



**PERIODIC REVIEW**  
**ALUMINUM RECYCLING CORPORATION**  
FSID 627  
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## **1.0 INTRODUCTION**

This report presents the Washington State Department of Ecology's (Ecology) second periodic review for the Aluminum Recycling Corporation Site (Site). This periodic review is required as part of the site cleanup process under the Model Toxics Control Act (MTCA), Ch. 70.105D RCW, implemented by Ecology. Periodic reviews evaluate post-cleanup site conditions and monitoring data to assure human health and the environment are being protected. They are required for sites where an institutional control is part of the cleanup action.

Cleanup actions were conducted at the Site by the Burlington Northern Santa Fe Railroad Corporation (BNSF) in 2003. These actions addressed contaminated soils, but residual groundwater contamination remained. Groundwater monitoring has been ongoing since completion of the cleanup action. The first periodic review was completed in 2008.

## **2.0 SUMMARY OF SITE CONDITIONS**

### **2.1 SITE DESCRIPTION AND HISTORY**

The eight-acre Site, located at 3412 E. Wellesley Avenue, Spokane, Washington, was initially used as a gravel pit for an asphalt plant (Figure 1). Beginning in 1954, Site use changed to an aluminum reprocessing facility using scrap aluminum and aluminum dross. Several lessees continued these operations until 1987, when the property was abandoned by all lessees with an estimated 65,000 cubic yards of dross material remaining on-site. BNSF retained ownership of the property throughout that timeframe.

The facility processed white dross, which was composed of aluminum skim and other materials derived from primary smelting operations. White dross, which contains various oxides, aluminum metal, carbides, and nitrides, was treated through the addition of salts, cryolite, and heat to separate out molten aluminum metal. The resulting residue after the secondary treatment was high-salt black dross. This material, along with a small volume of semi-processed white dross, was deposited on-site in various waste piles and in the former gravel pit. Approximately 65,000 cubic yards of dross remained on-site when the property was abandoned in 1987. When the black dross is wet, it generates ammonia odors and heat. This caused complaints from the public and one fire. Temporary surface stabilization measures had been taken to limit these reactions.

### **2.2 SITE INVESTIGATIONS AND CLEANUP**

In 1985, Ecology completed a Preliminary Assessment (PA) of the property, and recommended dust and fumes be controlled; the dross materials be appropriately disposed of; and local water supply wells be sampled to ensure they hadn't been contaminated. Ecology then conducted a PA/Site Inspection (SI) Phase I in 1987. It concluded the Site was potentially contaminated with hazardous substances. No dangerous waste designation was completed at that time.

In 1988, BNSF performed a Site characterization study. Groundwater, soil, and deeper dross samples were collected, and surface stabilization and Site access restrictions occurred.

In 1989, a dross characterization study was done for BNSF. About 95% of the dross on-site could be considered a dangerous waste under Washington State regulations due to high concentrations of chloride, fluoride, and nitrate. Also, groundwater under the dross piles contained chloride, fluoride, and nitrate at levels exceeding state drinking water standards.

In 1991, Ecology completed a Site ranking using the Washington Ranking Method (WARM); the Site received a rank of 2 on a scale of 1 to 5, with 1 representing the greatest threat to human health and the environment. In 1996, BNSF's consultant reviewed the previous work and provided information on the physical and chemical properties of the dross, indicating it was not a dangerous waste according to bioassay testing. It also indicated the remaining salts were encapsulated and unable to be leached. Site access restrictions were also established.

BNSF and Ecology signed an Agreed Order in November 1998 to complete a Remedial Investigation/Feasibility Study (RI/FS) which was finalized one year later. Results indicated groundwater was contaminated with chloride, fluoride, nitrate, and nitrite. Soil was also contaminated where it was mixed with dross.

A Cleanup Action Plan (CAP) was prepared in 2000 which summarized investigations and contamination at the Site, and selected the remedy. The remedy, implemented in 2001, involved excavation and consolidation of dross and soil mixed with dross into an on-site pit, capping of the consolidation area with a low permeability multimedia cover system, and routing of surface water drainage into an on-site lined evaporation pond. Fencing, signs, and deed restrictions are maintained for the property. Four existing monitoring wells, installed prior to the RI/FS, are also sampled on a quarterly basis for chloride, fluoride, nitrate, and nitrite.

### 3.0 PERIODIC REVIEW

#### 3.1 REGULATION

Under WAC 173-340-420, a periodic review of the cleanup action takes place at least every five years after the initiation of the cleanup action. A periodic review is required at sites where any of the following occur:

- Ecology conducts a cleanup action.
- Ecology approves a cleanup action under an order, agreed order, or consent decree.
- As resources permit, whenever Ecology issues a no further action opinion.

