Five-Year Review Report

FINAL

Second Five-Year Review Report

For

Triumph Mine Tailings Piles Site

Blaine County, Idaho

May 27, 2009

Prepared by Idaho Department of Environmental Quality
Boise, Idaho

Approved by: **Date:**

6/5/09

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Director
Idaho Department of Environmental Quality

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I. Introduction

This Review is being done in accordance with the 1994 Triumph Site Memorandum of Agreement (MOA) between the U.S. Environmental Protection Agency (EPA) and the Idaho Department of Environmental Quality (DEQ). In that MOA, DEQ agreed to perform remediation work at the Triumph Site (Site) in a manner consistent with the EPA's Superfund process. The DEQ Record of Decision (ROD) for the site subsequently included a requirement for a five-year review. Under Superfund, a five-year review is required at sites where contaminants are left behind after remediation. The Triumph ROD states that "Five-year reviews will be required at Triumph because contaminants will remain on-site and may pose potential risk. All caps will be subject to five-year review as well as routine operation and maintenance. House dust metal concentrations may also be reviewed to determine the effectiveness of source control in reducing house dust metal loadings. Additionally, ground water quality in the area including downstream drinking water wells will be subject to review."

This second review was conducted by DEQ using data from the site monitoring program and a five-year review sampling event conducted October 6, 2008. A public comment period was held from March 20 to April 20, 2009. Responses to comments have been incorporated into the text as appropriate and addressed specifically in the Response to Comments section at the end of the review. The review was completed May 27, 2009.

II. Site Chronology

Mine Background.

The Triumph Mine produced ore containing lead, zinc, and silver from 1882 to 1957. During processing, the ore was crushed and ground. The mine used a gravity process in the original mill and a floatation process in the new mill. Both mills produced concentrates containing high concentrations of lead, zinc, and silver, and a residual waste material (tailings). Tailings were conveyed as slurry into two piles, the upper tailings pile (UTP) and the lower tailings pile (LTP).

Wooden flumes conveyed the tailings to the tailings piles. The flumes terminated near the outer edges of the tailings piles. Coarser particles generally were deposited near the flume outlet (close to the perimeter of the piles), and finer particles were transported further from the outlet (toward the interior of the tailings piles).

The upper tailings, primarily gravity-processed, were deposited between 1882 and 1947, and the lower tailings, primarily flotation-processed, were deposited from 1951 to 1957. The UTP consists of waste material generated at the original mill, the North Star Mill (old process area), before it was destroyed by fire. The new flotation mill near the

Triumph portal replaced the original mill. The LTP consists of the waste material generated by the new flotation mill. Because of milling improvements, particle sizes in the LTP are generally finer (fine sand to clay) than those in the UTP (coarse sand to clay).

Regulatory History. In 1988, DEQ performed a Preliminary Assessment of the Site. DEQ found elevated concentrations, above background, of arsenic, manganese, and zinc, in surface water in the Triumph Tunnel drainage ditches near the LTP and the East Fork of the Big Wood River. EPA completed a Site Inspection in September of 1991. EPA continued with additional site assessment work in 1992 and 1993. In May of 1993, EPA proposed to add the Site to the federal National Priorities List (NPL), commonly known as Superfund. General Notice letters were sent out in June of 1993 to Triumph Minerals, Asarco, and the Idaho Department of Lands (IDL). Snyder Mines, Inc. and the Bureau of Land Management were also notified of potential liability.

