

Fourth Periodic Review
Mica Landfill Site

Hidden Hollow Dr, Spokane, Spokane County
Facility Site ID: 633, Cleanup Site ID: 1020

Toxics Cleanup Program, Eastern Region

Washington Department of Ecology
Spokane, Washington

August 2026, Publication 26-09-025

Document Information

This document is available on the Department of Ecology's Mica Landfill Site cleanup site page.[1]

Related Information

- Facility Site ID: 633
- Cleanup Site ID: 1020

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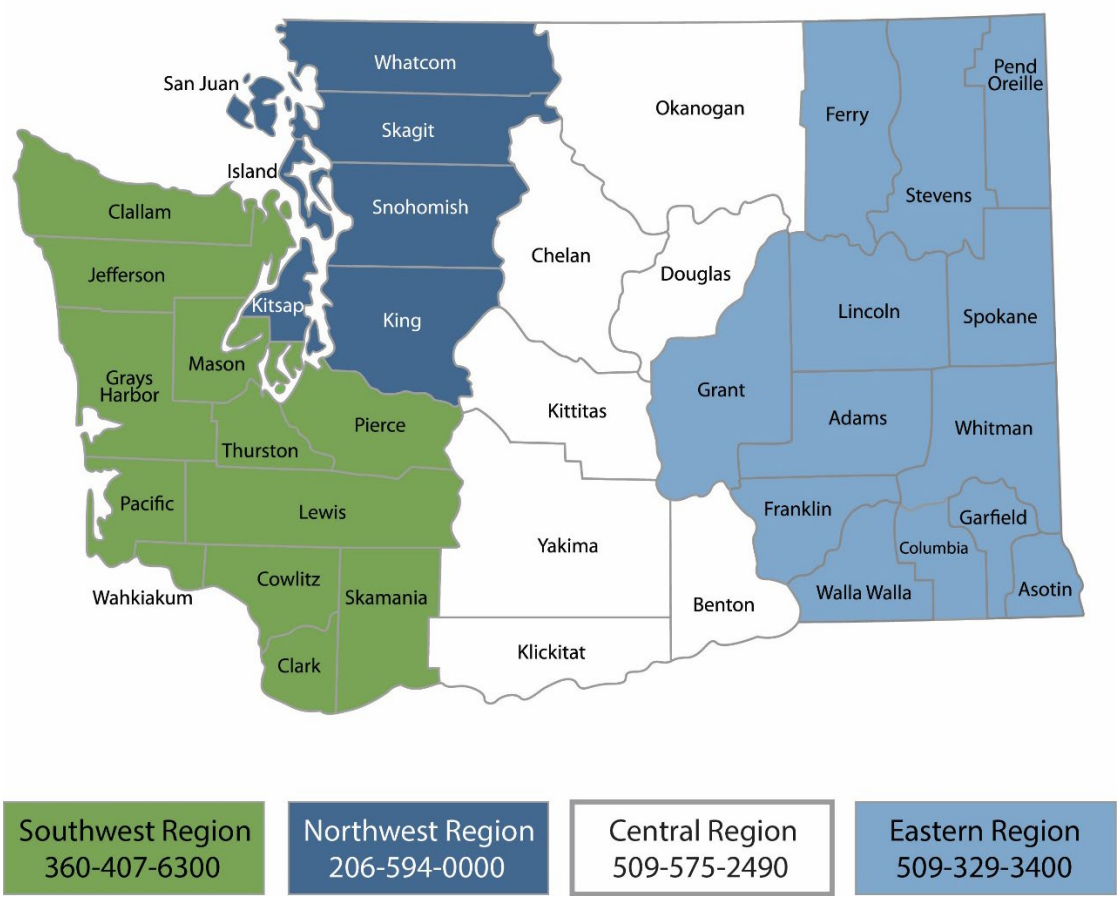
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[1] https://apps.ecology.wa.gov/cleanupsearch/site/1020
[2] https://ecology.wa.gov/About-us/Who-we-are/Our-Programs/Toxics-Cleanup

Department of Ecology's Regional Offices

Map of Counties Served



Region	Counties served	Mailing Address	Phone
Southwest	Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Mason, Lewis, Pacific, Pierce, Skamania, Thurston, Wahkiakum	PO Box 47775 Olympia, WA 98504	360-407-6300
Northwest	Island, King, Kitsap, San Juan, Skagit, Snohomish, Whatcom	PO Box 330316 Shoreline, WA 98133	206-594-0000
Central	Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima	1250 W Alder St Union Gap, WA 98903	509-575-2490
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 47600 Olympia, WA 98504	360-407-6000

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Introduction

The Washington Department of Ecology (Ecology) reviewed post-cleanup site conditions and monitoring data to ensure human health and the environment are being protected at the Mica Landfill cleanup site (Site). Site cleanup was implemented under the Model Toxics Control Act (MTCA) regulations, Chapter 173-340 Washington Administrative Code (WAC). This is the fourth periodic review conducted for this Site. Ecology completed the first periodic review in January 2008, the second periodic review in April 2013, and the third periodic review in April 2020.

Interim action (IA) cleanup activities at this Site were completed in 1994, and Ecology approved them as the final cleanup in 2001. These actions addressed contaminated soils, but residual groundwater contamination remains at the Site. Groundwater monitoring has been ongoing since completing the cleanup action, and institutional controls are in place to ensure the remedy remains protective. For this Site, a periodic review is required because cleanup was done under a consent decree and an institutional control is required (WAC 173-340-420(2)).

When evaluating whether human health and the environment are being protected, Ecology must consider the following factors (WAC 173-340-420(4)):

a) The effectiveness of ongoing or completed cleanup actions, including the effectiveness of engineered controls and institutional controls in limiting exposure to hazardous substances remaining at the site

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 and resource uses

e) The availability and practicability of more permanent remedies

f) The availability of improved analytical techniques to evaluate compliance with cleanup levels

Ecology publishes a notice of all periodic reviews of Ecology-supervised sites in the *Contaminated Site Register* and provides an opportunity for public comment.

Summary of Site Conditions

Site description and history

Mica Landfill is a 161-acre municipal solid waste landfill about 11 miles southeast of Spokane, and 1.5 miles north of the Town of Mica (Figure 1). The landfill was operated by Spokane County from 1972 until 1990, and jointly by Spokane County and the City of Spokane from 1990

through 1991. Mica Landfill stopped receiving waste in late 1991. The landfill received about 65,000 tons of residential and municipal solid waste per year, dewatered sewage treatment plant sludge, demolition debris, and industrial wastes. Demolition debris was generally mixed with municipal waste, or used as base material for landfill roads. Industrial wastes included pesticides, fungicides, herbicides, fertilizers, electronics industry chemicals, petroleum products, degreaser solvents, dyes and paints, industrial sludges, baghouse dust wastes from metal smelters, and other miscellaneous chemicals. Also, about 24,000 tons of black dross, which is a byproduct of the aluminum production industry, was disposed of in a designated area of the landfill. Dross was disposed between 1974 and 1987.

