



Periodic Review

Lehigh Cement Company Closed CKD Pile

Metaline Falls, Pend Oreille County

Facility Site ID: 58794555, Cleanup Site ID: 2783

Toxics Cleanup Program, Eastern Region

Washington Department of Ecology
Spokane, Washington

December 2025, Publication 25-09-021

Document Information

This document is available on the Department of Ecology's [Lehigh Cement Company Closed CKD Pile Site cleanup site page](#).¹

Related Information

- Facility Site ID: 58794555
- Cleanup Site ID: 2783

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[Toxics Cleanup Program](#)²

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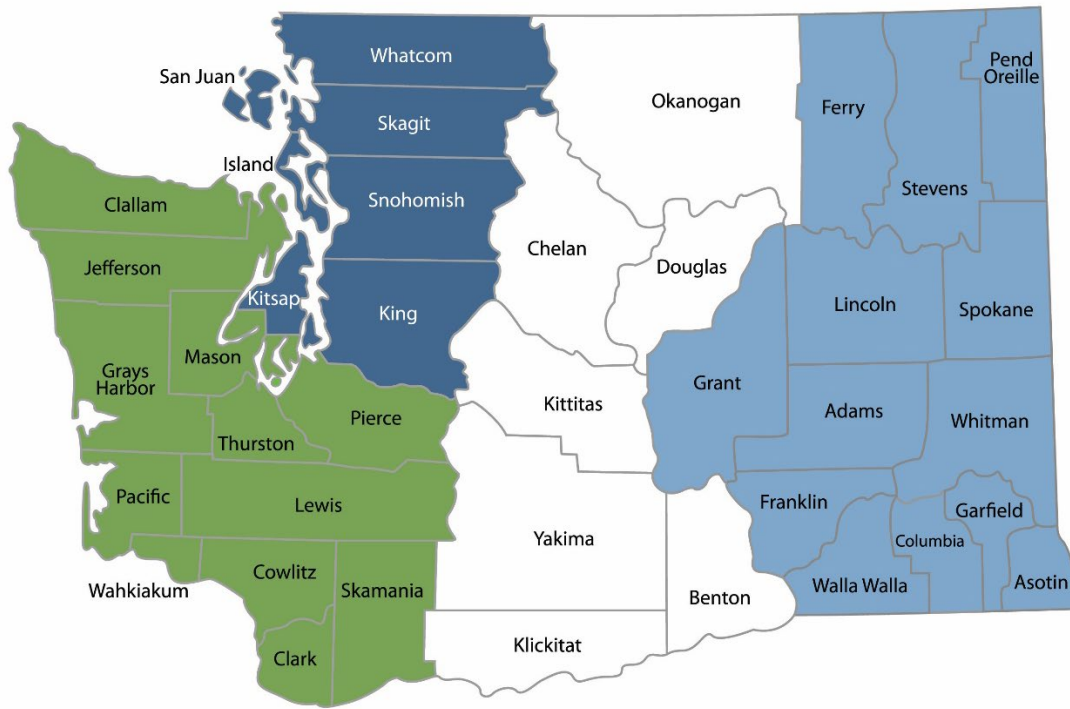
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¹ <https://apps.ecology.wa.gov/cleanupsearch/site/2783>

² <https://ecology.wa.gov/About-us/Who-we-are/Our-Programs/Toxics-Cleanup>

Department of Ecology's Region Offices

Map of Counties Served



Southwest Region 360-407-6300	Northwest Region 206-594-0000	Central Region 509-575-2490	Eastern Region 509-329-3400
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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 Lehigh Cement Company Closed CKD Pile Site 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 first periodic review conducted for this Site.

Cleanup activities at this Site were completed under Consent Decree 06-2-0034-6 entered into Pend Oreille County Superior Court on March 9, 2006. The cement kiln dust (CKD) that remains on the property is a dangerous waste, and residual concentrations of metals that exceed MTCA cleanup levels remain on the property. The pH of groundwater at the Site also exceeds Washington State water quality criteria. The MTCA cleanup levels for air, soil, sediment, surface water, and groundwater are established under [WAC 173-340-750](https://app.leg.wa.gov/WAC/default.aspx?cite=173-340-750),³ [WAC 173-340-740](https://app.leg.wa.gov/WAC/default.aspx?cite=173-340-740),⁴ [WAC 173-340-760](https://app.leg.wa.gov/WAC/default.aspx?cite=173-340-760),⁵ [WAC 173-340-730](https://app.leg.wa.gov/WAC/default.aspx?cite=173-340-730),⁶ and [WAC 173-340-720](https://app.leg.wa.gov/WAC/default.aspx?cite=173-340-720),⁷ respectively.

Ecology determined institutional controls in the form of an environmental covenant would be required as part of the cleanup action for the Site. [WAC 173-340-420\(2\)](https://app.leg.wa.gov/WAC/default.aspx?cite=173-340-420(2))⁸ requires Ecology to conduct a periodic review of certain sites every five years. For this Site, a periodic review is required because institutional controls and financial assurance are required as part of the cleanup action.

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

³ <https://app.leg.wa.gov/WAC/default.aspx?cite=173-340-750>

⁴ <https://app.leg.wa.gov/WAC/default.aspx?cite=173-340-740>

⁵ <https://app.leg.wa.gov/WAC/default.aspx?cite=173-340-760>

⁶ <https://app.leg.wa.gov/WAC/default.aspx?cite=173-340-730>

⁷ <https://app.leg.wa.gov/WAC/default.aspx?cite=173-340-720>

⁸ <https://app.leg.wa.gov/wac/default.aspx?cite=173-340-420>

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

Summary of Site Conditions

Site description and history

The Site is located immediately southeast of Metaline Falls, Washington, in the southeast quarter of Section 21, Township 39 North, Range 43 East, Willamette Meridian. The lower portion of the Site between State Route 31 and Sullivan Creek is between 2,020 and 2,025 feet above mean sea level, and the top of the CKD pile to the south of State Route 31 is about 90 feet higher. State Route 31 runs between the parcels where CKD is located and the lower parcel where the remedial system is located.

