December 15, 2011

STAFF ANALYSIS

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FROM: DEQ Wastewater Staff

SUBJECT: Permit Renewal Staff Analysis: INL INTEC New Percolation Ponds;
Reuse Permit Number LA-000130-05.

1.0 PURPOSE

The purpose of this staff analysis is to satisfy the requirements of IDAPA 58.01.17.400.04 *Application Processing Procedure – Contents of the Staff Analysis* for issuing wastewater reuse permits. Specifically, this staff analysis shall briefly state the principal facts and the significant questions considered in preparing the permit conditions, and a summary of the basis for the conditions with references to applicable requirements and supporting materials.

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2.0 PROCESS DESCRIPTION

2.1 Facility Overview

The Idaho National Laboratory (INL) is located on approximately 890 square miles of high desert terrain in southeastern Idaho. The Lost River, Lemhi, and Beaverhead mountain ranges border it on the north and northwest. The eastern border of the INL is approximately 25 miles west of Idaho Falls, Idaho.

The Idaho Nuclear Technology and Engineering Center (INTEC) is a 265 acre, multipurpose facility located at INL. The facility was constructed in 1951 and presently employs approximately 1150 people. Within INTEC are all of the facilities necessary to receive and store spent nuclear fuel and manage the waste fission products resulting from the spent fuel recovery process. Additional research and development work is conducted to develop and improve fuel management and waste processing technologies. Environmental restoration and remediation activities are also conducted as part of the INL cleanup.

2.2 Waste Streams

The fates of waste streams generated by this facility are:

1. The spent nuclear fuel is prepared for shipment to an off-site repository.
2. Hazardous or radioactive wastewater from the INTEC processes and laboratories are sent to either the low level liquid waste evaporator or the high level waste tank farm for treatment or storage.
3. Wastewater from the Service Waste System (process wastewater), treated sewage, and precipitation runoff are discharged to two percolation ponds located approximately two miles west-southwest of INTEC. This wastewater stream is regulated by the DEQ reuse permit.

3.0 SUMMARY OF EVENTS

3.1 Chronological Events

1984 – 1985: the original two percolation ponds (now abandoned and replaced with the 'new percolation ponds') were constructed south of INTEC to replace the disposal well. These original ponds either formed, or contributed to formation of, perched water formations below INTEC. Routine use of the disposal well ended in 1984.

August 26, 2002: use of the new percolation ponds begins. INTEC began wastewater disposal to the current percolation ponds. The new percolation ponds were constructed to address perched water formation contamination below the core INTEC facility (fenced area). Contamination was due to several factors, including abandoned injection (disposal) wells, contaminated surface soils, and tank farm (fuel and waste storage) contamination. The new percolation ponds were located outside of the contaminated area to reduce contaminated perched water formation recharge and conveyance of contaminants to the Snake River Plain Aquifer.

The relocation of the percolation ponds resulted from the October 1999 Record of Decision (ROD) signed by the EPA, DOE, and the Idaho DEQ. The ROD outlined specific actions to address cleanup of contamination at INL, as required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). One of the goals set by the ROD was to maintain aquifer and perched water formation constituent concentrations compliant with ground water quality standards

November 19, 2004: permit renewal LA-000130-04 was issued. A major change involved with the permit was the combination of sewage treatment wastewater with service (process) wastewater. Previously, sewage treatment wastewater was disposed of in rapid infiltration ditches adjacent to the treatment lagoons, but high nitrogen levels led to combination with process water to reduce the nitrogen levels, through dilution, to acceptable levels. The rapid infiltration ditches were retired from use after the wastewater streams were combined.

December 2, 2004: the percolation ponds begin receiving sewage treatment plant waste.

May 1, 2005: CH2M-WG Idaho, LLC (acronym CWI) became the INTEC contractor for reuse activities.
May 25, 2005: The percolation ponds received approximately ten minutes of low radiation water and 40 to 50 minutes of high radiation water - estimated at 184 gallons - via the INTEC service waste system during floor cleaning operations. The flow was due to incorrect line selection:

1. floor cleaning operations wastewater failed to drain to proper isolation due to a clogged line;
2. operators selected a separate line, believing it led to proper isolation, but the line actually led to the service wastewater system, which disposes to the percolation ponds.
3. radiological detection alarms resulted in bypassing the wastewater to an isolation tank after approximately 184 gallons were sent to the percolation ponds, equal to 10 minutes of low radiation flow and 40 to 50 minutes of high radiation flow to the ponds.
4. Most of the 184 gallons of wastewater fell below the radioactivity alarm point at CPP-751 (200,000 pCi/L), and therefore continued to the percolation ponds. When the levels reached the CPP-751 alarm point it was diverted to the diversion tank. CPP-797 (alarm sounds at 60,000 pCi/L) did not alarm during the discharge.

August 16, 2005: the facility diverted service water from the percolation ponds to holding tanks after about 100 mL of mixed radioactive waste had discharged into the service water system. The release was attributed to a leaking tube bundle in building CPP-604. Although the automated waste stream diversion to holding tanks operated as designed, it was determined during analysis of the incident that less than 100 mL of contaminated water were released to the percolation ponds.

April 20, 2006: The DEQ approves the revised compliance activity *Salt Loading Corrective Action Plan*. The plan proposed installing a reverse osmosis (RO) system to reduce softener salt from 70,000 pounds per month to 33,000 pounds per month. Total suspended solids were estimated to reduce from the pre-RO range of 450 to 500 mg/L to a post-RO level of 300 mg/L.

October 11, 2006: The DEQ approved 5,000 gallons per day septage disposal to the sewage treatment plant collection system.

March 16, 2007: DEQ removed the requirement to monitor daily sewage treatment plant influent due to inadequate building & control structure design.

October 12, 2007: the facility incurred a power loss which resulted in equipment failure and flooding. See the 2008 inspection report synopsis in Section 3.2 (below) for details.

May 12, 2009: INTEC submitted the permit renewal application.

March 22, 2010: INL staff met with the DEQ requesting removal of well V-212 (the deeper perched water formation monitoring well) from the permit as a monitoring well (and therefore no sampling for ground water quality standards). The request was made due to the following events:

1. A well casing crack at a pipe seal was first discovered in 1995 via video logging.
2. A subsequent video log in 2007 showed cement well seal material leaking through the crack.
3. A 2007 video log showed an increase in well seal material buildup at the crack, as well as substantial sedimentation in the well water.

It is suspected that calcium hydroxide is leaking from the well seal, through the casing crack, and precipitating calcium carbonate in the well water. As a consequence, the pH levels in the well have increased since 2008 with two ground water quality standard exceedances of 9.42 and 9.83 in July and October of 2009.

The DEQ response to the request:

> On March 22, 2010, INTEC requested that perched water formation monitoring well V-212 be removed as a compliance well. The well has been video logged and proven to have joint leaks in the PVC casing. The leaks are accumulating precipitate – most likely calciferous and originating from cement well seal outside the casing – and are probably affecting solubility, metals concentrations, and well water pH values.
>
> INTEC also points out the similarities in constituent concentrations between the well and the other perched water formation monitoring well V-200, which may make two wells unnecessary.

However, the DEQ feels that well V-212 is the only perched water formation monitoring well for the lower perched water formation associated with the cinder cone at approximately 265 feet below ground level. Further, the well is located between the two percolation ponds, and therefore may best represent ground water impacts due to percolation.

December 2010: INTEC informed the DEQ that reverse osmosis use had been reduced since 2008, and eliminated completely by October 2010. Reverse osmosis is discussed in Section 4.2.3 *Wastewater Monitoring.*

3.2 Inspection Reports

2004 Inspection

With the activation of the new percolation ponds, the perched water wells have started to show an increase in TDS and chlorides. Comparison for the past year:

	October 2002	October 2003
• TDS	323 mg/l	554 mg/l
• chloride	33.6 mg/l	213 mg/l

2005 Inspection

Due to continued problems with meeting the (previously) permitted total nitrogen level of 20 mg/L, the facility proceeded with the diversion of the sewage treatment plant effluent from the (now abandoned) rapid infiltration ponds to the service water system. This was completed on December 2, 2004.

This DEQ inspection was the first after combination of permits LA-000115-02 (the sewage wastewater treatment facility) and LA-000130-03 (the percolation of process water to the 'new' percolation ponds). The permit combination reflected the operational change of diverting sewage wastewater to the service wastewater stream for disposal in the percolation ponds.

2006 Inspection

The 2006 inspection report contained nothing noteworthy.

2007 Inspection

The facility requested the addition of roof drainage from boiler building CPP-1647 to be piped into the service water drain system. This was approved by the DEQ in March 2007.

At the time of the inspection, the facility was transferring the liquid from (sewage treatment plant) Cell #3 into Cell #2 to allow the seepage test on Cell #2 to be conducted. It was observed at the time of the inspection that a previously patched area on the liner in the #3 pond had a section of weld that had appeared to open up. In addition the facility staff had identified another patch above the water line with a small hole in it. They indicated they would repair both areas prior to refilling Cell #3.

2008 Inspection

Although the permit does not limit the total dissolved solids (TDS) and chlorides in the wastewater, the combined service water effluent as sampled at CPP-797 had concentrations of 500 mg/L and 250 mg/L, respectively, for 11 of 16 samples taken in 2007 for TDS and chlorides. These can affect ground water quality if high levels continue to be discharged. The startup and use of the new reverse osmosis water treatment system should reduce the concentrations of both of these constituents in 2008.

The facility successfully completed seepage testing of all four ponds in 2007.

During the inspection, the operations of the service water pumps and operations in building CPP-797 and the backup system pumps in building CPP-1749 were observed and discussed with the engineering staff.

- In October of 2007, the site experienced a power failure on the incoming commercial power. The facility has several backup emergency diesel generators that should have engaged after a commercial power failure.
- At the time of the power failure, the emergency generators did not come on line as expected.
- As a redundant backup for the electric service to the four (4) service water pumps, the system in building CPP-1749 is equipped with a diesel driven pump that should come on line when the power (both

commercial and emergency generator power) is lost. However, the redundant diesel drive pump only ran for a short time before it failed to operate.

- As a result, the water level in CPP-797 and CPP-1749 rose to about 10 inches above the floor thereby causing various electrical panels and boxes to get wet.
- No radiological releases were experienced but the system was down for several days to clean up, dry out and replace electrical equipment.
- As explained during the review of the system failure, it appears that inadequate maintenance had been performed on the controls for the primary generator activation system and the redundant diesel driven pump system and controls.
- As a result of the power failure, the facility developed corrective action plans to prevent reoccurrences.

The total coliform analyses (monthly grab samples) of the sewage treatment plant effluent ranged from 20 to "too numerous to count" in May 2007. These levels were elevated during the time the facility was conducting the seepage testing of the lined lagoons.