AND one of the following conditions exists:

- An institutional control and/or financial assurance is required as part of the cleanup action.
- Cleanup level is based on a practical quantitation limit as provided for in WAC 173-340-707.
- Modifications to the default equations or assumptions using site-specific information would significantly increase the concentration of hazardous substances remaining at the site after cleanup or the uncertainty in the ecological evaluation or the reliability of the cleanup action is such that additional review is necessary to assure long-term protection of human health and the environment.

When conducting a periodic review of a cleanup action and evaluating whether human health and the environment are being protected, the factors Ecology shall consider include [WAC 173-340-420(4)]:

- The effectiveness of ongoing or completed cleanup actions;
- New scientific information for individual hazardous substances of mixtures present at the site;
- New applicable state and federal laws for hazardous substances present at the site;
- Current and projected site use;
- Availability and practicability of higher preference technologies; and
- The availability of improved analytical techniques to evaluate compliance with cleanup levels.

Because the cleanup action was performed under a consent decree and institutional controls are required, the site is subject to periodic reviews at a frequency of no less than every five years. A periodic review was completed by Ecology in 2008. Ecology determined in that review the remedy remained protective and no changes were needed.

### 3.2 BASIS FOR REVIEW

This review is based on documents describing the actions listed in Section 2.2. These include periodic groundwater compliance monitoring reports submitted quarterly from 2008 through 2012.

### 3.3 THE EFFECTIVENESS OF ONGOING OR COMPLETED CLEANUP ACTIONS

An engineered cover system was placed over the dross materials remaining on the Site. This low-permeability cover was designed to minimize the infiltration of surface water and route it away from the emplaced waste. Although grasses were planted on the cover surface, they did not grow successfully. Despite that, surface erosion appears to be minimal. The lined evaporation pond, installed to capture surface runoff, functions well, and can handle high flow events without overflow. The cover system and evaporation pond are visually inspected on a monthly basis to ensure there is no significant deterioration.

Institutional controls at the Site include access restrictions and a restrictive covenant. Fencing and signs are checked and maintained on a monthly basis along with the cover and pond. The restrictive covenant, which limits the use of the Site, was recorded and is in place. These limitations include: maintenance of fences and signs; industrial use only; limitations on groundwater withdrawal and use; and restrictions on activities which would interfere with the performance of the remedy. These institutional controls have proven effective in limiting exposure and protecting the integrity of the remedy.

Groundwater contaminant concentrations have been monitored quarterly since June 1997 at four Site monitoring wells (Figure 2). Fluoride has been below cleanup levels throughout this review period at wells MW4, MW5, and MW6 (Figure 3, Table 1). MW3 has shown two detections exceeding cleanup levels. A statistical analysis of fluoride data at this well shows that the data is lognormal, and the upper one-sided 95% confidence limit (0.69 mg/L) does not exceed the cleanup level (0.96 mg/L). Additionally, no single sample concentration is greater than two times the cleanup level, and less than 10% of the sample concentrations exceed the cleanup level. (Tables 1 through 4) Therefore, the cleanup level for fluoride in groundwater at the Site has been achieved, and fluoride can be removed from future monitoring events.

Chloride has been below cleanup levels throughout this review period at MW3, MW4, and MW6 (Figure 4, Table 2). However, chloride has exceeded the cleanup level in 15 of 20 samples at MW5 during this evaluation period. A statistical analysis of chloride data at this well shows the data is lognormal, and the upper one-sided 95% confidence limit (617.1 mg/L) exceeds the cleanup level (250 mg/L), indicating the well has not yet achieved cleanup levels. However, the Mann-Kendall statistical test shows a slightly decreasing trend in chloride concentrations.

Nitrate was below cleanup levels throughout this review period at MW4 and MW6 (Figure 5, Table 3). The cleanup level was exceeded in 3 of 14 samples in MW3, and in 11 of 20 samples in MW5. The trend is decreasing at MW3 and slightly increasing at MW5. This represents an improvement since the last periodic review.



Nitrite has had more detections at all wells as compared to the last periodic review, including multiple exceedances at wells MW4, MW5, and MW6 (Figure 6, Table 4). The exceedances are frequently interspersed with non-detections, including a one year period with no detections at any wells between October 2010 and October 2011. Trends at these wells are unclear and unpredictable. However, the magnitude of the exceedances is not great; the maximum concentration is only 1.8 mg/L (cleanup level 1 mg/L).

Overall, contaminant concentrations are showing improvements.