From 1914 to 1989, Lehigh operated a cement plant in Metaline Falls. CKD, a by-product of Portland cement production, was collected from the Lehigh plant. The CKD was transported from the dust collection systems to a ravine across Quarry Road, east of the plant. About 544,000 tons of CKD were placed in the ravine to form the existing CKD landfill or pile. Lehigh sold the cement production plant and specific land holdings to Lafarge Corporation in 1989. Lehigh retained ownership of the CKD landfill. Since 2023, Lehigh has been known as Heidelberg Materials US Cement LLC (Heidelberg). Heidelberg remains the potentially liable person (PLP) for the Site.

A vicinity map is in Appendix A, and a Site plan is in Appendix B.

Site investigations

In 1992, Lehigh began preliminary characterization of the CKD landfill for the purpose of assessing closure options. The preliminary characterization indicated that groundwater downgradient of the CKD landfill was affected by high pH and selected high metals. The chemical characterization of the CKD indicated a subset of the CKD samples contained elevated concentrations of cadmium, chromium, and lead. Toxicity characteristic leaching procedure (TCLP) analysis showed the CKD did not exceed dangerous waste regulations for the elevated metals. However, some of the CKD samples had a pH greater than 12.5 standard units (SU), and therefore, the material qualified as a state-only dangerous waste under WAC 173-303-090(6).

Additional site characterization was performed in 1993 to further characterize downgradient groundwater impacts and provide geotechnical information to develop engineering design considerations for the closure plan. The groundwater information collected from this field program supported conclusions made from the first characterization program, indicating that pH and metals were elevated downgradient of the CKD pile.

An Agreed Order provided for the short-term post-closure care of the Closed CKD Pile and two years of groundwater monitoring. The groundwater monitoring indicated the contaminated

groundwater observed prior to closure continued to be present downgradient of the Closed CKD Pile. In addition to groundwater monitoring, an emergency action was completed in 1998. The project, known as the Washington State Department of Transportation (WSDOT) Deck Extension, entailed filling a topographic low area on WSDOT property east of State Route 31. This low area represented an immediate threat to human health and the environment due to the surfacing and accumulation of high pH groundwater.

Another Agreed Order was signed in 1999 for the completion of a focused Remedial Investigation/Feasibility Study (RI/FS) of groundwater and surface water contamination associated with the Closed CKD Pile. The focused RI program was developed to further characterize and define soil and groundwater contamination.

Following cover system placement, the groundwater sample parameters focused on pH, metals, and analytes specific to geochemical analysis such as major cations and anions. Sample analyses indicated high pH continued to be downgradient of the Closed CKD Pile. In addition to the elevated pH, arsenic concentrations were above Method A cleanup levels in samples from downgradient wells.

Surface water samples were collected from seeps discharging to Sullivan Creek and from locations near the Closed CKD Pile. Seep water analysis indicated high pH and elevated arsenic concentrations were in the seep samples from downgradient of the Closed CKD Pile. Sediment samples collected in 1992 from Sullivan Creek indicated total metal concentrations were below MTCA Method A soil cleanup levels. Sediment samples collected in 1998 from the ponded water area on the WSDOT property that was later covered in the deck extension project also showed that total metal concentrations were below MTCA Method A cleanup levels.

Cleanup actions

Lehigh implemented an approved landfill closure plan during 1996. The CKD landfill was closed by constructing an impermeable cover on the surface of the CKD to minimize surface water infiltration and by constructing a stormwater management system to convey surface water run-on and run-off to and from the landfill. Components of the cover include a geosynthetic clay liner, a drainage geocomposite (geonet), reinforcement geotextile, and cover soils. The stormwater management system consists of catch basins, internal and external drainpipes, and a sediment basin.

The cleanup action to address contamination in groundwater consisted of a funnel and gate system to route impacted groundwater through a subsurface treatment system. This system was installed in 2007-2008. The funnel component of the remedy consists of a subsurface hydraulic barrier wall downgradient of the Closed CKD Pile that intercepts and directs groundwater toward a treatment corridor. A gravel drainage layer immediately upgradient and within the interior of the barrier wall provides a high permeability flow path for groundwater as it enters the funnel. Groundwater is intercepted and funneled toward the gate where it encounters an in-situ treatment corridor. The corridor treatment consists of a series of permeable treatment walls. Inside the treatment walls, the system diffuses carbon dioxide into

groundwater, resulting in carbonic acid production. The carbonic acid neutralizes the high pH water, which in turn reduces soluble metals concentrations in groundwater. Following treatment, groundwater discharges to Sullivan Creek through a subsurface effluent outfall.

The discharges to Sullivan Creek were covered by a National Pollutant Discharge Elimination System (NPDES) permit at the time of the implementation of the funnel and gate system. A new NPDES permit is in process through Ecology's Water Quality program that will adjust the allowable permitted concentrations of Site contaminants for discharge into Sullivan Creek.

Cleanup performance monitoring

The landfill cap and stormwater controls have been in place since 1996, and the groundwater treatment system has been in operation since 2008. The operations and maintenance plan requires visual monitoring of the integrity of the CKD pile cap and the stormwater features on and around the CKD pile, groundwater monitoring, and maintenance and monitoring of the treatment system. Results from these inspections are reported to Ecology on a quarterly basis. A Discharge Monitoring Report (DMR) is submitted to Ecology each month that lists pH and laboratory analyzed metals concentrations of the groundwater within the treatment area and states whether the system has been discharging to Sullivan Creek.

The restoration timeframe for groundwater impacted by the CKD pile was expected to be immediate upon successful completion and optimization of the treatment system. The restoration timeframe for the remnant plumes that lie to the east and west of the funnel and gate system was not estimated in the Cleanup Action Plan. Rather, the restoration timeframe and effectiveness of the remedy on the remnant plume conditions was left to be determined as part of this periodic review.

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](https://app.leg.wa.gov/WAC/default.aspx?cite=173-340-704)⁹ 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 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.

MTCA Method B cleanup levels were determined to be appropriate for contaminants at this Site. Table 1 shows the groundwater cleanup level for each contaminant of concern and the basis for that cleanup level.