2009 Inspection

Following the system overview, the INTEC facility staff reviewed the findings and corrective actions taken after the October 2007 unplanned electrical outage that affected the service water pumps. A copy of the corrective action report findings for the Service Water System was requested from the facility. A review of that report indicated all recommended corrective actions as they relate to the Service Water System have been undertaken and implemented.

2010 Inspection

With the elimination of various facilities within INTEC by demolition activities, the volume of service water discharged to the percolation ponds has dropped significantly. At the time of the inspection, the flow was about 200 gpm versus the previous rate of 700 to 800 gpm. The lower flow rate is causing the service water pumps to cycle on and off more frequently, and this is affecting the flow meter measuring device. It seems when the pumps cycle on and off, air is trapped in the flow measuring instrument. The facility is currently reviewing a system fix for the problem.

The facility had issues with the effluent sampler at the Sewage Treatment Plant during cold weather in January 2007. They installed heaters in various locations around the plant. Based on observations during the inspection, these heater units appear to be in place and ready for the coming cold weather.

4.0 DISCUSSION

4.1 Aquifer Impact Criteria

Criteria influencing ground water infiltration of wastewater at INTEC and its impact on the Snake River Plain Aquifer (SRPA) include local geology, surface water hydrology, and hydrogeology. The following is a synopsis of the 1992 permit application by INTEC consultant Westinghouse.

Summary

Perched aquifers in the INTEC area appear to be replenished by both the Big Lost River (intermittently) as well as by wastewater disposal at the facility. Although fractured volcanic rock provides rapid vertical movement of water, the flow is impeded due to in-filling of fractures with overlying sedimentary material. Estimated time of travel from the ground surface to the SRPA is seven months.

Geology

In general, the Snake River Plain in the vicinity of INTEC consists of volcanic rock with sedimentary interbeds to a depth of 2,000 to 3,000 feet. Volcanic rock consists mainly of basaltic lava flows, ash, and cinders, and varies from 10 to 50 feet thick. The sedimentary interbeds are primarily fluvial (of streams and rivers), lacustrine (of lakes) and eolian (wind borne) deposits of clay, silt, sand and gravel, and range in thickness from 1 foot to 50 feet. Surface alluvium in the area of INTEC varies from 16 to 50 feet thick before encountering basalt.

A clayey interbed extends (non-continuously) over much of the INL area, and appears at a depth of approximately 110 feet in the INTEC area, resulting in a perched aquifer. Another perched aquifer – the result of a low permeability cinder cone – occurs at about 265 feet below ground surface.

Surface Water Hydrology

The majority of SRPA recharge is a result of alluvial ground water inflow with origins in surrounding mountain ranges. Irrigation also adds to recharge, and precipitation to a very small extent. Stream recharge from the Little Lost River and Birch Creek is negligible; however, the Big Lost River does contribute. In the vicinity of INTEC, the Big Lost River flows intermittently – usually spring and winter flow in wet years – recharging both the SRPA and perched aquifers in the area.

Hydrogeology

Regional flow of the SRPA is north-northeast to south-southwest, and aquifer depth ranges from 200 feet below ground surface (bgs) in the northern INL to 900 feet bgs in the southern part of the facility. INTEC currently reports depth to ground water around 500 feet (reported as 450 feet in 1991 by the Westinghouse 1992 report). Aquifer flow rates in the INTEC area range from 5 to 20 feet per day, with an average of 10 feet per day.

Infiltration & Vertical Water Movement

Westinghouse (1992) estimated vertical flow velocity from the ground surface to the SRPA to be a maximum of 2 feet per day, or 225 days (seven months) travel time from surface to the SRPA. Perched aquifer dissipation time is estimated at two years after perched aquifer recharge stops.

4.1.1 Aquifer and Perched Water Terminology

During this permit renewal, the DOE requested the two perched water formations below INTEC no longer be called 'aquifers', based on DEQ rules. The perched water formations fail to meet the definition based on 'economically significant quantities of water.' The IDAPA 58.01.11.007 *Ground Water Quality – Definitions* state:

> *Aquifer: A geological unit of permeable saturated material capable of yielding economically significant quantities of water to wells and springs.*

Consequently, language in this staff analysis and in the reuse permit has been changed from 'perched aquifer' to 'perched water formation' or 'perched water.' The perched water formations are subject to the Ground Water Quality Rule section 006 *Policies*:

> *01. Ground Water Quality Protection. It is the policy of the state of Idaho to maintain and protect the existing high quality of the state's ground water.*

4.1.2 Reuse Permit Waste Stream

The DEQ reuse permit regulates wastewater disposal which is accomplished through percolation in two percolation ponds. Wastewater to the percolation ponds is a combined flow of the following streams:

- sewage treatment plant effluent;
- service wastewater (process water) from INTEC operations; and,
- precipitation runoff from demolition sites.

Precipitation runoff is collected in the service wastewater disposal system and combined with the sewage treatment plant effluent for disposal to two 10 feet deep, 2.1 acre percolation ponds. The percolation ponds do not fill to any extent – the wastewater infiltrates the ground faster than it can accumulate.

Wastewater is limited by the reuse permit in two ways:

1. The quantity of wastewater disposed through percolation is limited to 3 million gallons per day, equal to a total of 1,095 million gallons per year.

2. The down gradient (down gradient from percolation) perched water formations and Snake River Plain Aquifer wells are monitored to assure compliance with the ground water quality standards according to IDAPA 58.01.11 *Ground Water Quality Rule*.

Note that the previous permit limits to wastewater concentrations (100 mg/L total suspended solids (TSS) averaged over 30 days, and 20 mg/L total nitrogen averaged over 30 days) have been removed due to DEQ Reuse Rule changes.

4.1.3 Waste Stream: Sewage Treatment Plant Effluent

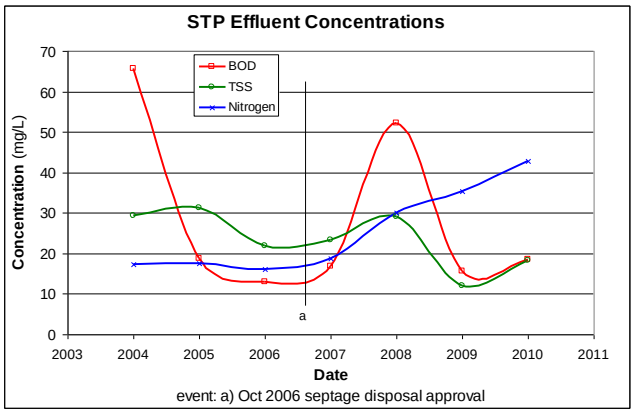
The sewage treatment plant is of standard design: wastewater enters the plant and undergoes primary and secondary treatment in four lagoons. Primary treatment is accomplished in the first two lagoons with aeration. Secondary treatment is accomplished in the third and fourth (facultative) lagoons through the settling of solids for anaerobic digestion and aerobic treatment of the wastewater near the water - atmosphere interface. After treatment the water is pumped from the treatment plant to the service water disposal system for final disposal at the percolation ponds.

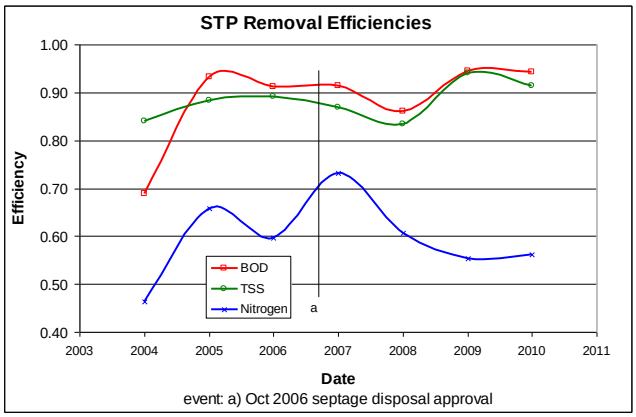
Sewage Treatment Plant Process Change: Septage

On October 11, 2006 the DEQ approved 5,000 gallons per day septage discharge to the sewage treatment plant. No permit modification was deemed necessary. The DEQ did not request waste characterization.

The septage is generated at other INL cleanup locations from porta potties, comfort stations, shower trailers, and septic tanks. The facility has reported no sewage treatment plant efficiency losses in Biological Oxygen Demand (BOD) removal or Total Suspended Solids (TSS) removal since the introduction of septage.

Septage quantities were reported in 2009 and 2010 averaged 6,858 and 9,715 gallons per week, respectively. The charts below show acceptable sewage treatment plant (abbreviated STP) TSS and BOD effluent concentrations and removal efficiencies. Total nitrogen concentrations appear to be rising as a result of septage discharge.





Sewage Treatment Plant Monitoring

Sewage treatment plant effluent qualitative analysis (constituent concentration analysis) has been reduced with this permit renewal to BOD and TSS as indicators of treatment efficiency, total nitrogen to monitor rising nitrogen concentrations in the groundwater, total coliform, and pH.

The sewage treatment plant effluent *quantity* is also required to be monitored and reported.

4.1.4 Waste Stream: Service Water

Service water, or process water, is collected from INTEC facilities for disposal. The water consists of:

- steam condensates;
- noncontact cooling water;
- regeneration effluent from the reverse osmosis and water softening systems;
- boiler blowdown wastewater;
- stormwater; and,
- other nonhazardous liquids.

Service Water Process Changes: Reverse Osmosis (RO)

The use of reverse osmosis (RO) on service water influent was initiated in December 2007 as a result of the 2004 permit compliance activity *Salt Loading Corrective Action Plan*, which was initiated to investigate ways to reduce salt loading in the wastewater. Although wastewater is not subject to ground water quality standards, it has impacted ground water concentrations: perched water formation monitoring results for both total dissolved solids and chloride had concentrations above the ground water standards of 500 mg/L and 250 mg/L, respectively, prior to RO initiation. As of 2007, the existing (salt based) water softening system was used in conjunction with the reverse osmosis system, but to varying degrees.

In December 2010, INTEC informed the DEQ that RO was no longer used for the service wastewater due to high maintenance costs. The State Water Self-Disclosure Log dated December 22, 2010, and submitted to the DEQ on behalf of the Department of Energy, revealed that three of five RO units were removed from service in July 2008, and the remaining two units were removed from service in 2010. INTEC failed to inform the DEQ prior to removal of the RO units.

Currently, water softeners are used only for boiler feed water, though no volumetric flow rate has been disclosed. Water previously treated with RO is now treated with an anti-fouling agent (with the trade name DREW 11-755), as of September 2010. The use of this phosphate based agent has been predicted to add 1.65 mg/L organic phosphorus and 0.5 mg/L organic carbon (total organic carbon, or TOC) to the wastewater stream. Wastewater monitoring since the introduction of the agent has revealed:

- TDS concentrations have dropped from an average of 476 mg/L (2004 thru 1009) to 262 mg/L for November 2009 and 262 mg/L for December 2009.
- Water softening salt use has reduced to 2,500 lb in October 2010 and 2,000 lb in November 2010 (2006 pre-reverse osmosis use averaged 70,000 lb/month; 2008 RO use averaged 41,667 lb/month).

