Triumph Mine Tailings Piles Site

Fifth Five-Year Review

State of Idaho
Department of Environmental Quality

January 2025

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Blaine County, Idaho

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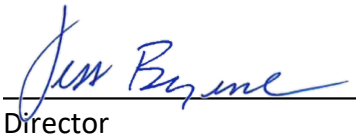
Approved by: Date:



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Director
Idaho Department of Environmental Quality

Cover photo: Triumph Mine surge pond, lower tailings pile, and river valley.

Idaho Department of Environmental Quality
Waste Management and Remediation
1410 N. Hilton St.
Boise, ID 83706

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Table of Contents

List of Tables

List of Figures

Abbreviations, Acronyms, and Symbols

ARPA	American Rescue Plan Act
ASARCO	American Smelting and Refining Company
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COCs	Contaminants of concern
CPM	Community Protection Measures
DEQ	Idaho Department of Environmental Quality
EC	Environmental Covenant
EFL	East Fork Lane
EFR	East Fork Road
EPA	United States Environmental Protection Agency
FR	Federal Register
gpm	gallons per minute
ICL	Idaho Conservation League
IDL	Idaho Department of Lands
L	liter
LTP	Lower tailings pile
mg	milligram
kg	kilogram
MOA	Memorandum of Understanding
NA	not applicable
ND	no detected
NPL	National Priorities List
O&M	Operations and maintenance
PWS	public water system
ROD	Record of Decision

1 Introduction

This Triumph Mine Tailings Piles Site review fulfills a requirement to review the effectiveness of remedial actions to ensure adequate protection of human health and the environment. Remedial action work at the Triumph Mine site addressed contamination from past mining activities. The 1998 Record of Decision (ROD) documented the contaminants of concern (COCs) and human health risk assessment and identified the selected remedial actions (DEQ 1998). Under the 1998 ROD, work has continued to address historical contamination. This is the fifth five-year review to evaluate potential risks from contaminant migration when contaminants remain on-site. This document reviews site investigations and remedial actions performed from 2019 through 2023 and includes information for current ongoing actions and planning for future actions.

Section 2 provides a regulatory history of the site. Section 3 describes the physical characteristics of the site relevant to historical contamination pathways. Section 4 summarizes remedial actions documented in the first four five-year reviews. Section 5 describes monitoring results, inspections, site investigations and remedial actions performed in the last five years. Section 6 reviews administrative components of the five-year review process, summarizes public notices, and summarizes public input. Section 7 reviews the validity of the remedial decisions in the 1998 ROD and other decision documents. Section 8 provides a description of outstanding issues, recommendations, and follow-up actions. Finally, Section 9 provides the protectiveness statement for the selected remedies.

2 Site Chronology

The United States Congress established the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) in 1980. CERCLA is informally called Superfund. When there is no responsible party, the United States Environmental Protection Agency (EPA) receives authority via Superfund to clean up contaminated sites. The Superfund cleanup process includes a preliminary site assessment that determines, through a hazard ranking system, if a site should be included on the National Priorities List (NPL).

In 1993, EPA determined that the Triumph Mine site warranted listing as a Superfund site (FR 1993), but local residents and county commissioners opposed federal involvement. EPA agreed to withdraw the site from the NPL if the state completed the investigations, monitoring, and remedial actions following methods similar to EPA's Superfund cleanup process. A 1994 Memorandum of Agreement (MOA) between EPA and the Idaho Department of Environmental Quality (DEQ) listed the completion activities required to withdraw the site from proposed Superfund status (EPA 1994).

Required completion activities included a consent order, remedial investigation, feasibility study, proposed plan, ROD, remedial action plan, and all remedial actions. A 1994 consent order between DEQ, Idaho Department of Lands (IDL), and the American Smelting and Refining

Company (ASARCO) established the terms for a remedial investigation/feasibility study. A 1997 amendment to the consent order included mitigation of the following human health risk sources: upper and lower tailings piles, process area, all waste ditches and ponds, and Triumph Mine portal drainage. A second consent order in 1999 split the site into two operable units, one for contaminated soils and the other for mine water components (DEQ 1999).

DEQ completed a remedial investigation in January 1997 (Kennedy Jenks 1997), a baseline ecological risk assessment in May 1997 (Tetra Tech, Inc. 1997a), a baseline human health risk assessment in August 1997 (Tetra Tech, Inc. 1997b), and a feasibility study in March 1998 (Kennedy Jenks 1998). The ROD was issued in March 1998 (DEQ 1998). The final remedial design report was issued in August 1999 (McCully, Frick & Gilman 1999).

After DEQ fulfilled these completion activities, EPA withdrew its proposal to list the Triumph Mine Tailing Piles Site on the NPL. EPA did not believe that further response under Superfund was appropriate at that time because major sources of risk were mitigated, including replacing or capping all contaminated yards, gardens, roads, waste rock, and tailings. The EPA determination identified ASARCO's responsibility to address mine water discharge from the mine portal, enforced by the established DEQ consent orders (FR 2003).

In 2003, ASARCO financed construction of the first Triumph tunnel plug to control mine water discharge. ASARCO began to have financial difficulties and in April 2009 entered into a bankruptcy settlement agreement resulting in trust funds and a land transfer to complete the mine water remedy (ASARCO 2009). This settlement agreement transferred responsibility of mine water operable unit remedies to DEQ. IDL remains responsible for the soils operable unit remedies.

In 2018, the Idaho Conservation League (ICL) filed a lawsuit against DEQ and IDL alleging a violation of the Clean Water Act for discharging pollutants without a permit from a point source to an underground discharge basin about 500 feet from East Fork Big Wood River. A settlement agreement specified water quality monitoring that may be discontinued upon issuing a National Pollutant Discharge Elimination System permit or following "correction of the condition of the discharge basin" (ICL 2018). DEQ and IDL submitted a joint discharge permit application to EPA in September 2018, with DEQ responsible for mine water and IDL responsible for groundwater conveyed around the tailings piles.

In July 2019, EPA transferred individual industrial water discharge permit authority to DEQ (FR 2019). The DEQ Idaho Pollutant Discharge Elimination System (IPDES) Program became the permitting authority for the joint discharge permit application at the Triumph Mine site. The permit application is included in the annual DEQ IPDES Permit Issuance Plan (DEQ 2024). DEQ and IDL coordinate with the IPDES program to provide data and remedial action updates.

In response to the lawsuit, DEQ increased monitoring stipulated by the settlement agreement in addition to ongoing monitoring to evaluate the effectiveness of remedial actions (Tetra Tech 2022, 2023b-f). IDL and DEQ provide required monitoring data to ICL in stipulated reports. Recent groundwater flow modeling suggests that mine-impacted groundwater flows southwest

parallel with the river with no apparent discharge to surface water or its functional equivalent (WSP 2024).

In 2021, the State of Idaho directed funding from the American Rescue Plan Act (ARPA) for use at the Triumph Mine site. The availability of this federal funding expires in December 2026.

Priority actions for ARPA funding include treating mine water discharge if appropriate, remediating contaminated soils in public roadways and rights-of-way, and reducing contaminant loading to groundwater in and around the lower tailings pile. A June 2024 *fact sheet* (https://www2.deq.idaho.gov/admin/LEIA/api/document /download/22255) describing these actions is available on DEQ's website and is provided in Appendix A.

Table 1 lists the chronology of regulatory events.

Table 1. Summary of regulatory events at Triumph Mine Tailings Piles Site.

Event	Reference
EPA proposed NPL listing	FR 1993
MOA between EPA, IDL, and DEQ	EPA 1994
Consent Order among DEQ, IDL, and ASARCO	1994, 1997 amendment, second consent order 1999
Remedial Investigation	Kennedy Jenks 1997
Feasibility Study	Kennedy Jenks 1998
Proposed Plan	DEQ 1997
Record of Decision	DEQ 1998
Remedial Action Plan	McCully, Frick & Gilman 1999
EPA withdraws site from NPL	FR 2003
ASARCO Settlement Agreement	ASARCO 2009
ICL Settlement Agreement	ICL 2018
DEQ and IDL submitted joint discharge permit application	DEQ 2018
ARPA funding provided	2021

3 Background

Previous five-year reviews describe the history of Triumph Mine Tailings Piles Site operation and the history of remedial actions (DEQ 2004, 2009, 2014, 2019). This section provides a summary of physical details relevant to the cleanup actions documented in previous and current investigations.

3.1 Site Location, Description, and Physical Characteristics

The Triumph Mine site is in the community of Triumph in Blaine County, Idaho. The site is about 6 miles east of State Highway 75 between the cities of Hailey and Ketchum (Figure 1). The Triumph Mine was part of an interconnected series of several mines, including the North Star and Independence Mines. The mines produced ore rich in zinc and lead with some silver, operating primarily from 1882 to 1957.

Historic land and resource uses include mining, ore processing, and residential. About 30 houses are located adjacent to the mine complex. Anticipated future land uses are residential and recreational.