⁹ <https://app.leg.wa.gov/WAC/default.aspx?cite=173-340-704>

Table 1. Site cleanup levels for groundwater contaminants

Contaminant	Groundwater cleanup level	Groundwater cleanup level basis
High pH	6.5 to 8.5	Protection of drinking water and surface water
Arsenic	5 µg/L	Natural background concentration
Chromium	10 µg/L	Protection of aquatic life – chronic exposure
Lead	5 µg/L	Natural background concentration
Manganese	2,240 µg/L	Protection of human health

µg/L = micrograms per liter
 pH is listed in standard units

The point of compliance is the area where cleanup levels must be attained. Since the CKD pile is in contact with groundwater, the Site has a conditional point of compliance (CPOC) for groundwater. This Site has a CPOC for the groundwater outside the hydraulic barrier (the funnel) of the treatment system, and a separate CPOC for the groundwater that flows into the treatment system. Groundwater that flows under the CKD pile and enters the funnel and gate system is expected to be contaminated, so the CPOC for this groundwater is the point where treated water is released to Sullivan Creek. This groundwater must meet the discharge criteria of the NPDES permit at the CPOC. For groundwater outside the subsurface hydraulic barrier, the CPOC was set at the groundwater/surface water interface in accordance with WAC 173-340-720(8)(c). Groundwater must meet cleanup levels at all locations downgradient of the CPOC.

Environmental Covenant

Ecology determined 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 19, 2008, institutional controls in the form of an [environmental covenant](#)¹⁰ (Covenant) were recorded for the Site.

The Covenant recorded for the Site imposes the following limitations:

1. No groundwater may be taken from the parcel except for purposes related to the remedial action, such as groundwater monitoring;
2. The owner shall maintain the groundwater remediation system in accordance with Ecology’s approved documents;
3. The owner shall maintain a barrier that keeps unauthorized people away from the groundwater remediation system;

¹⁰ <https://apps.ecology.wa.gov/cleanupsearch/document/135999>

4. The owner shall maintain signs that warn of hazardous conditions;
5. The owner must allow authorized workers to access the groundwater remediation system;
6. No activity is allowed on the parcel that could result in the release of hazardous substances, create a new exposure pathway, or interfere with the integrity of the remedial action;
7. The owner must tell Ecology in advance if the property is sold, and must restrict any leases on the property to uses and activities that do not violate the covenant;
8. The owner must receive approval from Ecology if they want to use the property in a way that is inconsistent with the covenant. If Ecology approves this use, it can only be after public notice and comment;
9. The owner must allow Ecology to access the property for the purposes of evaluating the remedial action, sample, or inspect the remedial action.

At the time of this periodic review, the Covenant is in effect at the property and Heidelberg is still the owner of the property.

Periodic Review

Effectiveness of completed cleanup actions

During the Site visit Ecology conducted on October 7, 2025, the treatment system was running, but water was not being discharged to Sullivan Creek, as water levels remained too low for discharge. The Site is vacant except for the building that contains treatment system components such as carbon dioxide tanks, the computer interface, and materials for sampling and analysis of groundwater. The CKD pile remains fenced, and the cap appears to be in good condition.

A photo log is in Appendix C.

Direct contact

The cleanup actions were intended to eliminate exposure to dangerous waste at the Site. Exposure pathways to dangerous waste by ingestion or direct contact were reduced by the installation of the impermeable cap. The cap has been seeded and is mowed as needed, and rodent burrows and saplings are removed at least annually. The CKD pile is fenced, and signs are posted saying the property contains hazardous materials. This component of the cleanup action appears to be in good condition, and no additional maintenance is required at this time. Stormwater control features appear to be working as intended to move stormwater off the cap

and route it around the CKD pile. The remedy is working as intended to protect against exposure to dangerous waste.

Protection of groundwater and surface water

Dangerous waste remains at the Site in the form of the material of the CKD pile. Infiltration pathways for rainwater through the CKD have been removed by the impermeable cover and the stormwater control system; however, CKD remains in contact with groundwater within and/or below the pile. Ecology determined removing the CKD pile would not be practicable at the time of the Cleanup Action Plan and that determination has not changed.

The funnel and gate system works to reduce the concentrations of dissolved metals in groundwater by lowering the pH of the water before discharging the treated water to the shoreline of Sullivan Creek. The shoreline has been reinforced with rip rap and native vegetation and now appears natural. Discharge from the system occurs within the rip rap along the bank and does not accumulate or pond on the nearshore.

The remedy appears effective at lowering the pH of groundwater entering the system and reducing concentrations of the contaminants of concern to below cleanup levels before discharge, except for arsenic, which has had a mean concentration of 0.0185 micrograms per liter (mg/L) since 2016 (see Appendix D, Figure D1). While the exact criteria for discharge to Sullivan Creek has not yet been set by Ecology's Water Quality Program, the criteria for discharge will likely be set above the groundwater cleanup level for arsenic; it remains to be seen whether the system will be successful at reducing arsenic concentrations to the NPDES criterion. Ecology will assess this component of the remedy at the next periodic review, once a new NPDES permit is issued.

As the remedy was designed, groundwater impacted by the CKD pile should be intercepted by the funnel and gate system and treated before discharge to Sullivan Creek. The system disconnects the groundwater plume on either side of the funnel, creating areas outside the subsurface hydraulic barrier containing contaminated groundwater. The original conceptual site model (CSM) for the Site determined that the remnant groundwater to the north and south of the system would take time to attenuate once it was disconnected from the CKD pile source. It has been 17 years since the implementation of the remedy; groundwater in the remnant plumes should show declining trends in pH by now.

After the implementation of the treatment system, the remnant plume wells showed a drop in pH to below the cleanup level (Appendix D, Figure D2). However, the northern remnant plume wells have not sustained these drops in pH, and groundwater in these wells now remains consistently above the 8.5 pH cleanup level. Statistical analysis of wells PM-15 and PM-19 since early 2011 indicates there are increasing trends in pH in both wells (Appendix D, Figure D3).

Based on this assessment, it does not appear the remedy is affecting the northern remnant plume as expected based on the current CSM, and groundwater is not meeting cleanup levels at the compliance monitoring wells in the northern plume.

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 Pend Oreille County Auditor's office. 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 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.

Current and projected Site and resource uses

The Site is zoned for industrial purposes but is not currently used for purposes besides implementation of the cleanup action. There have been no changes in current or projected future Site or resource uses. The current Site use does not have a negative impact on the protectiveness of the cleanup action.

