Plan was approved by Idaho DEQ on November 13, 2007 (Rackow 2007b). Wastewater effluent discharges from TAN-655 to the TAN/TSF Disposal Pond ceased on November 29, 2007. The TAN/TSF Sewage Treatment Facility permitted facilities are scheduled to be closed by June 2008.

**WRP Wastewater Monitoring Results** – The permit specifies a maximum annual hydraulic loading rate to the TAN/TSF Disposal Pond. Table 5-8 shows the yearly flow through November 29, 2007, when flow ceased, to the TAN/TSF Disposal Pond. As the table shows, during 2007, the yearly total flow to the TAN/TSF Disposal Pond was below the permit limit. The calendar year 2007 total effluent flow was less than that for calendar year 2006 (10.84 MG) because of decommissioning and demolition activities.

During 2007, 24-hour composite samples (except pH, fecal coliform, and total coliform, which were grab samples) were collected from the TAN-655 lift station effluent monthly. The permit for the TAN/TSF Sewage Treatment Facility specifies the parameters that are required to be sampled and analyzed. The permit sets limits for only two of the parameters: TSS (100 mg/L) and total nitrogen (20 mg/L). Table 5-9 shows the TSS and total nitrogen results, and Table F-8 shows the monitoring results for all required parameters. As Table 5-9 shows, all monthly total nitrogen and TSS concentrations were below the permit limits.

In addition to the permit-required wastewater effluent monitoring, samples were collected at the Sewage Treatment Facility (TAN-623) in January, February, and March 2007. This additional monitoring was performed in anticipation of the reduced process wastewater flows to TAN-655 and to determine if there would be any nutrient loading and other impacts to the TAN/TSF Disposal Pond.
Table 5-8. Yearly Flow to TAN/TSF Disposal Pond (2007).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Average</th>
<th>Permit Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearly total (through 11/29/2007)</td>
<td>2.059</td>
<td>12.52</td>
<td>7.451</td>
<td>20</td>
</tr>
<tr>
<td>Yearly average</td>
<td>10,871</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5-9. Total Nitrogen and Total Suspended Solids Effluent Monitoring Results for TAN/TSF Sewage Treatment Facility at TAN-655 (2007).a

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Average</th>
<th>Permit Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total nitrogen (mg/L)</td>
<td>2.059</td>
<td>12.52</td>
<td>7.451</td>
<td>20</td>
</tr>
<tr>
<td>Total suspended solids (mg/L)</td>
<td>2.0d</td>
<td>46.9</td>
<td>15.6</td>
<td>100</td>
</tr>
</tbody>
</table>

a. Duplicate samples were collected in March for all parameters, and the duplicate results are included in the summaries.
b. Annual average is determined from the average of the monthly values. Half the reported detection limit was used in any calculation for those data reported as below the detection limit.
c. Total nitrogen is calculated as the sum of total Kjeldahl nitrogen and nitrate+nitrite, as nitrogen.
d. Sample result was less than the detection limit; value shown is half the detection limit.

Table F-9 presents the monitoring results. The results from TAN-623 are similar to the results from TAN-655 and were below permit limits. All monthly total nitrogen concentrations were below the permit limit of 20 mg/L. All monthly total suspended solids concentrations were below the permit limit of 100 mg/L.

WRP Groundwater Monitoring Results – To measure potential TAN/TSF Disposal Pond impacts to groundwater, the permit requires that groundwater samples be collected from six monitoring wells (see Figure 5-2):

- One background aquifer well (TANT-MON-A-001) upgradient of the TAN/TSF Disposal Pond
- Four aquifer wells (TAN-10A, TAN-13A, TAN-20, and TANT-MON-A-002) that serve as points of compliance
- One perched water well (TSFAG-05) located inside the Disposal Pond fence.