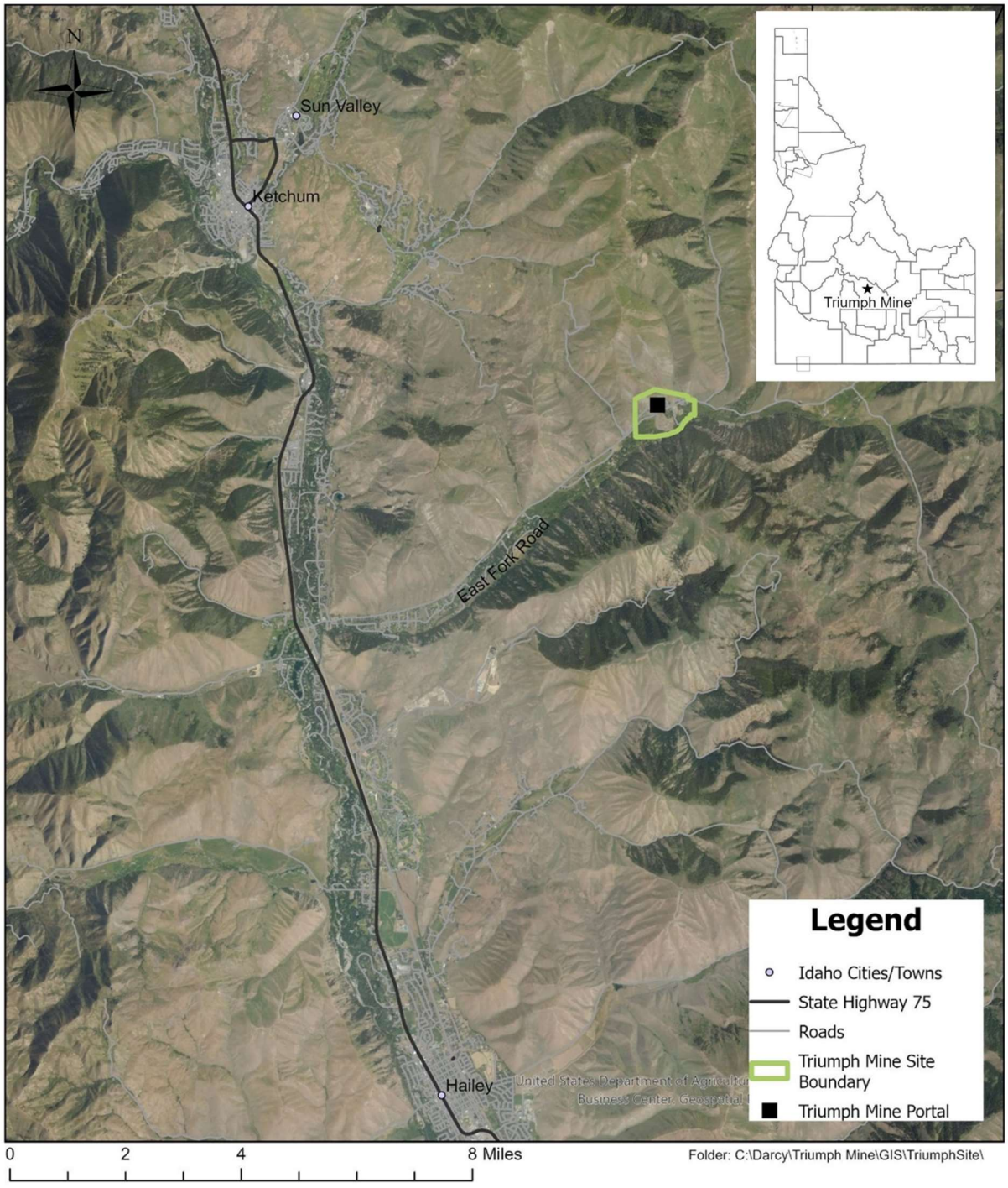

Figure 1. Location of the Triumph Mine Tailings Piles Site in Blaine County, Idaho.

Historical features include a mine portal and former milling and processing areas. Two large tailings piles created during historic mining activities are bounded on the north by East Fork Road and on the south by East Fork Big Wood River. The Triumph Mine portal is at about 43.645° N, -114.261° W at an approximate elevation of 6,185 feet.

East Fork Big Wood River Valley trends southwest. Regional geology of the hillslope and mining complex includes the Wood River Formation that contains sandstone interbedded with conglomerate and limestone (Kennedy Jenks 1997). The Milligen Formation produces ores that are unusually high in metals concentrations. Outcrops of this formation contribute to variability in metal concentrations of soils throughout the area (TetraTech 2021). The hillslope also contains the Triumph thrust fault array (Rahe 2011).

The Triumph Mine site is in the northeastern extent of the Wood River Valley Aquifer system in the floodplain of the East Fork Big Wood River (Golder 2021). Groundwater exists in fractured bedrock, perched aquifers in colluvial deposits on the hillslope, and in the alluvial deposits of unconsolidated sediments of the river valley (TetraTech 2021). Groundwater in the alluvial aquifer flows southwest, parallel with the river (Kennedy Jenks 1997; Bartolino and Adkins 2012; Fisher et al. 2014).

Figure 2 provides a map of site features:

- General trend of the mine tunnel, with locations of plugs at 1,175 feet and 235 feet from the portal
- Mine portal where discharge is measured at an average 6 to 7 gallons per minute (gpm)
- Blue lines showing an underground piping system conveying mine water from the portal to the surge pond; from the surge pond downhill and under East Fork Road; channeling groundwater from the permanent pond around the lower tailings pile to meet the pipeline from the surge pond, then channeling the combined discharge to an underground basin about 500 feet from the river
- Remediated areas including the former process areas, waste rock pile, and the upper and lower tailings piles
- Former ponded area on the lower tailings pile and the existing permanent pond to the northeast of the lower tailings pile
- State-owned property boundaries for DEQ and IDL

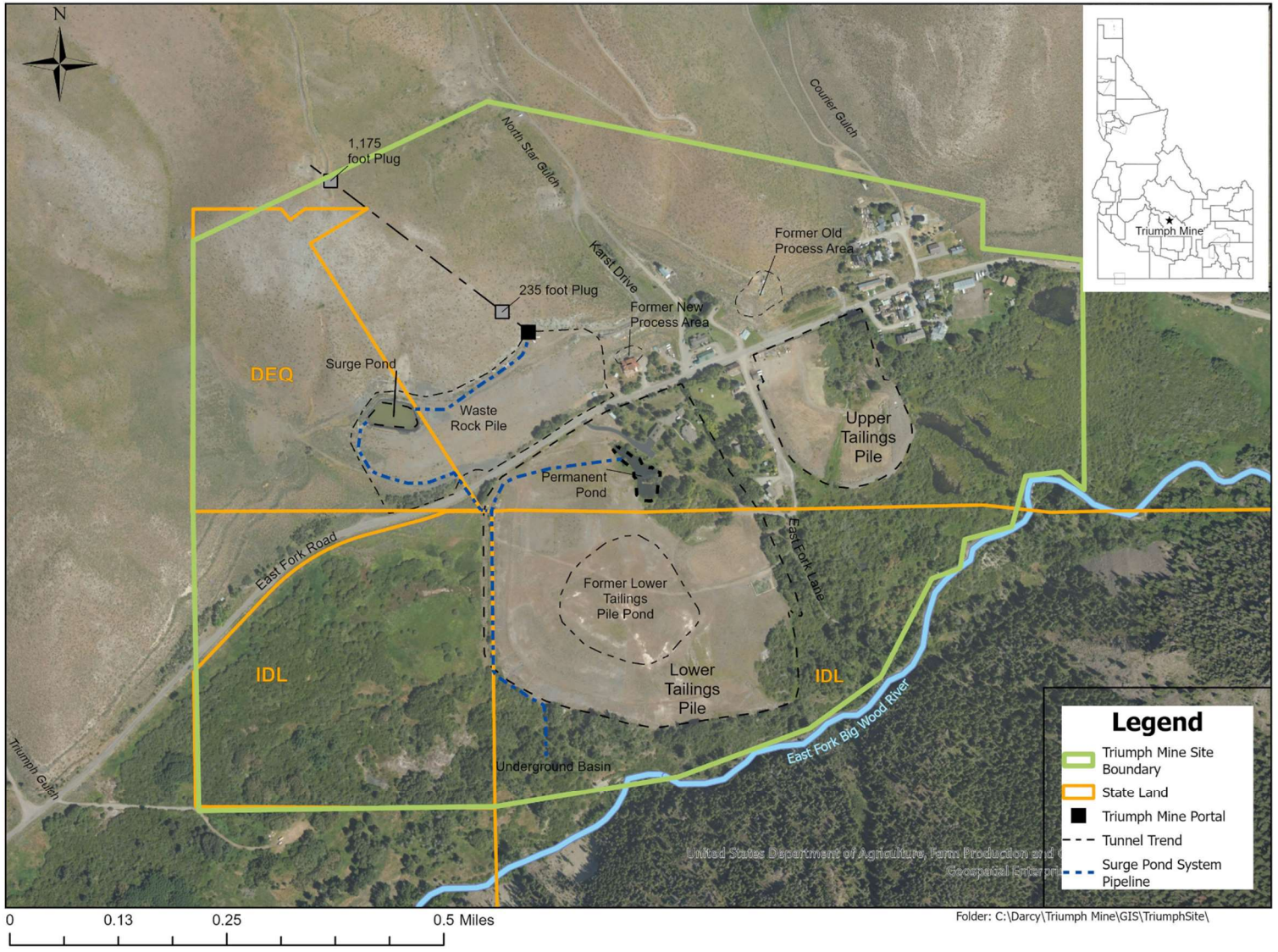

Figure 2. Map of Triumph Mine site including areas of previous contamination in relation to current conditions.

3.2 History of Contamination and Initial Response

Before remediation, DEQ investigated contamination resulting from historic mining, milling, and processing operations. The ROD identified COCs including antimony, arsenic, cadmium, copper, lead, manganese, mercury, nickel, selenium, silver, vanadium, and zinc. Indicator chemicals in residential soils were arsenic and lead. The presence of indicators meant there were likely other mine-related contaminants present (DEQ 1998). The primary sources of contamination were the tailings piles, mine process area, mine portal water, and to a lesser degree, waste rock pile. Elevated concentrations greater than three times background concentrations were found in sediments in the tailings piles, ditch sediments from the mine tunnel, waste rock pile, process area soils, and residential soils. Elevated concentrations in water were present in the mine portal water, drain ditch, waste rock seeps, and tailings ponds. Some wetlands samples had elevated concentrations where visible tailings were present in wetlands to the south and west of the tailings piles. Low concentrations of dissolved COCs were found in East Fork Big Wood River water and sediments (Kennedy Jenks 1997).

Routes of contamination migration were investigated before remediation occurred. These routes of migration included air migration from windblown dust, surface water transport via overland flow and channel flow, and transport in the groundwater unsaturated and saturated zones. Site studies confirmed the relatively low mobility of most of the COCs in the environment (Kennedy Jenks 1997).

Both human health and ecological risk assessments were performed. The human health risk assessment was the basis for taking remediation, as identified by the ROD (DEQ 1998). The ecological risk assessment found no unacceptable risks to ecological receptors (DEQ 1998).

4 Remedial Actions

This section describes the selected remedial actions and cleanup goals identified in the ROD for the remediation units (DEQ 1998). Remedial actions previously implemented are summarized based on details from past five-year reviews (DEQ 2004, 2009, 2014, 2019).