Availability and practicability of more permanent remedies

The remedy implemented included containing hazardous substances and installing a funnel and gate treatment system. It is protective of human health and the environment for direct contact, but it is not effective for groundwater and potentially surface water related impacts. While more permanent remedies may be available, they are still not practicable at this Site.

Availability of improved analytical techniques to evaluate compliance with cleanup levels

The analytical methods used at the time of the cleanup action were capable of detection below the selected MTCA cleanup levels. The presence of improved analytical techniques would not affect decisions or recommendations made for the Site.

Conclusions

- The Covenant for the property is in place and is effective in protecting human health and the environment from exposure to hazardous substances and the integrity of the cleanup action. Based on this periodic review, Ecology has determined the requirements of the Covenant are being followed.
- The cleanup actions completed at the Site appear to be protective of the direct contact exposure pathway, but declining pH trends have not yet been observed in the northern remnant plume.
- MTCA requires that the cleanup action address contamination within a reasonable restoration timeframe. The Cleanup Action Plan identified the first periodic review for assessment of the restoration timeframe of groundwater in the remnant plume.
- Ecology's analysis shows that while there was a period of decreasing pH in the northern remnant plume from 2008 to 2011, there are statistically significant increasing trends in the data for pH in the northern remnant plume since 2011. As such, a restoration timeframe cannot be estimated, and the remedy is not functioning as intended.
- Before the next periodic review, the PLP shall:
 1. Update Ecology on the progress made on the September 16, 2016, *Staged Field-Scale Treatability Testing Workplan*, specifically whether the full range of proposed work was completed in accordance with the approved workplan, and whether any remaining work is still applicable to the conditions at the Site.
 2. Submit a work plan that will allow for an assessment of current groundwater conditions, hydrogeology, and optimization of the remedy in the northern remnant plume, which may or may not entail components that were first proposed in the 2016 *Staged Field-Scale Treatability Testing Workplan*. This work plan will be due to Ecology within 90 days of issuance of the renewed NPDES permit or by December 31, 2026, whichever is sooner. The work plan shall include sampling and analysis, quality assurance and quality control, and health- and safety-related documentation commensurate with the work proposed.
 3. Begin work as outlined in the Ecology-approved work plan within 30 days of Ecology approval to determine whether groundwater is meeting cleanup levels at the conditional point of compliance.
 4. Submit a report detailing the results from the work completed, outlining current conditions of groundwater in the northern plume, updating the CSM as needed, and proposing any additional work to address groundwater conditions in the remnant plume based on these results.
 5. Work with Ecology to establish a schedule for any additional proposed work so it can be completed prior to the next periodic review (currently scheduled for 2030).

The property owner is responsible for continuing to inspect the Site to ensure the integrity of the cleanup action is maintained and operating as intended while additional work is being completed.

Next review

Ecology will schedule the next review for the Site five years from the date of this periodic review unless additional cleanup actions are required; if substantive additional cleanup action is required, the next periodic review will be completed five years after those activities are completed.

References

Ecology. *Cleanup Action Plan*. January 2006.

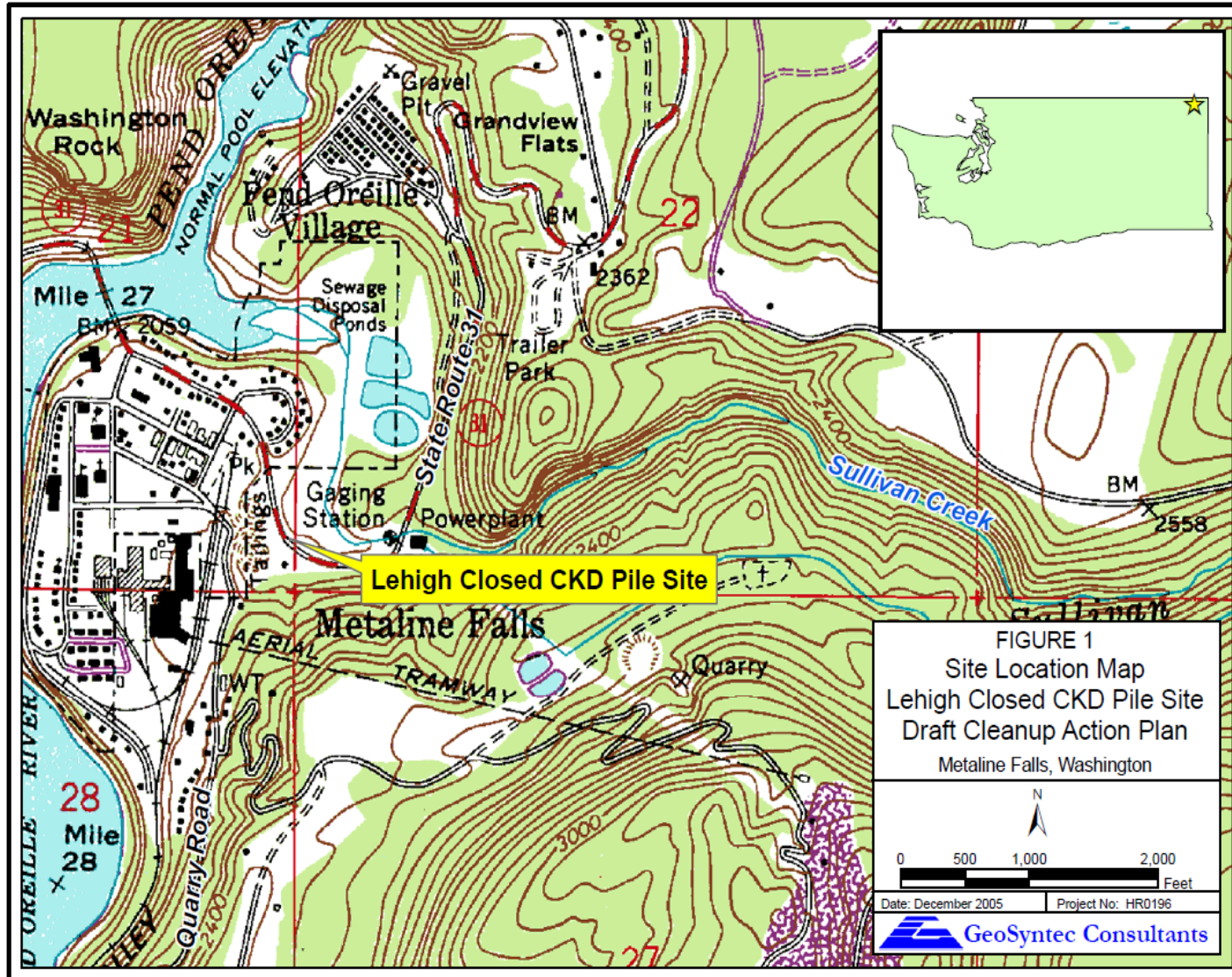
Ecology. *Environmental Covenant*. February 19, 2008.