In 1974, the Mica monitoring well was installed at the south end of the Site to assess the impacts to groundwater from the south-central leachate pond. In 1975, leachate samples were collected from a drain line and analyzed.

In 1986, Spokane County purchased 24 acres next to the southwest corner of the landfill. This land was used to build another lined leachate pond for the southwest landfill drainage system. An additional monitoring well was installed to measure any potential groundwater impacts downgradient of the new leachate pond and existing leachate collection system.

Site investigations

Spokane County started formal investigations in 1981 when volatile organic compounds were found in the Mica well and an off-site domestic well. Spokane County assessed potential groundwater contamination from the landfill in three phases that ended in 1983 and involved field investigations and installing groundwater monitoring wells.

The landfill was added to the National Priorities List in 1985 after an EPA evaluation, and Ecology became the lead agency at the Site. A Memorandum of Agreement, executed in 1989, between EPA and Ecology gave Ecology responsibility for all aspects of the remedial investigation, feasibility study, remedial design, remedial action, and community relation activities at state lead Superfund sites, such as Mica Landfill. A two-phase remedial investigation (RI) was completed in 1988 and 1992 under a consent decree. The RI included groundwater, landfill gas, sediment, and leachate sampling, and geophysical surveys. Work on a feasibility study was started, but never completed.

In 1992, Ecology proposed to complete a major component of the remedial work as an IA. The IA was the presumptive remedy for landfills (see the Cleanup Actions section below). After completing the IA construction in February 1994, compliance monitoring began with collecting groundwater and leachate samples and has continued since then with minor modifications.

At the end of the five-year monitoring period, the IA data was reviewed to determine if the remedy was performing as planned. Ecology then wrote the Cleanup Action Plan (CAP) in 2001 that established the IA as the final remedy for the Site, the parameters and schedule for all future Site compliance monitoring, and the requirement for deed restriction on the property. A consent decree was negotiated to implement the cleanup action.

Cleanup actions

A presumptive remedy was implemented as an IA for the landfill, including installing:

- A cap over existing cells with a double-layered geosynthetic and engineered clay cap
- A leachate collection system that originally discharged to leachate collection ponds and was transported by trucks, but is now transported by gravity-fed pipe to the Spokane County Regional Water Reclamation Facility
- A landfill gas collection and treatment system using passive flares
- A stormwater control system to drain water off the landfill surface and minimize erosion.

The intent of the IA was to minimize precipitation infiltration and leachate generation, eliminate direct exposure to landfilled materials, and contain and treat landfill byproducts such as leachate and methane gas. During the five-year IA operation period, minor modifications were made to the system to correct or enhance operation. Generally, these involved the operation of the leachate collection system and the gas flare system.

Groundwater, leachate, and landfill gas monitoring

Beginning in February 1994 for a period of five years, groundwater and leachate samples were collected quarterly. That data was reviewed in 2000 prior to accepting the IA as the final cleanup remedy. Groundwater is monitored within four drainages, and a subset of wells in each drainage was selected for long-term monitoring. Three private drinking water wells next to the Site are also included in the monitoring program. A combination of quarterly and semi-annual groundwater monitoring continues to occur to evaluate concentration trends and plume extents, and to ensure continued protection of human health and the environment. An evaluation of trends is included in the "Effectiveness of completed cleanup actions" section below.

Leachate volume and precipitation are measured to track long-term trends and general remedial performance. The landfill is not a high producer of methane gas; all landfill flares are passive and operate intermittently based on barometric pressure. Flare gas sampling is performed annually.

Cleanup standards

Cleanup standards include cleanup levels, the location where these cleanup levels must be met (point of compliance), and any other regulatory requirements that apply to the Site. WAC 173-340-704[3] states MTCA Method A may be used to establish cleanup levels at sites that have few hazardous substances, are undergoing a routine cleanup action, and where numerical

[3] https://app.leg.wa.gov/WAC/default.aspx?cite=173-340-704

standards are available for all indicator hazardous substances in the media for which the Method A cleanup level is being used. Method B may be used at any site and is the most common method for setting cleanup levels when sites are contaminated with substances not listed under Method A. Method C cleanup levels may be used to set soil and air cleanup levels at industrial sites.

Ecology decided MTCA Method B cleanup levels were appropriate for contaminants at this Site. The point of compliance is the area where the cleanup levels must be attained. Groundwater points of compliance are established for the entire Site from the top of the saturated zone to the lowest affected portion of the aquifer, which is bedrock at this Site.

Ecology selected the indicators for the Site in the CAP: 10 volatile organic contaminants, one semi-volatile organic contaminant, seven metals, and two inorganics. Table 5 shows the cleanup levels for these indicators.

Environmental Covenant

Ecology decided institutional controls would be required as part of the cleanup action to document the remaining contamination, protect the cleanup action, and protect human health and the environment. On February 22, 2008, institutional controls in the form of an environmental covenant[4] (Covenant) were recorded for the Site.

The Covenant recorded for the Site imposes the following limitations (the Site is referred to as the Property within the Covenant):

1. No wells may be drilled, nor groundwater extracted, for any use, except for purpose of groundwater and gas monitoring within the Property as required by the Consent Decree.
2. The Owner of the Property shall maintain fences and locked gates around the property and shall perform regular inspections to assure that the restrictions on access to the Property are effective.
3. No person shall engage in any activity within the boundaries of the Property that may result in the release of hazardous substances which were contained in the remedial action. Construction activities encompassing footings, utilities, pilings, parking areas or other requirements associated with ground level structures, shall be deemed non-interference activities within the meaning of this paragraph, so long as such activities do not involve any ground disturbance more than 45 feet below the existing surfaces.
4. The Owner shall prohibit any activity on the Property that would threaten the structural integrity of the landfill cap or otherwise interfere with the Cleanup Action, operation and maintenance, monitoring, or other measures necessary to assure the integrity of the remedial action and continued protection of human health and the environment.