4.1 Remedy Selection

For the soil remediation unit, the ROD identified arsenic concentrations in the soil as a trigger for cleanup activities. The arsenic remediation goal of 300 milligrams per kilogram (mg/kg) (parts per million) protects human health based on soil ingestion, inhalation, and dermal exposure routes in addition to consumption of garden produce (DEQ 1998). For lead concentrations, the EPA lead screening level of 400 mg/kg was used to identify potential risks (EPA 1996).

For the mine water remediation unit, the ROD identified manganese concentrations in groundwater as a trigger for cleanup activities. The human health risk assessment established a

risk-based remediation goal of 0.84 milligrams per liter (mg/L) in groundwater. There is also a groundwater quality secondary constituent standard of 0.05 mg/L for manganese (IDAPA 58.01.11.200.01.b) based on aesthetics of odor and taste, whereas the remediation goal of 0.84 mg/L is based on health risks.

The arsenic drinking water standard of 0.01 mg/L is the cleanup objective for groundwater to prevent human ingestion of groundwater at levels above acceptable risk levels. The acceptable risk levels for contaminants found in groundwater are the federal drinking water standards. To meet the cleanup objective for arsenic in groundwater, groundwater used as drinking water must be evaluated against the drinking water standard.

The ROD based the remedy selection on residential and recreational land use scenarios (DEQ 1998). To address the potential risks from the site, the following cleanup objectives were developed:

- Soils—Prevent human ingestion and/or inhalation of and direct contact with contaminated soil and dust above acceptable risk level under current and future residential scenarios. The soils cleanup objective included soils in yards, gardens, road shoulders, roads within and adjacent to residential properties and the waste rock area. House dust is addressed through source control via capping of contaminated soils and tailings. Community protection measures apply to residential yards if contaminated soil occurs below the layer of capping materials.
- Tailings Piles—Prevent human ingestion and inhalation of, and direct contact with, tailings and fugitive dust above acceptable risk levels. Prevent human ingestion of surface water on the tailings ponds. Prevent contaminant migration and exposures to ponds on the tailings piles that would result in unacceptable risk to human health and the environment.
- Process Area—Prevent human ingestion and inhalation of, and direct contact with, contaminated soil and dust above acceptable risk levels. Prevent contaminant migration that would result in unacceptable risk to human health and the environment.
- Wetlands—Protect the wetlands from negative impacts created by the remediation.
- Mine Portal Ditch—Prevent human ingestion and direct contact with ditch sediments above acceptable risk levels.
- Groundwater—Prevent human ingestion of groundwater at levels above acceptable risk level for future residential scenarios.
- Mine Portal Water—Prevent human ingestion of mine portal water and prevent contaminant migration through mine water discharges. The mine plug remedies were designed to reduce the load of arsenic and manganese to the wetlands and groundwater.

Indicator chemicals are those chemicals that indicate the presence of other potential COCs. Arsenic and lead in soils and arsenic and manganese in water are indicator chemicals at the Triumph Mine site. Selected remediation goals (Table 2) for the indicator chemicals also reduce other contaminants. Human health risks drive the overall remedies.

Table 2. Remediation goals for Triumph Mine Tailings Piles Site cleanup.

Media	Analyte	Remediation Goals and Standards
Soil	Arsenic	300 mg/kg[a]
Soil	Lead	400 mg/kg[b]—screening level
Groundwater	Manganese	0.84 mg/L[c]
Drinking water	Arsenic	0.01 mg/L[d]—drinking water standard

a. Milligram per kilogram (mg/kg) equals one part per million.
b. The 1996 lead screening level of 400 mg/kg was revised to 200 mg/kg (EPA 2024).
c. Milligram per liter (mg/L) equals one part per million.
d. Arsenic drinking water standard changed from 0.05 mg/L to 0.01 mg/L in 2001.

The goal of Triumph Mine site remedial action is to prevent potential sources of pollution from reaching drinking water or impacting groundwater and surface water. The groundwater quality standards (IDAPA 58.01.11) apply to drinking water, and Idaho surface water quality criteria (IDAPA 58.01.02) apply to surface water at the site.

4.2 Remedy Implementation

Remedies identified in the Findings of the Remedial Investigation/Feasibility Study included (a) capping the tailings piles, waste rock pile, and process area; (b) removal and capping of contaminated soils in residential yards to a depth of 1 foot; (c) removing discrete piles of visible tailings in the wetland; (d) and plugging the mine portal with a contingency for treatment if necessary (Kennedy Jenks 1998).

This section summarizes the history of remedial activities at the site. For more detail on each activity, refer to the fourth five-year review (DEQ 2019).

Most of the remedial activities occurred between 1998 and 2004. Based on the 1999 consent order, the following work was completed:

- Removed contaminated soil from 19 residential yards, 3 community roads, and 6 road shoulders.
- Removed discrete tailing deposits in the wetlands.
- Capped tailings and waste rock piles.
- Installed of a plug 1,175 feet within the mine adit to prevent the discharge of contaminated mine water and debris.

IDL completed the following work after the ASARCO bankruptcy settlements:

- Regraded the lower tailings pile to eliminate ponding and erosion caused by stormwater runoff.
- Repaired the pipeline conveying water from the permanent pond upgradient of the lower tailings pile.
- Conducted operation and maintenance (O&M) work to evaluate and maintain remedy effectiveness.
- Monitored and collected data to support five-year reviews of the site.

DEQ completed additional work after the ASARCO bankruptcy settlement:

- Installed boreholes and grouting to mitigate risks to the pipeline leading from the plug installed at 1,175 feet to the mine portal.
- Conducted engineering evaluations and cost assessments to determine closure alternatives for the mine water discharge.
- Installed a second mine plug 235 feet within the mine to further prevent the discharge of contaminated mine water and debris.
- Installed monitoring wells downgradient of the mine to evaluate mine plug effectiveness and groundwater quality.
- Conducted monitoring and O&M work to evaluate and maintain remedy effectiveness.
- Prepared five-year reviews for the site.

4.3 System Operations/Operation and Maintenance

DEQ and IDL continue to operate under agreements from the 1999 consent order for remedial design and remedial action at the Triumph Mine Tailings Piles Site. IDL is responsible for soil remediation activities, and DEQ is responsible for mine portal water remediation.

Although the consent order established the legal relationship between DEQ and IDL for the remedial cleanup at the site, the agencies established a cooperative working relationship to manage the cleanup efforts. This cooperation allows remediation activities to be conducted more efficiently and collaboratively.

5 Progress Since the Last Five-Year Review

This section describes the remedial actions performed from 2019 through 2023, including the physical sample collection, data review, and visual inspections performed to evaluate the effectiveness of the remedial actions.

5.1 Monitoring Activities

This five-year review documents the monitoring results and evaluates the effectiveness of remedial actions implemented for arsenic and manganese in mine water drainage and arsenic and lead in soils as identified in the 1998 ROD and supporting studies. In addition to the COCs, the data collected allows a better understanding of the mine discharge and its interactions with the environment. These data—including field parameters, general chemistry, total and dissolved metals, and discharge—are available in detailed reports according to the field sampling plans referenced below.

5.1.1 Soils Operable Unit Monitoring and Data Review

This section summarizes monitoring and site investigations for the soils operable unit.

5.1.1.1 Tailing Piles and Residential Soils

During initial remedy implementation, ASARCO and IDL removed contaminated soil and replaced it with clean fill along community roads. During this review period, DEQ and IDL evaluated this remedy (Tetra Tech 2023e). Excess arsenic and lead (more than three times the remediation goal) were detected in areas shown in Table 3.

Table 3. Extent of recontaminated soils on community roads.

Investigation Area	Concentration Range Above Cleanup Goal	
	Arsenic (mg/kg) Cleanup Goal = 300 mg/kg	Lead (mg/kg) Screening Level = 400 mg/kg
East Fork Road	390–1,335	410–2,021
Triumph Circle	None	None
Karst Drive	None	454
East Fork Lane	307–1,938	430–5,304
LTP Access Road	315–2,208	410–5,176
EFR Ditch	308–3,0746	420–2,359
LTP Ditch Area	315–30,994	407–25,231
LTP Ditch	333–15,405	407–5,125

Notes: LTP = lower tailings pile; EFR = East Fork Road

Road maintenance, snow plowing, stormwater runoff, and vehicle traffic are the most likely pathways of contaminant migration on roadways. Exceedances around the lower tailings pile are associated with potential water seep zones and areas with thin cover soil. DEQ performed additional data collection to identify depths of contaminated soil (Alta 2024). Based on these results (Table 4), DEQ identified seven decision units describing the square footage and areas requiring remediation.

Table 4. Depth of recontaminated soils on community roads.

Investigation Area	Concentration Range Above Cleanup Goal	
	Arsenic (mg/kg) Cleanup Goal = 300 mg/kg	Lead (mg/kg) Screening Level = 400 mg/kg
Pullout Area	—	—
Surface	1,043–1,441	456–2,306
6 inches bgs	729–1,197	1557–1,852
12 inches bgs	746–1,878	1433–3,277
EFR	—	—
6 inches bgs	408–6,243	702–2,864
12 inches bgs	333–5,718	563–9,159
EFL	—	—
6 inches bgs	724–2,946	978–14,800
12 inches bgs	540–7,645	1179–14,000
Karst Drive	—	—
6 inches bgs	None	None
12 inches bgs	None	None

Notes: EFR = East Fork Road; EFL = East Fork Lane; bgs = below ground surface

5.1.1.2 House Dust

In October 2023, dust sampling was conducted in five residential homes. This ongoing work further evaluated the effectiveness of source control and capping of contaminated soils and tailings. Per the ROD (DEQ 1998), DEQ must perform monitoring to demonstrate that residential house dust levels are within acceptable limits. DEQ mailed letters to residents of Triumph with remediated properties, resulting in five residents participating. Samples of vacuum bag contents were collected by field personnel. All results were less than the remediation cleanup goals for arsenic (300 mg/kg) and lead (400 mg/kg). Concentrations of arsenic in the five household dust samples ranged from 7 to 30 mg/kg. Lead dust sample results ranged from 28 mg/kg to 77 mg/kg.