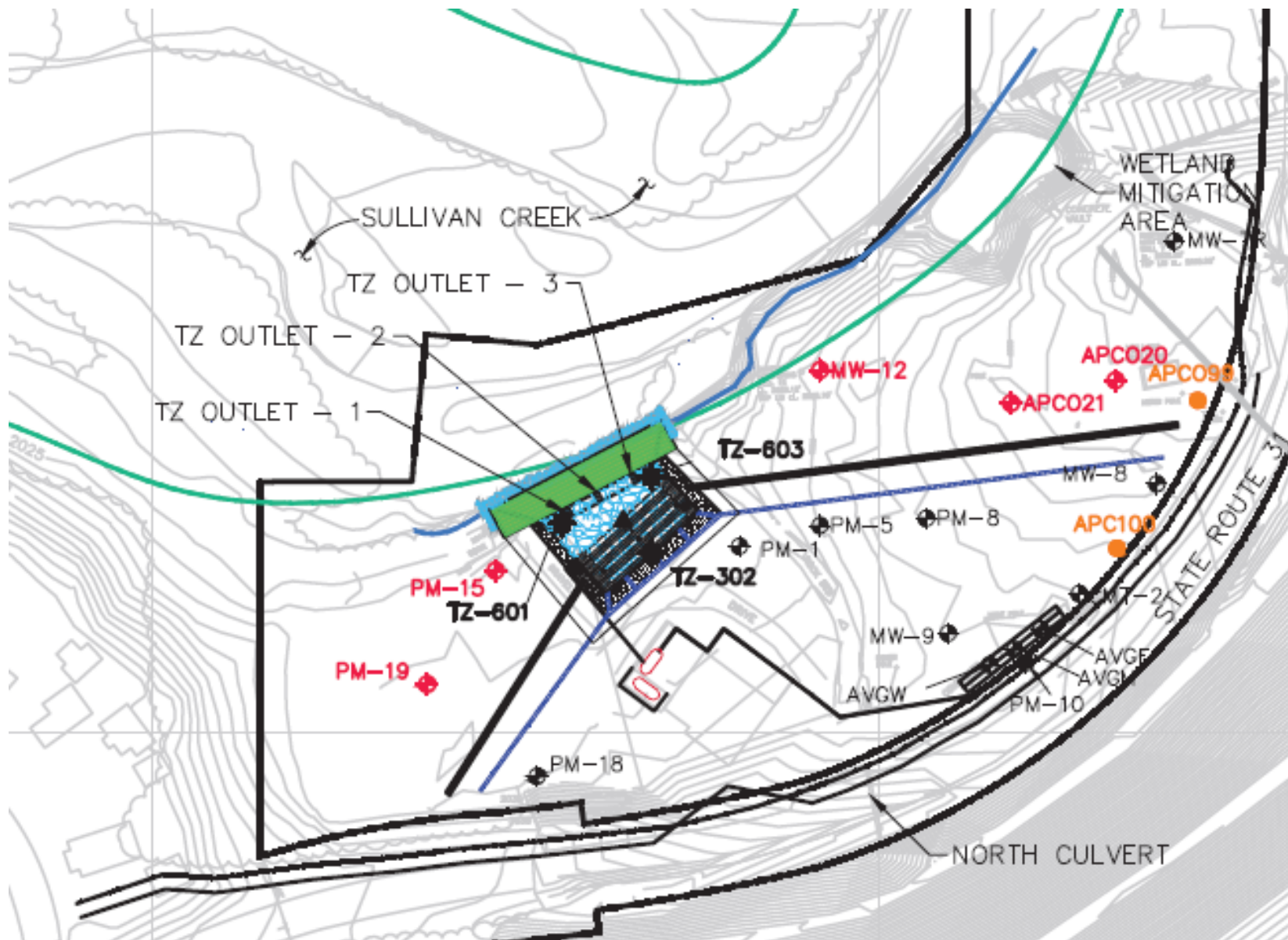
Ecology. Site visit. October 7, 2025.

Geosyntec Consultants. *Staged Field-Scale Treatability Testing Workplan, Lehigh Cement Company Closed Cement Kiln Dust Pile Site*. September 16, 2016.

Geosyntec Consultants. Quarterly Progress Reports. Various dates, 2008–2025.