Significant community opposition to the potential listing of Triumph on the NPL resulted in a Memorandum of Agreement (MOA) between EPA and DEQ. This 1994 agreement defers remediation responsibility from EPA to DEQ regulatory authorities. The agreement states that DEQ response activities will be conducted consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended, the National Oil and Hazardous Substances Pollution Contingency Plan, more commonly called the National Contingency Plan (NCP), and Idaho State laws and regulations. DEQ entered into a Consent Order with Asarco and IDL in January 1994, to perform a Remedial Investigation/Feasibility Study for the Site. The Remedial Investigation was completed in January 1997. DEQ completed the Baseline Ecological Risk Assessment in May 1997 and the Baseline Human Health Risk Assessment in August 1997. The final Feasibility Study was completed March 1998 at about the same time the Site ROD was issued on March 19, 1998. A second Consent Order was entered into with Asarco and IDL for remedial design and action in August 1999. In this consent order, the Site was broken into two operable units: the soils and mine water components. On April 30, 2003, EPA de-proposed the Triumph Site from the National Priorities List. EPA de-proposed the Site based on the MOA and DEQ fulfilling its obligations under the agreement. During the course of remediation, Asarco found itself in a difficult financial situation and was unable to meet remedial obligations at Triumph and other sites around the country. In 2003, money was made available from Asarco through a settlement the company made with the federal government. In 2003, $300,000 of Asarco money was provided to the Site for mine plug installation to cut off the uncontrolled flow from the Triumph Tunnel. The amount of money, if any, that will be available for the monitoring and contingency implementation, if needed, is not known. However, funds have been requested through the Asarco settlement trust fund process.

Since the last five-year review, Asarco formally entered into bankruptcy. DEQ has entered into a bankruptcy settlement with Asarco and is awaiting final disposition based on final bankruptcy rulings.

Remedial Action Implementation History. Phase I of the remedial action began October 19, 1998, and ended November 25, 1998, prior to finalizing the second consent order. Phase II construction began May 1999 and was completed December of that same year. Mine plug installation work was initiated in the summer of 2001, beginning with rehabilitation of the Triumph Tunnel. A new tunnel was drilled to connect with the old tunnel after the old tunnel was found to be too unstable to be re-opened safely and cost-effectively. The new tunnel intersected with the old tunnel in a location identified to be appropriate for plug installation. The plug construction was initiated in the summer of 2003 and water from the mine was shut off on August 28, 2003.

III. Background

The Triumph Site consists primarily of two mill tailings piles associated with former lead, zinc, and silver mining and milling areas. Also included are a mine portal and a former processing area adjacent to the tailings piles (Figure 1). There are about 30 residences located adjacent to these areas, which make up the unincorporated town of Triumph.