5.1.1.3 Community Protection Measures

Property owners and communities have accepted the premise that contamination can be left in place under certain circumstances, without presenting any risk to human health or the environment. The tool used in these circumstances is a Community Protection Measure (CPM) known as an Environmental Covenant (EC). The ROD prescribes CPMs for properties with soil arsenic concentrations greater than 300 mg/kg beneath the cap when the top 1-foot layer has been remediated. ECs describe activity and use limitations. An EC is recorded at the Blaine County Assessor's Office and attached to the property deed. The document describes how to safely manage contamination on the property, giving options to dispose of contaminated soil on state land at no cost or to replace the soil barrier. Boundaries of properties with an existing EC are delineated on the *waste remediation facility mapping tool* (https://www.deq.idaho.gov/waste-management-and-remediation/facility-mapper/).

Currently, not all property owners have recorded a soil EC that allows for elevated arsenic concentrations. Therefore, IDL with assistance from DEQ performs a yearly property inspection as part of their operations and maintenance schedule. Residential property inspections document new excavation and construction activities. As concerns are observed, IDL and DEQ work with property owners to follow the CPM for proper disposal of contaminated soil, and installation of a clean one-foot-thick cap of soil to prevent exposure to contamination.

In addition to the soils CPM, a drinking water CPM applies to the property immediately west of the lower tailings pile, which is owned by IDL. A restrictive EC on wells drilled for domestic water purposes was recorded with Blaine County in 2008, describing requirements for well depth and maximum contaminant concentrations in water used for human consumption. Ongoing groundwater monitoring results reported in section 5.1.1.5 demonstrate no exceedances of drinking water standards and primary groundwater standards (IDAPA 58.01.11.200.01.a), but frequent exceedances of secondary groundwater standards for iron and manganese (IDAPA 58.01.11.200.01.b).

5.1.1.4 Permanent Pond Water

A permanent pond—located on private property—represents groundwater in the alluvial aquifer upgradient from the lower tailings pile. Samples were collected regularly for arsenic,

manganese, zinc, cadmium, and lead concentrations. Arsenic and manganese concentrations have remediation goals. Figure 3 shows current and historic arsenic concentrations. One high concentration was detected in April 2023 during large snowpack melt and runoff conditions. The Idaho groundwater standard for arsenic is 0.05 mg/L (IDAPA 58.01.11) and the Idaho surface water standard is 0.01 mg/L (IDAPA 58.01.02). The six samples taken in the last five years have exceeded both the groundwater and surface water standards.

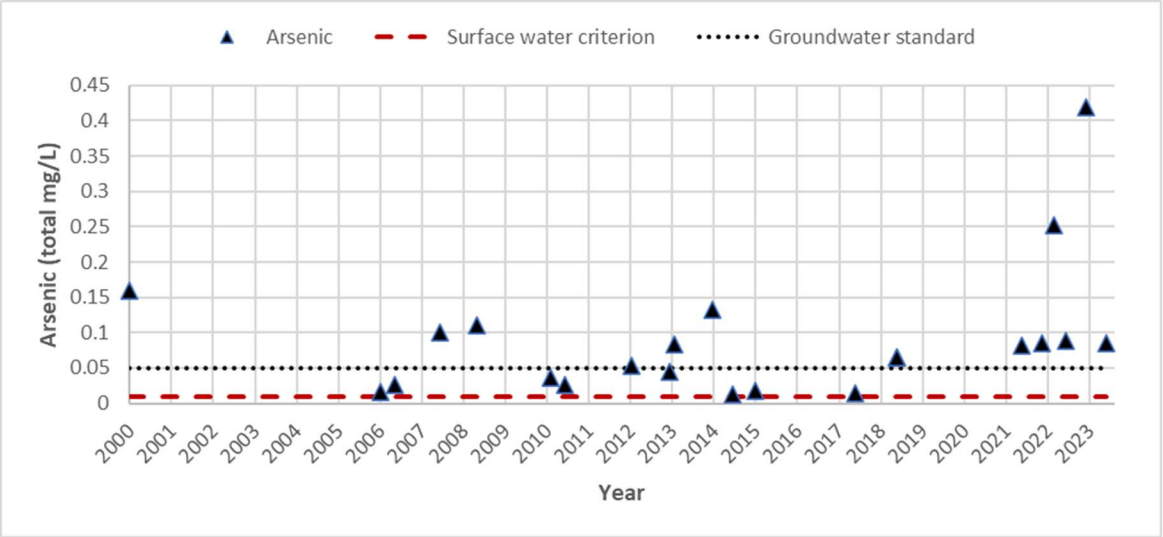

Figure 3. Arsenic concentrations measured in permanent pond samples.

For manganese, no sample results exceeded the Triumph risk-based remediation goal of 0.84 mg/L except for the results of one sample collected during the April 2023 snowmelt sampling event, which had an uncharacteristically high concentration detected (Figure 4).

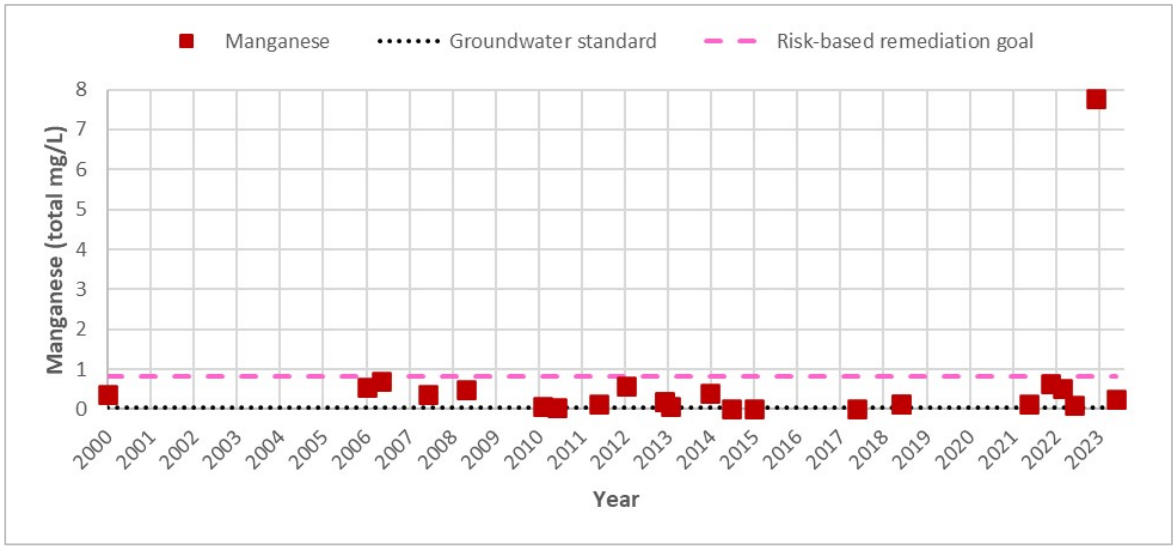

Figure 4. Manganese concentrations measured in permanent pond samples.

The secondary groundwater standard for manganese (0.05 mg/L) is exceeded frequently in the permanent pond sample results.

5.1.1.5 Drinking Water and Community Wells

The groundwater monitoring that is part of the soils operable unit includes collecting samples from private drinking water and community wells. The community wells supplying the Triumph Public Water System (PWS) are no longer sampled as part of the Triumph Tailings Piles Site O&M requirements. In 2015, the community well system (No. ID5070093) was enrolled in Idaho's Drinking Water Program. Results are available on the *Drinking Water Watch* (dww.deq.idaho.gov/IDPDWW/) system.

DEQ monitored private drinking water wells during this review period and provided the results to the landowners (Table 5). Locations and addresses are not provided to protect personal information.

None of the primary drinking water standards were exceeded in samples collected from these private wells during this review period. Antimony and cadmium were not detected. Occasional detections of arsenic, lead, selenium, and zinc did not exceed human health standards. The secondary standards for iron and manganese were frequently exceeded. The risk-based remediation goal for manganese was not exceeded in the samples collected.

Table 5. Drinking water monitoring results.

Location	Sample Date	Antimony (mg/L)	Arsenic (mg/L)	Cadmium (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Selenium (mg/L)	Zinc (mg/L)
Remediation goal		NA	NA	NA	NA	NA	0.84	NA	NA
Primary[a]		0.006	0.05	0.005	NA	0.015	NA	0.05	NA
Secondary[b]		NA	NA	NA	0.3	NA	0.05	NA	5
DW-531	4/2021	<0.005	0.0047	<0.001	**9.77**	<0.005	**0.0714**	<0.002	<0.005
DW-531	10/2021	<0.005	<0.001	<0.001	**2.32**	<0.005	**0.0756**	<0.002	<0.05
DW-531	4/2022	<0.05	<0.001	<0.001	**7.28**	<0.005	**0.0503**	<0.002	<0.05
DW-218	1/2022	<0.005	<0.001	<0.001	**0.473**	<0.005	<0.001	<0.002	<0.005
DW-218	4/2022	<0.005	<0.001	<0.001	**0.307**	<0.005	<0.001	<0.002	<0.005
DW-218	7/2022	<0.0010	0.0003	<0.0005	0.031	<0.001	0.00172	0.00129	0.0117
DW-218	11/2022	<0.0017	0.0008	<0.0005	**0.59**	0.0007	0.0118	0.0008	0.0515
DW-210	4/2021	<0.005	<0.001	<0.001	**1.53**	<0.005	0.0173	<0.002	<0.05
DW-210	9/2021	<0.005	<0.001	<0.001	<0.1	<0.005	<0.01	<0.002	<0.05
DW-114	7/2022	<0.0017	0.0007	<0.0005	**17.4**	0.0007	**0.113**	0.00299	0.145
GW-214	1/2019	<0.005	<0.002	<0.0005	**4.32**	<0.005	**0.07**	<0.005	0.15
GW-210	1/2019	<0.005	<0.002	<0.0005	0.06	<0.005	<0.05	<0.005	0.13

Notes: Values with < indicate concentration was below the detection limit. Bold= exceeds criteria. NA = not applicable; mg/L = milligrams per liter.
a. Primary groundwater standards at IDAPA 58.01.11.200.01.a.
b. Secondary groundwater standards at IDAPA 58.01.11.200.01.b.

5.1.2 Mine Water Operable Unit Monitoring and Data Review

5.1.2.1 Mine Water

DEQ monitors mine water discharge for arsenic, manganese, zinc, and iron. These metals are detected regularly and are useful indicators of water quality. Arsenic and manganese are reported because cleanup goals are identified in the ROD, and detected concentrations regularly exceed water quality standards.