Appendix A. Vicinity Map





Appendix C. Photo Log

Photo 1: Groundwater remediation system – gate treatment area



Photo 2: Tank and piping within the support building



Photo 3: Support building hazardous materials signage



Photo 4: Signage on groundwater remediation system



Photo 5: Revegetation and rip rap along the Sullivan Creek bank



Photo 6: CKD Landfill area with fencing and cap



Photo 7: Fencing and signage on upper area of capped CKD pile

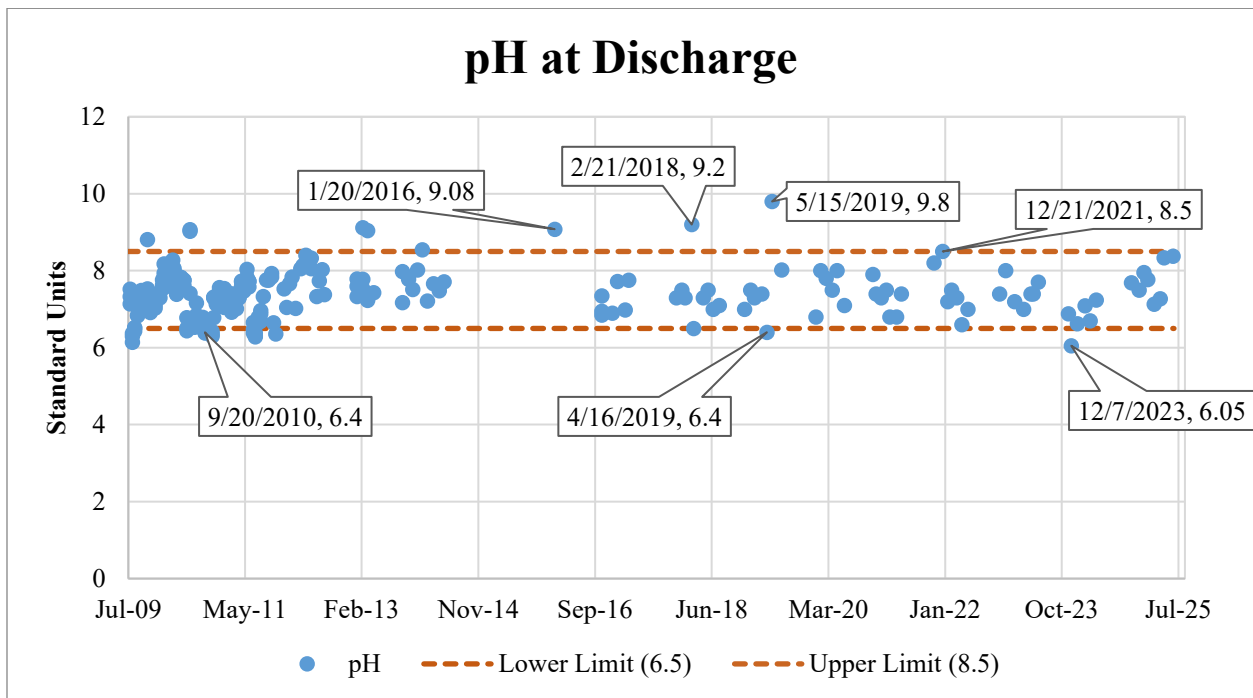
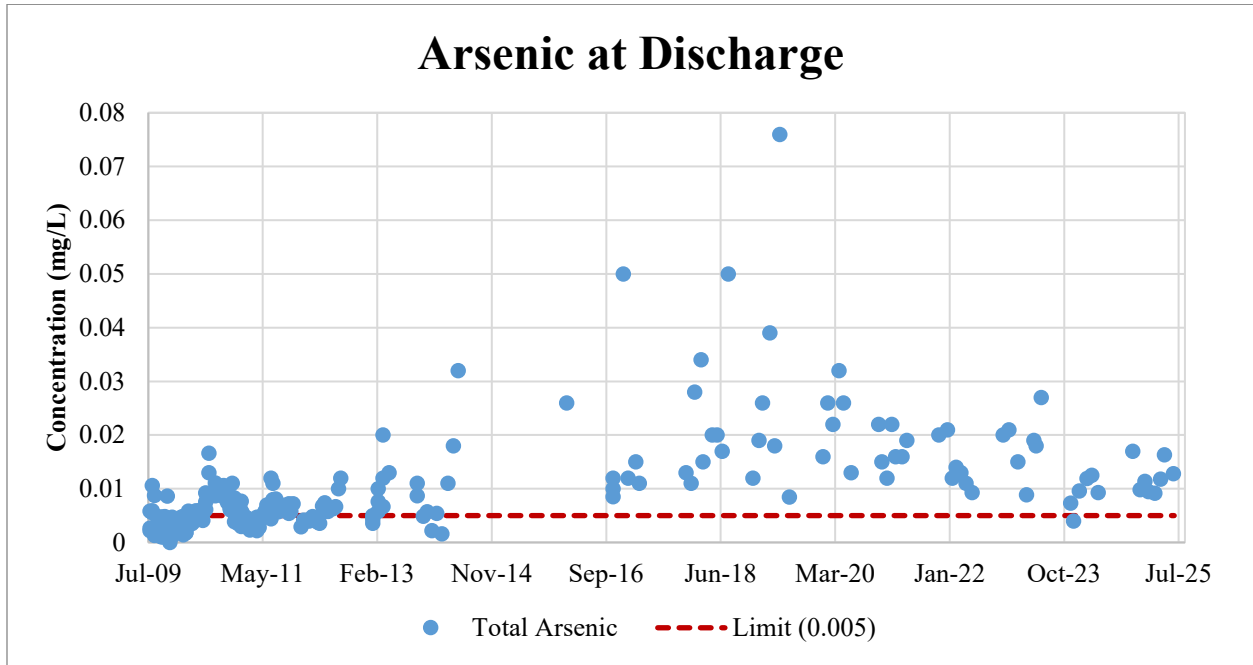


Photo 8: View of the support building and Sullivan Creek from top of the CKD landfill