Wastewater concentrations associated with the RO (specifically total dissolved solids and chloride) are charted in Section 4.3.1 *Wastewater Monitoring*, below. Note the substantial decrease in perched water concentrations once the RO system came on line in 2008 (actual startup was December 2007). However, SRPA chloride and TDS concentrations continue on an upward trend, which may be reflective of travel time to the SRPA and drain time for the perched water formations.

Reverse Osmosis Conclusion

The use of reverse osmosis was successful in reducing salt loading to the wastewater. The substitution of RO in September 2009 with an anti-fouling agent may be an even more effective step in salt reduction.

4.1.5 Waste Stream: Combined Wastewater

The combined wastewater (service wastewater, sewage treatment plant effluent and precipitation runoff) is monitored prior to the percolation ponds. Monitoring is conducted in building CPP-797, located approximately 750 feet downstream of the confluence points of the precipitation runoff, sewage treatment plant effluent, and service water disposal streams. Monitoring conducted is:

- quantity of wastewater (limited to 3 million gallons per day, equal to a total of 1,095 million gallons per year); and,
- water quality sampling for constituents listed in the reuse permit.

4.2 Monitoring Results

4.2.1 Wastewater Monitoring

As of 2004, service (process) wastewater has been combined with sewer treatment pond effluent for disposal. The two streams were combined to reduce the high nitrogen concentrations in the sewage treatment plant effluent to acceptable levels by dilution with the service wastewater.

About Monitoring Wastewater

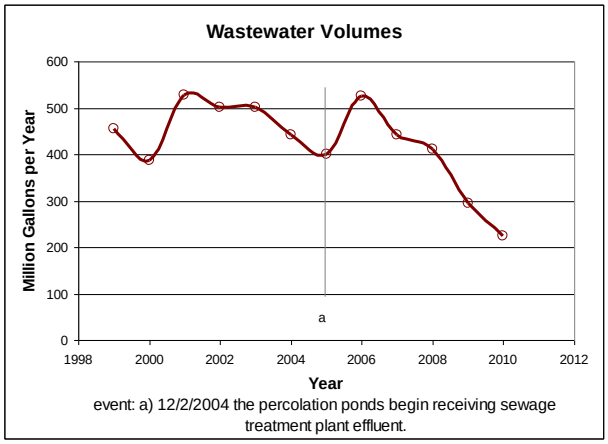
Samples of combined wastewater are taken one day per month with a flow proportioned sampler. The sampler collects a minimum of 8 aliquots (for example – an aliquot collection at least every 3 hours in 24 hours total). The aliquots are combined in a composite sample which is then used to withdraw samples for analysis.

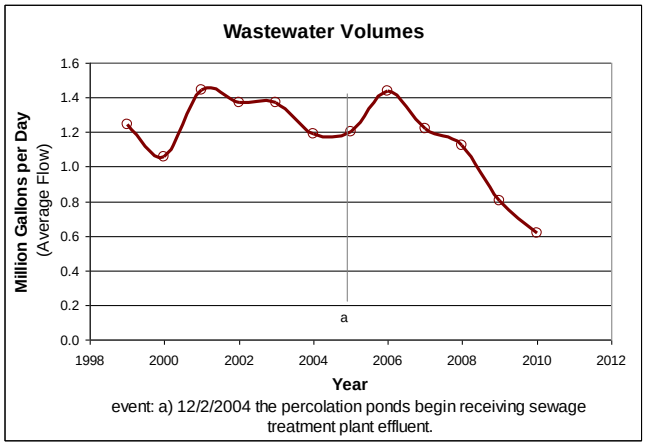
The wastewater concentrations graphed in this report are 12 month averages – that is, the 12 samples per year are averaged to one yearly value. Due the averaging effect of charting yearly values, monthly concentrations exceeding permit limits may not appear on the chart; therefore, any monthly exceedances are mentioned in the text of this report.

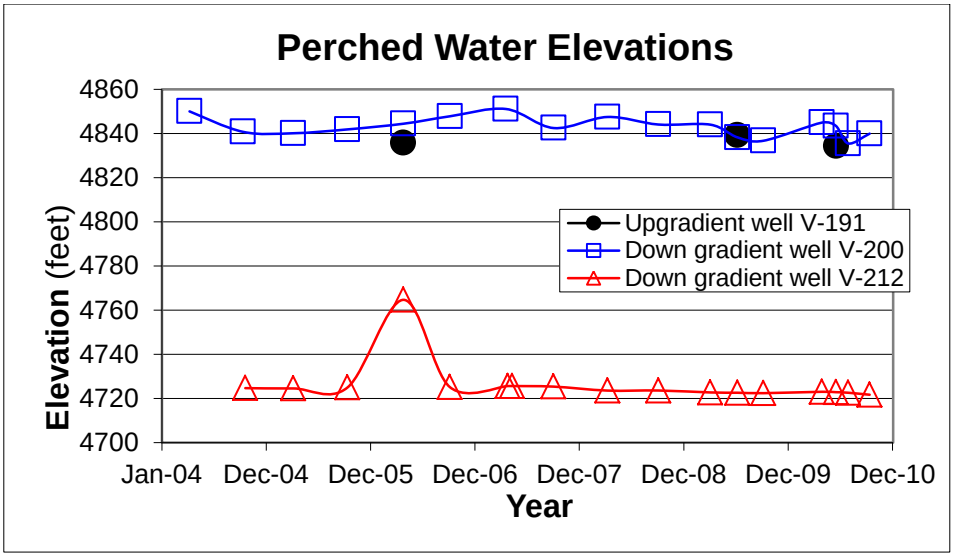
Wastewater Disposal Rates

The quantities of wastewater disposed through percolation are charted below. Pond rotation frequency is quarterly.

It is significant that perched water formation elevations are not steadily increasing as a result of wastewater disposal.

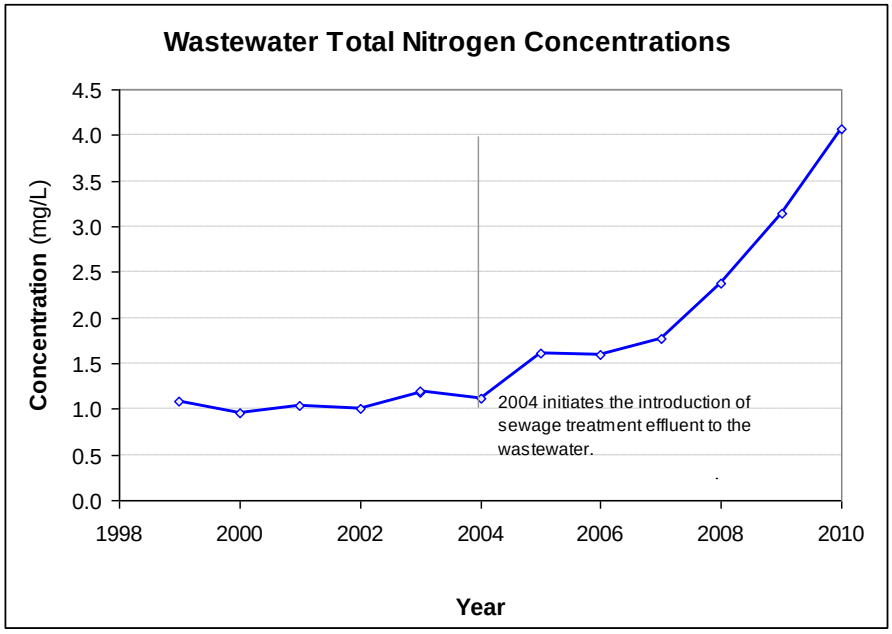


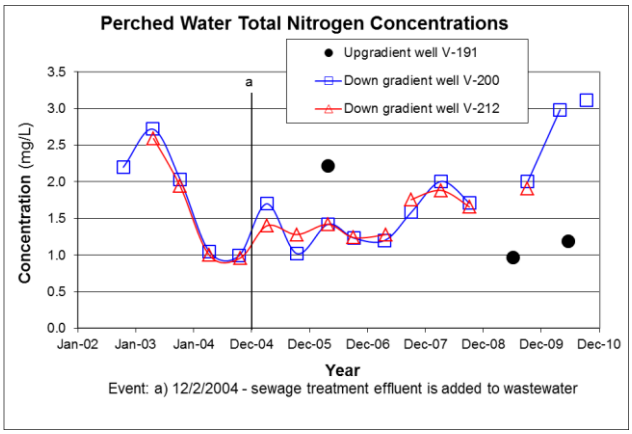


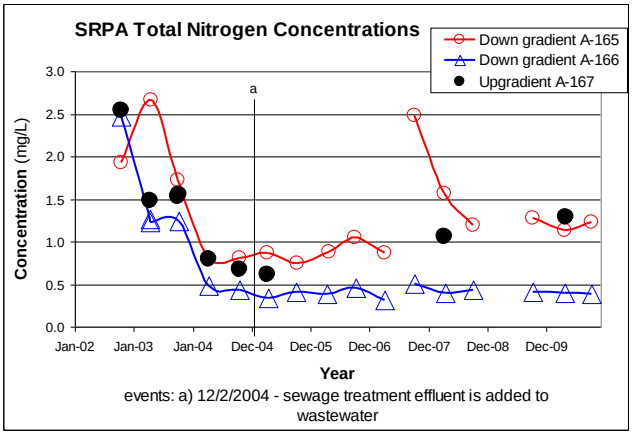


Wastewater Total Nitrogen Concentrations

Total nitrogen – previously permit limited to 20 mg/L on a 30 day average – is graphed below. The period from 2004 to 2009 showed no monthly sample results which exceeded the permit limit. Note the increasing concentration trend in the wastewater and perched water formations. Wastewater nitrogen concentrations are no longer permit limited due to DEQ Reuse Rule change.