[4] https://apps.ecology.wa.gov/cleanupsearch/document/55

5. The Owner must give written notice to Ecology, or to a successor agency, of the Owner's intent to convey any interest in the Property at least thirty (30) days prior to such conveyance. No conveyance of title, easement, lease, or other interest in the Property shall be consummated by the Owner without adequate and complete provision for continued monitoring, operation, and maintenance of the Cleanup Action on the Property.
6. The Owner shall include in any lease of the Property provisions restricting uses and activities under such Lease to those consistent with these covenants.
7. If the Owner proposes to use the Property in a manner which is inconsistent in any way with these restrictive covenants, such person must give prior written notice to Ecology of its proposal. No person shall use the Property in any manner inconsistent with these restrictive covenants without prior written consent of Ecology.
8. Ecology and its designated representatives shall have the right to enter the Property at reasonable times for the purpose of evaluating compliance with the Consent Decree, including the right to take samples, inspect any remedial actions taken on the property, inspect records, and to observe compliance with these restrictive covenant provisions.
9. The Owner reserves the right under WAC 173-340-440(12) to record an instrument that provides that this Declaration of Restrictive Covenants shall no longer be of any further force or effect. However, such an instrument may be recorded only with the consent of Ecology or its successor agency. Ecology or its successor agency may consent to the recording of such an instrument only after appropriate public notice and opportunity for comment to occur.

Periodic Review

Effectiveness of completed cleanup actions

During the Site visit Ecology conducted on May 29, 2025, the remedy appeared to be functioning as intended. Wells remain accessible and in good condition. The ground surface is vegetated to minimize erosion, regularly inspected for any surface damage or erosion, and repaired as needed. Leachate ponds, flares, and associated conveyance piping and systems are also regularly inspected and repaired as needed. Site access is restricted by fencing and gates, which are regularly inspected and repaired as needed. A photo log is in Appendix D.

The Site's cleanup action is a presumptive remedy using engineering controls in the form of an engineered landfill cap, a leachate collection system, and a gas collection and treatment system. The cap has been in place for 31 years. The condition of engineered controls is measured by Spokane County staff on at least a weekly basis through inspections of the cap and physical barriers, including flares, leachate ponds, pumps, and fences. Any observances, such as erosional features, vegetative growth, or signs of vandalism, that may indicate a weakness or

potential deficiency in the cap are monitored or repaired according to the Operation & Maintenance Plan. Mowing is not typically done as vegetation is native and self-sustaining; noxious weed abatement is performed as needed. Markers are established at points on the landfill cover to measure any settlement taking place. These are checked on a visual basis monthly, and marker elevations are surveyed annually. Maintenance of flares and ponds is performed yearly; flare flame arrestors are removed, inspected, and cleaned, and leachate ponds are drained so liners can be inspected and repaired, if needed. Leachate pond outfalls are also inspected and cleaned weekly to monthly, depending on the leachate flow volumes. These actions provide reasonable assurance that engineered controls are effective.

Direct contact

Direct contact exposure pathways are controlled by the landfill cover system, which prevents contact with contaminated soil. The environmental covenant remains filed with the deed for the property, and prevents future uses that would interfere with the continued protection of the cover system. Details are provided in the "Environmental Covenant" section above.

Groundwater cleanup

Ecology evaluates contaminant trends in every periodic review to ensure no significant major changes are occurring and human health and the environment remain protected. Annual and semi-annual groundwater monitoring reports, including all data and detailed concentration and trend analysis, are available in the documents section on Mica Landfill's cleanup site page.

Data from 2018 through 2024 was evaluated for concentrations and trends. Twelve on-site monitoring wells and three off-site water supply wells are used to track contaminant movement in four drainages (Figure 2). At a high level, contamination generally seems to be present at the same locations and in the same ranges. No wholescale changes in plumes seem present.

The size of the dataset precludes including all the data here, so summaries of trends and notable exceedances in specific wells are provided. Tables 1–4 show the wells and contaminants with detections and/or exceedances of the cleanup levels (Table 5) and the associated trends. If a well and/or contaminant isn't listed, it wasn't detected during the five-year period. Only four of twenty trends are increasing, and the South Area has no increasing trends.

Wells MW-16 and MW-20 continue to be the wells with the highest contaminant concentrations. The southwest drainage continues to have the highest groundwater impacts from residual landfill contamination. Figures 3 through 7 show concentrations and trends for the various wells and contaminants listed in Table 5.

Institutional controls

Institutional controls in the form of a Covenant were implemented at the Site in 2008. The Covenant remains active and discoverable through the Spokane County Auditor. Ecology found no evidence a new instrument has been recorded that limits the effectiveness or applicability of

the Covenant. This Covenant prohibits activities that will result in the release of contaminants contained as part of the cleanup action and prohibits any use of the property that is inconsistent with the Covenant, unless approved by Ecology in advance. This Covenant ensures the long-term integrity of the cleanup action will be protected.

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

There is no new relevant scientific information for the hazardous substances remaining in soil and groundwater at the Site.

New applicable state and federal laws for hazardous substances present at the Site

There are no new applicable or relevant state or federal laws for hazardous substances remaining at the Site. There is new awareness of per- and polyfluoroalkyl substances (PFAS), and an interest in determining if these substances may be present in groundwater leaving the landfill to ensure that local drinking water wells are protected.

Current and projected Site and resource uses

The Site has been in operation as a landfill for over 30 years and is zoned Rural Conservation. This designation applies to environmentally sensitive areas and wildlife corridors and encourages low-impact uses and rural clustering to protect sensitive areas and preserve open space. Deed restrictions in place at the property limit the property's current and future use. These restrictions limit or prohibit any activity that will interfere with the integrity of the cap or may cause a release. Current zoning designation, the presence of deed restrictions, and the nature of the Site (presence of landfill gas and active leachate discharge) all strongly support no change in future Site use. These mechanisms all minimize the chance the Site be used in a way that would reduce the remedial action's effectiveness or cause a release.

Availability and practicability of more permanent remedies

The cleanup action was a presumptive remedy for the Site. Other remedial options for the Site were evaluated in the CAP. Operating a groundwater pump-and-treat system was considered as an enhancement to the current action and determined not to provide a significant remedial benefit. Higher preference cleanup options such as source removal remain available but are still not practicable.

Availability of improved analytical techniques to evaluate compliance with cleanup levels

For the contaminants at the landfill, the laboratory techniques are Methods SM2320/2310B for inorganics; EPA 350.1 for ammonia, SM5310 for total organic carbon; EPA 6020B, 6010B, and 7040A for metals; EPA 8260B for volatiles, and EPA 8270D for semi-volatiles. These methods are widely accepted for analyzing groundwater contaminants. No improved analytical techniques are available. However, the reporting limits for vinyl chloride are above the cleanup levels. Laboratory analysis should be adjusted such that reporting limits are below cleanup levels.

