Third Periodic Review
Aluminum Recycling Corporation Site

3412 E. Wellesley Avenue, Spokane, Spokane County

Facility Site ID 627, Cleanup Site ID 1133

Toxics Cleanup Program, Eastern Region

Washington State Department of Ecology
Spokane, Washington

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Document Information

This document is available on the Department of Ecology's Aluminum Recycling Corporation website[1].

Related Information

- Cleanup site ID: 1133
- Facility site ID: 627

Contact Information

Toxics Cleanup Program

Eastern Regional Office
Sandra Treccani, Site Manager
4601 N. Monroe St.
Spokane, WA 99205
Phone: 509-724-3119

Website[2]: Washington State Department of Ecology

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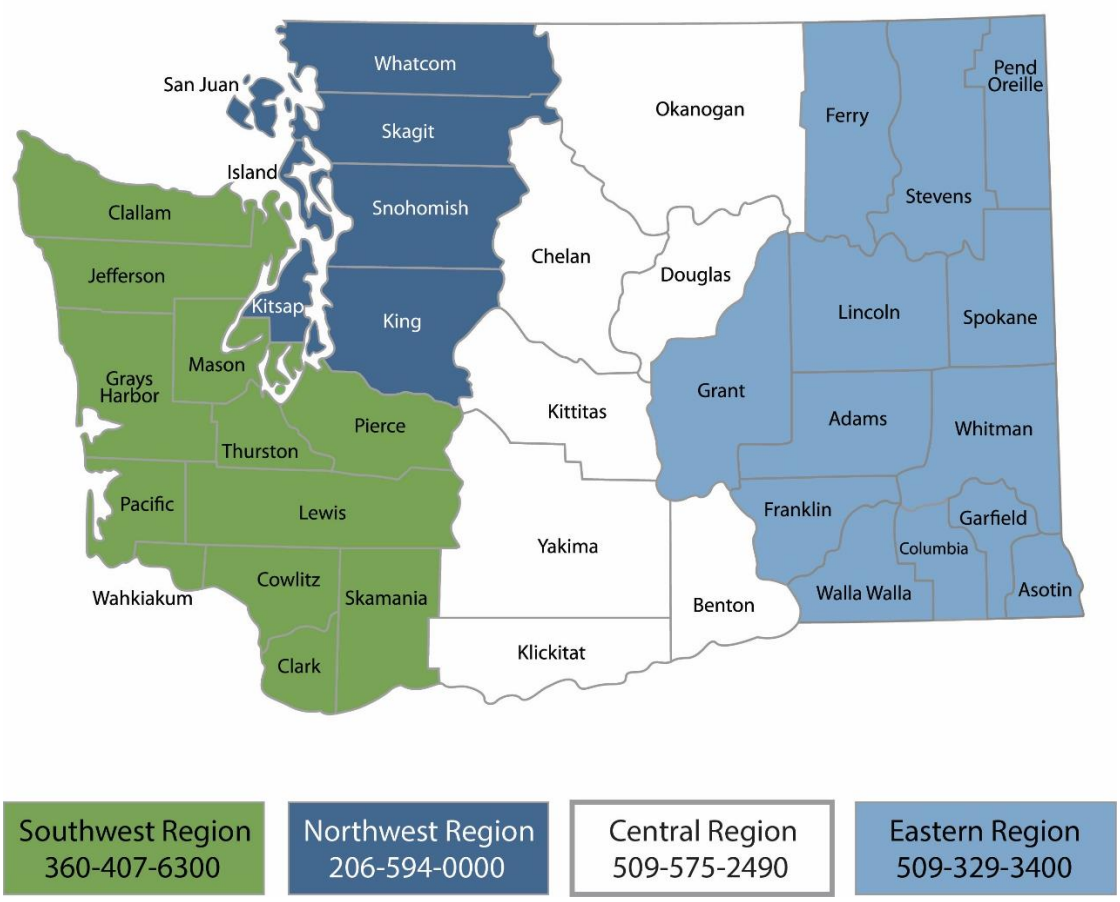
[1] https://apps.ecology.wa.gov/cleanupsearch/site/1133
[2] www.ecology.wa.gov/contact
[3] https://ecology.wa.gov/About-us/Accountability-transparency/Our-website/Accessibility

Department of Ecology's Regional Offices

Map of Counties Served



Region	Counties served	Mailing Address	Phone
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Eastern	Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman	4601 N Monroe Spokane, WA 99205	509-329-3400
Headquarters	Across Washington	PO Box 46700 Olympia, WA 98504	360-407-6000

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Introduction

This report presents the Washington State Department of Ecology's (Ecology) third periodic review for the Aluminum Recycling Corporation cleanup site (Site). This periodic review is required as part of the site cleanup process under the Model Toxics Control Act (MTCA), Ch. 70A.305 Revised Code of Washington, 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.