### 3.4 NEW SCIENTIFIC INFORMATION FOR INDIVIDUAL HAZARDOUS SUBSTANCES OR MIXTURES PRESENT AT THE SITE

No new scientific information is available for chloride, nitrate, nitrite, or fluoride.

### 3.5 NEW APPLICABLE STATE AND FEDERAL LAWS FOR HAZARDOUS SUBSTANCES PRESENT AT THE SITE

No new federal or state laws exist that would apply to contaminants at the Site.

### 3.6 CURRENT AND PROJECTED SITE AND RESOURCE USES

The Site is currently vacant. Trespassing is discouraged by the presence of a chain-link fence at the Site perimeter. Regular Site inspections indicate the fencing does keep trespassers off the Site.

No change in land use is currently projected for the Site. When the CAP was originally written, it was anticipated a freeway would be built very near the Site. Accommodations were made during the design for rerouting train tracks and other issues specific to the freeway corridor. Work on this freeway has now started, and it is expected to reach areas proximal to the Site in the next five years. Initial conversations have begun with Washington State Department of Transportation (WDOT) representatives to ensure that freeway-related work will not impact the protectiveness of the cleanup action. If any work may impact the cleanup action, Ecology will work closely with WDOT and BNSF to ensure human health and the environment remain protected. Additional public outreach work would be performed for any plans that may change the cleanup action.

### 3.7 THE AVAILABILITY AND PRACTICABILITY OF MORE PERMANENT REMEDIES

A “permanent” cleanup action is defined in MTCA as a cleanup action in which cleanup standards can be met without further action being required. Several remedial alternatives were evaluated in the CAP. Of these, the only remedy evaluated that would be more permanent would be removal and off-site disposal. No new technologies have been developed since the CAP that would be more permanent.

3.8 THE AVAILABILITY OF IMPROVED ANALYTICAL TECHNIQUES TO EVALUATE COMPLIANCE WITH CLEANUP LEVELS

No improved analytical techniques are available.

**4.0 CONCLUSIONS**

Ecology has determined the remedy at the Aluminum Recycling Corporation Site is generally protective of human health and the environment. The measures that were taken for the original cleanup action remain protective today. Continued inspections ensure the cap remains functioning, and compliance monitoring allows for groundwater impacts and trends to be measured. The existence of institutional controls in the form of deed restrictions confirms Site uses will remain consistent with the presence of contamination. Further periodic reviews will be required as long as institutional controls are in place at the Site, in accordance with WAC 173-340-420(7).

**5.0 REFERENCES CITED**

Washington State Department of Ecology, 2001, Model Toxics Cleanup Act Regulation Chapter 173-340 WAC