The mine water management system treats metals concentrations. Figure 5 demonstrates steadily decreasing arsenic and manganese concentrations from the mine pool, after treatment in the surge pond, and at the discharge pipe for combined discharge.

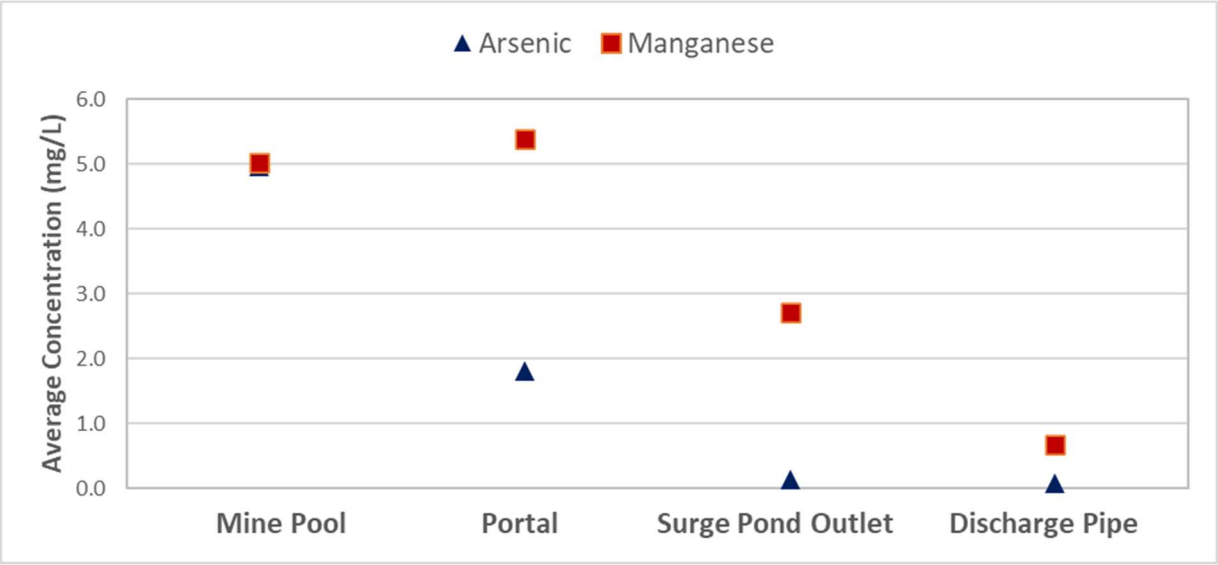

Figure 5. Arsenic and manganese concentrations throughout the mine water management system.

These data represent the average metals concentrations for the number of samples and date ranges shown in Table 6.

Table 6. Arsenic and manganese concentrations in mine water management system.

Location	Arsenic			Manganese		
	n	Date Range	Average (mg/L)	n	Date Range	Average (mg/L)
Mine Pool	12	2016–2023	4.96	12	2016–2023	5.02
Portal	18	2008–2023	1.80	18	2010–2023	5.38
Surge Pond Outlet	29	2006–2023	0.14	30	2006-2023	2.72
Discharge Pipe	62	2014–2023	0.09	67	2011–2023	0.68

Note: n = number of samples

Differences in concentrations between the portal and surge pond outlet show the level of treatment occurring in the surge pond. On average throughout the entire period of record,

arsenic shows a 92% reduction and manganese shows a 49% reduction as mine water passes through the surge pond.

During this review period, DEQ implemented additional monitoring of the mine tunnel, portal, and 235-foot adit plug to understand hydrogeologic conditions and movement of the mine water (Tetra Tech 2021, 2023b).

5.1.2.2 Mine Pool Elevation

An estimated 200 million gallons of water is accumulating in the Triumph Mine workings behind two hydraulic adit plugs. The first plug was constructed in 2003 and is located 1,175 feet in from the adit portal. The second plug, located at 235 feet in from the adit portal, was constructed in 2016 following a collapse of a timbered section of the portal at 285 feet.

DEQ monitors the elevation of the mine pool by plug pressure readings at the 235-foot plug. After the 1,175-foot plug installation in 2003, the elevation of the mine pool began to rise as the mine workings behind it filled with water. By 2013, the elevation stabilized and slightly decreased. After the second plug was installed at 235 feet, another small increase in elevation occurred.

Currently, the approximate mine pool elevation is 6,465 feet above mean sea level. Elevations would need to rise to 6,567 feet for water to enter the nearby North Star Mine workings and flow into the Plummer tunnel. The Plummer tunnel is the lowest known elevation opening with a connection to the Triumph tunnel. Figure 6 provides the record of mine pool elevations to date with comparisons to the Plummer tunnel elevation; Triumph tunnel 300-foot level; elevation of seeps at the North Star Gulch; and elevation of the 1,175-foot plug. These elevations were measured from a monitoring well which correlates with groundwater elevations near the level of the 1,175-foot plug.

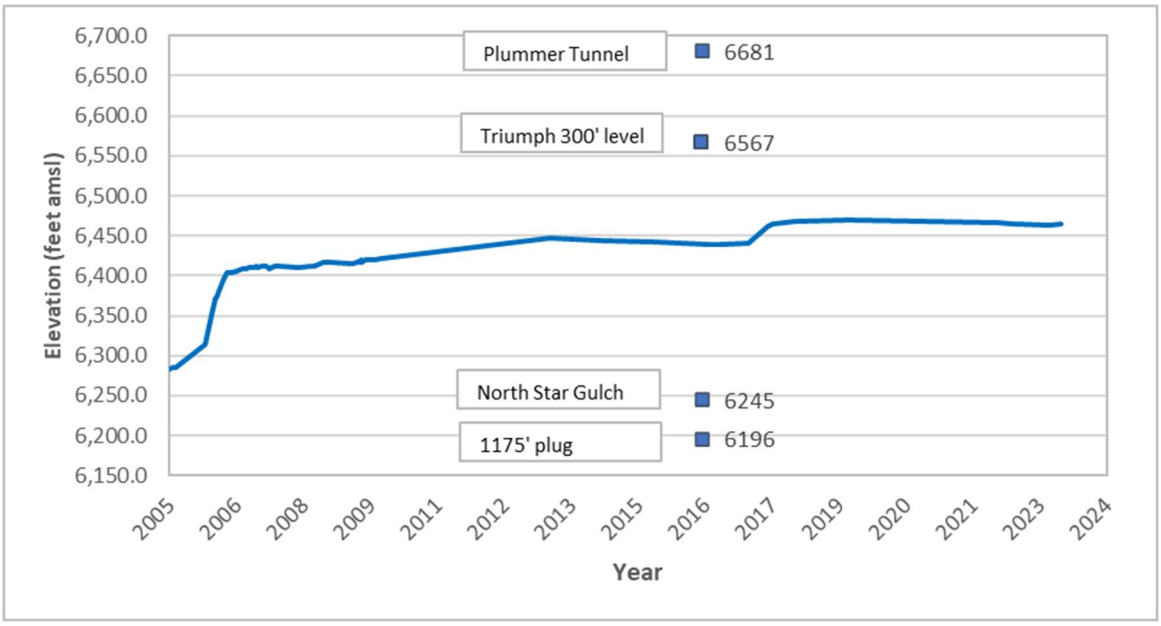

Figure 6. Mine pool elevation record.

The Challenger tunnel located in Triumph Gulch to the west of the Triumph tunnel was investigated for mine seeps after the 1,175-foot plug was installed. No notable changes to the flows of seeps related to the Challenger tunnel were observed. DEQ continues to survey seeps and springs according to the ROD (DEQ 1998). Seepage from the North Star Gulch to the east of the Triumph tunnel are discussed in the next section.

5.1.2.3 Seep Survey and Discharge

Before installing the 1,175-foot plug, DEQ surveyed seeps and springs in areas that could be affected, and there were no seeps in North Star Gulch directly east of the tunnel. After plug installation, a new seep was identified in North Star Gulch. This seep has been sampled periodically and measured at an average discharge of 2 gpm or less, with the water quickly infiltrating back into the ground. Analytical results in Table 7 indicate the seepage water quality is affected by mining activities but not directly by the mine pool water because arsenic, iron, and manganese concentrations are much lower in the seeps than in the mine pool (Tetra Tech 2023b).

Table 7. Analytical results for select analytes at North Star Gulch seep.

Analyte	Criteria	10/2019	10/2021	4/2022	7/2022	11/2022	1/2023	4/2023	7/2023	10/2023
Arsenic (mg/L)	0.05	0.00326	0.00483	0.00336	0.00226	ND	0.003	0.004	0.005	0.003
Iron (mg/L)	0.3[a]	ND	0.249	0.188	0.0275	ND	ND	ND	0.04	ND
Manganese (mg/L)	0.05[a]	**0.0919**	**0.762**	**0.48**	**0.424**	ND	0.001	0.045	0.006	0.005

Notes: ND = not detected; Bold = exceeds criteria.
a. Secondary standards based on aesthetic qualities IDAPA 58.01.11.

Mine pool water quality samples collected on November 2, 2022, resulted in the following:

- Arsenic—0.042 mg/L
- Iron—5.1 mg/L
- Manganese—0.82 mg/L

5.1.2.4 Mine Water Operable Unit Groundwater

Groundwater monitoring for the mine water operable unit evaluates effectiveness of the remedial actions. Monitoring describes the connection between the mine pool behind the adit plugs and the groundwater in the alluvial aquifer. Two monitoring wells compare the shallow aquifer (MW-2A/2S) and the deep aquifer in bedrock (MW-3B/3D). In previous reports (DEQ 2019), these were referred to as the shallow (MW-2S) and deep (MW-3D) wells. Current consultant reports (Tetra Tech 2024) refer to these wells according to the aquifer in which they are completed—the shallow well is in the alluvial aquifer (MW-2A) and the deep well is in the bedrock aquifer (MW-3B). Paired monitoring events resulted in metals concentrations reported in Table 8.

Table 8. Analytical results for a shallow well in the alluvial aquifer and a deep well in the bedrock aquifer.