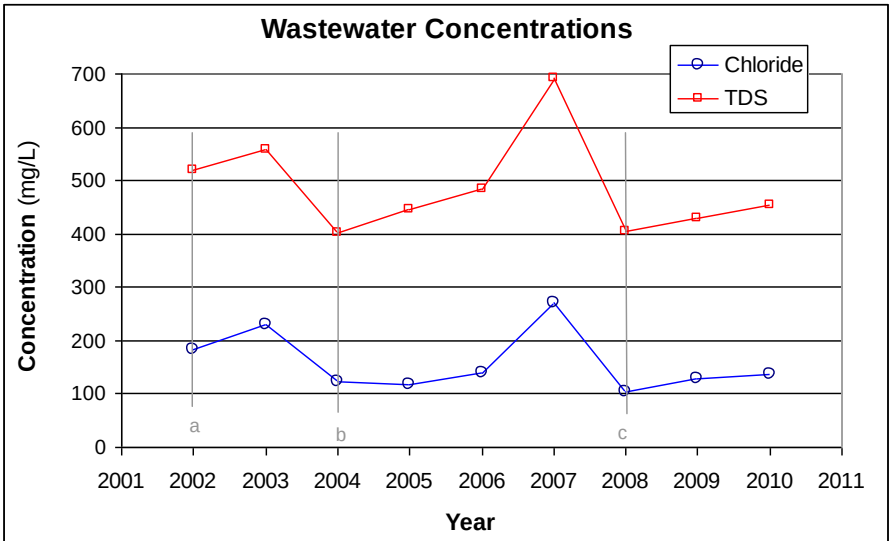


Wastewater Total Dissolved Solids and Chloride Concentrations

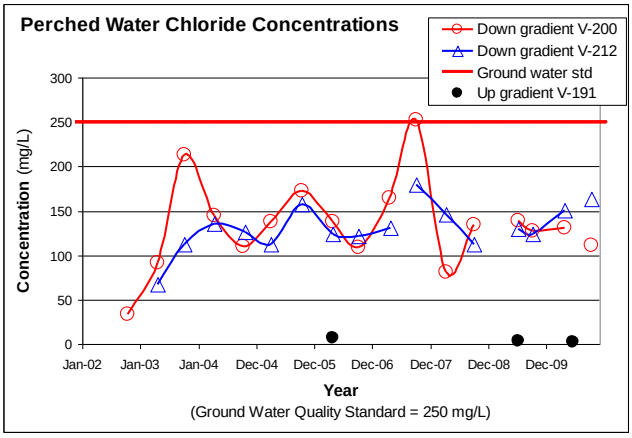
Chloride and total dissolved solids (TDS) are secondary ground water constituents. As discussed in Section 4.2.3 *Waste Stream: Service Water*, reverse osmosis (RO) was introduced in December 2007 to reduce salt loading in the wastewater.

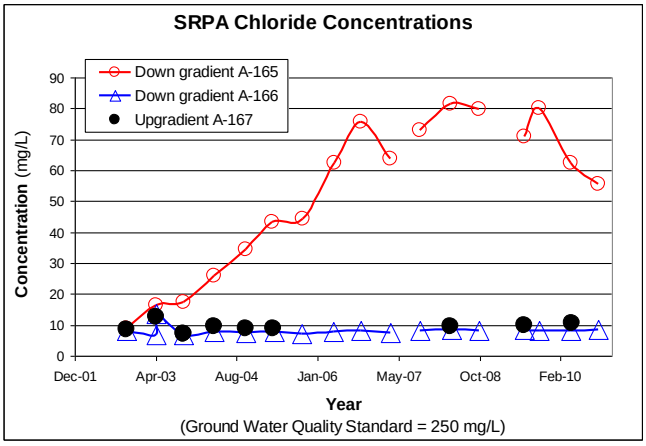
Wastewater concentrations (TDS and chloride) associated with the introduction of RO are charted below. Note the substantial decrease in perched water concentrations once the RO system came on line in 2008 (actual startup was December 2007). However, Snake River Plan aquifer (SRPA) chloride and TDS concentrations continue on an upward trend, which may be reflective of travel time to the SRPA and drain time for the perched water formations. Based on the assumption of 225 days travel for water from surface to aquifer (Westinghouse, 1992), and two years of storage in the perched aquifer, the results of reverse osmosis should appear in 2009, and reduce considerably by 2011.

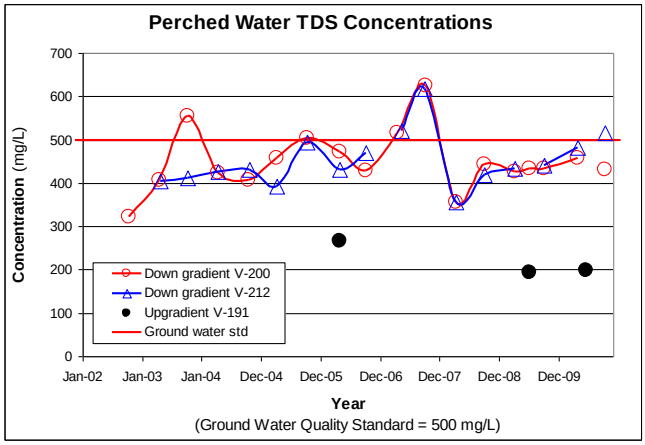
There was one chloride standard exceedance in all of the perched aquifer monitoring wells: compliance well V-200 sampled at 253 mg/L in 2007 (the standard is 250 mg/L). There were six exceedances of the TDS 500 mg/L standard in wells V-200 and V-212 – both down gradient compliance wells.

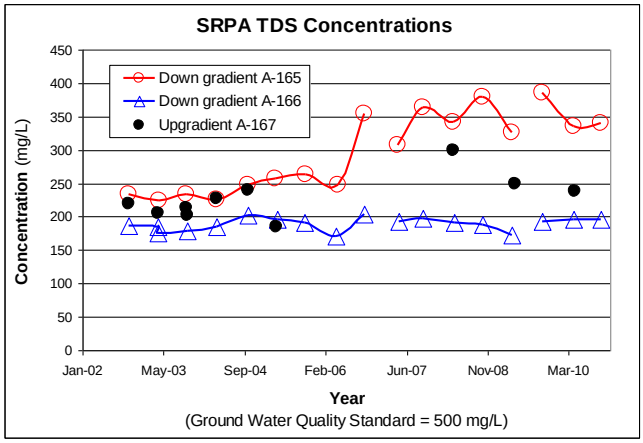


Events: a. 2002 initiates service water only to the new percolation ponds;
b. 2004 initiates sewer treatment effluent addition to the percolation ponds;
c. in 2008 the reverse osmosis unit came on line.









Wastewater Total Suspended Solids Concentrations

Wastewater sampling from 2005 to 2010 resulted in TSS concentration at or below the 4 mg/L detection limit for all sampling with the exception of June 2006, which resulted in 99.9 mg/L. The cause of the high value appeared to be sediment dispersal during seepage testing on the sewage treatment lagoons. Total suspended solids are not monitored in the ground water.

4.2.2 Monitoring Ground Water

Ground water monitoring is accomplished through six wells at INTEC (see the map below). The down gradient wells are compliance points, and therefore must meet the ground water quality standards. The upgradient wells are used to determine background concentrations, and therefore constituent concentration changes as a result of the percolation ponds.

1. The Snake River Plain Aquifer water quality is measured at three wells:
   - Well A-167 has been the upgradient well used to determine the water quality of the aquifer prior to infiltration of INTEC wastewater. See *Ground Water Monitoring Changes at INTEC*, below, and Section 6.0 *Permit Changes* about removing this well as the upgradient monitoring well.
   - Well A-165 is a down gradient water quality compliance well used to measure constituent concentrations after infiltration of INTEC wastewater.
   - Well A-166 is a down gradient water quality compliance well used to measure constituent concentrations after infiltration of INTEC wastewater.
2. There are two perched water formations in the INTEC percolation pond vicinity, both of which are subject to the ground water quality standards.
   a. A clayey interbed extends (non-continuously) over much of the INL area. In the INTEC area, the perched water formation is located at about 110 feet below ground surface and is monitored by two wells:
      - Well V-191 is an upgradient well used to determine the water quality of the perched water formation prior to infiltration of INTEC wastewater. See *About Well V-191*, below.
      - Well V-200 is a down gradient compliance well used to measure constituent concentrations after infiltration of INTEC wastewater.
   b. A second perched water formation – the result of a low permeability cinder cone – occurs at about 265 feet below ground surface, and is monitored by one well:
      - Well V-212 is a down gradient compliance well used to measure constituent concentration after infiltration of INTEC wastewater.

About Well V-191

Well V-191 is located in the upper perched water formation (about 110 feet below ground surface) and is used as the upgradient monitoring well: concentrations sampled at this well are intended as non-wastewater impacted levels. The well is often dry, making data scarce. However, because the aquifer is recharged by the intermittently flowing Big Lost River (See Section 4.1 *Aquifer Impact Criteria*), it is often dry between recharge years; that is – it is expected and acceptable that the well is often dry.

In 2005 INL submitted a proposed modification (*INL, 2005*) to the reuse permit which would remove well V-191 as the upgradient well, to be replaced by one of two recommended wells. The DEQ did not approve the change. Briefly, the proposal cited elevated chloride concentrations in well V-191 as evidence of wastewater impact from the percolation ponds. The DEQ concurs the well may be impacted, but recommends continued use of the well. Data from the well should be reviewed with: 1) interpretation of well V-191 data as possibly affected by wastewater; 2) consideration of concentration trends in well V-191 which are similar to trends in the two other perched water wells as evidence of wastewater impact; 3) consideration of increasing concentration trends at well V-191 as suggestive of wastewater areal spread through the perched water formation; and, 4) consideration of increasing concentration trends in well V-191 as directly related to percolation pond use.

Ground Water Monitoring Changes at INTEC

Ground water monitoring wells are addressed with this permit renewal. See Section 4.4 *Permit Changes* for a discussion of these issues.