Sampling must be conducted semiannually and must include permit-specified parameters for analysis. As specified in Section F of WRP-LA-000153-02, parameter concentrations in wells TAN-10A (except for iron), TAN-13A, TAN-20, and TANT-MON-A-002 are limited to the PCSs and SCSs in IDAPA 58.01.11, “Ground Water Quality Rule.” All permit-required samples are collected as unfiltered samples.
During 2007, groundwater samples were collected in April/May and October. Table F-10 shows water table elevations and depth to water table, determined before purging and sampling, and analytical results for all parameters specified by the permit. Well TSFAG-05 was dry during both April and October 2007. Therefore, no analytical results are presented for this well.

As Table F-10 shows, most groundwater parameters were below their respective PCSs and SCSs. Table 5-10 shows the parameters that exceeded their respective PCS or SCS in 2007. As required by the permit, the groundwater exceedances were reported to Idaho DEQ (McNeel 2007b, 2007c, 2008). None of these exceedances endangered public health or the environment.

Iron and filtered iron concentrations in well TAN-10A were above the SCS of 0.3 mg/L in April 2007 and October 2007 (see Table F-10). However, Section F of WRP-LA-000153-02 exempts the iron concentrations in well TAN-10A from the limits set forth in IDAPA 58.01.11; therefore, these exceedances do not represent permit noncompliances.

The following subsections discuss exceedances of aluminum, total coliform, iron, manganese, and TDS. The 2007 Wastewater Land Application Report for the TAN/TSF Sewage Treatment Facility (ICP 2008b) also contains interpretive discussions of these exceedances.

**Aluminum Concentrations in Well TANT-MON-A-002** - The aluminum concentration in well TANT-MON-A-002 (0.203 mg/L) exceeded the SCS of 0.2 mg/L in October 2007 (see Table 5-10). However, the duplicate sample (0.0534 mg/L) was below the SCS (see Table F-10). The exceedance is about four times higher than the duplicate result. The laboratory report and the groundwater monitoring logbook were reviewed, and no anomalies with the analysis or sample collection methods were identified.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum (mg/L)</td>
<td>0.203</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.2</td>
</tr>
<tr>
<td>Coliform, total (colonies/100 mL)</td>
<td>—</td>
<td>—</td>
<td>28.0</td>
<td>—</td>
<td>1 col/100 mL</td>
</tr>
<tr>
<td>Iron (mg/L)</td>
<td>0.320</td>
<td>0.926</td>
<td>0.960</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Manganese (mg/L)</td>
<td>—</td>
<td>537</td>
<td>575</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>Total dissolved solids (mg/L)</td>
<td>—</td>
<td>—</td>
<td>500</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Samples recollected because analytical laboratory failed to analyze April 2007 sample for total dissolved solids.

<sup>b</sup> Secondary constituent standard (SCS) in groundwater referenced in Idaho Administrative Procedures Act 58.01.11.
Past reports have investigated aluminum exceedances at TAN and are summarized in the 2007 WRP Report (ICP 2008b). Aluminum samples will be collected from well TANT-MON-A-002 and other permitted wells at TAN during the final scheduled permitted sampling event in April 2008 (ICP 2007b).

**Iron Concentrations in Well TANT-MON-A-002** - The iron (unfiltered) concentration (0.320 mg/L) exceeded the SCS of 0.3 mg/L in well TANT-MON-A-002 in October 2007 (see Table 5-10). However, the duplicate sample (0.164 mg/L) was below the standard (see Table F-10). The laboratory report and the groundwater monitoring logbook were reviewed, and no anomalies with the analysis or sample collection methods were identified. In contrast to the unfiltered iron exceedance, all filtered iron results were below the standard in well TANT-MON-A-002 during 2007 (see Table F-10).

Elevated iron concentrations historically have been detected in the TAN permitted monitoring wells. Several investigations of iron exceedances at TAN have been performed and are summarized in the 2007 WRP Report (ICP 2008b). Iron samples will be collected from well TANT-MON-A-002, as well as other permitted wells at TAN, during the final scheduled permitted sampling event in April 2008 (ICP 2007b).