BNSF Railway Company (BNSF) conducted cleanup actions at the Site in 2003. These actions addressed contaminated soils, but residual groundwater contamination remained. Groundwater monitoring has been ongoing since completing the cleanup action. Ecology completed the first periodic review in 2008 and the second periodic review in 2013.

Summary of Site Conditions

Site history

The eight-acre Site 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 all lessees abandoned the property 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.

Site physical characteristics

Regional hydrogeology

Geology in the Site vicinity consists of Columbia basalts overlain by Quaternary flood deposits. The flood deposits are composed of poorly sorted boulders, cobbles, gravel, and sand. The coarse nature of the deposits results in very high permeabilities. Depth to bedrock below the Site ranges from 250–300 feet below ground surface. (EMR, 1999)

The Site overlies the Spokane-Valley Rathdrum-Prairie Aquifer, which is the sole source of water for more than 400,000 people in the greater Spokane area. The aquifer flows from Northern Idaho to the west and southwest down the Spokane Valley at an estimated rate of 60 to 90 feet per day (ft/day). In the area of the Site, the flow divides around a protrusion of basalt at Five Mile Prairie and flows to the northwest through the Hillyard Trough. The flow rate in this region is about 46 ft/day. Depth to groundwater at the Site is approximately 178 feet below ground surface.

Previous site investigations

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. We 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 percent 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.

Ecology prepared a Cleanup Action Plan (CAP) in 2000, which summarized investigations and contamination at the Site, and selected the remedy. The remedy, implemented in 2001, involved excavating and consolidating dross and soil mixed with dross into an on-site pit, capping the consolidation area with a low-permeability, multimedia cover system, and routing 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.

Nature and extent of contamination

Soils

Soil was also sampled as part of the RI/FS investigation. Samples were taken along with the dross from the same borings and test pits. The maximum depth of soil samples was 5 feet below the soil/dross interface at each sample location. With the exception of chloride, concentrations were generally lower in the soils than in the dross. The presence of these contaminants in soil was due to contaminants leaching downward through the dross piles.

Groundwater

Groundwater beneath the Site is contaminated through the leaching of contaminants as a result of precipitation and runoff through the dross piles and soil. The groundwater contains chloride, fluoride, and nitrate at concentrations above Site cleanup levels. Maximum concentrations measured in investigations prior to and during the RI were 1,400 parts per million (ppm) chloride, 14 ppm fluoride, and 83 ppm nitrate. Figure 3 shows the distribution of chloride in groundwater. Because chloride is a conservative tracer, it is expected to move readily in groundwater and represents the maximum extent groundwater contamination might occur. Therefore, other parameters are not plotted but are assumed to have the same general distribution pattern.

Cleanup Action Plan

After BNSF completed the RI/FS in November 1999, Ecology finalized the Cleanup Action Plan in May 2000.

Cleanup standards

The two primary components of cleanup standards are cleanup levels and points of compliance.

Cleanup levels

Cleanup levels determine the concentration at which a particular hazardous substance does not threaten human health or the environment. Site cleanup levels were developed as follows:

- Groundwater – Method B cleanup levels protective of drinking water were used. Indicator hazardous substances were chloride, fluoride, nitrate, and nitrite.
- Soils – Method B residential cleanup levels protective of groundwater and direct contact were used for Site soils. The indicator hazardous substances were lead and dross material.

Table 1 shows the final cleanup levels for the identified Site indicators after considering background concentrations, practical quantitation limits, and total Site risk.

Points of compliance

The point of compliance is defined in MTCA as the point or points where cleanup levels shall be attained (Washington Administrative Code [WAC] 173-340-200). Once those cleanup levels have been attained at that point, the site is no longer considered a threat to human health and the environment.

WAC 173-340-740(6) gives the point of compliance requirements for soil. For soil cleanup levels based on protection of groundwater, the point of compliance is in the soils throughout the Site.

The point of compliance for groundwater is defined in WAC 173-340-720(8). Groundwater points of compliance are established for the entire Site from the top of the saturated zone to the lowest potentially affected portion of the aquifer.

Site cleanup

Ecology completed negotiations on the Cleanup Action Plan and Consent Decree in May 2000. The selected remedial action for soil was consolidating dross and contaminated soil, and capping with an impermeable cover.