FIGURES

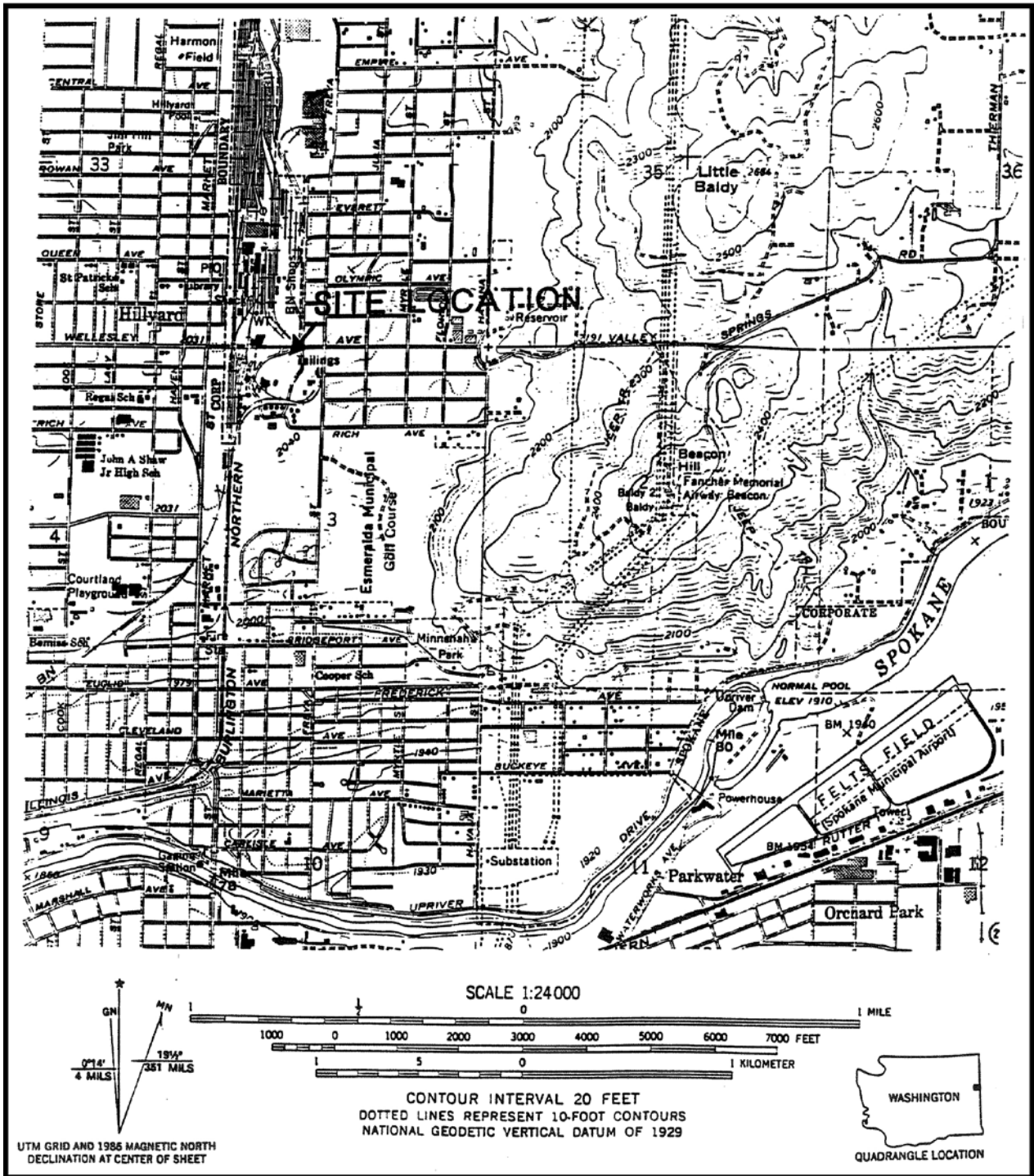


Figure 1. Site Map

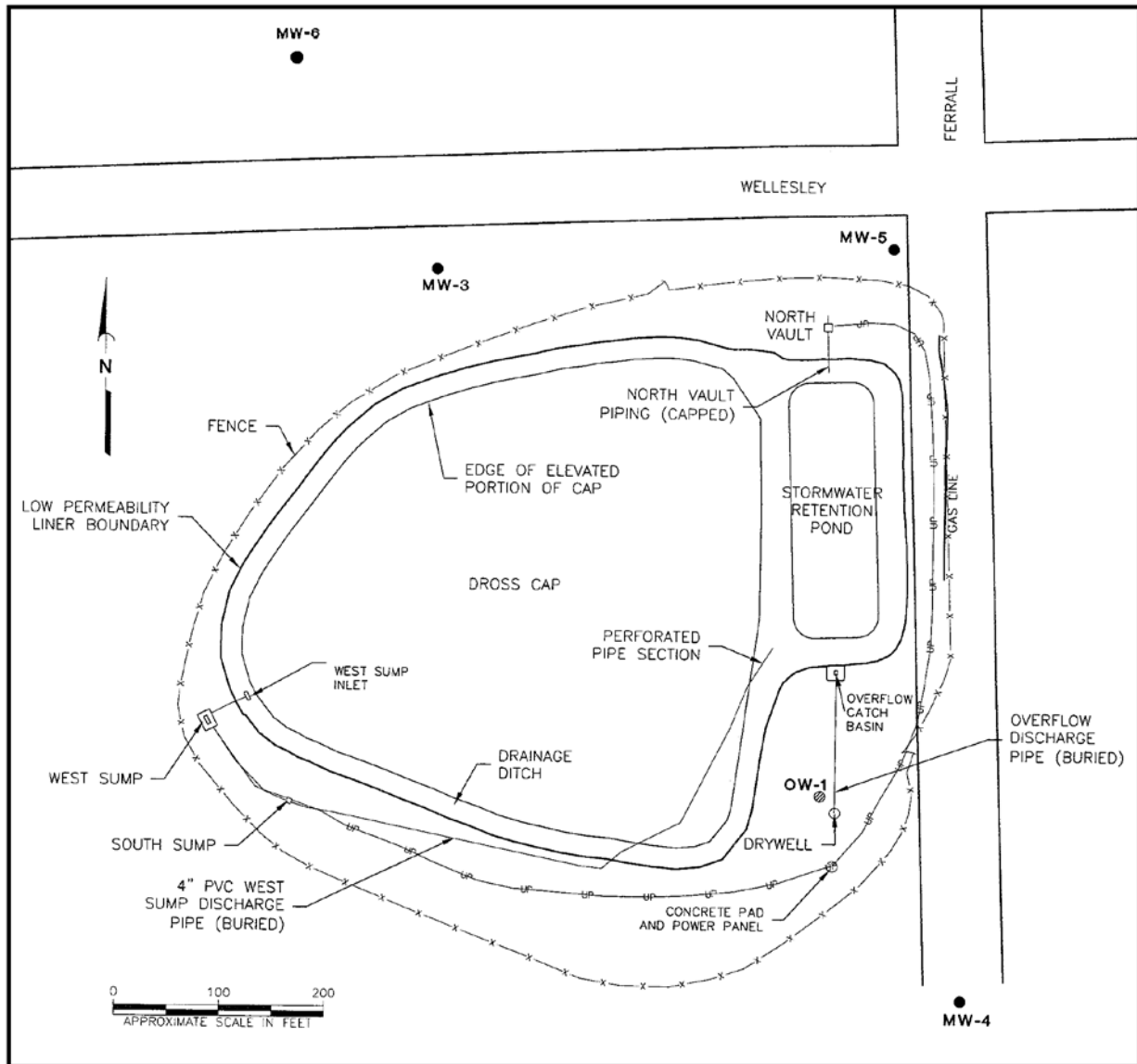


Figure 2. Well Locations and Final Site Configuration

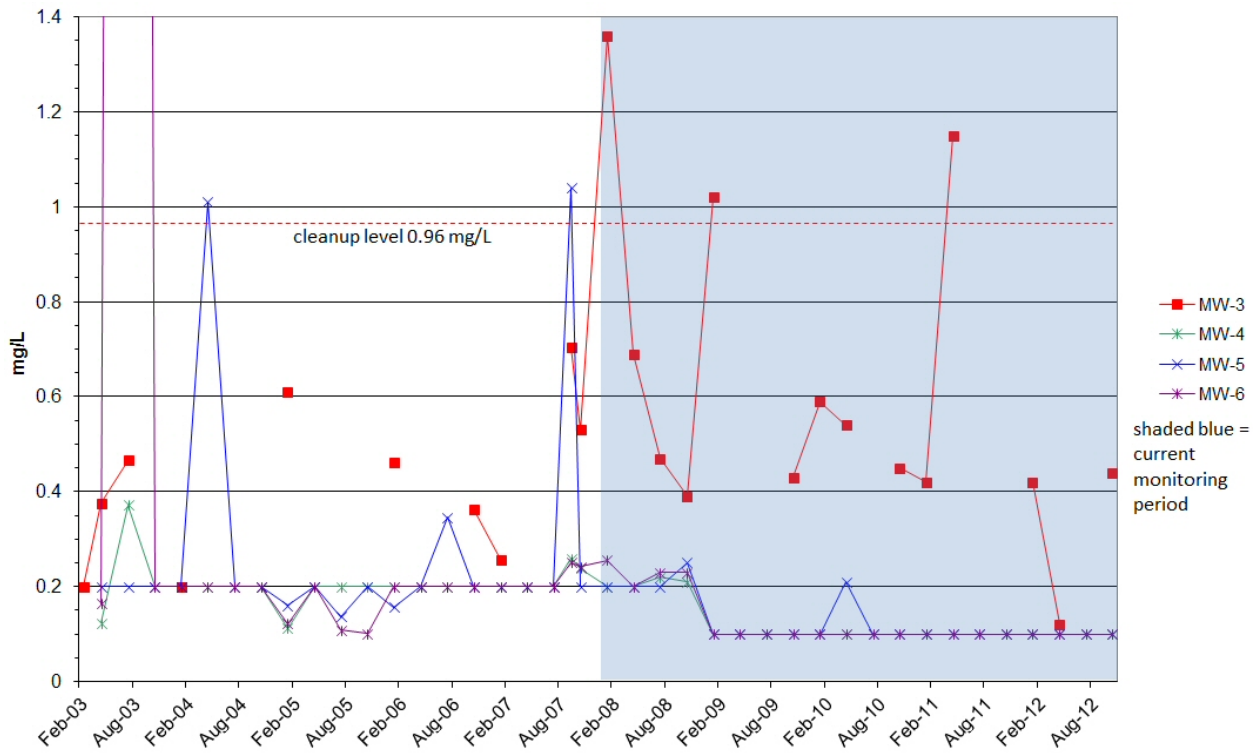


Figure 3. Fluoride Concentrations

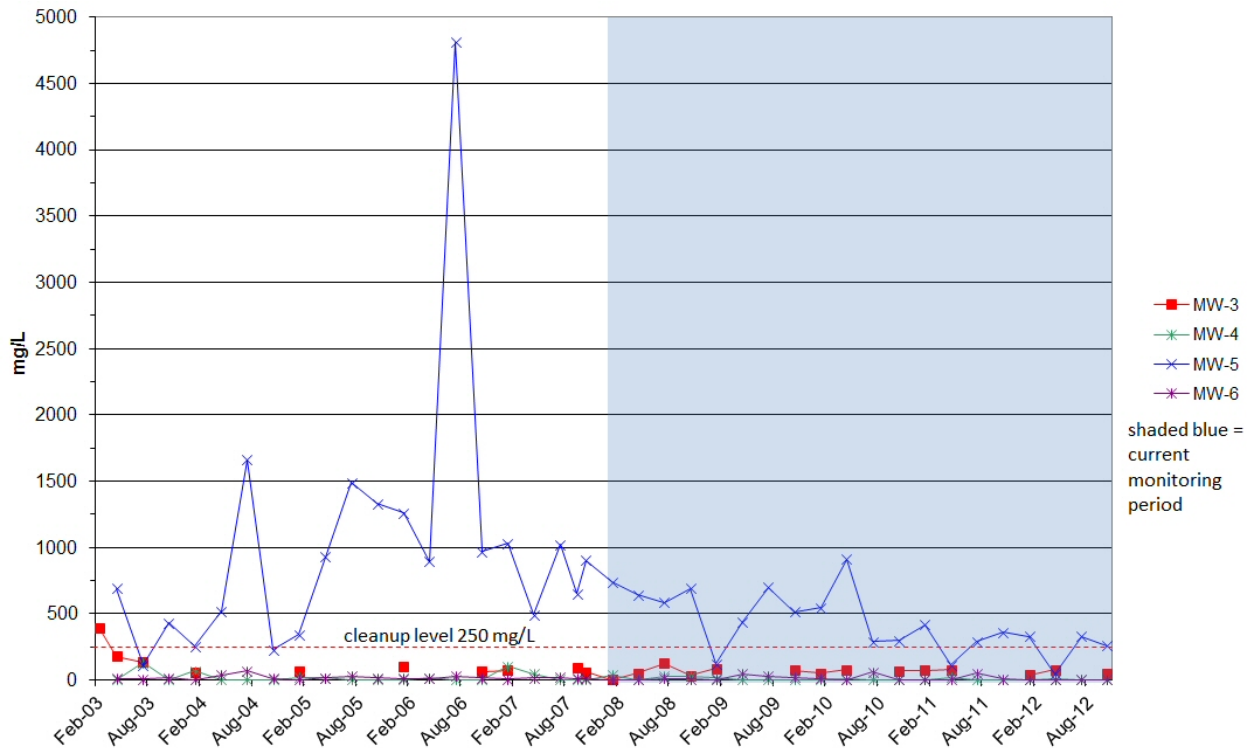


Figure 4. Chloride Concentrations

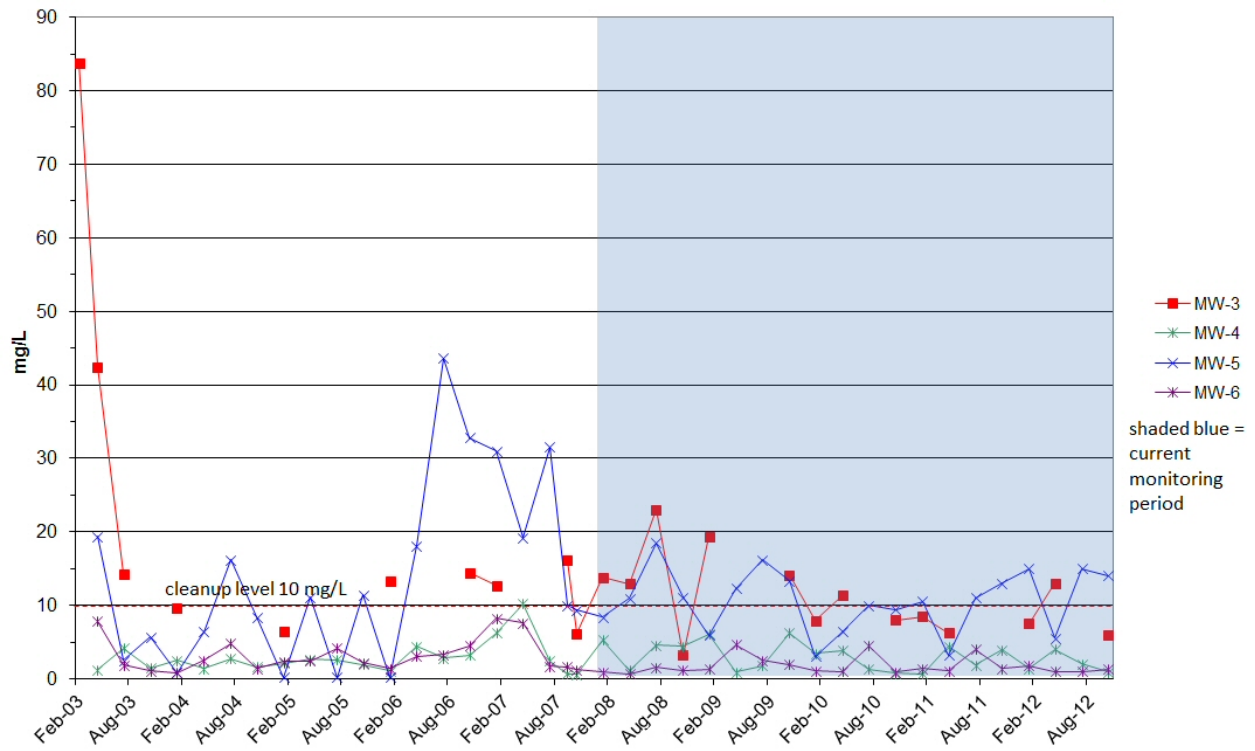


Figure 5. Nitrate Concentrations

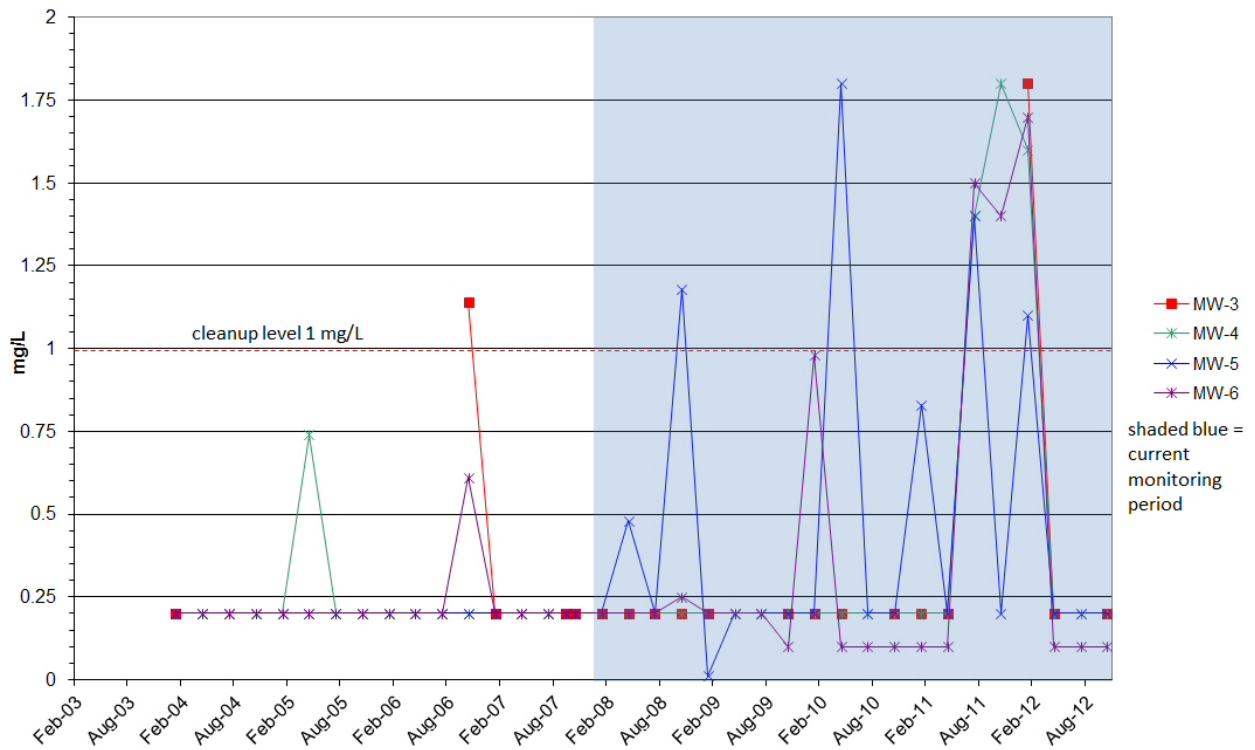


Figure 6. Nitrite Concentrations

TABLES



Date	Fluoride	Chloride	Nitrate	Nitrite
1/30/2008	0.43	74.5	14.1	0.2
4/22/2008	0.59	53.8	7.9	0.2