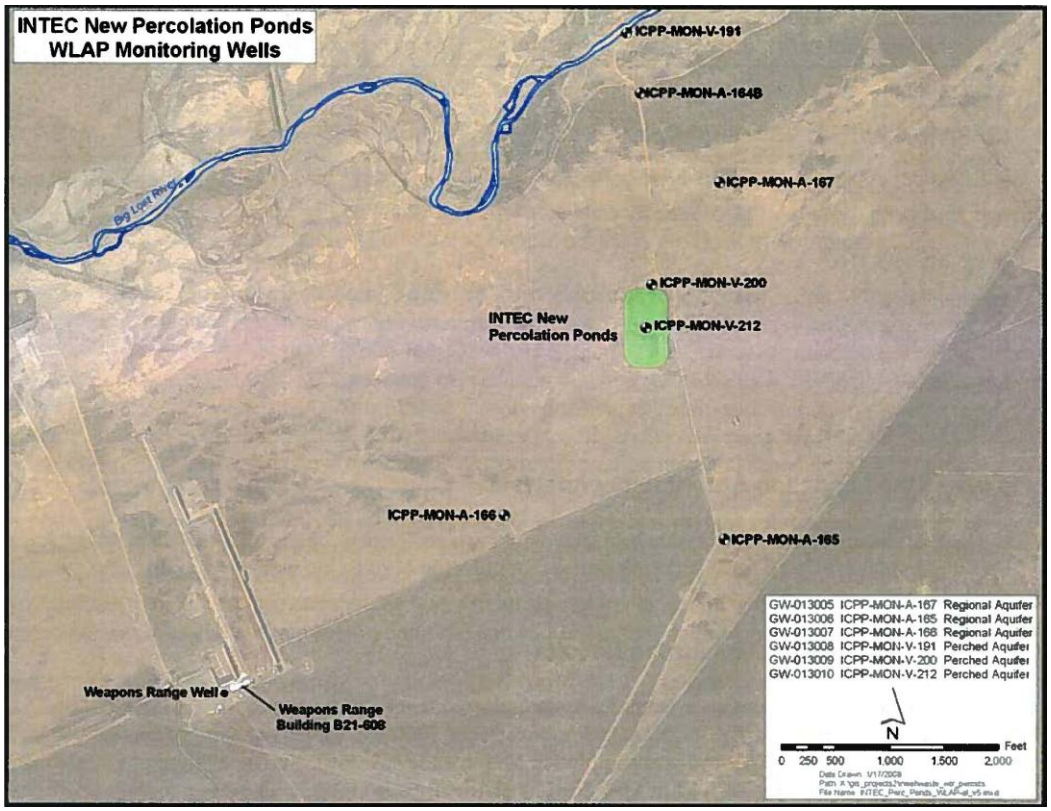
1. The upgradient Snake River Plain Aquifer monitoring well A-167 has been replaced with well A-164B, due to insufficient water volumes – and therefore lack of monitoring data – in well A-167.

Ground Water Constituents Monitored at INTEC

INTEC monitors the following primary constituents (those constituents based on protection of human health), secondary constituents (those based on aesthetic qualities), and other constituents.

Primary Constituents Monitored at INL						
Arsenic	Cadmium	Chromium	Coliform: total and fecal		Copper	Fluoride
Mercury	Nitrate	Nitrite	Selenium		*Radionuclides**	
Secondary Constituents Monitored						
Aluminum	Chloride	Iron	Manganese	pH	Silver	Total Dissolved Solids
Other Monitored Constituents						
Sodium	Nitrogen	Phosphorus				

* The US DOE asserts, with respect to Atomic Energy Act (AEA) radioactive materials, that it is a self-regulating entity under the AEA. As such, the approval granted by DEQ to the permittee to land apply wastewater, as contained in this permit, does not authorize the application or disposal of AEA radioactive materials that may occur during the wastewater land application activities authorized by this permit.
The DEQ does not comment on radionuclide monitoring at INTEC.

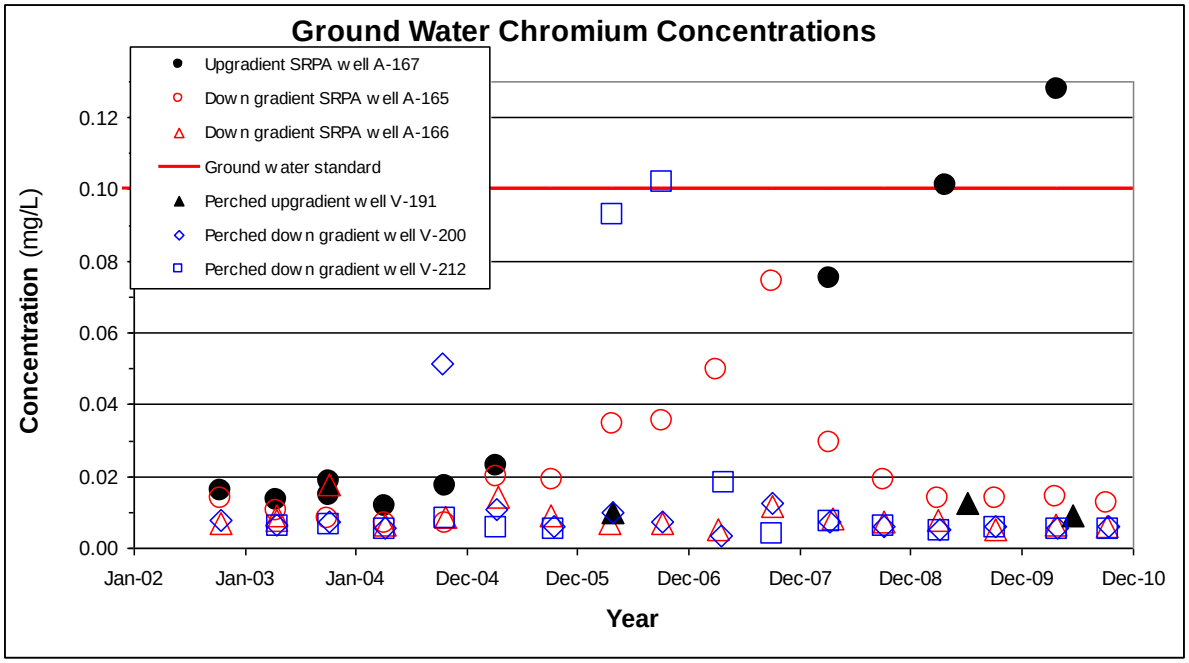


4.2.2.1 Primary Constituents in Ground Water

Chromium

INTEC recorded one ground water quality standard exceedance for chromium in well A-167 (0.128 mg/L on 4/27/2008; the standard is 0.1 mg/L). Two samples were at the standard: the 2008 sample taken from well A-167 (0.101 mg/L) and the 2006 sample taken from well V-212 (0.102 mg/L).

All of the monitoring wells are charted below. The DOE response to chromium concentrations are attached to this staff analysis as Appendix 1.



4.2.2.2 Secondary Constituents in Ground Water

Monitoring for secondary ground water quality standards has revealed the following exceedances.

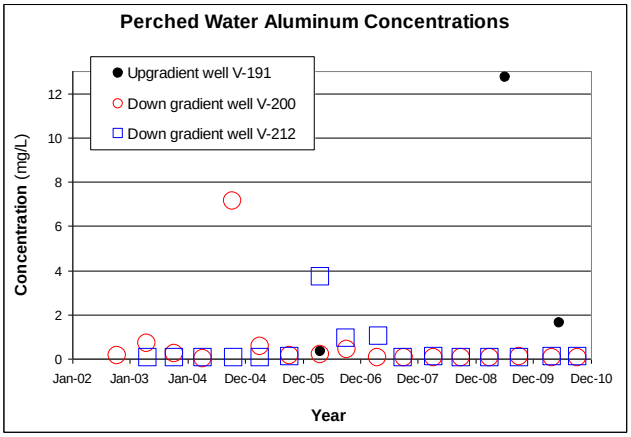
1. Snake River Plain aquifer (SRPA) and perched water formation exceedances:
   - aluminum (ground water quality standard is 0.2 mg/L),
   - iron (ground water quality standard is 0.3 mg/L), and,
   - manganese (ground water quality standard is 0.05 mg/L).
2. Perched water formation exceedances:
   - total dissolved solids (TDS – discussed below).
   - chloride had one violation at the 110 feet deep compliance well V-200; and,
   - pH had two 2009 exceedances in well V-212 at pH 9.42 & pH 9.83, and one 2006 exceedance in well V-200 at pH 8.76.

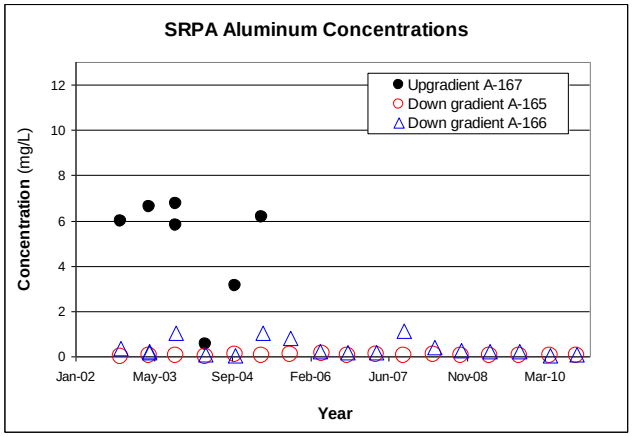
Aluminum, Iron, and Manganese

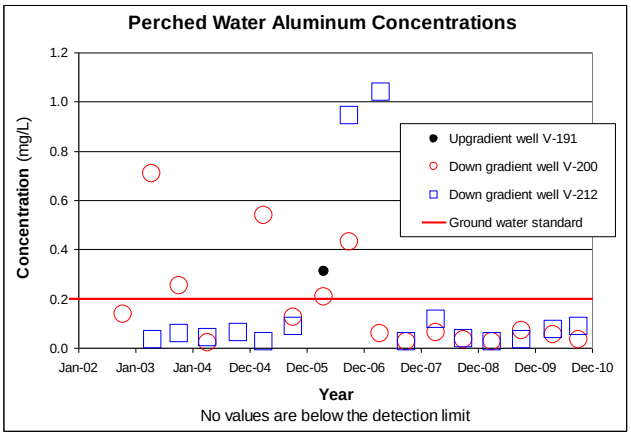
The exceedances for these three metals are charted below. The high concentrations have been detected since reporting started for the new percolation ponds. Note that with all three of these metals, the concentrations occur in both the upgradient and down gradient wells, indicating the source is not INTEC, and the metals were present at elevated levels prior to reaching the percolation pond area. Also, note in the graphs below, the concentrations have diminished by the time the ground water reaches the down gradient wells, showing evidence of dilution in the aquifer. Therefore, it appears that INTEC is not the cause of the aluminum, iron, and manganese ground water quality standards exceedances.

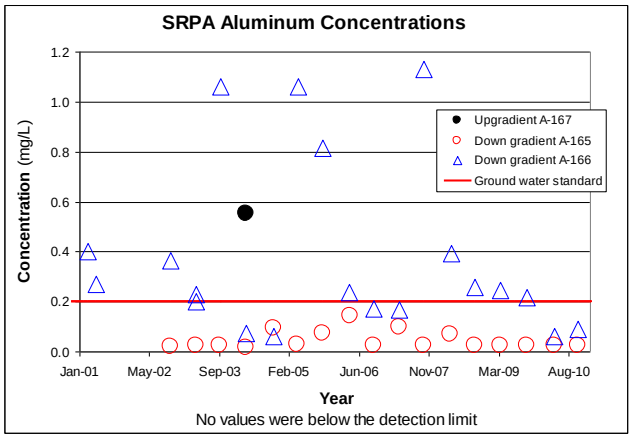
Filtered Samples

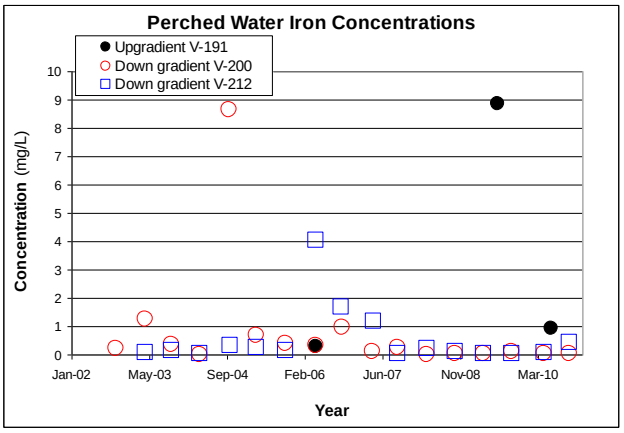
INTEC has requested using filtered samples for ground water analysis (see Section 4.5.2 *Permit Changes Requested by INTEC*) under the assumption that unfiltered sample results are associated with sediment being dissolved during the analytical process. Monitoring results for filtered samples resulted in only two ground water standard exceedances (aluminum results in 2006 and 2007 were 0.261 and 0.254, respectively).