Recommendations

- Continue groundwater monitoring at a semi-annual frequency, with reporting to Ecology
- Evaluate labs and/or improved methodologies to achieve reporting limits below the cleanup level for vinyl chloride
- Starting in 2027, add one year of monitoring for PFAS using EPA Method 1633 at specific wells upgradient of drinking water wells (MW20, MW31, and MS5) to determine if these substances may be present at levels of concern in groundwater leaving the landfill
- Work with Ecology to start submitting groundwater data into Ecology's Environmental Information Management (EIM) system per Toxics Cleanup Program Policy 840[5]

Conclusions

- The cleanup actions completed at the Site remain protective of human health and the environment:
    - The cover minimizes precipitation infiltration and prevents direct contact with contaminated soils and/or wastes.
    - Leachate is appropriately collected, transferred, and treated off-site.
    - Gas management systems prevent impacts from potential concentration of vapors below the cover system.
- No trends of contaminants in groundwater are concerning. Groundwater compliance monitoring will continue at the required wells and for the required contaminants until Ecology determines it is no longer necessary.

[5] https://apps.ecology.wa.gov/publications/SummaryPages/1609050.html

- Monitoring for leachate volumes and methane generation will ensure that systems are performing as designed.
- The Covenant for the property is in place and effective in protecting human health and the environment from exposure to hazardous substances.

Protectiveness of the remedy

Based on Ecology's review of the Site data, the remedy is functioning as intended and is protective of human health and the environment. The requirements of the Covenant are being followed. No additional cleanup actions are required by the property owner at this time besides those outlined above. The property owner is responsible for continuing to inspect the Site to assure the integrity of the cleanup action is maintained.

Next review

Ecology will schedule the next review for the Site five years from the date of this periodic review. If additional cleanup actions or institutional controls are required, the next periodic review will be scheduled five years after those activities are completed.