Site cleanup occurred between October 2001 and January 2003. Ecology approved the final Cleanup Action Report in July 2003. Ecology also filed an environmental covenant for the property in June 2001 that prohibited groundwater use and required cap maintenance. Groundwater has been regularly monitored since cleanup completion.

Periodic Review

Regulation

WAC 173-340-420(2) requires Ecology to conduct a periodic review of a site every five years under the following conditions:

(a) Whenever Ecology conducts a cleanup action;
(b) Whenever Ecology approves a cleanup action under an order, agreed order, or consent decree;
(c) Or, as resources permit, whenever Ecology issues a no further action opinion;
(d) And, one of the following conditions exists:
    (1) Institutional controls or financial assurance are required as part of the cleanup.
    (2) Where the cleanup level is based on a practical quantitation limit.
    (3) Where, in the department's judgment, 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 evaluating whether human health and the environment are being protected, the factors Ecology shall consider include [WAC 173-340-420(4)]:

(a) The effectiveness of ongoing or completed cleanup actions.

(b) New scientific information for individual hazardous substances or mixtures present at the Site.
(c) New applicable state and federal laws for hazardous substances present at the Site.
(d) Current and projected Site use.
(e) Availability and practicability of higher preference technologies.
(f) The availability of improved analytical techniques to evaluate compliance with cleanup levels.

Ecology shall publish a notice of all periodic reviews in the *Site Register* and provide an opportunity for public comment.

Basis

Because the Site underwent a cleanup action Ecology approved under a consent decree and institutional controls were required as part of the cleanup action, periodic reviews are required at a frequency of at least every five years.

Periodic reviews were competed in 2008 and 2013; this is the third periodic review for the Site.

Effectiveness of ongoing or completed cleanup actions

Evaluating the cleanup action effectiveness involves assessing contaminant levels and trends to determine if the cleanup actions are performing as expected.

An engineered cover system was placed over the dross materials remaining on the Site. This low-permeability cover was designed to minimize surface water infiltration 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 an annual 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 an annual 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 that 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 since June 1997 at four Site monitoring wells (Figure 2). Monitoring frequency was quarterly through 2016, semi-annually in 2016 and 2017, and annually since then. Beginning in 2021, monitoring will only occur once every three years. Fluoride was removed from the monitoring program in the 2013 Periodic Review because cleanup levels were achieved in all wells.

Nitrite hasn't been detected in any well at the Site since October 2013. Therefore, nitrate is no longer a contaminant of concern, and it can be removed from the monitoring program.

Groundwater data for chloride and nitrate in all wells are shown in Tables 2 and 3. A Mann-Kendall trend evaluation was performed for chloride and nitrate data. Both contaminants show slightly decreasing trends at all wells, except for nitrate in monitoring well 6, which shows a slight increasing trend. Overall, contaminant concentrations are showing improvements.

New scientific information for individual hazardous substances or mixtures present at the Site

There is no new scientific information that affects the Site.

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.

Current and projected Site and resource use

The Site is vacant. Trespassing is discouraged by a chain-link fence around 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 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 started, and construction is occurring immediately adjacent to the Site. Monitoring well 3 was impacted by construction work, and was replaced in March 2022.

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.

Availability of improved analytical techniques to evaluate compliance with cleanup levels

No improved analytical techniques are available.

Conclusions

Ecology has determined the remedy at the 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).

References

GeoEngineers, 2003, *Final Cleanup Action Report, Aluminum Recycling Corporation Site*.

Environmental Management Resources, 1999, *Final Remedial Investigation/Feasibility Study for the Hillyard Dross Site*.

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

Washington State Department of Ecology, 2000, *Final Cleanup Action Plan, Aluminum Recycling Corporation Site*.