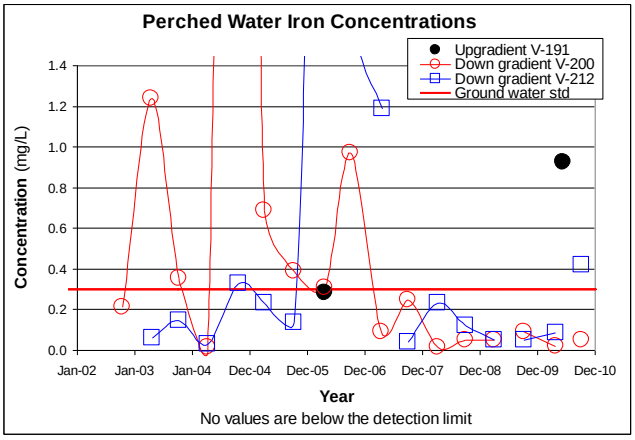

Perched Water Aluminum Concentrations
Upgradient well V-191
Down gradient well V-200
Down gradient well V-212
Concentration (mg/L)
0
2
4
6
8
10
12
Jan-02
Jan-03
Jan-04
Dec-04
Dec-05
Dec-06
Dec-07
Dec-08
Dec-09
Dec-10
Year

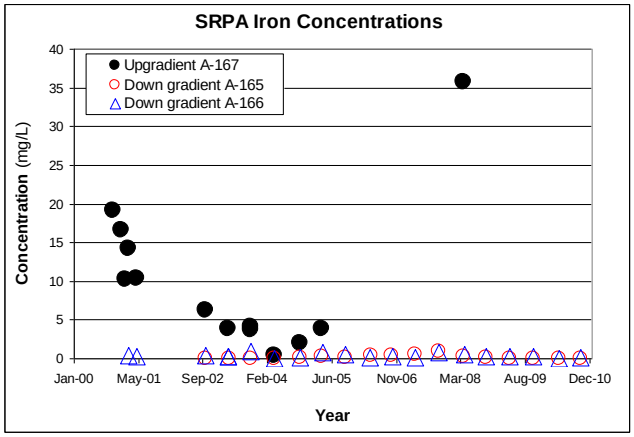

SRPA Aluminum Concentrations
Upgradient A-167
Down gradient A-165
Down gradient A-166
Concentration (mg/L)
0
2
4
6
8
10
12
Jan-02
May-03
Sep-04
Feb-06
Jun-07
Nov-08
Mar-10
Year

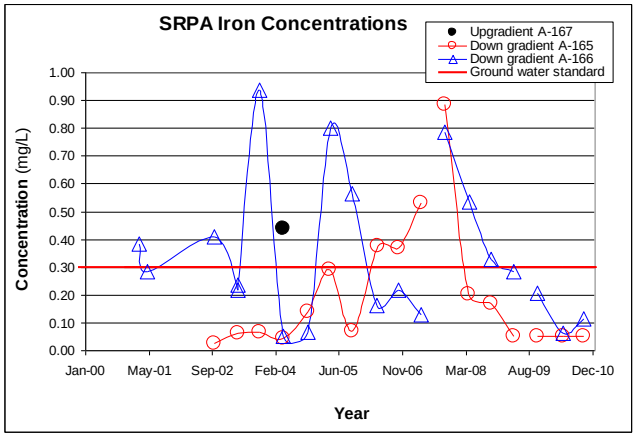

Perched Water Aluminum Concentrations
Upgradient well V-191
Down gradient well V-200
Down gradient well V-212
Ground water standard
Concentration (mg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Jan-02
Jan-03
Jan-04
Dec-04
Dec-05
Dec-06
Dec-07
Dec-08
Dec-09
Dec-10
Year
No values are below the detection limit

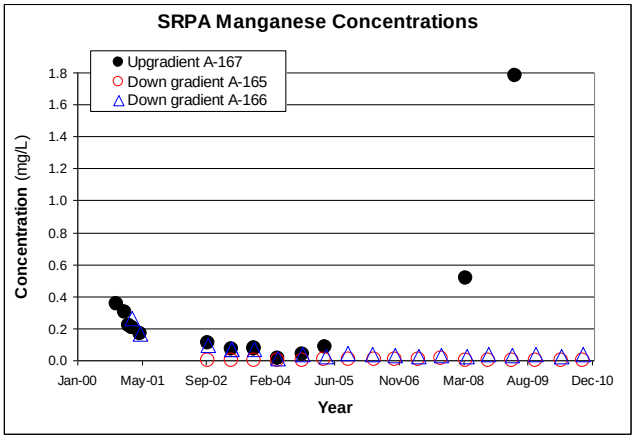

SRPA Aluminum Concentrations
Upgradient A-167
Down gradient A-165
Down gradient A-166
Ground water standard
Concentration (mg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Jan-01
May-02
Sep-03
Feb-05
Jun-06
Nov-07
Mar-09
Aug-10
Year
No values were below the detection limit

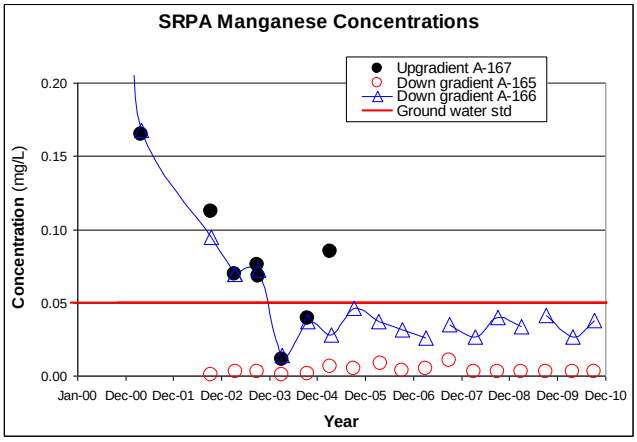

Perched Water Iron Concentrations
Upgradient V-191
Down gradient V-200
Down gradient V-212
Concentration (mg/L)
0
1
2
3
4
5
6
7
8
9
10
Jan-02
May-03
Sep-04
Feb-06
Jun-07
Nov-08
Mar-10
Year

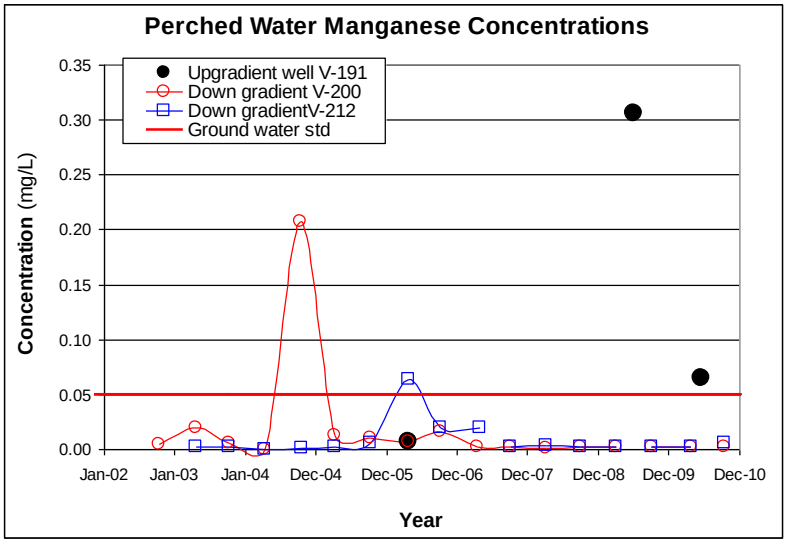

Perched Water Iron Concentrations
Upgradient V-191
Down gradient V-200
Down gradient V-212
Ground water std
Concentration (mg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Jan-02
Jan-03
Jan-04
Dec-04
Dec-05
Dec-06
Dec-07
Dec-08
Dec-09
Dec-10
Year
No values are below the detection limit


SRPA Iron Concentrations
Upgradient A-167
Down gradient A-165
Down gradient A-166
Concentration (mg/L)
0
5
10
15
20
25
30
35
40
Jan-00
May-01
Sep-02
Feb-04
Jun-05
Nov-06
Mar-08
Aug-09
Dec-10
Year


SRPA Iron Concentrations
Upgradient A-167
Down gradient A-165
Down gradient A-166
Ground water standard
Concentration (mg/L)
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
1.00
Jan-00
May-01
Sep-02
Feb-04
Jun-05
Nov-06
Mar-08
Aug-09
Dec-10
Year







4.2.2.3 Other Monitored Constituents in Ground Water

INTEC also monitors for sodium, nitrogen, phosphorus, and Total Kjeldahl Nitrogen. None of these constituents had excessive concentrations. Sodium concentrations appear to have stabilized since the reduction in salt based water softening at INTEC.

4.3 Permit Changes

4.3.1 Permit Changes Recommended by the DEQ

The DEQ incorporated the following permit changes into the draft permit.

Permit Section E – Compliance Activities

The new compliance activity associated with this permit renewal is explained in Section 4.6.1 - *Compliance Activities in the Proposed Permit*:

- CA-130-01 Plan of Operation update.

Permit Section G – Monitoring Requirements Changes

Item 5 – Ground Water Monitoring Procedure was changed from a specific procedural description in the permit to monitoring procedures approved by the DEQ and incorporated into the Plan of Operation; that is – procedures are no longer explained in the permit, but are to be explained in the Plan of Operation.