**Manganese and Total Dissolved Solids Concentrations in Well TAN-10A** - In well TAN-10A, manganese concentrations (0.926 mg/L in April 2007 and 0.960 mg/L in October 2007) exceeded the SCS (0.05 mg/L), and TDS concentrations (537 mg/L in May 2007 and 575 mg/L in October 2007) exceeded the SCS (500 mg/L) (see Table 5-10). Concentrations of both manganese and TDS have been above their SCSs in well TAN-10A in the past. Increases of TDS in well TAN-10A in early 2000 seem to follow earlier increases in the effluent; however, no pattern is evident from 2000 forward, with increases in well TAN-10A occurring prior to increases in the effluent. Similarly, no pattern is evident for the concentrations of manganese in the effluent when compared to concentrations in well TAN-10A.

To further evaluate manganese and TDS concentrations, semiannual samples were collected from 17 nonpermitted wells in addition to the six permitted wells during the 2006 and 2007 reporting years. The additional wells are within the trichloroethene plume, and five of the 17 wells are in the TSF-05 injection well hot spot. During the 2006 reporting year, exceedances of manganese and TDS were reported in all of the additional wells (ICP 2007c). Similar to the 2006 reporting year, exceedances of manganese were reported in all 17 wells, and exceedances of TDS were reported in 16 wells during the 2007 reporting year (ICP 2008b).

The 2007 WRP report summarizes past reports that have evaluated manganese and TDS exceedances (ICP 2008b). Samples will be collected for manganese and TDS from well TAN-10A and other permitted wells at TAN during the final scheduled permitted sampling event in April 2008 (ICP 2007b).

**Total Coliform Concentrations in Well TAN-10A** - Total coliform (28.0 colonies/100 mL) exceeded the primary constituent standard of 1 colony/100 mL in October 2007 in well TAN-10A (see Table 5-10). However, fecal coliform was absent in this well (see Table F-10). Total coliform also has been reported sporadically in TAN/TSF Sewage Treatment Facility permitted wells since 1996. Wastewater effluent from the TAN/TSF Sewage Treatment Facility contains total and fecal coliform
and could be a potential source of the contamination. However, the sporadic reports of total coliform and an absence of fecal coliform in well TAN-10A and the other permitted monitoring wells suggest that the October 2007 total coliform result is not related to the TAN-623 treatment process and wastewater effluent disposal.

In situ bioremediation activities may be impacting the water quality in well TAN-10A. In situ bioremediation is the remedy being used to clean up the groundwater in the TAN/TSF area under the CERCLA OU 1-07B Remedial Action. The in situ bioremediation process uses an amendment to promote bacterial growth. The bacterial growth breaks down the contaminants in the groundwater. Videos taken of well TAN-10A in February and March 2007 show black biofilm in the well screen area; in situ bioremediation may have caused or contributed to the biofilm. A sample was collected of the biofilm buildup on the TAN-10A pump/piping in November 2007, and several biological activity reaction tests (BART) were performed. The SLYM BART test indicated that slime-forming organisms were present in the water sample. Coliform bacteria can persist within slime formed by naturally occurring groundwater microorganisms. The detected coliform bacteria could have been from this source.

Total and fecal coliform samples will be collected from well TAN-10A during the final scheduled permitted sampling event in April 2008 (ICP 2007b).

**Actions To Address Groundwater Quality Standard Exceedances** – The 2007 WRP report (ICP 2008b) summarizes investigations of exceedances of iron, manganese, and aluminum at the INL Site. While elevated concentrations of aluminum, iron, and manganese historically have been detected in some of the permitted monitoring wells at TAN, wastewater effluent concentrations of aluminum, iron, and manganese have usually been below SCSs. Therefore, factors other than wastewater effluent discharges are believed to be causing the elevated aluminum, iron, and manganese concentrations in permitted wells. The report concludes that because of historically elevated metals concentrations, both filtered and unfiltered metals samples will be collected from TAN permitted wells during the final scheduled sampling event in April 2008.

**5.3 Liquid Effluent Surveillance Monitoring**

Additional radiological and nonradiological parameters also are monitored. This additional monitoring is performed to comply with DOE Order 450.1 and 5400.5 environmental protection objectives. The following sections discuss results of this additional monitoring by individual facility.