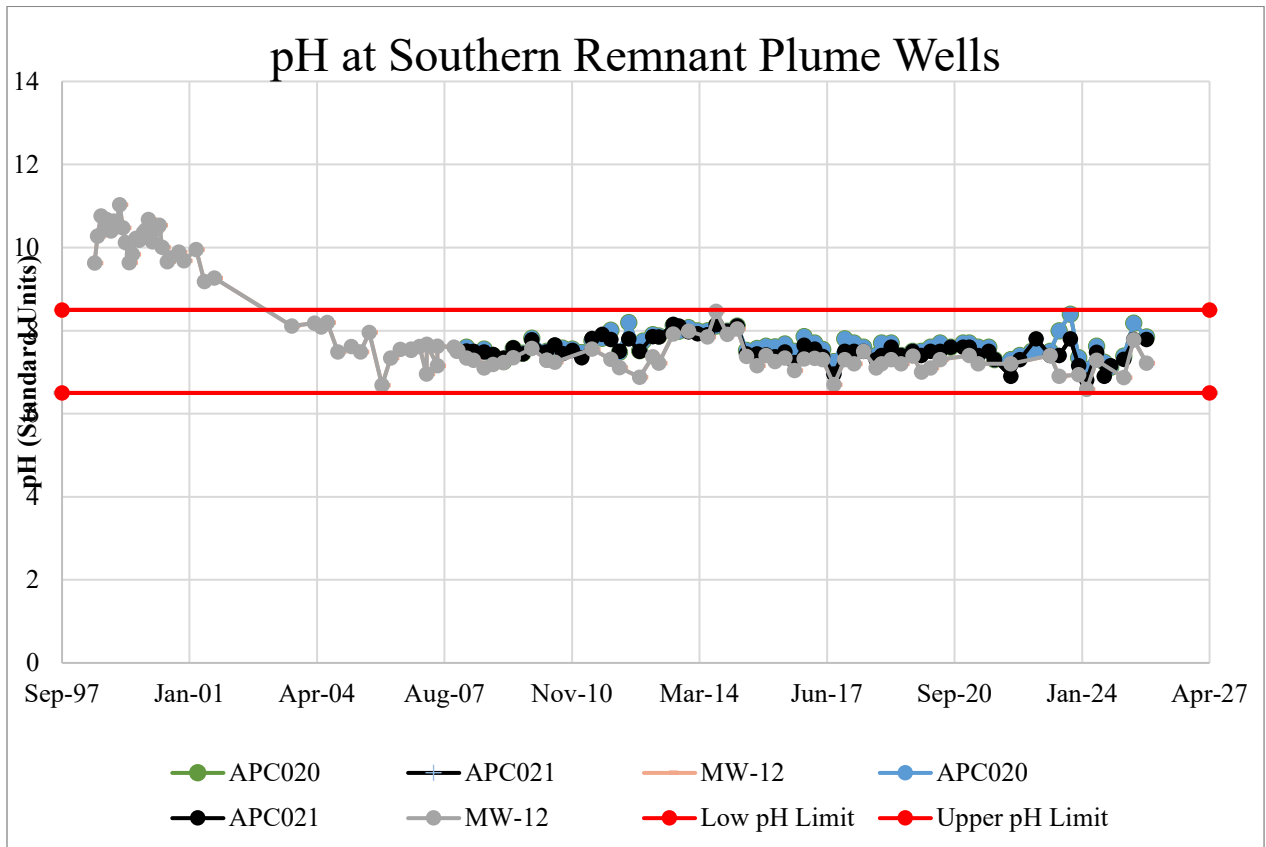
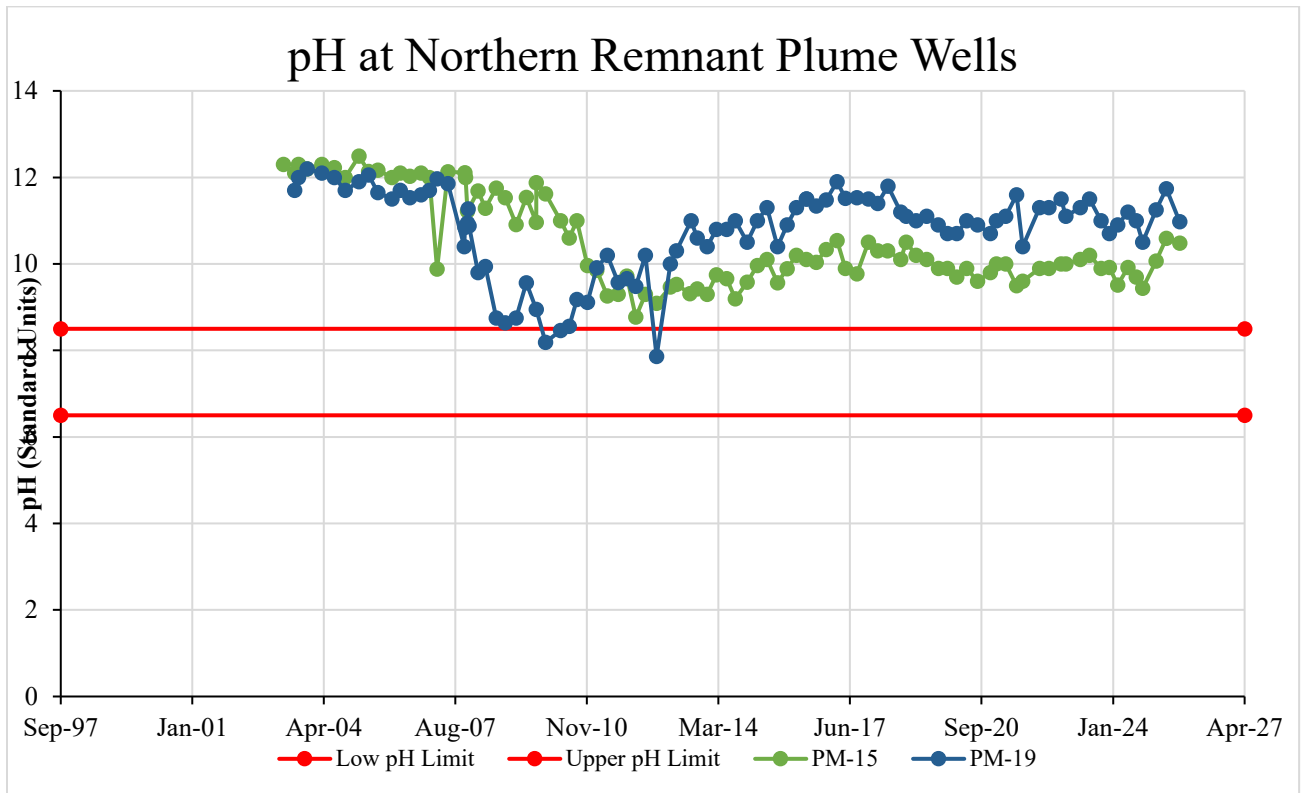


Appendix D. Charts

D1. Arsenic concentrations and pH at discharge to Sullivan Creek since implementation of the remedy