References

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Appendix A. Figures

Figure 1. Area map

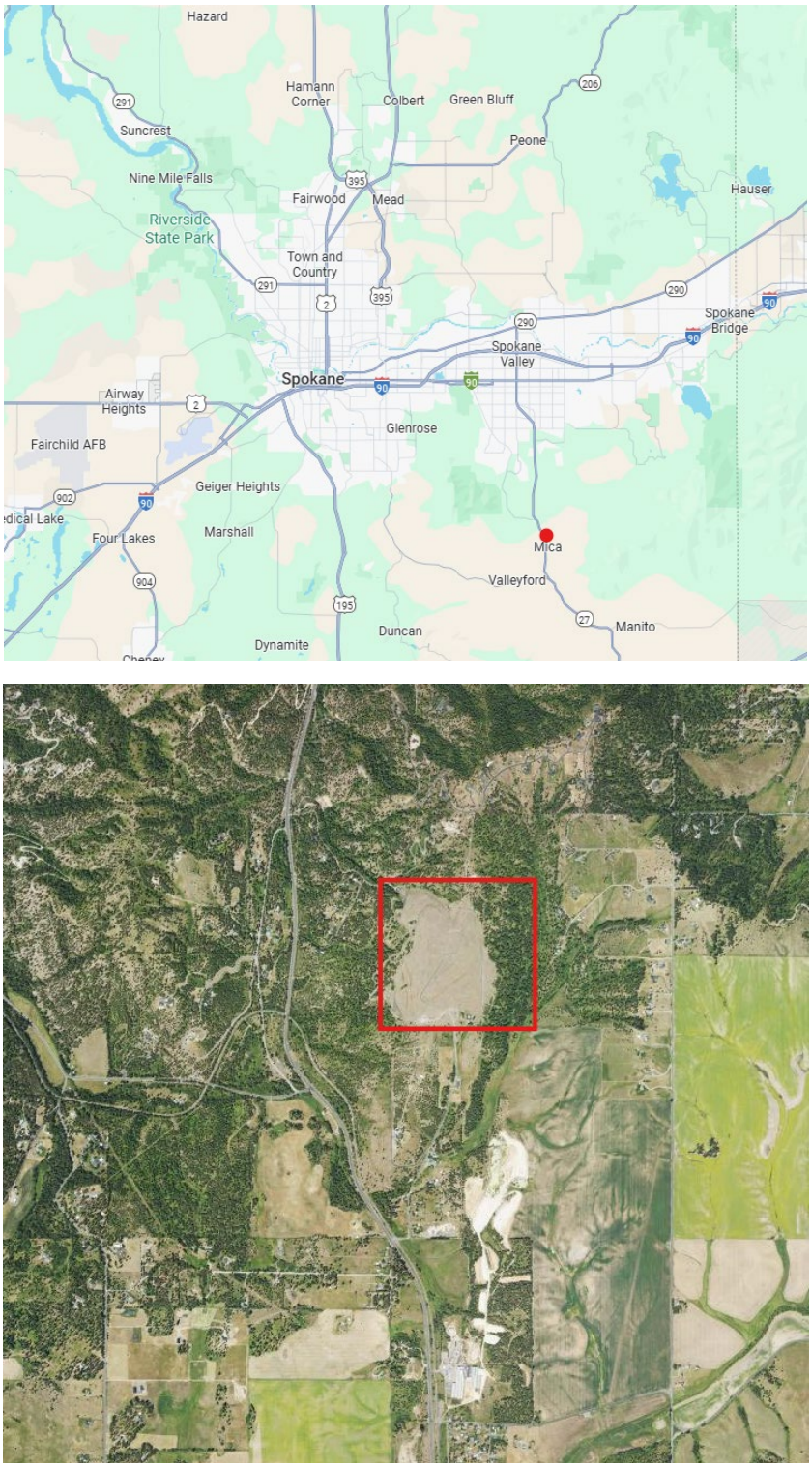


Figure 2. Well locations and drainages

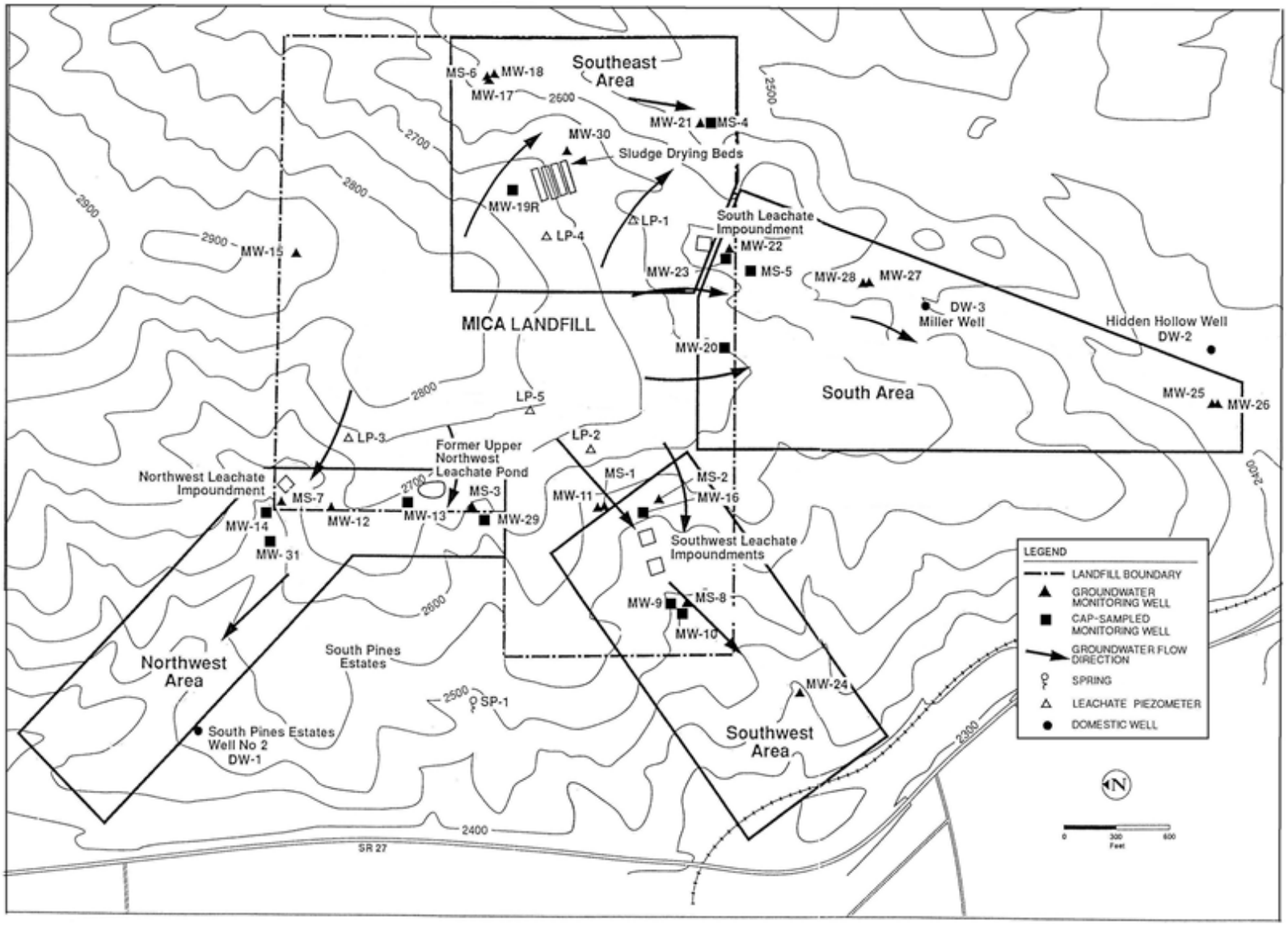