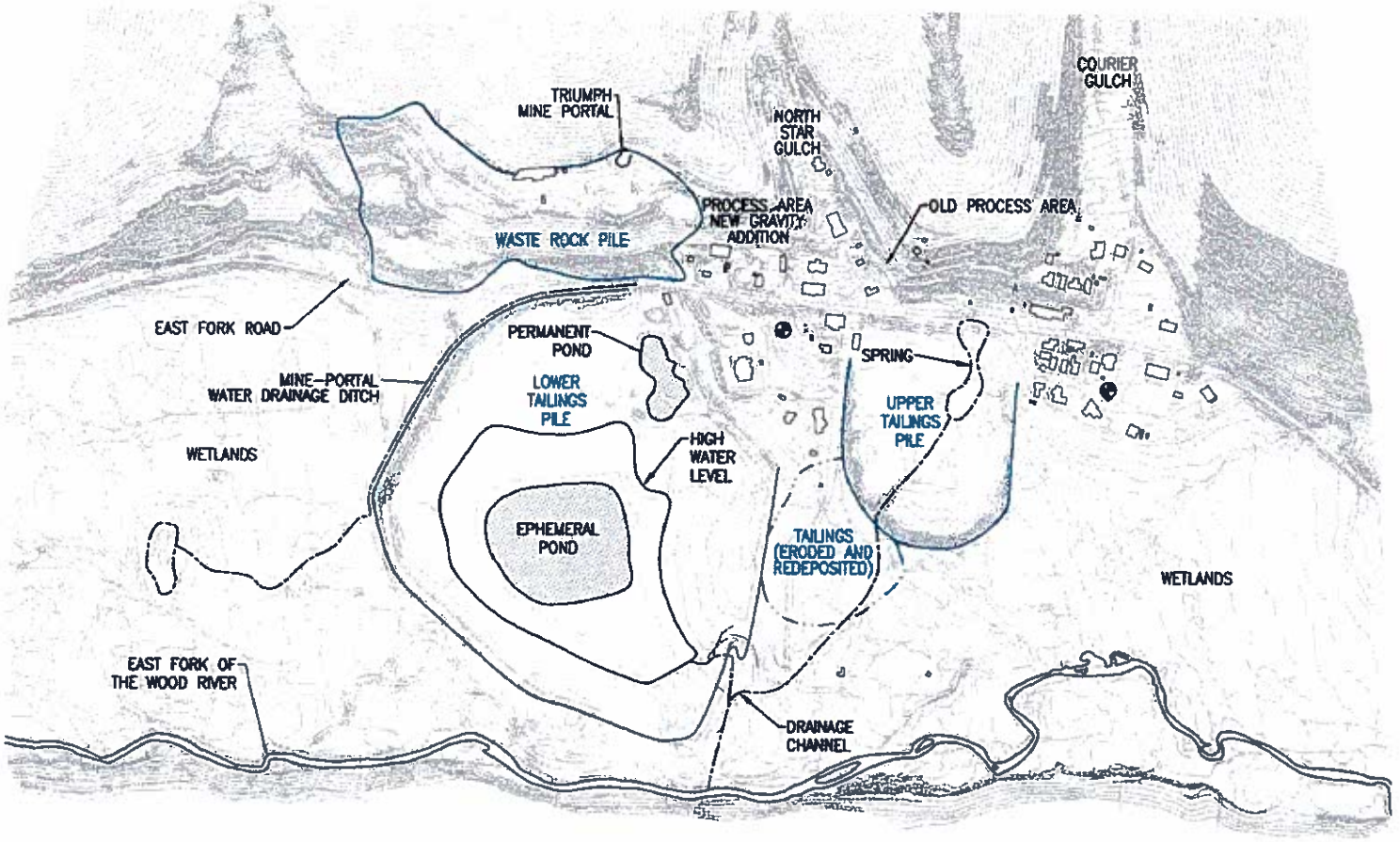
The two tailings piles are located on the valley floor immediately north of the East Fork of the Wood River. These tailings piles are broad, flat features and rise 10 feet or more above the valley floor. The UTP occupies approximately 6 acres and the LTP occupies about 22 acres. Using an estimated tailings depth of 15 feet, the approximate total volume of the two piles is 680,000 cubic yards. The LTP contained two permanent ponds. As a result of remediation, the southern pond has been eliminated. The Triumph Mine portal is situated on the south-facing hillside above the tailings piles, and a waste rock pile extends below the portal to the base of the valley floor.

Approximately 65 people reside in the town of Triumph. Houses are located along the northwestern boundary of the UTP and along the eastern boundary of the LTP.

Areas impacted by metal contamination are the tailings piles, process area, residential properties, and wetlands adjacent to the tailings piles. The Mine prior to plug installation was discharging slightly acidic water from the portal at a rate of 90 to 190 gpm.

Habitats within the valley include coniferous forest on the steep mountains to the southeast and scrub-shrub grasslands on the slopes of the mountains to the northwest of the valley. The valley includes a riparian zone along the fluvial plain of the East Fork of the Wood River, with several types of wetlands present. These wetlands provide different habitats for a potentially wide range of mammals, birds, reptiles, amphibians, fish, invertebrates, and plants.

The local physiography consists of an east/west-trending alpine valley bounded on the north and south by bedrock upland mountains. Rocks exposed in the vicinity of the Site include the Wood River Formation (south side of the valley) and the Milligen Formation (north side of the valley). The two formations are bounded by a thrust fault contact.



LEGEND

● COMMUNITY WATER SUPPLY WELL

BASE MAP REFERENCE:

TOPOGRAPHIC BASE MAP PRODUCED BY INLAND AERIAL MAPPING OF BOISE, IDAHO FOR ECOLOGY AND ENVIRONMENT, 1993.

0 200 400

APPROXIMATE SCALE IN FEET

N

Kennedy/Jenks Consultants

TRIUMPH MINE TAILINGS PILES SITE
TRIUMPH, ID

SITE PLAN

946091.01/P6SK002

Figure 1

The Wood River Formation has an upper member consisting of calcareous and siliceous sandstones with interbeds of conglomerate and limestone. The lower member consists of thinly bedded limestone overlying heavily bedded blue sandy limestone with a massive conglomerate in the basal portion.