Analyte (mg/L)	Groundwater Standards	Oct 2019	Oct 2020	Apr 2021	Oct 2021	Apr 2022	July 2022	Nov 2022	Jan 2023	Apr 2023	July 2023	Oct 2023
MW-2A												
Antimony	0.006	<0.002	<0.005	<0.005	<0.005	<0.005	<0.00172	<0.005	<0.003	<0.003	<0.003	<0.003
Arsenic	0.01	0.00277	0.0015	0.00134	0.00336	0.00132	0.00124	0.001	0.001	0.001	0.001	0.001
Barium	2	—	—	—	—	—	0.019	0.02	0.019	0.017	0.017	0.017
Cadmium	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	0.000835	<0.002	0.00043	0.00046	0.00049	0.00046
Chromium	0.1	—-	—	—	—	—	<0.00163	<0.02	<0.001	<0.001	<0.001	<0.001
Copper	1.3	—	—	—	—	—	<0.00226	<0.01	<0.001	<0.001	<0.001	<0.001
Iron	0.3	<0.1	<0.1	<0.1	**2.57**	<0.1	0.0397	<0.1	0.05	<0.02	<0.02	<0.02
Lead	0.015	<0.005	<0.005	<0.005	0.00559	<0.005	<0.000513	<0.002	<0.0003	<0.0003	<0.0003	<0.0003
Manganese	0.84	<0.01	<0.01	<0.01	0.0428	<0.01	0.00111	<0.01	0.001	<0.001	<0.001	0.001
Selenium	0.05	0.0151	0.00826	0.0073	0.00629	0.00571	0.00613	0.006	0.005	0.005	0.009	0.012
Silver	0.1	—	—	—	—	—	<0.00131	<0.03	<0.0002	<0.0002	<0.0002	<0.0002
Zinc	5	<0.05	<0.05	<0.05	0.066	<0.05	0.0258	<0.05	0.023	0.04	0.05	0.037
MW-3B												
Antimony	0.006	**0.0187**	**0.0199**	**0.0226**	**0.0278**	**0.0296**	**0.0203**	**0.018**	**0.017**	**0.021**	**0.017**	**0.016**
Arsenic	0.01	0.00434	0.00253	0.00467	0.00779	**0.0112**	0.00537	**0.025**	0.003	**0.014**	0.007	0.002
Barium	2	—	—	—	—	—	0.0709	0.46	0.054	0.068	0.055	0.034
Cadmium	0.005	<0.001	<0.001	<0.001	0.00328	0.00388	0.00127	**0.011**	0.00047	0.0011	0.00068	0.00024
Chromium	0.1	—	—	—	—	—	0.011	**0.12**	0.009	0.005	0.005	0.002
Copper	1.3	—	—	—	—	—	0.0144	0.16	0.007	0.006	0.007	0.003
Iron	0.3	**1.9**	**0.991**	**1.67**	**11.4**	**10.5**	**4.55**	**35.6**	**2.18**	**1.41**	**1.51**	**0.77**
Lead	0.015	<0.005	<0.005	0.00811	**0.0223**	**0.0266**	0.0126	**0.063**	0.004	**0.0194**	0.0111	0.0031
Manganese	0.84	0.253	0.234	0.246	0.385	0.371	0.303	0.8	0.306	0.279	0.428	0.303
Selenium	0.05	<0.002	<0.002	<0.002	0.00381	0.00469	0.00123	0.016	<0.001	0.002	<0.001	<0.001
Silver	0.1	—	—	—	—	—	<0.00131	<0.07	<0.0002	0.0003	0.0008	0.0002
Zinc	5	0.113	0.0843	0.124	0.534	0.52	0.234	1.58	0.161	0.17	0.183	0.132

Note: Bold = exceeds criteria.

Water quality in the alluvial well meets applicable groundwater standards except for one exceedance for iron in October 2021. However, water quality in the bedrock well exceeds groundwater standards frequently during paired sampling events. Antimony and iron exceed standards in samples collected. Arsenic, cadmium, chromium, and lead, occasionally exceed standards.

Ongoing monitoring to evaluate the effectiveness of remedial actions identify potential connections between the mine pool and the alluvial aquifer (Tetra Tech 2022, 2023b) in addition to potential interactions among the tailings piles, alluvial aquifer, and bedrock aquifer (TetraTech 2022). Other ongoing monitoring evaluates a potential infiltration treatment location downgradient of the lower tailings pile (Alta 2023a) and measures infiltration rates used in groundwater modeling (Alta 2023b).

The monitoring results will determine priority actions for the next five-year review period, including potential treatment of mine water discharge; remediating soils in public roadways; and limiting groundwater loading in and around the lower tailings pile.

5.1.2.5 Combined Mine Water and Permanent Pond Discharge

The combined mine portal and permanent pond waters discharge into a subsurface basin about 500 feet from the river. DEQ identified additional monitoring of receiving waters if the combined discharge is required to receive an IPDES industrial permit. DEQ determined the reasonable potential to exceed water quality standards according to IPDES Program guidance for non-publicly owned treatment works (DEQ 2017a, 2017b, and 2018b). In addition to characterizing the potential point source discharge to surface water, the monitoring program will evaluate if mine water discharged to groundwater has a functional equivalent of a direct discharge to surface water (EPA 2023). EPA guidance for determining the functional equivalent of a direct discharge is limited but indicates that distance between the groundwater discharge and surface water, depth to groundwater, and soil characteristics such as permeability and hydraulic conductivity may affect the fate and transport of pollutants through the subsurface.

The combined discharge of mine water piped from the surge pond and groundwater discharge piped from the permanent pond terminates in an underground basin about 500 feet from the river. DEQ established four river monitoring locations to determine if the underground basin discharged to the river, either via a surface connection or functional equivalent of direct discharge to surface water through groundwater (Figure 7). Table 9 provides a summary of arsenic and manganese concentrations for 2023.

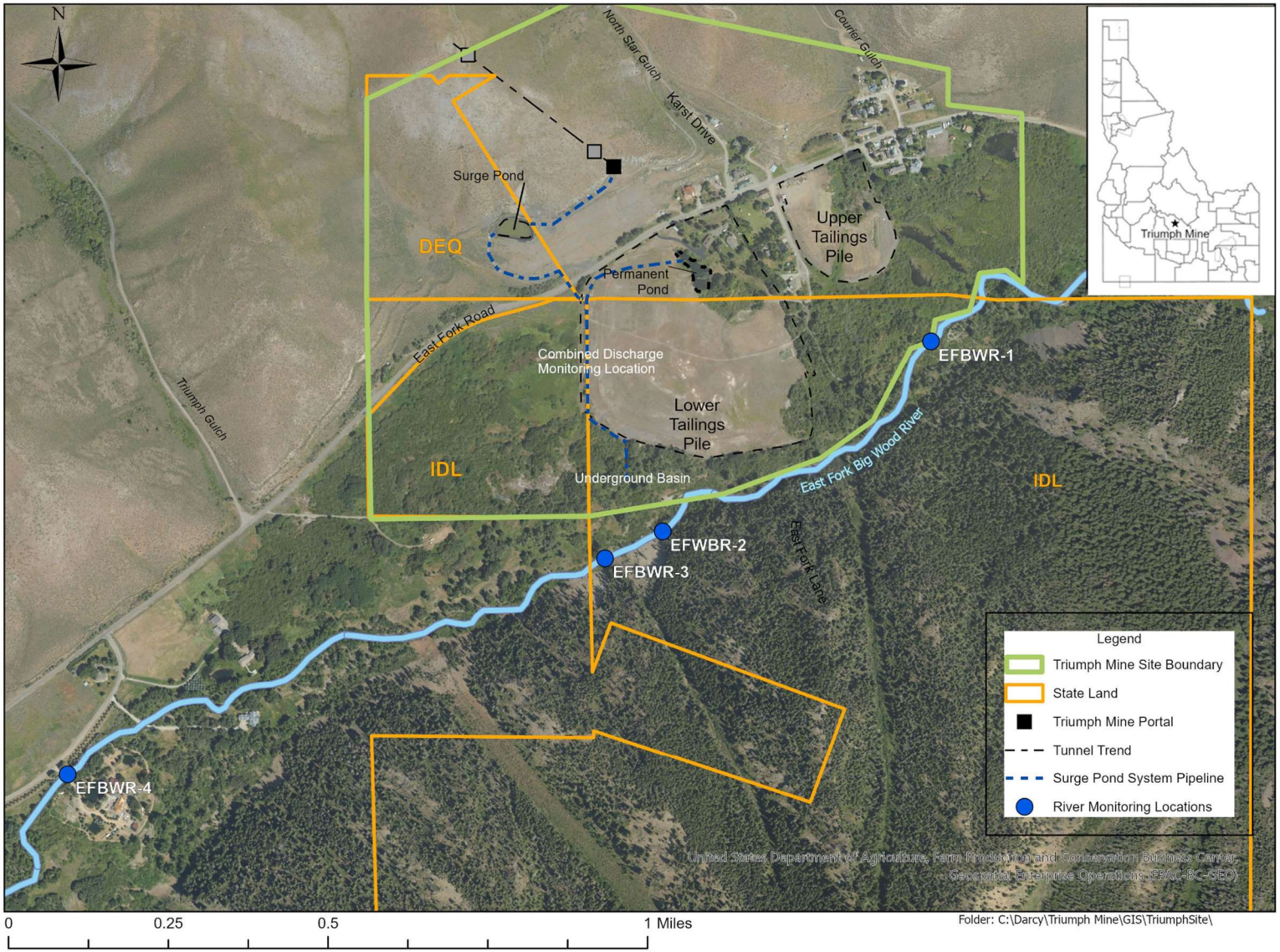

Figure 7. Monitoring locations to evaluate impacts of combined discharge on surface water.

Table 9. Summary of analytical results for 2023 surface water monitoring.

Investigation Area	Range of Metals concentration—Minimum to maximum	
	Arsenic (mg/L) Criterion = 0.01 mg/L[a]	Manganese (mg/L) Criterion = 0.05 mg/L[b]
Combined discharge	**0.066–0.574**	**0.322–1.94**
EFBWR-1	Not detected	0.005–0.008
EFBWR-2	Not detected	0.007–0.012
EFBWR-3	Not detected	0.005–0.014
EFBWR-4	Not detected	0.007–0.018

Note: Bold = exceeds criteria
a. Aquatic life water quality criterion for surface water IDAPA 58.01.02.
b. Secondary groundwater standard for aesthetics IDAPA 58.01.11.200.01.b

Both arsenic and manganese criteria were exceeded in the combined discharge. Arsenic was not detected in the river. Manganese concentrations exhibited no distinct differences in the river upstream and downstream of the combined discharge. These results suggest the contaminants are not migrating from the underground basin to surface water in the river.