Figure 3. Northwest area – Nitrate concentration trends

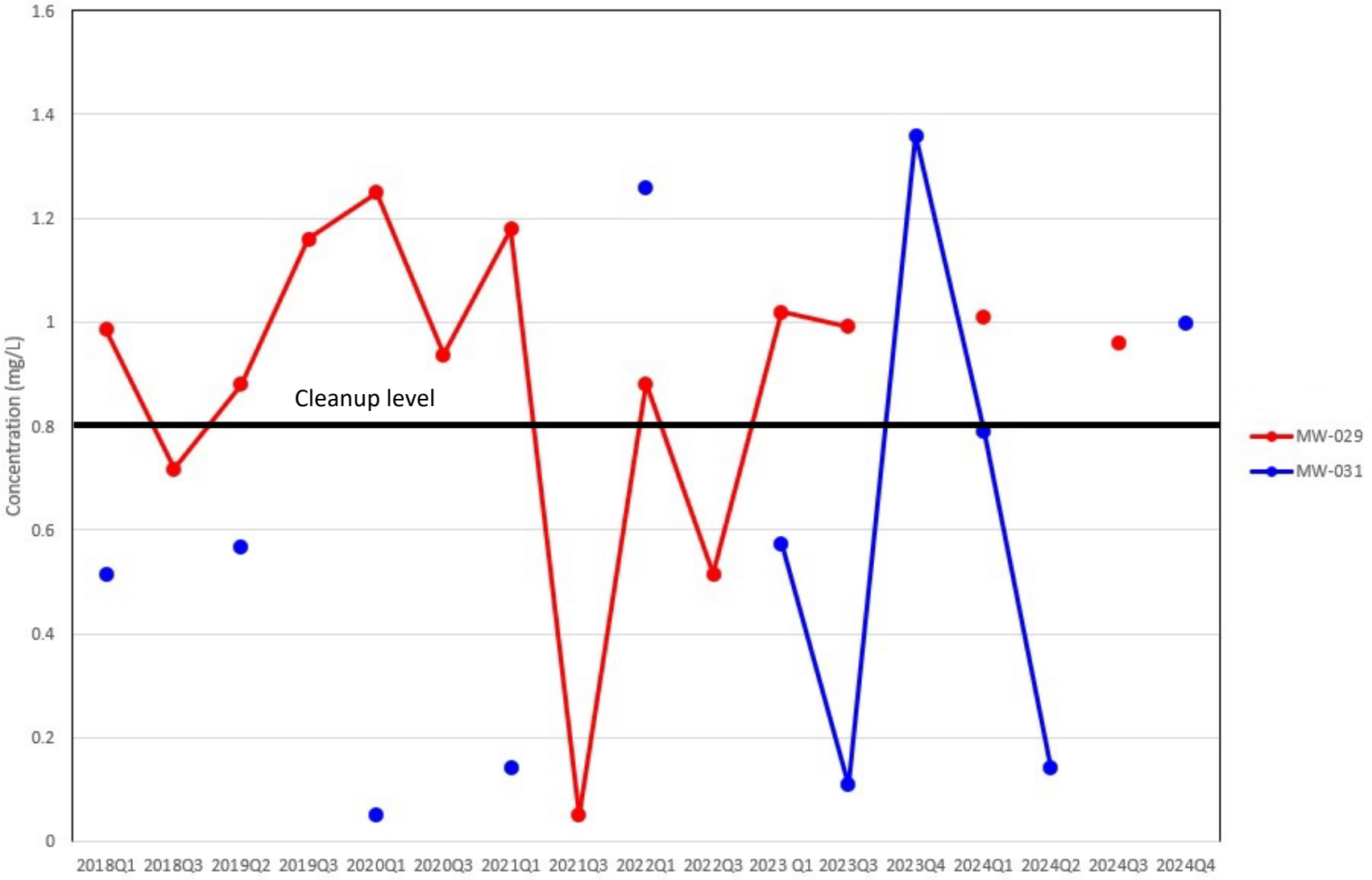


Figure 4. Southwest area – MW-16 concentration trends

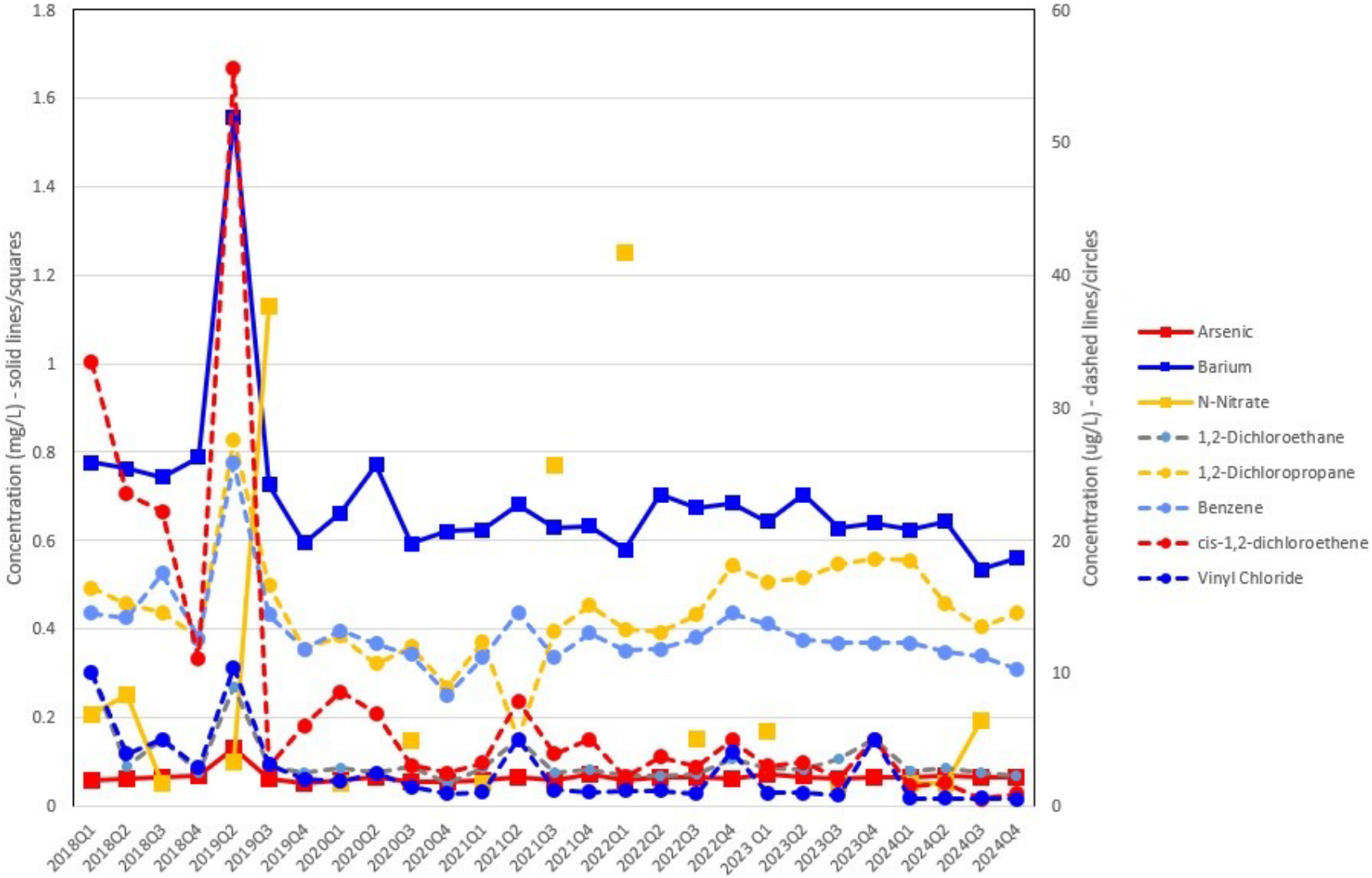