**Central Facilities Area**

Both the influent and effluent to the CFA Sewage Treatment Facility are monitored according to the WRP issued for the plant. Table F-11 summarizes the additional surveillance monitoring conducted during 2007 at the CFA Sewage Treatment Facility and shows those parameters with at least one detected result during the year. During 2007, most additional parameters were within historical concentration levels.
Idaho Nuclear Technology and Engineering Center
Table F-12 summarizes the additional monitoring conducted during 2007 at the INTEC Sewage Treatment Plant and INTEC New Percolation Ponds and shows the analytical results for parameters that were detected in at least one sample during the year. During 2007, most additional parameters were within historical concentration levels. The 2007 INTEC New Percolation Ponds Radiological Monitoring Report (ICP 2008c) provides additional information.

Materials and Fuels Complex
During 2007, the Industrial Waste Pond, Industrial Waste Ditch, and Secondary Sanitary Lagoon were sampled monthly for iron, sodium, chloride, fluoride, sulfate, pH, conductivity, TSS, turbidity, biochemical oxygen demand, gross alpha, gross beta, gamma spectrometry, tritium, and various other parameters. Additionally, a sample for selected metals is collected once a year. The Industrial Waste Pond was dry in January. Tables F-13 to F-15 summarize the analytical results for parameters that were detected in at least one sample.

Radioactive parameters were also monitored and reported when detected. Plutonium-241 was reported at an activity of 9.47 pCi/L from the MFC Industrial Waste Pond on July 25, 2007. Tritium was detected in the samples collected from the Sanitary Sewage Lagoon every month except February. Potassium-40 was also reported but was U flagged; representing the sample result was below the laboratory method detection limit. Monitored radiological parameters, including gross alpha and gross beta, are below applicable standards.

Test Area North/Technical Support Facility
The effluent to the TAN/TSF Disposal Pond receives a combination of process water and treated sewage waste. Additional monitoring for surveillance purposes is conducted monthly for metal parameters and conductivity and quarterly for radiological parameters (with the exception of strontium-89 (89Sr), iodine-129 (129I), and tritium, which are monitored annually, and strontium-90 (90Sr), which was monitored monthly starting in March 2005). There are no permit limits for these additional parameters. Table F-16 summarizes the results of this additional monitoring for those parameters detected in at least one sample during the year. During 2007, the concentrations of most additional parameters were within historical concentration levels. The 2007 TAN/TSF Radiological Monitoring Report (ICP 2008d) provides additional information.

Reactor Technology Complex
The effluent to the Cold Waste Pond receives a combination of process water from various RTC facilities. Monitoring for surveillance purposes was conducted quarterly for metals and for radiological parameters: in July the monitoring frequency was increased to monthly in anticipation of a wastewater reuse permit from the Idaho DEQ. Table F-17 summarizes the results of this additional monitoring for those parameters with at least one detected result.

During 2007, concentrations of sulfate and TDS were elevated in samples collected during reactor operation. These differences are caused by the normal raw water hardness, as well as corrosion inhibitors and sulfuric acid added to control the pH of the cooling water.
5.4 Drinking Water Monitoring

The INL Site monitors drinking water to ensure it is safe for consumption and to demonstrate that it meets Federal and State regulations. Drinking water parameters are regulated by the state of Idaho under authority of the Safe Drinking Water Act. Parameters with primary MCLs must be monitored at least once within three-years intervals. Parameters with secondary MCLs are monitored every three years based on a recommendation by the U.S. Environmental Protection Agency (EPA). Many parameters require more frequent sampling during an initial period to establish a baseline, and subsequent monitoring frequency is determined from the baseline results.