7/23/2008	0.54	80.6	11.3	0.2
10/22/2008	NS	NS	NS	NS
1/29/2009	0.45	68.2	7.95	0.2
4/28/2009	0.42	74.2	8.44	0.2
7/9/2009	1.15	77.1	6.24	0.2
10/29/2009	NS	NS	NS	NS
1/19/2010	NS	NS	NS	NS
4/7/2010	0.42	40	7.5	1.8
7/27/2010	0.12	77	13	0.2
10/20/2010	NS	NS	NS	NS
1/18/2011	0.44	51	6	0.2
4/21/2011	1.2	35	4.2	0.2
7/14/2011	0.41	39	6.9	0.2
10/6/2011	NS	NS	NS	NS
1/24/2012	0.31	71	9.7	0.2
4/10/2012	0.38	60	5.1	0.2
7/11/2012	0.26	57	9.5	0.2
10/30/2012	NS	NS	NS	NS

NS = not sampled

Table 1. MW3 Groundwater Results

Date	Fluoride	Chloride	Nitrate	Nitrite
1/30/2008	0.1	4.7	6.25	0.2
4/22/2008	0.1	3.98	3.49	0.2
7/23/2008	0.1	7.32	3.86	0.2
10/22/2008	0.1	2.75	1.28	0.2
1/29/2009	0.1	2.59	0.78	0.2
4/28/2009	0.1	2.5	0.68	0.2
7/9/2009	0.1	19.3	4.42	0.2
10/29/2009	0.1	2.7	1.9	1.4
1/19/2010	0.1	5.6	3.9	1.8
4/7/2010	0.1	3.2	1.4	1.6
7/27/2010	0.1	7.8	4	0.2
10/20/2010	0.1	2.7	2	0.2
1/18/2011	0.1	2.6	0.9	0.2
4/21/2011	0.21	2.4	0.9	0.2
7/14/2011	0.1	3.8	1.6	0.2
10/6/2011	0.1	4.3	2.4	0.2
1/24/2012	0.1	3.6	2.3	0.2
4/10/2012	0.1	3	1	1.3
7/11/2012	0.1	4.7	2.7	0.2
10/30/2012	0.1	2.8	2.4	0.2

NS = not sampled

Table 2. MW4 Groundwater Results

Date	Fluoride	Chloride	Nitrate	Nitrite
1/30/2008	0.1	513	13.3	0.2