The Facility Monitoring Table incorporates the following changes:

- Quantitative (water quantity) monitoring of the sewage treatment facility *influent* is no longer required. This change was already made in a permit modification since the latest permit issuance, and is incorporated into this permit.
- Qualitative monitoring of the sewage treatment facility influent and effluent has been limited to biological oxygen demand (BOD), total suspended solids (TSS), total nitrogen, total phosphorus, pH and total coliform. BOD and TSS monitoring is intended to verify proper wastewater treatment; nitrogen monitoring is required to help assess the upward trend in nitrogen concentrations in the wastewater; and phosphorus monitoring is to assist in tracking phosphorous contributions from the service water conditioner (the phosphorous based DREW 11-755, explained in section 4.2.3 *Waste Stream: Service Water)*;
- Annual flow meter calibration requirements have been changed to 'first permit year' calibration in accordance with new DEQ quinquennial calibration requirements.
- Dissolved concentrations have replaced total solids concentrations for compliance determination for the following metals: aluminum, iron, manganese and silver, according to Section 400 of the IDAPA 58.01.11 Ground Water Quality Rule.

Permit Appendix 1 – Environmental Monitoring Serial Numbers Changes

Ground water sampling point GW-013005, used as the upgradient regional aquifer sampling point, made the following change:

- Monitoring well ICPP-MON-A-167 was removed as the sampling point due to historic insufficient well casing water volumes, and replaced with existing monitoring well ICPP-MON-A-164B, as discussed in section 4.3.2, below.

4.3.2 Permit Changes Requested by INTEC

SRPA Upgradient Monitoring Well Replacement

- The requested permit change for Appendix 1 Environmental Monitoring Serial Numbers will replace the upgradient, regional aquifer monitoring Well ICPP-MON-A-167 (Well A-167) with monitoring well ICPP-MON-A-164B (Well A-164B). Well A-167 is used as an upgradient well and not as a compliance point. The well had insufficient volume for six of the thirteen sampling events from 2005 thru 2010. The DEQ recommends the replacement of well A-167 with well A-164B. Well construction comparisons and well locations are shown below. A monitoring well map is located in section 4.2.2.

Well Information	ICPP-MON-A-164B	ICPP-MON-A-167
Completion date	2000	2000
Completion depth (ft bgs)*	585	504
Screened interval (ft bgs)	493 – 533	462 - 504
Depth to water table (Oct. 2008)	503.36	501.21
Casing	4 inch stainless steel	6 inch stainless steel

*****ft bgs = feet below ground surface

Alternative Low Flow Sampling Procedure

The requested permit change for Section G Monitoring Requirements is for an alternative ground water monitoring procedure to determine when a well is suitable for sampling for constituents required by the permit.

- INTEC requests a low flow sampling procedure for wells with low volumes of water. Briefly, the proposal removes constant temperature as a steady state indicator, and replaces the required '3 casing volumes' flush with steady state indicators of 'constant pH & specific conductance, or 3 casing volume flushes.'

The DEQ requests the low flow sampling criteria, including criteria that initiate low flow sampling, be included in the Quality Assurance Project Plan (QAPP) section of the revised Plan of Operation, to be approved upon approval of the Plan. That is – the DEQ does not approve the proposed low flow sampling at this time.

Use of Filtered Sampling Results for Metals Compliance

The DEQ approved the requested permit change for Section G *Monitoring Requirements*, allowing dissolved concentrations for secondary constituent ground water standards compliance determinations. Currently, unfiltered concentrations are used for compliance. As stated in the request: "*Concentrations of aluminum, iron, and manganese in all filtered samples taken since October 2003 have been below the applicable secondary constituent standards, indicating that the elevated metals are not in solution in the groundwater, but are associated with the sediment being dissolved during the analytical process (e.g., acidification)*."

IDAPA 58.01.11, the Ground Water Quality Rule, in Section 400 *Ground Water Contamination*, states:

> 05. Site-Specific Ground Water Quality Levels or Points of Compliance. The Department may allow site-specific ground water quality levels, for any aquifer category, that vary from a standard(s) in Section 200 or Section 300, or may allow site-specific points of compliance, based on consideration of effects to human health and the environment, for:
>
> > d. Dissolved concentrations of secondary constituents listed in Section 200 of this rule. The Department may allow the use of dissolved concentrations for secondary constituents if the requesting person demonstrates that doing so will not adversely affect human health and the environment.

Stormwater Addition to Wastewater

A December 16, 2009 INTEC letter to the DEQ requested stormwater discharge to the Service Waste System, and therefore discharge to the percolation ponds. The stormwater will be collected from a 33,600 square feet area of the Tank Farm, and is part of remedial actions at that area. Disposal is scheduled to begin around May 2011. A March 3, 2011 DEQ letter approved the stormwater disposal.

4.3.3 Insignificant Permit Changes

All other changes to the permit are deemed insignificant to facility operations, and consist of re-dating of the permit, changes in personnel, and grammatical edits.

4.4 Status of Current Activities & Recommended Activities for the New Permit

4.4.1 Previous Permit Compliance Activities

The following compliance activities were required by the previous permit (LA-000130-04). All the compliance activities have been completed.

COMPLIANCE ACTIVITY	REPORTED STATUS
CA-130-01 – submit O&M manual	Approved by the DEQ in April 2006
CA-130-02 – Salt Loading Corrective Action Plan	Approved by the DEQ on April 20, 2006
CA-130-03 – Sewage treatment plant lagoon seepage tests	DEQ approved seepage rate tests on October 15, 2007
CA-130-04 – Seepage Test Action Plan	Not required

4.4.2 Compliance Activities in the Proposed Permit

COMPLIANCE ACTIVITY	JUSTIFICATION	DETAIL
CA-130-01: Plan of Operation update	Quality Assurance Project Plan (QAPP) content is now required by DEQ.	Add Quality Assurance Project Plan (QAPP) content to the existing Plan of Operation. See the explanation below.

About Compliance Activity CA-130-01 *Plan of Operation Update*

The primary goal of this update is to add Quality Assurance Project Plan (QAPP) content to the existing Plan of Operation (Plan). Specifically, existing INTEC QA/QC documents need only to be referenced in the updated Plan of Operation to meet the new DEQ QAPP criteria. Note that sampling methods incorporated in the Plan of Operation will be subject to DEQ approval – and therefore moves specific techniques (for example

- low flow sampling criteria) from the permit to the Plan of Operation. Also, the necessity of any other (facility-wide) updates should also be evaluated, and the changes incorporated into the Plan of Operation.

About Seepage Testing

The DEQ has changed the seepage test frequency to every ten years. The INL last tested the sewage treatment plant lagoons in 2007; therefore, seepage testing is not due until 2017, and will be addressed in the next permit renewal.

4.5 Conclusions and Recommendations

The DEQ recommends that the INL INTEC facility conduct the permit required monitoring and report the required data to evaluate system performance and permit compliance.

5.0 RECOMMENDATION FOR ISSUANCE OF PERMIT

Staff recommends that the attached draft permit be issued.

6.0 REFERENCES

CH2M*WG Idaho, LLC – *"Renewal Application for Wastewater Reuse Permit for the Idaho Nuclear Technology and Engineering Center New Percolation Ponds"*, May 2009.

CH2M*WG Idaho, LLC – "*Wastewater Land Application Site Performance Report for the Idaho Nuclear Technology and Engineering Center New Percolation Ponds", 2005 thru 2010 (annual reports).*

Idaho DEQ – "*Staff Analysis of the INEEL Proposal to Combine the Idaho Nuclear Technology and Engineering Center (INTEC) Sewage Treatment Plant (STP) with the Service Waste System (SWS) Effluent, Wastewater Land Application Permit Request LA-000130-4 (Municipal and Industrial Wastewater)",* November 2004.

INL Geosciences Research – "*Proposed Modification to the Wastewater Land Application Permit for Wastewater Discharge to the Idaho Nuclear Technology and Engineering Center New Percolation Ponds*", 2005.

US Department of Energy – "*Order DOE 5400.5 Radiation Protection of the Public and the Environment*", January 1993.

US Department of Energy – "*Final Record Of Decision (ROD) Idaho Nuclear Technology & Engineering Center (INTEC) Operable Unit (OU) 3-13"*, DOE/ID-10660 Rev. 00, October 1999

US Department of Energy – "*Record Of Decision (ROD) For Tank Farm Soil And Idaho Nuclear Technology And Engineering Center (INTEC) Groundwater, Operable Unit (OU) 3-1",* DOE/ID-11296 Rev. 00, May 2007

USGS – "*An Update of Hydrologic Conditions and Distribution of Selected Constituents in Water, Snake River Plain Aquifer and Perched-Water Zones, Idaho National Laboratory, Idaho, Emphasis 2002–05*", USGE Scientific Investigations Report 2008–5089, 2008

USGS – "*Summary of Background Concentrations of Selected Radiochemical and Chemical Constituents in Groundwater from the Snake River Plain Aquifer, Idaho: Estimated from an Analysis of Previously Published Data",* Knobel, Orr, and Cecil, Journal of the Idaho Academy of Science Volume 28, No. 1, June 1992.

Westinghouse Idaho Nuclear Company, Inc. – "*Wastewater Land Application Permit" October 1992.*

7.0 Appendix 1: Chromium Report

Compliance Activity CA-130-02 "Chromium Report" Additional Information

The following information is being provided in response to DEQ's observation that there is an increasing trend in chromium concentrations in the groundwater at the New Percolation Ponds.

Wastewater Effluent Chromium Concentrations

Monthly monitoring for chromium in the wastewater effluent monitored at building CPP-797 (wastewater sampling point WW-013001) has occurred since August 2002 when the New Percolation Ponds were first placed into service. Although chromium is detected in the CPP-797 wastewater effluent, its concentration has averaged 0.0056 mg/L over the past nine years, with a maximum concentration of 0.0086 mg/L during that time period. Based on these results, the wastewater discharged into the INTEC New Percolation Ponds is not the source of the chromium groundwater contamination.

Aquifer Chromium Concentrations

Since October 2002, groundwater samples have been collected semi-annually from two downgradient aquifer monitoring wells, ICPP-MON-A-165 and ICPP-MON-A-166. In addition, groundwater samples have been collected semi-annually from upgradient aquifer monitoring well ICPP-MON-A-164B since April 2005. The table below shows the maximum and average total (unfiltered) chromium concentrations for these three wells.

Well	Number of Samples	Total Chromium Concentration	
		Maximum (mg/L)	Average (mg/L)
ICPP-MON-A-165	18	0.0741	0.0222
ICPP-MON-A-166	18	0.0880	0.0128
ICPP-MON-A-164B	13	0.0120	0.0107

Of the 49 samples collected, all results have been significantly below the chromium primary constituent standard (PCS) of 0.1 mg/L, indicating that the groundwater located upgradient and downgradient of the New Percolation Ponds does not have any chromium contamination issues.

From October 2002 until April 2005, six groundwater samples were collected from upgradient aquifer monitoring well ICPP-MON-A-167. None of these samples exceeded the groundwater standard, and the average total chromium concentration during this time period was 0.0166 mg/L. Since the April 2005 sampling event, this well has only been sampled four times because it was either dry or had insufficient sample volume.