The Milligen Formation consists of a gray and black carbonaceous argillite with interbeds of limestone and quartzite. The Milligen Formation is the host for the ore deposits of the Triumph-Parker Mine Mineral Belt. The three main ore-bearing minerals are argentiferous galena, sphalerite, and argentiferous tetrahedrite. Host rock consists mainly of argillite, locally carbonaceous, with interbeds of limestone, siltite, and minor quartzite.

The unconsolidated sediments consist of alluvial deposits varying in grain size from clay to cobbles. The south side of the valley is currently undergoing erosion and deposition caused by the East Fork of the Wood River.

Ground water at the Site generally occurs under unconfined conditions within the alluvial valley fill. The flow of the ground water within this alluvial valley fill generally parallels the flow of surface water.

The upper aquifer at the Site is a perched ground water zone known as the saturated zone. The saturated zone is known to exist under the LTP, and possibly occurs discontinuously in the UTP. The ground water is perched on a clay layer that underlies a large portion of both tailings piles. This saturated zone is recharged by surface water from the ponds on the lower pile and a spring on the upper pile. The northern pond in the LTP is likely made up of both surface water and ground water. The southern pond was made up of surface water run-on. Downward seepage of the water within the tailings saturated zone into the gravel aquifer likely occurs to a greater degree at the base of the western and southern portions of the LTP where the clay layer is absent.

The lower aquifer, in which the community water supply wells are screened, is called the gravel aquifer. The ground water in the gravel aquifer occurs under confined conditions wherever the clay layer is present.

The main surface water body in the vicinity of the Site is the East Fork of the Wood River, which runs along the south side of the valley floor. Surface water is also present in the wetlands in the valley adjacent to the tailings piles and the river, particularly in the area upstream of the UTP. A spring emerges along the northern boundary of the UTP. Water from the spring flows through a drainage channel in the UTP, where it enters the wetlands as a channel that flows into the East Fork of the Wood River.

The Triumph Tunnel discharged 90 to 190 gallons per minute (gpm) prior to the plug installation. Water emerged from the Mine portal and entered into holding ponds before being piped downhill through plastic drainage pipes. At times, this water was not contained in the pipes and ran down the road or seeped into the waste rock pile.

Water discharged from the drainage pipes into a ditch, then entered a culvert and crossed the East Fork road, where it entered an unlined ditch. The water flowed in a southerly direction along the western edge of the LTP, where the ditch is less well defined. Ultimately, the water dispersed in the wetlands and toward a small pond west of the tailings pile.

Chemicals of concern (COCs) for the Site were antimony, arsenic, cadmium, copper, lead, manganese, mercury, nickel, selenium, silver, vanadium, zinc. Indicator chemicals (chemicals that indicate the presence of others) for the residential soil investigation were arsenic and lead. The greatest risks from the Site were associated with contaminated soils, tailings, and water rock materials. These sources were addressed in the soil portion of the remedy. The soil sources remedy was designed to also be protective of ground water and surface water. The mine plug portion of the remedy was designed to reduce the load of arsenic and manganese moving from the Mine into the wetlands and ground water. The overall remedy was driven by human health risk. No unacceptable ecological risks that warranted remediation were identified.

IV. Remedial Actions

Selected Remedy Description. The remedy at the Site was based on residential and recreational use scenarios.