Figures

Figure 1: Site location

Figure 2: Site map and well locations

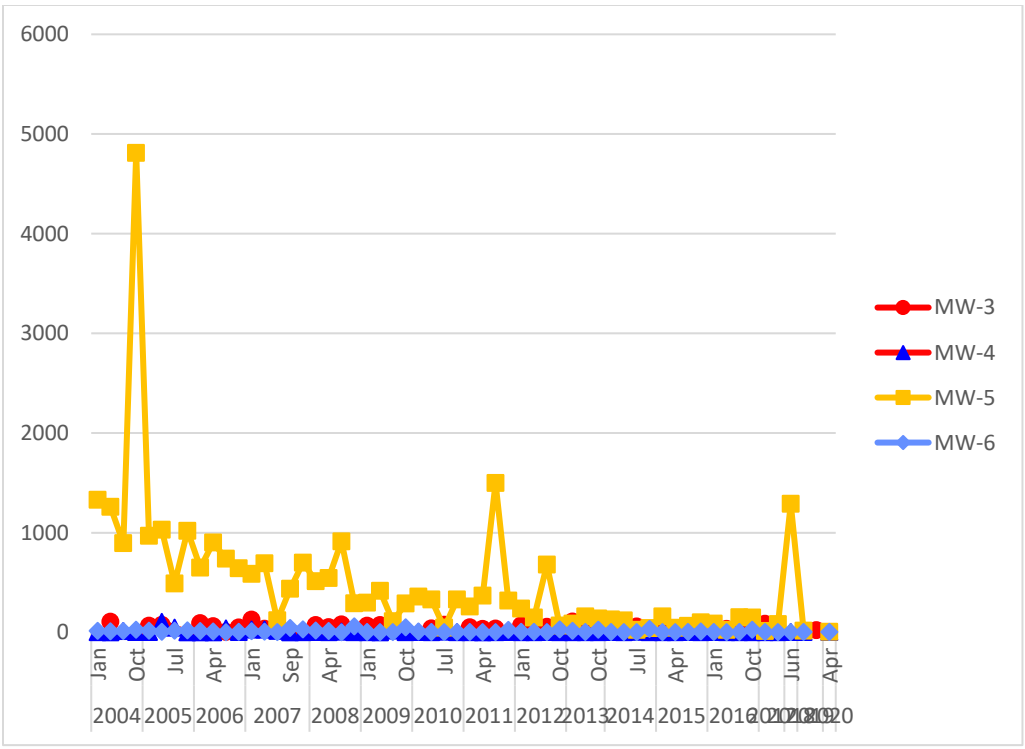

Figure 3: Chloride concentrations, since cleanup completed

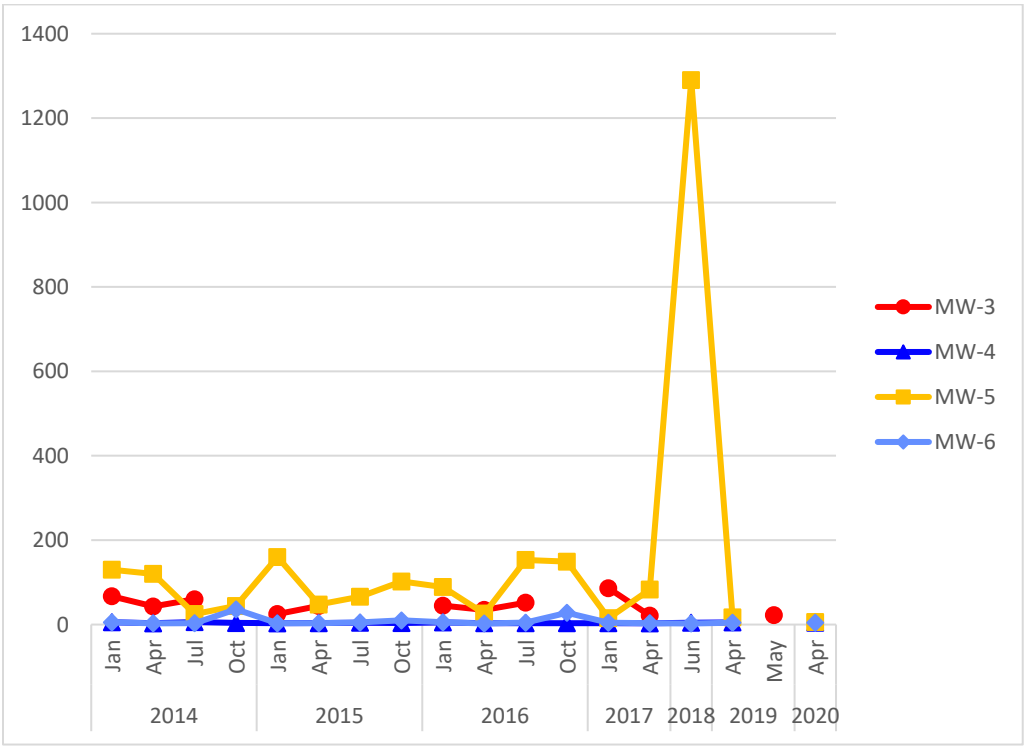

Figure 4: Chloride concentrations, since 2013

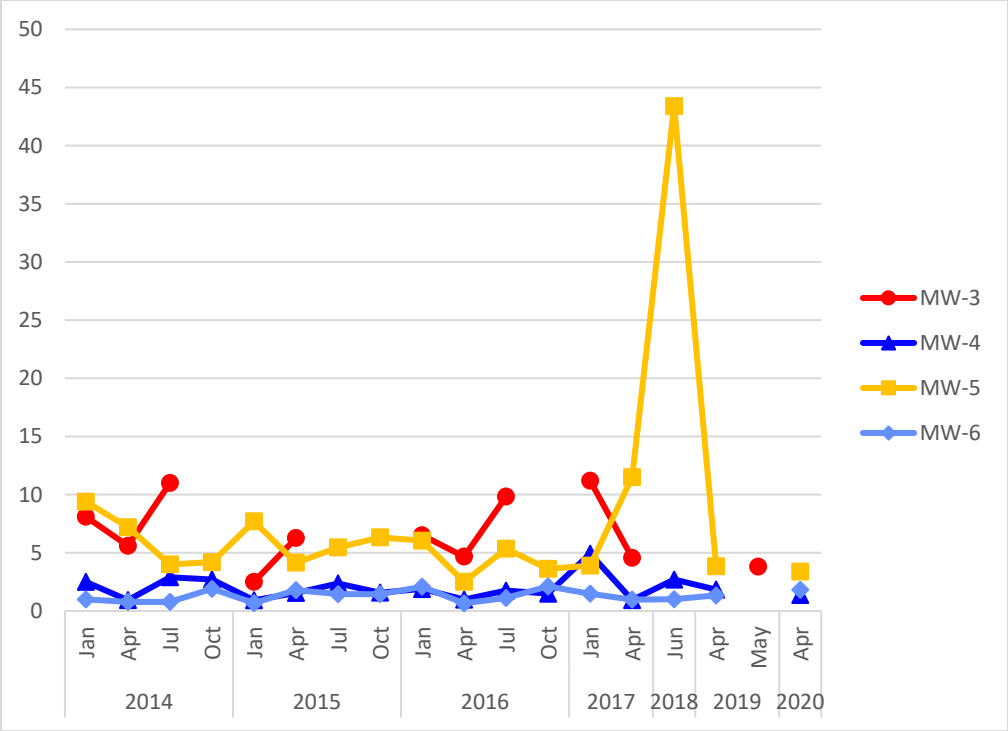

Figure 5: Nitrate concentrations, since 2013

Tables

Table 1: Cleanup levels

Indicator	Groundwater cleanup level (parts per million)	Groundwater basis
Chloride	250	Method B
Nitrate-nitrogen	10	Maximum contaminant level
Nitrite-nitrogen	1	Maximum contaminant level

Table 2: Chloride groundwater data

Red or * means exceeds cleanup level.
All concentrations are in parts per million.

Sampling date	Well MW-3	Well MW-4	Well MW-5	Well MW-6
Jan 2014	67	5.5	130	5.4
Apr 2014	43	3.2	120	2.9
Jul 2014	60	5.9	25	3.3
Oct 2014	dry	3.8	44	36
Jan 2015	25	3.2	160	3.2
Apr 2015	44	3.55	47.4	3.29
Jul 2015	dry	4.47	66.1	5.01