Currently, the INL Site has eleven onsite drinking water systems. The INL Site contractors, BEA and CWI, monitor these systems to ensure a safe working environment. BEA monitors nine of these drinking water systems and CWI monitors two (INTEC and Radioactive Waste Management Complex [RWMC]). According to the “Idaho Rules for Public Drinking Water Systems” (IDAPA 58.01.08), INL Site drinking water systems are classified as either nontransient or transient, noncommunity water systems. The four BEA transient, noncommunity water systems are at the Experimental Breeder Reactor No. 1 (EBR-I), Weapons Range (Live Fire Test Range), Critical Infrastructure Test Range Complex (CITRC), and the Main Gate. The five remaining BEA water systems are classified as nontransient, noncommunity water systems. These systems are located at CFA, MFC, RTC, TAN/Contained Test Facility (CTF), and TAN/TSF. The two CWI drinking water systems (INTEC and RWMC) are classified as nontransient, noncommunity water systems.

As required by the state of Idaho, the INL Site Drinking Water Program uses EPA-approved (or equivalent) analytical methods to analyze drinking water in compliance with current editions of IDAPA 58.01.08 and Title 40 Code of Federal Regulations (CFR) Parts 141–143. State regulations also require the use of laboratories that are either certified by the State or by another state whose certification is recognized by Idaho. The Idaho DEQ oversees the certification program and maintains a listing of approved laboratories.

Because of historic or problematic contaminants in the drinking water systems, BEA and CWI monitor certain parameters more frequently than required by regulation. For example, bacterial analyses are conducted monthly rather than quarterly at all nine BEA drinking water systems during months of operation. These non-regulated, additional samples resulted in four positive detections for the year. Bacteria were detected in the RTC valve in February, the Main Gate in October, and Specific Manufacturing Capability (SMC) in October and December. Because of known groundwater plumes near two BEA drinking water wells, additional sampling is conducted for tritium at CFA and for trichloroethylene at TAN/TSF.

**INL Site Drinking Water Monitoring Results**

During 2007, BEA collected 314 routine samples and 19 quality control samples from the nine INL Site drinking water systems. In addition to routine samples, BEA also collected 28 non-routine samples after repairs were made to a water main and prior to placing the water main back into service. Drinking water systems at EBR-I, CITRC, Weapons Range, MFC, RTC, and TAN/CTF were well below drinking water limits for all regulatory parameters; therefore, they are not discussed further in this report.
Central Facilities Area
The CFA water system serves approximately 600 people daily. Since the early 1950s, wastewater containing tritium was disposed to the Eastern Snake River Plain Aquifer (ESRPA) at INTEC and at RTC through injection wells and infiltration ponds. This wastewater migrated south-southwest and is the suspected source of tritium contamination in the CFA water supply wells. This practice of disposing of wastewater through injection wells was discontinued in the mid-1980s. In general, tritium concentrations in groundwater have been decreasing (see Figure 5-3) because of changes in disposal techniques, diffusion, dispersion, recharge conditions, and radioactive decay.

Since December 1991, the mean tritium concentration has been tracked using three sampling locations within the CFA water distribution system. Prior to 2007, water samples were collected once from well CFA #1 at CFA 651, once from well CFA #2 at CFA-642, and quarterly from the distribution manifold at CFA-1603 for compliance purposes. All of the 2006 results were below the MCL for tritium. Thus in 2007, BEA decreased the frequency of the tritium sampling to semi-annual and reduced the number of sampling locations to CFA-1603 (manifold).
CFA Worker Dose – Because of the potential impacts to workers at CFA from an upgradient plume of radionuclides in the ESRPA, the potential effective dose equivalent from radioactivity in water was calculated. The 2007 calculation was based on the mean tritium concentration for the CFA distribution system in 2007. For the 2007 dose calculation, it was assumed that each worker’s total daily water intake would come from the CFA drinking water distribution system. This assumption overestimates the actual dose because workers typically consume only about half their total intake during working hours and typically work only 240 days rather than 365 days per year. The estimated annual effective dose equivalent to a worker from consuming all their drinking water at CFA during 2007 was 0.30 mrem (3.0 μSv), below the EPA standard of 4 mrem/yr for public drinking water systems.

Idaho Nuclear Technology and Engineering Center
During 2007, the following drinking water samples were collected at INTEC:

- 42 routine (compliance) samples
- 6 quality control samples (4 field duplicates; 1 trip blank; 1 performance evaluation sample)
- 16 non-routine samples (15 bacterial samples, associated primarily with water main repairs; 1 sample for EPA Method 524.2 volatile organics).