Figure 5. South area – DW-2, DW-3, and MS-5 nitrate concentration trends

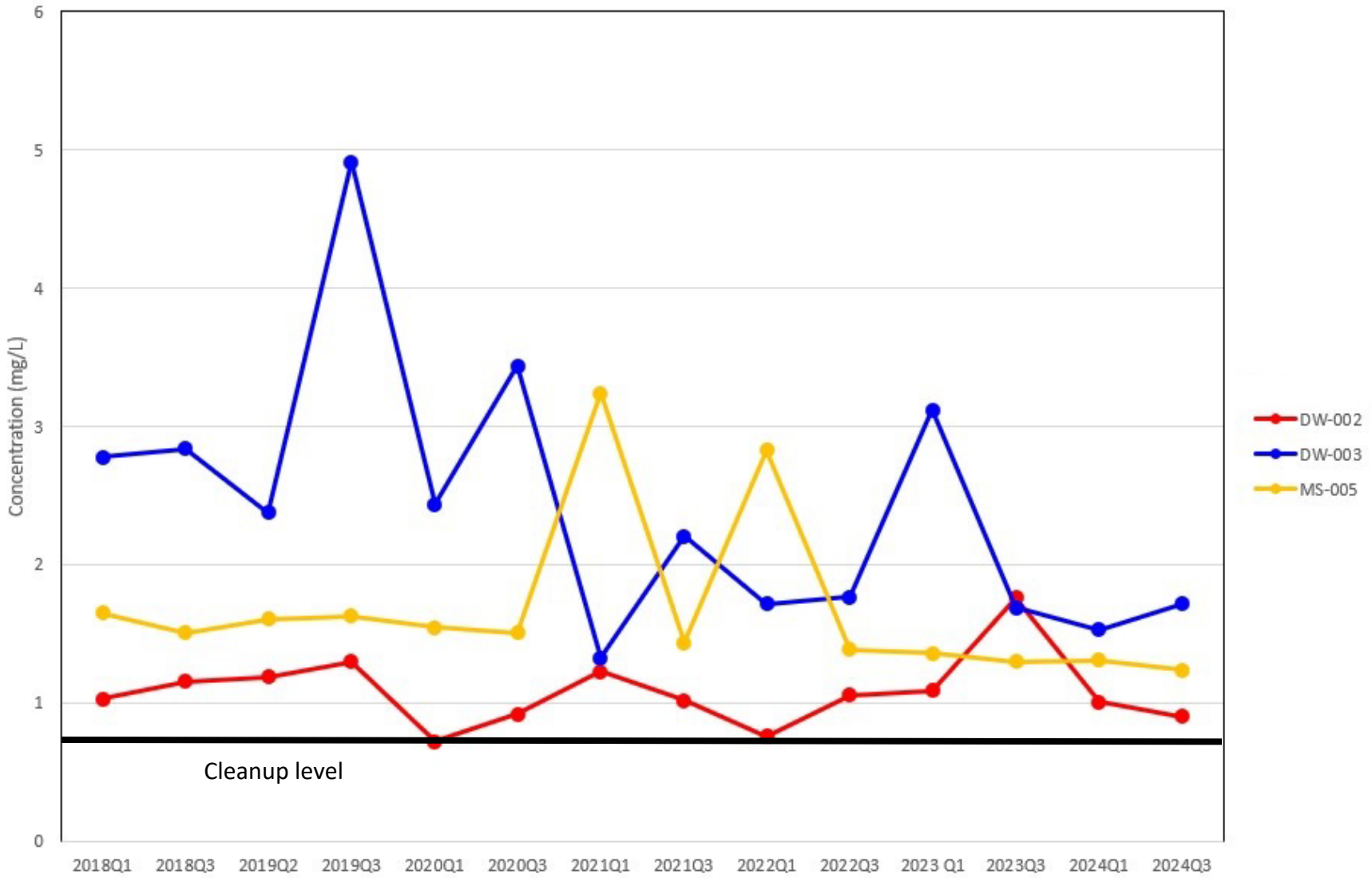


Figure 6. South area – MW-20 concentration trends

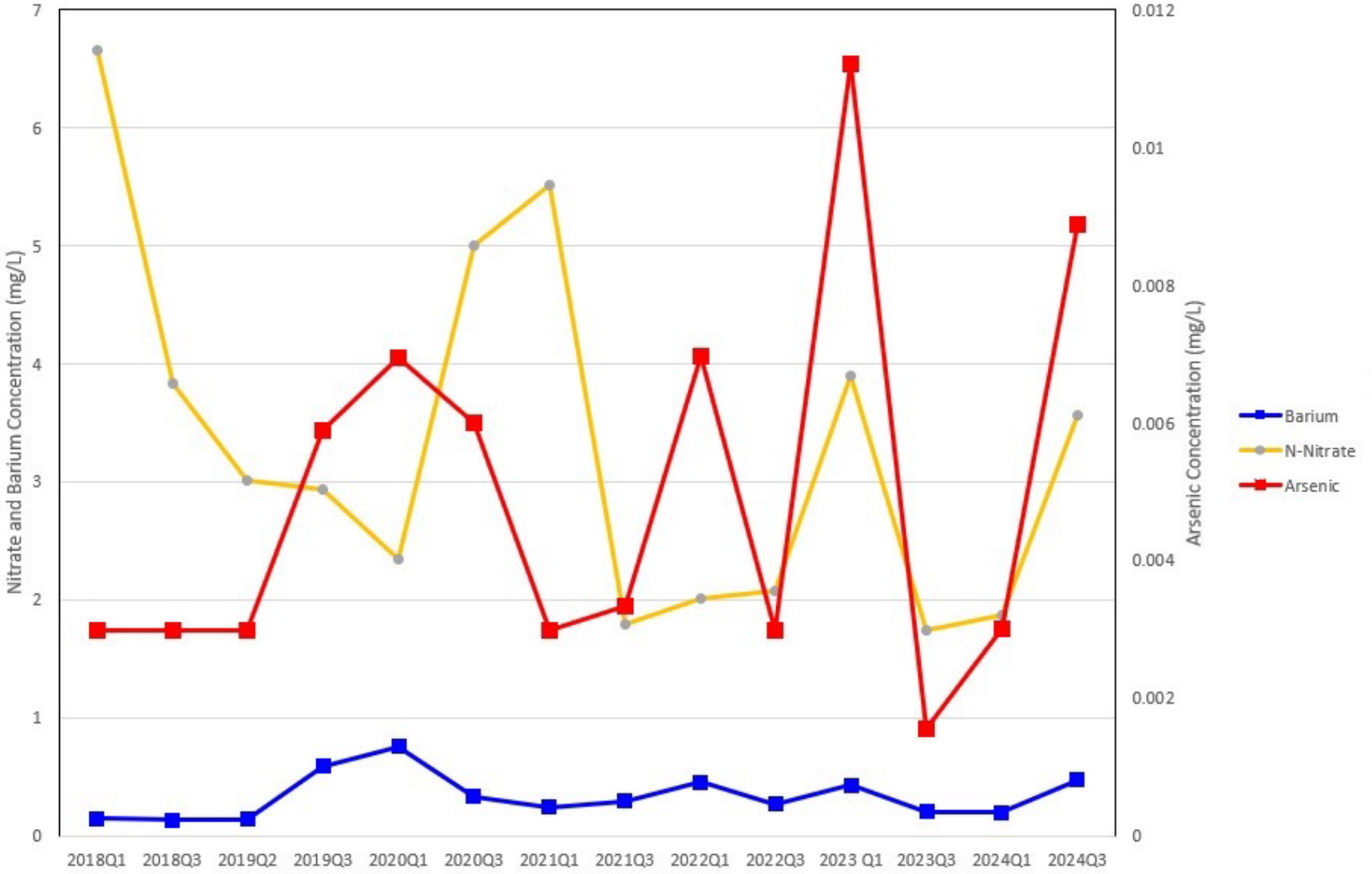
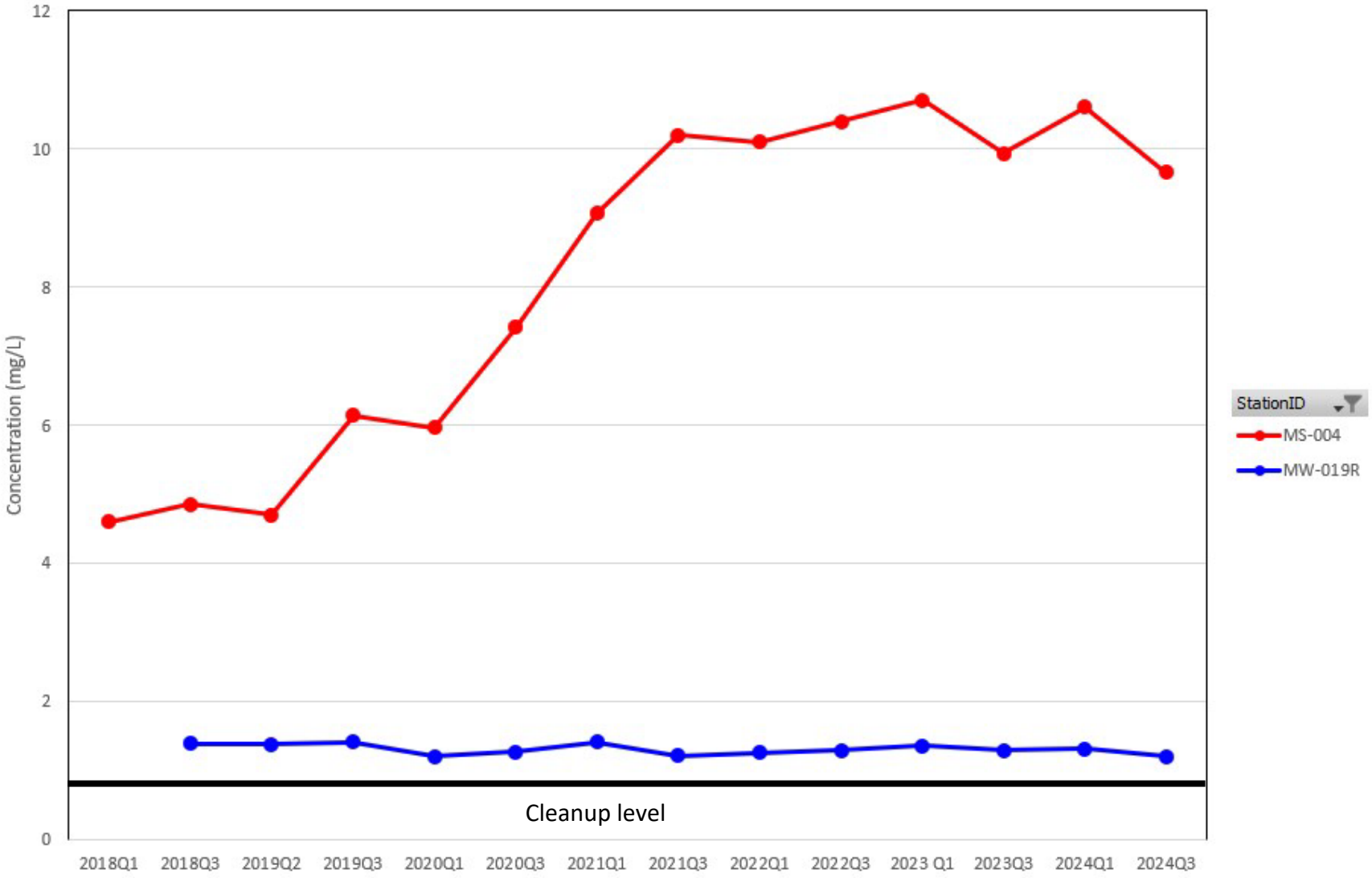