4/22/2008	0.1	546	3.05	0.2
7/23/2008	0.21	914	6.36	1.8
10/22/2008	0.1	292	10	0.2
1/29/2009	0.1	298	9.43	0.2
4/28/2009	0.1	417	10.5	0.83
7/9/2009	0.1	112	3.2	0.2
10/29/2009	0.1	290	11	1.4
1/19/2010	0.1	360	13	0.2
4/7/2010	0.1	330	15	1.1
7/27/2010	0.1	48	5.5	0.2
10/20/2010	0.1	330	15	0.2
1/18/2011	0.1	260	14	0.2
4/21/2011	0.1	370	11	0.2
7/14/2011	0.1	1500	24	0.2
10/6/2011	0.1	320	8.2	0.2
1/24/2012	0.1	240	13	0.2
4/10/2012	0.1	150	6.7	0.2
7/11/2012	0.1	680	14	0.6
10/30/2012	0.1	69	1.3	0.6

NS = not sampled

**Table 3. MW5 Groundwater Results**

Date	Fluoride	Chloride	Nitrate	Nitrite
1/30/2008	0.1	19.2	1.98	0.1
4/22/2008	0.1	14.4	1.04	0.98
7/23/2008	0.1	2.47	1.02	0.1
10/22/2008	0.1	61.8	4.45	0.1
1/29/2009	0.1	5.32	0.88	0.1
4/28/2009	0.1	3.49	1.36	0.1
7/9/2009	0.1	2.89	1.08	0.1
10/29/2009	0.1	51	4	1.5
1/19/2010	0.1	9.7	1.4	1.4
4/7/2010	0.1	4.8	1.8	1.7
7/27/2010	0.1	2.7	1	0.1
10/20/2010	0.1	4.5	1	0.1
1/18/2011	0.1	5.7	1.3	0.1
4/21/2011	0.1	2.7	1	0.1
7/14/2011	0.16	4.1	1.4	0.1
10/6/2011	0.1	25	6.8	0.1
1/24/2012	0.1	5.8	1.1	0.1
4/10/2012	0.1	6.9	1.7	1.2
7/11/2012	0.1	2.7	0.2	1.2
10/30/2012	0.1	31	4.8	0.1

NS = not sampled

**Table 4. MW6 Groundwater Results**