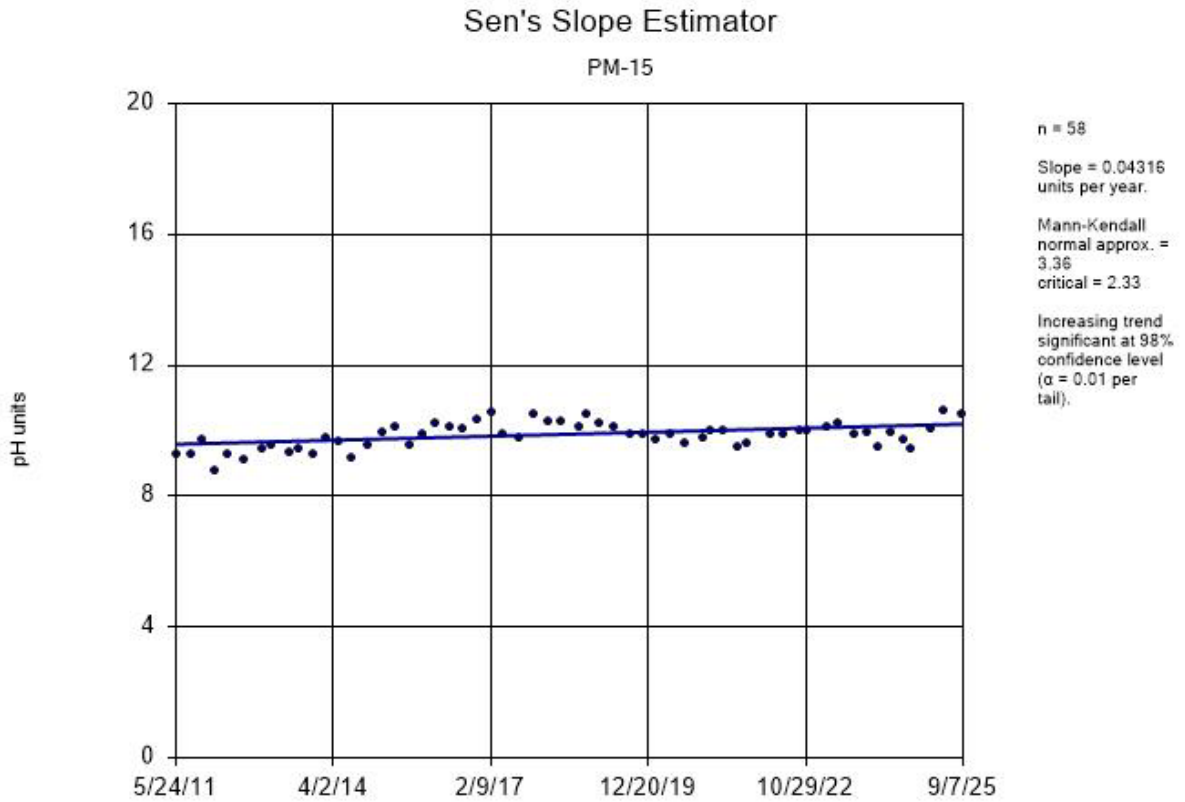


D2. pH in groundwater in the remnant plume wells



D3. Statistical analysis of pH in northern remnant plume well PM-15

Sanitas™ v.10.1.02 Software for use by regulators in official oversight duties. EPA

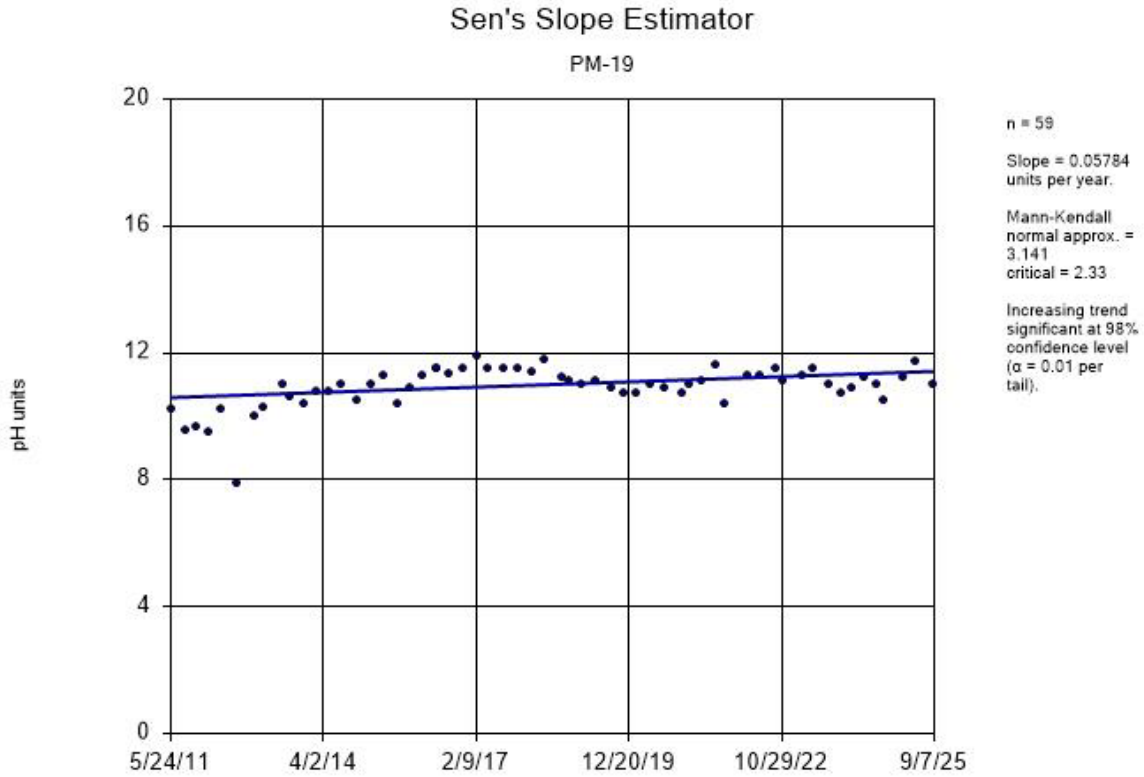


Constituent: pH Analysis Run 12/1/2025 10:20 AM

Lehigh Closed CKD Pile Site Client: GOVT. USE ONLY Data: 5 RemnantplumeWells_pH

D4. Statistical analysis of pH in northern remnant plume well PM-19

Saritas™ v.10.1.02 Software for use by regulators in official oversight duties. EPA



Constituent: pH Analysis Run 12/1/2025 10:20 AM

Lehigh Closed CKD Pile Site Client: GOVT. USE ONLY Data: 5 RemnantplumeWells_pH