All INTEC monitored parameters were below their respective limits in 2007. Nitrate is required to be monitored annually. The nitrate result for 2007 at INTEC was 0.74 mg/L, well below the MCL of 10 mg/L.

Main Gate Badging Facility/Reactor Technology Complex/Specific Manufacturing Capability
Coliform Bacteria
In October 2007, total coliform bacteria was detected during the regulatory compliance monitoring. The system owner was notified, the filters were replaced, the water system disinfected and flushed, resampled, and results indicated no detection of bacteria. It should be noted that this drinking water system does not have an automatic disinfection system.

Total coliform bacteria detections at SMC and RTC (TRA 608) were noncompliance (construction) samples. Re-sampling was conducted with no total coliform or E. coli bacteria detections.

Radioactive Waste Management Complex
The RWMC production well is located in WMF-603 and supplies all of the drinking water for more than 500 people. The well was put into service in 1974. A chlorine residual has been maintained throughout the distribution system since 2004. Water samples collected for monitoring purposes were from the well head (WMF-603), from the point of entry to the distribution system (WMF-604), and from various buildings throughout the distribution system.

During 2007, the following drinking water samples were collected at RWMC:

- 31 routine (compliance) samples
5.22 INL Site Environmental Report

- 16 quality control samples (8 field duplicates, 4 trip blanks, 4 performance evaluation samples)
- 18 non-routine samples (15 bacterial samples, primarily associated with water main repairs; 3 samples for EPA Method 524.2 volatile organics).

In the past, carbon tetrachloride, trichloroethylene, and nitrate have been detected in the drinking water system at RWMC. All other regulatory parameters were well below drinking water limits in 2007. Concentrations of carbon tetrachloride, trichloroethylene, and nitrate remained below their respective MCLs in 2007 as presented in the following tables:

- Carbon tetrachloride (see Table 5-11)
- Trichloroethylene (see Table 5-12)
- Nitrate (required to be monitored annually) (see Table 5-13).

Historically carbon tetrachloride and trichloroethylene had consistently been detected in samples collected at WMF-603 and WMF-604. The sample collected in April 2006 at WMF-603 indicated a carbon tetrachloride 6.5 µg/L concentration, the highest level since 1993. The April 2006 sample

### Table 5-11. Carbon Tetrachloride Concentrations in the RWMC Drinking Water Well and Distribution System (2007).

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of Samples</th>
<th>Minimum (µg/L)</th>
<th>Maximum (µg/L)</th>
<th>Average*(µg/L)</th>
<th>MCL</th>
</tr>
</thead>
<tbody>
<tr>
<td>WMF-603b</td>
<td>5</td>
<td>4.9</td>
<td>6.1</td>
<td>5.4</td>
<td>NAc</td>
</tr>
<tr>
<td>WMF-604 Distributiond</td>
<td>5</td>
<td>0.25e</td>
<td>4.30</td>
<td>1.06</td>
<td>5</td>
</tr>
</tbody>
</table>

a. Half the reported detection limit was used in any calculation for those data reported as below the detection limit.
b. Sampled for surveillance purposes (not required to be sampled).
c. NA—Maximum contaminant level is not applicable to the well concentration.
d. Entry point to the distribution system and used for the purpose of determining compliance with the maximum contaminant level.
e. Sample result was less than the detection limit; value shown is half the detection limit.

### Table 5-12. Trichloroethylene Concentrations in the RWMC Drinking Water Well and Distribution System (2007).

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of Samples</th>
<th>Minimum (µg/L)</th>
<th>Maximum (µg/L)</th>
<th>Average*(µg/L)</th>
<th>MCL</th>
</tr>
</thead>
<tbody>
<tr>
<td>WMF-603b</td>
<td>5</td>
<td>2.20</td>
<td>2.90</td>
<td>2.54</td>
<td>NAc</td>
</tr>
<tr>
<td>WMF-604 Distributiond</td>
<td>5</td>
<td>0.25</td>
<td>2.00</td>
<td>0.60</td>
<td>5</td>
</tr>
</tbody>
</table>

a. Half the reported detection limit was used in any calculation for those data reported as below the detection limit.
b. Sampled for surveillance purposes (not required to be sampled).
c. NA—Maximum contaminant level is not applicable to the well concentration.
d. Entry point to the distribution system and used for the purpose of determining compliance with the maximum contaminant level.
result from WMF-604 returned 4.5 µg/L. In July 2006, RWMC facility management decided to install a packed tower air stripping treatment system. Design approval was received from Idaho DEQ in December 2006 and the treatment system became operational in July 2007.