Soils OU. The ROD called for the excavation of soil in residential yards to a depth where the Remediation Goal (RG) of 300 mg/kg (same as parts per million, ppm) arsenic will be achieved or to one foot, whichever occurs first (excavation to one foot is anticipated to remove most of the soil containing arsenic above the 300 mg/kg cleanup level). During construction, this aspect of the remedy was implemented by removing the top six inches of soil if contamination exceeding the action level was found in the 0 to 1 inch and/or the 1 to 6 inch depth layers. When contamination was found at depths greater than 6 inches the top foot of soil was removed. Contaminated excavated soil was placed on the LTP and graded to allow surface water to drain. Uncontaminated clean soil was imported and placed in the residential excavations and vegetated. Excavation of contaminated soil materials and replacement with uncontaminated materials was also performed on unpaved roads and road shoulders. In most residential yards, removal of soil with more than 300 mg/kg arsenic in the top foot was a total removal of contaminated soil. These yards will not need any of the institutional controls termed Community Protection Measures (CPMs) in the ROD to ensure the barrier is maintained. In yards and other capped areas that have material remaining with contaminants at more than the RG at depths below one foot., CPMs will be applied. In yards with contaminated soil below the top foot, produce garden areas were provided enough soil to create a two-foot layer of uncontaminated soil.

The LTP served as the disposal location for contaminated soils removed from residential areas. Small isolated tailings accumulations located adjacent to the main piles were consolidated onto the two larger piles. The piles were graded to ensure

runoff and capped with a minimum of six inches of soil. The cap was then seeded to create a vegetative cover. The vegetated soil cap serves as a barrier to reduce exposures to people and the environment and contaminant migration. A twelve-inch soil cap buffer was created on the tailings piles that are directly adjacent to residential yards and where there is no physical barrier like a road or fence between the residential yard and the tailings pile.

The waste rock and process areas were graded (as necessary) and covered to eliminate the potential for direct contact to people and the environment. A six-inch vegetative cover was used to eliminate direct exposure and airborne emissions from the area.

Visible tailings and soil hot spots were removed from wetlands areas and disposed on the tailings piles. Areas of barren soil that pose a risk of erosion and contain arsenic greater than the RG were excavated or capped. The wetlands have been found to be providing important metal-absorbing and habitat functions at the Site and were left largely undisturbed.

The Triumph Tunnel drainage ditch south of the East Fork Road was excavated to a depth where the RG of 300 mg/kg arsenic was achieved or to one foot, whichever occurred first. The ditch was put into a culvert from the road and was reopened as a ditch as the course turned west away from the LTP. A soil cover was placed in the ditch if soil containing COCs above the RG remained. The materials excavated from the ditch were highly contaminated and were disposed on the tailings pile within a lined cell to ensure these materials do not leach.

House dust was addressed through source control via capping of contaminated soils and tailings. Routine housecleaning by residents after completion of the remediation was expected to reduce the metal loading within homes since the source of new contaminated dust was controlled by the soils remedy.

The ROD calls for CPMs to be developed for residential yards, residential developments, and other excavation activities located on capped tailings (or areas that still have soils with arsenic levels greater than 300 mg/kg whether below the one foot soil cap or not). The purpose of the CPMs is to allow the property owner to use their property as they determine appropriate but ensure that any exposed tailings materials or contaminated soils are properly handled, disposed, or capped. An example of the CPMs that could be implemented would be to work with Blaine County to create an overlay zone that would provide information to the property owner regarding the way contaminated soils and tailings would need to be handled and disposed. A disposal location has been established and is being maintained by IDL to support disposal of contaminated materials resulting from excavation activities. Despite the lack of CPMs, residents have been educated about the need to dispose of contaminated soils in a safe manner and have used disposal site,

The selected remedy includes CPMs to address future residential risks posed by COCs in wetlands soil. These future risks are related to garden produce ingestion. The type of CPMs will be similar to those outlined above for capped areas. The purpose of the CPMs will be to allow the property owner to use their property as they determine appropriate but ensure that any tailings materials or contaminated soils are properly handled, disposed, or capped to ensure that vegetable gardens are not planted in contaminated soil.

Water management was implemented to minimize erosion impacts on any soil caps installed as part of the remedy. Water from the springs in the UTP is conveyed through a constructed swale to minimize erosion.