Two of these post-April 2005 samples taken at well ICPP-MON-A-167 were slightly above the chromium groundwater standard - in April 2009 (0.101 mg/L) and in April 2010 (0.128 mg/L). Both samples were based on total (unfiltered) chromium analysis. In addition, three other metals, aluminum, iron, and manganese, were detected above their secondary constituent standards (SCS) in the April 2009 and April 2010 samples, as shown in the table below.

	April 2009 (mg/L)	April 2010 (mg/L)	SCS (mg/L)
Total Aluminum	165	224	0.2
Total Iron	121	168	0.3
Total Manganese	1.78	2.46	0.05

The results of the dissolved (filtered) chromium, aluminum, iron, and manganese samples taken in April 2009 and April 2010 from well ICPP-MON-A-167 were reported as either undetected or below their groundwater standard, as shown in the table below.

	April 2009 (mg/L)	April 2010 (mg/L)	PCS/SCS (mg/L)
Dissolved Aluminum	0.0250 U	0.0250 U	0.2
Dissolved Chromium	0.0025 U	0.0025 U	0.1
Dissolved Iron	0.050 U	0.0500 U	0.3
Dissolved Manganese	0.0270	0.0246	0.05

A review of the groundwater monitoring logbook for the April 2009 sampling event indicates that there was only 1.52 feet of water in the well at the time of sampling, and the color of the sample was described as cloudy and dirty. The April 2010 groundwater monitoring logbook indicates that there was only 2.04 feet of water in the well, and the color of that sample was described as black and murky. Due to the small volume of water in the well, both samples were collected using a bailer.

Based on this information, the elevated total chromium concentrations in the April 2009 and April 2010 well ICPP-MON-A-167 samples are most likely the result of metals from the collected sediment within the well and were not representative of the groundwater upgradient of the New Percolation Ponds.

Perched Water Chromium Concentrations

Groundwater samples have been collected semi-annually at downgradient perched water monitoring well ICPP-MON-V-200 (since October 2002) and at downgradient perched water monitoring well ICPP-MON-V-212 (since April 2003). Also, groundwater samples have been collected only four times at upgradient perched water monitoring well ICPP-MON-V-191 since the New Percolation Ponds were placed into service in August 2002.The table below shows the maximum and average total chromium concentrations for these three wells.

Well	Number of Samples	Total Chromium Concentration	
		Maximum (mg/L)	Average (mg/L)
ICPP-MON-V-200	18	0.0515	0.0095
ICPP-MON-V-212	17	0.1020	0.0172
ICPP-MON-V-191	4	0.0126	0.0090

Of the 39 samples collected from the perched water formation at the New Percolation Ponds, only one sample was at or near the chromium primary constituent standard of 0.1 mg/L - the October 2006 sample collected from monitoring well ICPP-MON-V-212 (0.102 mg/L). Two other metals, aluminum and iron, were also detected above their groundwater standards in the October 2006 sample, as shown in the table below.

ICPP-MON-V-212	October 2006 (mg/L)	SCS (mg/L)
Total Aluminum	0.944	0.2
Total Iron	1.670	0.3

The results of the dissolved (filtered) chromium sample taken in October 2006 from monitoring well ICPP-MON-V-212 was 0.0058 mg/L, which was comparable to the average chromium concentration in the wastewater effluent monitored at CPP-797 during the 2006 reporting year. The results of the dissolved aluminum and iron samples taken in October 2006 from this well were reported as either undetected or below their groundwater standard, as shown in the table below.

ICPP-MON-V-212	October 2006 (mg/L)	PCS/SCS (mg/L)
Dissolved Aluminum	0.0250 U	0.2
Dissolved Chromium	0.0058	0.1
Dissolved Iron	0.144	0.3

Several studies have been performed and actions taken to address the elevated concentrations of metals in the permitted monitoring wells at the New Percolation Ponds. The 2005 and 2007 annual reports summarize the results of these investigations. The studies found that the monitoring wells at the New Percolation Ponds contain aluminum, iron, and manganese, along with chromium and other elements that are abundant in naturally occurring alumino-silicate minerals and rocks. The elevated metals are not in solution in the perched water, but are associated with the sediment being dissolved when the acid used to preserve the sample is added. One study concluded that if samples are filtered through a 0.45-µm filter, then the remaining in-solution metals concentrations will be well below the respective primary/secondary constituent standards. The groundwater monitoring results for "filtered" samples over the past several years have supported this conclusion.

Based on this information, the total chromium concentration in the October 2006 well ICPP-MON-V-212 sample is most likely the result of metals from the collected sediment within the well and was not representative of the perched water formed from wastewater discharges to the New Percolation Ponds.

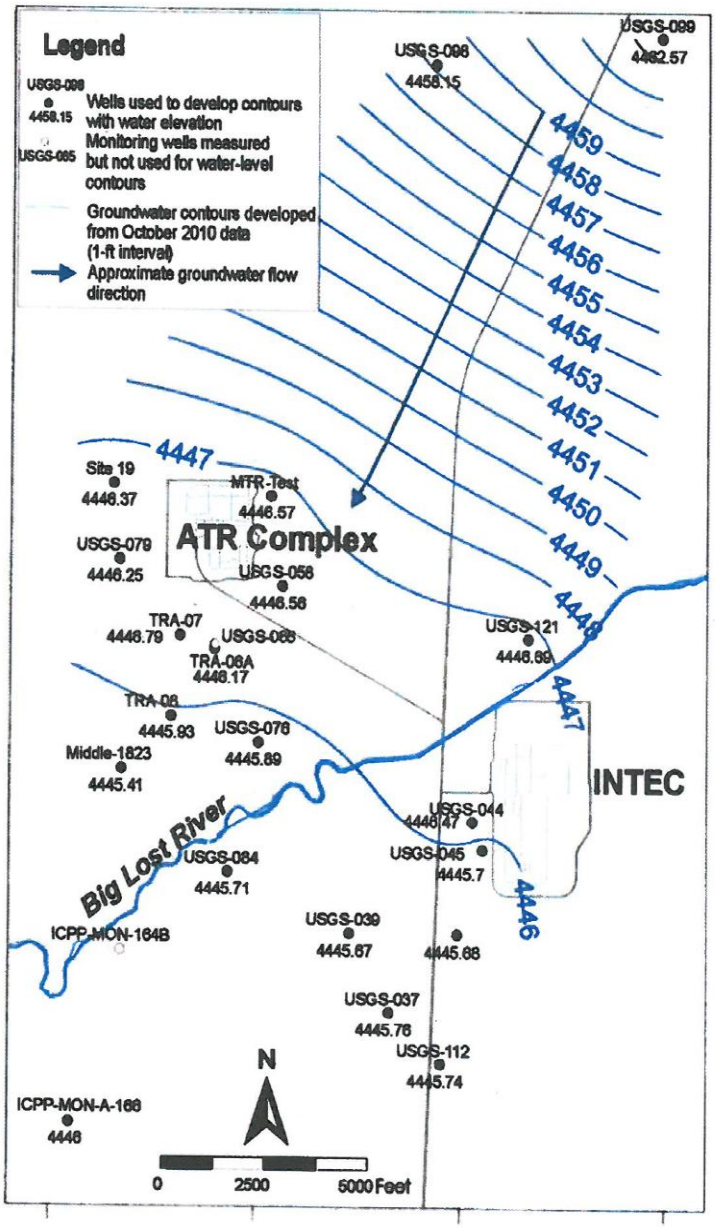
Other Potential Chromium Contamination Sources

The only other chromium groundwater contamination source near the New Percolation Ponds is the historical releases from the operations at the ATR Complex. The New Percolation Ponds are located approximately two and a half miles south of this facility.

Groundwater monitoring is being conducted at the ATR Complex to satisfy CERCLA requirements in the WAG-2, OU 2-13 Record Of Decision. In October 2010, chromium samples (filtered and unfiltered) were collected from seven aquifer wells. The results are provided in the table below:

Well	October 2010 Results	
	Total Chromium (mg/L)	Dissolved Chromium (mg/L)
USGS-065	0.089	0.090
USGS-058	0.014	0.011
TRA-08	0.025	0.022
TRA-07	0.130	0.097
TRA-06A	0.0078	0.0076
MIDDLE-1823	0.0097	0.0095
Highway-3	0.0023	0.0026

In general, groundwater flows in a southwest-to-south direction in the vicinity of the ATR Complex. The October 2010 aquifer water-level contour map for WAG-2 is shown below.



WAG-2 monitoring well MIDDLE-1823 is located approximately 4000 feet north of well ICPP-MON-A-164B, as shown on the map. A comparison of the October 2010 sample results for these two wells (as shown in the table below) indicate that the chromium concentrations are very low and the chromium contamination plume associated with the ATR Complex is not impacting the groundwater north of the INTEC New Percolation Ponds.

Well	October 2010 Results	
	Total Chromium (mg/L)	Dissolved Chromium (mg/L)
ICPP-MON-A-164B	0.0120	0.0116
MIDDLE-1823	0.0097	0.0095

Other Applicable Information

In the DEQ Staff Analysis for Wastewater Reuse Permit (WRP) LA-000161-01 [ATR Complex Cold Waste Pond (CWP)], DEQ recognizes that the groundwater at the ATR Complex is being monitored underWAG-2, OU-2-13 for chromium. Presented below is an excerpt from section 4.1 of this staff analysis:

> "*Though these chromium levels are a concern, it is clear that the CWP is not the source of the contamination and that the situation is being actively monitored by a number of agencies as part of the facility's Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) activities. Therefore, it is recommended that the SRPA* [aquifer] *wells not be monitored for chromium as it is appears that the CWP is not contributing to the elevated levels. The facility effluent, however, should continue to be monitored for the chromium and should there be any increase in the constituent concentration in the effluent, chromium sampling in the groundwater monitoring wells should be reconsidered.*"

In addition to not monitoring for chromium in the groundwater at the CWP, section F of WRP LA-000161-01 excludes the permittee from complying with the groundwater standard for chromium:

> "*Pursuant to IDAPA 58.01.11.400.05, compliance with the Primary Constituent Standard for Chromium, under this permit, shall not apply.*"

Summary

Although chromium is present in the wastewater effluent discharged into the New Percolation Ponds, its concentration is very low and is not the source of groundwater contamination. The elevated total chromium concentrations in the April 2009 and April 2010 well ICPP-MON-A-167 samples, and the October 2006 well ICPP-MON-V-212 sample, are most likely the result of metals from the collected sediment within these wells and were not representative of the groundwater at the New Percolation Ponds. The chromium contamination plume associated with the ATR Complex has not impacted the groundwater north of the INTEC New Percolation Ponds and is currently being monitored under the CERCLA process.