Figure 7. Southeast area – Nitrate concentration trends



Appendix B. Tables

Table 1: Groundwater contaminant concentrations – Northwest area

Well and Analyte	2019	2020	2021	2022	2023	2024	Trend	Maximum Concentration
MW-29 nitrate							No trend	1.25 mg/L
MW-31 nitrate							Increasing	1.36 mg/L

Yellow = > ½ of measurements exceed CUL
Orange = < ½ of measurements exceed CUL
Blank = not detected or detected below CUL
* = not detected, but detection limit above CUL

Table 2: Groundwater contaminant concentrations – Southwest area

Well and Analyte	2019	2020	2021	2022	2023	2024	Trend	Maximum Concentration
NW-16 nitrate							No trend	1.25 mg/L
NW-16 arsenic							Increasing	0.13 mg/L
MW-16 barium							Slightly decreasing	1.557 mg/L
MW-16 1,2-dichloroethane							No trend	9 ug/L
MW-16 1,2-dichloropropane							Increasing	27.6 ug/L
MW-16 acetone							Decreasing	4430 ug/L
MW-16 benzene							Slightly decreasing	25.8 ug/L
MW-16 cis-1,2-dichloroethene							Decreasing	55.6 ug/L
MW16 vinyl chloride						*	Decreasing	10.44 ug/L

Yellow = > ½ of measurements exceed CUL
Orange = < ½ of measurements exceed CUL
Blank = not detected or detected below CUL
* = not detected, but detection limit above CUL

Table 3: Groundwater contaminant concentrations – South area

Well and Analyte	2019	2020	2021	2022	2023	2024	Trend	Maximum Concentration
MS-5 nitrate							Decreasing	3.24 mg/L
MW-20 nitrate							Decreasing	5.52 mg/L
MW-20 arsenic							No trend	0.01 mg/L
MW-20 barium							Slightly decreasing	0.763 mg/L
MW-20 lead							Slightly decreasing	0.06 mg/L
DW-2 nitrate							Decreasing	1.76 mg/L
DW-3 nitrate							Decreasing	4.91 mg/L

Yellow = > ½ of measurements exceed CUL
Orange = < ½ of measurements exceed CUL
Blank = not detected or detected below CUL
* = not detected, but detection limit above CUL

Table 4: Groundwater contaminant concentrations – Southeast area

Well and Analyte	2019	2020	2021	2022	2023	2024	Trend	Maximum Concentration
MS-4 nitrate							Increasing	10.7 mg/L
MW-19R nitrate							Slightly decreasing	1.41 mg/L

Yellow = > ½ of measurements exceed CUL
Orange = < ½ of measurements exceed CUL
Blank = not detected or detected below CUL
* = not detected, but detection limit above CUL

Table 5: Groundwater cleanup levels

Contaminant	Cleanup Level, ug/L	Basis
Ammonia	272,000	Method B, non-carcinogen
Nitrate	800	MCL
Arsenic	5	Method A, background
Barium	560	Method B, non-carcinogen
Lead	15	Method A
Manganese	1,926	Method B, non-carcinogen
Mercury	0.4	MCL
Vanadium	112	Method B, non-carcinogen
Zinc	400	Method B, non-carcinogen
1,2-dichloroethane	1.2	PQL
1,2-dichloropropane	0.643	Method B, carcinogen
Acetone	688	Method B, non-carcinogen
Benzene	0.795	Method B, carcinogen
Cis-1,2-dichloroethene	33	MCL
Methylene chloride	5	MCL
Tetrachloroethene	0.858	Method B, carcinogen
Toluene	100	MCL
Trichloroethene	3.98	Method B, carcinogen
Vinyl chloride	0.023	Method B, carcinogen
Bis(2-ethylhexyl)phthalate	6	MCL

ug/L = micrograms per liter

MCL = Federal Maximum Contaminant Level

PQL = laboratory practical quantitation limit

Appendix C. Photo Log

Photo 1: View of southwest leachate pond facing south



Photo 2: View of southeast leachate pond facing west



Photo 3: View of northwest leachate pond facing south



Photo 4: View of north gate looking east



Photo 5: View of MW-16 wellhead



Photo 6: View of flare in distance looking east



Photo 7: Close-up view of flare