Carbon tetrachloride and trichloroethylene were detected in samples collected at WMF-603 in August 2007 and November 2007; these contaminants were not detected (<0.5 µg/L) in the samples collected at WMF-604 in August 2007 and November 2007.

**Test Area North/Technical Support Facility**

In 1987, trichloroethylene was detected at both TSF #1 and #2 wells, which supply drinking water to less than 100 employees at TSF. The inactive TSF injection well (TSF-05) is believed to be the principal source of trichloroethylene contamination at the TSF. Bottled water was provided until 1988 when a sparger system (air stripping process) was installed in the water storage tank to volatilize the trichloroethylene to levels below the MCL.

During the third quarter of 1997, TSF #1 was taken offline, and TSF #2 was put online as the main supply well because the trichloroethylene concentration of TSF #2 had fallen below the MCL of 5.0 µg/L. Therefore, by using TSF #2, no treatment (sparger air stripping system) is implemented other than the chlorination system.

Figure 5-4 illustrates the concentrations of trichloroethylene in both TSF #2 and the distribution system from 2000 through 2007. Since mid-2006 the concentration levels have been declining.

Table 5-14 summarizes the trichloroethylene concentrations at TSF #2 and the distribution system. TSF #2 is sampled for surveillance purposes only (not required by regulations), and the distribution system is the point of compliance (required by regulations). The mean concentration at TSF #2 and distribution system for 2007 are 1.25 µg/L and 0.825 µg/L, respectively, which are below the MCL.

**5.5 Waste Management Surveillance Surface Water Sampling**

In compliance with DOE Order 435.1, CWI collects surface water runoff samples at the RWMC Subsurface Disposal Area (SDA). Surface water is collected to determine if radionuclide concentrations exceed administrative control levels or if concentrations have increased significantly compared to historical data.
Table 5-14. Trichloroethylene Concentrations at TSF Well #2 and Distribution System (2007).

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of Samples</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>MCL</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAN/TSF #2 (612)^a</td>
<td>2</td>
<td>1.2</td>
<td>1.3</td>
<td>1.25</td>
<td>NA^b</td>
</tr>
<tr>
<td>TAN/TSF Distribution (610)</td>
<td>4</td>
<td>0.6</td>
<td>1.3</td>
<td>0.825</td>
<td>5.0</td>
</tr>
</tbody>
</table>

a. Regulations do not require sampling at this well.
b. NA - Not applicable. MCL applies to the distribution system only.

Figure 5-4. Trichloroethylene Concentrations in TSF Drinking Water Well and Distribution System (2000-2007).
Radionuclides could be transported outside the RWMC boundaries via surface water runoff. Surface water runs off the SDA only during periods of rapid snowmelt or heavy precipitation. At these times, water may be pumped out of the SDA retention basin into a drainage canal, which directs the flow outside the RWMC. The canal also carries runoff from outside the RWMC that has been diverted around the SDA.

During 2007, no precipitation occurred to cause a surface water runoff event at the RWMC SDA. Therefore, no surface water runoff was available for sampling at the RWMC SDA.
REFERENCES


ICP, 2007b, Closure Plan for Wastewater Land Application Permitted Test Area North/Technical Support Facility Sewage Treatment Facility at the Idaho National Laboratory Site, RPT-409, Idaho Cleanup Project.


ICP, 2008d, 2007 Radiological Monitoring Results Associated with the Test Area North/Technical Support Facility Sewage Treatment Facility, RPT-476, Idaho Cleanup Project.