5.2 Site Inspections

5.2.1 Soils Operable Unit Site Inspections

IDL documented inspections and maintenance activities and provided completed inspection forms with photos of site conditions to DEQ (IDL 2019, 2020a, 2020b, 2021, 2022, 2023). Some issues and remedies documented during inspections of soil cover and embankments included minor erosion of the lower tailings pile, with surface runoff redirected to intercept a riprap channel. Residential inspections noted no tailings exposures during routine visits. Residents have used the temporary repository area on the lower tailings pile periodically during this period to stage contaminated soil removed from private residences.

Observations of drainage and runon/runoff control systems included blocked drainage channels to the wetlands on the upper tailings pile caused by beaver dams. Following Idaho Department of Fish and Game's guidance, IDL installed structures to discourage construction of beaver dams. Seepage and orange sediment have been noted around the lower tailings pile on the ditch south of East Fork Road and on the north end of the permanent pond. Any remedies for the permanent pond depend on landowner consent, which has not been given. Remedies for recontaminated sediments linked to the East Fork Road ditch are being pursued according to DEQ monitoring results. When inspectors observed surface drainage, it was tracked to see if it intersected the river, and no surface connection was observed.

Inspections of the remedies for the waste rock pile and process areas have not resulted in any problems. Some changes or recent excavations have been observed for residential and community properties over the years. Without ECs in place for some of these residences, IDL requests information about contaminated soils disposal or barrier installations to prevent exposure to contamination.

The inspections include evaluating erosion, ponding, and cover conditions for residential roads and road shoulders. On Victor Drive, a culvert was replaced to provide greater drainage capacity for Courier Gulch. Monitoring identified arsenic and lead exceedances on the north side ditch of East Fork Road and east side ditch of East Fork Lane. More extensive monitoring for potential recontamination reported in Section 5.1.1.1.

5.2.2 Mine Water Operable Unit Site Inspections

The mine water O&M plan describes activities required to maintain the infrastructure installed by ASARCO between 1999 and 2003 (MFG 2000, 2003) and more recent infrastructure installed by DEQ between 2016 and 2021. These components include the portal to surge pond pipeline system and outlet slide gates (Tetra Tech 2023d).

The 2023 annual inspection report of the 235-foot plug noted that most of the weep hole pipes installed during the 2021 shotcrete effort have experienced full or partial clogging. Weep holes allow water to drain from behind the shotcrete to reduce potential shotcrete degradation. DEQ's contractor recommended installing additional weep holes in areas of moist shotcrete or where white precipitates have accumulated. The area with the most precipitate accumulation was in the tunnel between 220 feet inward from the portal adit and the plug at 235 feet. Routine inspections also included measuring the depth to groundwater in monitoring wells inside the adit; documenting the drainage rate from the adit portal; recording the mine pool hydraulic pressure from the gage on the pipe through the 235-foot plug; inspecting the drop inlet outside the adit portal; inspecting the pipeline from the portal to the surge pond; and inspecting the outlet of the surge pond (Tetra Tech 2023d).

5.3 Remedial Actions

Remedial actions occurring in the 2019 to 2023 period include efforts to stabilize the tunnel to maintain safe access to the 235 adit plug from the adit portal. A collapse occurring in 2019/2020 in the region from 135 feet to 150 feet inward from the adit portal. Stabilization included removing loose rocks on the adit walls, installation of mechanical supports, and placement of fiber-reinforced shotcrete. In addition, steps were taken to dewater the ponded water in the mine adit and re-grade the adit to allow drainage. Rehabilitation of the tunnel included installing welded wire fabric; installation of expanded rock bolts that provide immediate support and tolerate ground movement; and shotcrete application. Concrete was pumped onto the tunnel walls in 2-inch layers up to 8 inches thick. For some zones that had previous shotcrete work during the 2000/2001 rehabilitation activities, the 2021 stabilization process applied four more inches of shotcrete. These activities are expected to provide safe entry for up to a 20-year period.

Additional weep holes recommended by inspection reports were installed in November 2023. DEQ's contractor supervised the weep hole inspection, maintenance, and installation. Six existing weepholes were cleaned out, and 18 new weepholes were added in areas where the shotcrete appeared wet. The contractor observed that wetness on the shotcrete walls appeared to be from superficial dripping that spread along the surface of the shotcrete. When

new 2-inch-diameter weep holes were drilled, the inside surface of the weep holes remained dry. The contractor observed overall very good condition of the shotcrete and recommended annual inspections to clean the weep holes and allow free drainage to prevent buildup of water behind the shotcrete (Tetra Tech 2023f).

6 Five-Year Review Process

DEQ conducted this fifth five-year review using data from site monitoring programs and O&M inspections. This review follows EPA guidance (EPA 2001) and describes site-specific conditions at the Triumph Mine Tailings Piles Site.

DEQ sent a request for public input on the cleanup actions at Triumph Mine site to property owners on September 16, 2024. DEQ maintains communications and outreach with residents of the Triumph community through mailings, emails, and posting updates and information to the DEQ website *Triumph Mine Remediation* (https://www.deq.idaho.gov/waste-management-and-remediation/mining-in-idaho/triumph-mine-site/). A June 2024 fact sheet (Appendix A) provides the public with information about ongoing and future investigations and next steps for remedial actions as well as history and background of significant cleanup actions.

A public comment period for this review document will be held in February 2025. Public comments received will be considered during future actions and reviews.

7 Technical Assessment

According to EPA (2001) guidance, three key questions must be answered in the technical assessment of the remedy:

- Is the remedy functioning as intended by the decision documents?
- Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection still valid?
- Has any other information come to light that could call into question the protectiveness of the remedy?

These questions are listed and answered for the soils operable unit and the mine water operable unit in the sections below.

7.1 Is the Remedy Functioning as Intended by the Decision Documents?

The remedy for the soils operable unit is functioning as intended. Contaminated soils were removed and disposed of on site, and cap materials have created barriers to isolate the contaminated material. This remedy has broken the exposure pathway from contaminated soil to humans. Routine inspections recorded some erosion on the cap materials. As needed, property owners were contacted and provided assistance with following the CPM for properly

disposing of contaminated soil and reinstalling barrier material to prevent exposure to contamination. Runoff from the tailings piles has been managed to prevent erosion. Household dust sample results detected low levels of arsenic and lead.

The remedy for the mine water discharge is functioning as intended. The rise in mine pool elevation has slowed significantly, and it seems unlikely the mine water will discharge from the other mine portals before equilibrium conditions are achieved. Significant hillside seeps have not developed. Discharge from the Triumph tunnel has decreased from 90–190 gpm to 6–8 gpm after installing the second plug at 235 feet. The decrease in discharge volume resulted in dramatic decreases in the total pounds of metals discharged in mine water. In addition, most metals concentrations detected have decreased in the water that continues to seep past the plugs. The surge pond is providing mine water treatment, with a 92% reduction in manganese and a 49% reduction in arsenic on average.

The plugs and surrounding formation remain sound. Inspections and maintenance indicate that the probability of a catastrophic failure of the current plugging system remains low.

Although the total pounds of metals discharging from the Triumph tunnel have decreased dramatically, and water quality improvements are apparent, the remaining discharge does not meet applicable water quality standards. Ongoing evaluations and actions will be necessary to address disposal of mine water discharge according to all applicable regulations.

7.2 Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives Used at the Time of Remedy Selection Still Valid?

The exposure assumptions remain valid. The arsenic drinking water standard was 0.05 mg/L at the time of the ROD (DEQ 1998). EPA adopted a new standard of 0.01 mg/L in 2001. The cleanup objective for groundwater was to prevent human ingestion of groundwater at levels above acceptable risk levels. The acceptable risk levels for contaminants found in groundwater are the federal drinking water standards. To meet the cleanup objective for arsenic in groundwater, groundwater used as drinking water must be evaluated against the revised drinking water standard.

For lead concentrations, the EPA lead screening level of 400 mg/kg was used to identify potential risks (EPA 1996). This screening level was valid throughout the evaluation period. In 2024, EPA published updated guidance recommending reducing the residential soil lead screening level to 200 mg/kg. When multiple sources of lead exposure are present, the updated guidance recommends reducing screening levels to 100 mg/kg (EPA 2024).

Except for the arsenic concentrations in groundwater used as drinking water, the exposure assumptions, toxicity data, cleanup levels, and cleanup objectives used at the time of remedy selection remain valid. DEQ will continue to evaluate the protectiveness of the remedy in future five-year review cycles, considering any changes to toxicity values and health risk management policies.

7.3 Has Any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

DEQ is not aware of any additional information suggesting the remedy for the site is not protective.

8 Issues, Recommendations, and Follow-Up Actions

The fourth five-year review (DEQ 2019) identified outstanding issues for the soils operable unit. Table 10 identifies those issues, describes how they were addressed during the last five years, and identifies actions for the next review period.

Table 10. Soils operable unit issues, completed actions, and recommendations.