Oct 2015	dry	3.7	102	9.85
Jan 2016	44.8	5.16	89	5.46
Apr 2016	34.7	3.32	26	2.54
Jul 2016	51.9	3.39	153	4.65
Oct 2016	dry	3.25	149	28
Jan 2017	86.1	3.29	15	4.43
Apr 2017	21.2	2.88	83	3.27
Jun 2018	dry	4.41	1,290	2.62
Apr 2019	22.2	5.19	17	4.37
Apr 2020	dry	4.42	6.15	4.56

Table 3: Nitrate Groundwater Data

Red or * means exceeds cleanup level.
All concentrations are in parts per million.

Sampling date	Well MW-3	Well MW-4	Well MW-5	Well MW-6
Jan 2014	8.1	2.5	9.4	0.99
Apr 2014	5.6	0.93	7.2	0.78
Jul 2014	11	2.9	4	0.78
Oct 2014	dry	2.7	4.2	1.9
Jan 2015	2.5	0.92	7.7	0.68
Apr 2015	6.27	1.55	4.15	1.79
Jul 2015	dry	2.36	5.46	1.45
Oct 2015	dry	1.58	6.32	1.44
Jan 2016	6.51	1.89	6.04	2.09
Apr 2016	4.67	0.98	2.5	0.66
Jul 2016	9.83	1.75	5.35	1.12
Oct 2016	dry	1.49	3.62	2.11
Jan 2017	11.2	4.93	3.89	1.48
Apr 2017	4.57	0.94	11.5	0.97
Jun 2018	dry	2.7	43.4	1.01
Apr 2019	3.81	1.84	3.84	1.34
Apr 2020	dry	1.37	3.38	1.82