Remedial Action Component	Issues Identified in Last Review Period	Actions Completed in Current Review Period	Actions for Next Review Period	Affects Protectiveness? (Yes/No)
CPM	Lack of full participation by affected property owners in CPM Program.	Ongoing efforts to secure ECs and increase participation in CPM Program. Property inspections are part of O&M activities.	Ongoing community outreach and communication; continuing efforts to establish ECs.	No
CPM	Unknown barrier installation as part of new residential construction.	Updating CPM Plan and continuing efforts for community outreach.	Updated CPM Plan; continue property inspections as part of O&M activities.	No
LTP	LTP seepage and recontamination of remediated areas.	Recontamination caused by seepage documented in inspection reports; monitoring data indicated elevated levels of arsenic and lead.	Remediate recontaminated areas caused by seepage.	No
LTP	Permanent pond discharge does not meet water quality standards.	Monitored potential impacts to receiving water and found no COCs in the river; collected data for designing potential infiltration treatment.	Implement infiltration treatment for combined discharge of mine water and permanent pond.	No
Roads and road shoulders	Damage to road shoulders may have compromised barrier integrity.	Data collected demonstrates the extent and depth of recontaminated sediments on community roads.	Remediate roads, shoulders, and associated ditches.	No
Stormwater management	Damage to road shoulders during storm events and routing of stormwater.	Worked with Blaine County and residents of Victor Drive to correct roadside barrier integrity and stormwater conveyance.	Work was completed in this review period.	No
Groundwater	Limited groundwater data available.	Installed additional monitoring wells and increased frequency of groundwater monitoring. Continuing regular groundwater monitoring down gradient from the site. Monitoring site monitoring wells and domestic wells.	Continue groundwater monitoring, including domestic wells where available.	No

The 2019 five-year review identified three issues to prevent certifying completeness of the soils operable unit remedies. An ongoing issue for this review period is the residential soils remedy

cannot be certified complete until all applicable property owners have agreed to the CPMs by implementing ECs on their individual properties. IDL has included inspection of these properties on routine O&M inspections. These inspections will continue until all applicable properties have ECs. The second issue identified was insufficient house dust data. DEQ collected house dust data during this review period and will continue ongoing evaluations of remedy effectiveness. The third issue is spring runoff potentially affecting the lower tailings pile. DEQ is planning remedial activities during the next review period which will limit exposure to spring runoff drainage. Long-term monitoring and maintenance are conducted to address this issue and is included in the O&M plan.

Table 11 summarizes the outstanding issues for the mine water operable unit identified in the fourth five-year review, current review period, and recommendations for the next review period.

Table 11. Mine water operable unit issues, completed actions, and recommendations.

Remedial Action Component	Issues Identified in Last Review Period	Actions Completed in Current Review Period	Actions for Next Review period	Affects Protectiveness? (Yes/No)
Triumph tunnel stability	Poor ground conditions and decaying ground support from 100 feet to 235 feet from tunnel portal are prone to failure.	Tunnel was remediated with additional shotcrete and weep hole installation; regular inspections and maintenance were implemented.	Continue regular inspections and maintenance.	No
Triumph tunnel discharge	Discharge does not meet Clean Water Act water quality standards; discharge permit has not been issued.	DEQ monitored the receiving waters and found no COCs from mine water; DEQ is evaluating infiltration treatment options for mine water and has applied for a discharge permit.	Implement infiltration treatment for combined discharge.	No
Mine plugs	Finalize Draft Emergency Response Plan	DEQ has implemented an Emergency Communication Plan for an unplanned mine water release (DEQ 2025).	Continue to update Plan as needed.	No
Mine plugs	Update Plug System O&M Plan	Tunnel O&M Plan is being implemented.	O&M Plan will be expanded to include the infiltration treatment system.	No

In 2021, the State of Idaho directed funding from the ARPA for use at the Triumph Mine site. The availability of this federal funding expires in December 2026. Priority actions (Appendix A) for this additional funding include the following:

- Additional management of mine water discharge—An infiltration system can clean the discharge water and eliminate the need for a permit. DEQ and IDL are exploring the feasibility of infiltrating the discharge water on IDL property to the west of the lower tailings pile. Preliminary modeling results show efficient removal of heavy metal contaminants.

- Assessing additional treatment of mine water near the portal—The surge pond is treating heavy metals, and consultants are investigating methods for making the treatment functions more efficient.
- Recontamination of soils in public roadways—During routine inspections, DEQ and IDL detected elevated levels of lead and arsenic on some roads, ditches, and shoulders, suggesting a need for contaminant barrier maintenance. Consultants are evaluating the extent of soil contamination and developing a plan to meet cleanup goals required by the 1998 ROD.
- Assessing actions to limit the loading of groundwater in and near the remediated areas of the site. DEQ and IDL enlisted consultants to evaluate best management practices for the tailings impoundments, such as adjusting stormwater drainage channels and filling in low spots to more efficiently direct stormwater off the surfaces of the tailings piles.

Other maintenance projects are underway at the site. The community soil disposal repository on the lower tailings pile will be cleaned out to continue to accept contaminated soil from the community. The mine portal entrance will be stabilized by managing erosion on the hillside around the tunnel entrance. Fencing repairs and surge pond maintenance are planned.

These continuing projects will ensure the remedy continues to protect human health and the environment.

9 Protectiveness Statement

The remedy at the soils and mine water operable units are expected to be protective of human health and the environment upon completing all remedial actions. In the interim, exposure pathways that could result in unacceptable risks are being controlled.

10 Next Review

The next five-year review for the Triumph Mine Tailings Piles Site is required five years from the completion date of this review.

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Appendix A. Triumph Mine Site June 2024 Update

The Triumph Mine operated from the late 1800s until the 1950s, producing mostly lead, zinc, and silver. The mine is located 12 miles north of Hailey in central Idaho, near the unincorporated town of Triumph. Historical mining practices left high levels of heavy metals in the soil and water. The Idaho Department of Environmental Quality and the Idaho Department of Lands developed three focus areas for upcoming work.

Use infiltration to clean up mine discharge water

Following a legal settlement, the State of Idaho agreed to either 1) obtain a discharge permit or 2) eliminate the need for a permit.

For option 1, permitting and treatment of discharge water would require constructing significant aboveground infrastructure with extensive operations and maintenance (O&M) and considerable long-term costs into perpetuity. This has led DEQ to pursue option 2 to eliminate the need for a permit. Much of the recent sampling around the site has been to determine a path forward. While river sampling has not identified any detectable impacts from the mine water discharge, a permit to discharge will not be granted without water treatment.

An infiltration system can clean the discharge water and eliminate the need for a permit.

DEQ and IDL enlisted consultants to explore the feasibility of infiltrating the discharge water on IDL property, on the west side of the lower tailings pile. Preliminary modeling results indicate this is feasible to remove heavy metal contaminants. Due to precipitates in the water, the results predict the infiltration system will require ongoing regular maintenance every 5 to 10 years to remove precipitate accumulation.

Infiltration system options considered.

DEQ and IDL considered either a buried subsurface infiltration gallery or above-ground infiltration ponds. Due to precipitates in the water, the long-term costs to maintain a subsurface system are

not economically feasible. Above-ground infiltration ponds are the preferable option as they can be designed to allow ongoing maintenance and look like storm water infiltration ponds present at most modern developments.

Opportunities for public input.

Consultants completed feasibility modeling. A design of the infiltration ponds is available for public review and input until July 15. Please contact Michael Hahn with any input. If above-ground infiltration ponds are selected, construction could begin in spring 2025.

Maintain the existing remedy

During routine O&M, DEQ and IDL detected elevated levels of lead and arsenic on some roads, ditches, and shoulders, suggesting a need for contaminant barrier maintenance. Consultants are evaluating the extent of soil contamination in the areas and developing a maintenance plan to meet cleanup goals required by the 1998 Record of Decision.

Opportunities for public input.

Consultants will complete evaluations and develop a draft maintenance plan. DEQ and IDL expect to provide a draft plan to the community during summer 2024. Weather permitting, the work would begin in 2024 and continue into 2025.

Facilitate other projects at the Triumph Mine site

- Reduction of contaminant loading to groundwater: During large rain events, standing water has been observed on the surface of the tailings impoundments. DEQ and IDL enlisted consultants to evaluate best management practices for the tailings impoundments, such as adjusting stormwater drainage channels and filling in low spots, to more efficiently direct storm water off the tailings surfaces.
- Maintenance of community soil repository: The community soil disposal repository on the lower tailings pile will be cleaned out to continue to accept contaminated soil from the community.
- Mine portal entrance stabilization: DEQ will stabilize the mine entrance to maintain the drainage system long-term by managing erosion on the hillside around the tunnel entrance.
- Other small maintenance projects: Fencing repairs and surge pond maintenance will be performed to ensure the remedy continues to protect human health and the environment.

Contact: Michael Hahn, ARPA Project Coordinator, michael.hahn@deq.idaho.gov, (208) 373-0248

History and Background

1993 The United States Environmental Protection Agency (EPA) proposed listing Triumph Mine as a Superfund site. EPA identified the Idaho Department of Lands (IDL) and Asarco Incorporated as potentially responsible parties. Local residents opposed listing the Triumph Mine as a Superfund site over the stigma of a federal Superfund site located in their community.

1994 EPA and DEQ agreed to a Memorandum of Agreement that deferred cleanup oversight to DEQ. Without Superfund designation, the site cleanup activities became subject to federal regulations such as the Clean Water Act (CWA). Asarco and IDL entered into a legal agreement with DEQ to complete an initial assessment to determine the extent of the contamination and develop cleanup alternatives.

1998 DEQ prepared a Record of Decision (ROD), approved after public review and input, to describe the cleanup plan. The ROD details the selected remedy, five-year review requirements, and ongoing routine operation and maintenance (O&M) required to ensure the remedy protects human health and the environment. Initial cleanup activities were completed by 2004 and included:

- Removal of contaminated soils from residential properties and replaced with clean soils and new vegetation. Soils in nonresidential areas were replaced where heavy metals posed a risk to human health.
- Installation of mine water management infrastructure including a pipeline that combines discharge water from the mine adit and the permanent pond (located east of the lower tailings pile). The pipeline routed discharge water to the wetlands near the East Fork Big Wood River.

2003 EPA withdrew their proposal to list the Triumph Mine as a Superfund site. To control water discharge from the mine adit, Asarco installed the first plug in the Triumph Mine tunnel.

2009 Asarco entered into a bankruptcy agreement with the federal government and several states. DEQ and IDL received settlement funds as a part of the agreement.

2018 Without the protections of a Superfund designation at the site, the Idaho Conservation League filed a lawsuit against DEQ and IDL alleging a violation of the Clean Water Act for discharging pollutants in the pipeline from the mine adit and the permanent pond. During periodic, infrequent heavy precipitation or snowmelt events, this water can discharge directly into the river. DEQ and IDL entered into a settlement agreement with the Idaho Conservation League to pay legal fees and either obtain an Idaho Pollutant Discharge Elimination System permit or eliminate the need for a permit through the use of an infiltration system that diverts all water discharging in such a manner that no pollutants from this point source are entering navigable waters.

2019 DEQ and IDL submitted a joint discharge permit application as agreed upon.

2021 Idaho directed funding from the American Rescue Plan Act for use at the Triumph Mine Site. The availability of this funding expires in December 2026. After 2026, DEQ and IDL will need to request state funding for all activities at the Triumph Mine site.