Mine Water OU. The selected remedy for the Triumph Tunnel Water is a phased approach as necessary to meet applicable or relevant and appropriate requirements (ARARs). The first step was the installation of the mine plug in combination with monitoring to predict potential discharges at other portals. Additionally, the plug will be inspected for leakage and stability, and a comprehensive reconnaissance to locate seeps and discharges caused by the plugging will be conducted in the area on a regular basis. A reconnaissance of current seeps and discharges was performed prior to plugging to establish baseline conditions. Contamination related to discharges will be addressed through collection, treatment, excavation, or other appropriate measures to address the contamination caused by the discharge. In-line aeration that cause contaminants in the water to precipitate out for subsequent removal will be implemented if the mine water pool does not reach equilibrium without causing problematic seeps or discharges. The trigger for installation of the in-line component will be based on time-pressure curves that show the depth of water as the mine fills, overflow of the mine pool at another surface opening, the development of discharges or seeps, or a combination of these factors. Similarly, the wetland treatment portion of the remedy will be implemented if analytical results for samples of in-line treatmentindicate non-compliance with ARARs, including water quality standards.

The elevated manganese levels in ground water downstream of the LTP will be addressed primarily through source control and CPMs to prevent ingestion of the ground water. Natural attenuation is also expected to provide additional benefit. Ground water will be monitored to determine the effectiveness of source control and natural attenuation. If manganese levels do not reach the RG after source control, DEQ will determine the appropriate next steps to take to be protective of human health and the environment. Controlling sources as required by the selected remedy would be consistent with foreseen appropriate next steps. Review of the progress toward reaching the RG will occur at least every five years as part of the Five-Year Review. If there is residential development in the wetland area and the ground water does not meet drinking water standards, an alternative source will need to be obtained by the user.

CPMs for ground water will be established to prevent ingestion of impacted ground water that is downstream of the LTPs. The CPMs will likely include restricting

construction of drinking water wells in the impacted ground water using Idaho Department of Water Resources authorities. The purpose is to protect potential future residents from drinking the water with elevated manganese concentrations during the interim until manganese levels are reduced via source control to less than the risk-based concentration of 840 µg/l (same as part per billion, ppb), and other COCs are below drinking water standards.

Remedial Action Status. All soils-related remedy work at the site was completed in December 1999. As noted in the first Five-Year Review, various remedy repair activities occurred after the Site work was completed in 2004. Since that time only one repair was conducted and that was on the LTP. An area of erosion was found in the south central portion of the LTP during the Five-Year Review inspection in October 2008. The IDL was notified of the cut and repairs were completed in November of 2008. The work will be reviewed in the summer of 2009 to see if additional work is needed.

The operation and maintenance (O&M) plan for the soils portion of the remedy has been implemented by the IDL.

The CPMs for the soils portion of the remedy have still not been implemented. However, DEQ has been working with Blaine County and local property owners on a case-by-case basis to make sure the CPMs are included in new projects, generally as part of plat maps or permit documents.

DEQ has not certified the soils remedial work. The soils remedial work cannot be certified complete until the CPM portion of the ROD is successfully implemented.

The mine plug is still being monitored to determine if it will function as planned. Thus, it has not been certified complete. Seep surveys have been conducted and no seeps from the mine have been identified. Additionally, CPMs for drinking water have not been implemented.

V. Progress Since Last Review

The option of creating an Overlay District with Blaine County is no longer available due to concerns of the county. The IDL and DEQ have created a conservation easement document based on the CPMs that were developed for the proposed Overlay District. The plan is for the State of Idaho (either IDL or DEQ) to enter into the easement with each property owner that has soils with contamination greater than the action level remaining on their properties. The conservation easement relies on a reporting and education approach to ensure the remedy is protected.

Water pressure behind the mine plug continues to be monitored. Measurements taken from the date of plug installation (August 28, 2003) show that it took about 2 years (to July 2005 or 697 days after plugging) to reach about 50 pounds per square inch (psi) (Figure 2). The pressure stayed the same for about another half-year, and then began

a steady increase to a little over 100 psi in September 2006, 1,126 days after plugging. Since then, pressure has only slightly increased, to 110 psi, during the past two years. The mine water pool behind the plug seems to have stabilized, but will continue to be monitored. Seep surveys will also continue to be implemented. These are conducted in the late summer or early fall when green vegetation serves as an indicator for possible seeps.

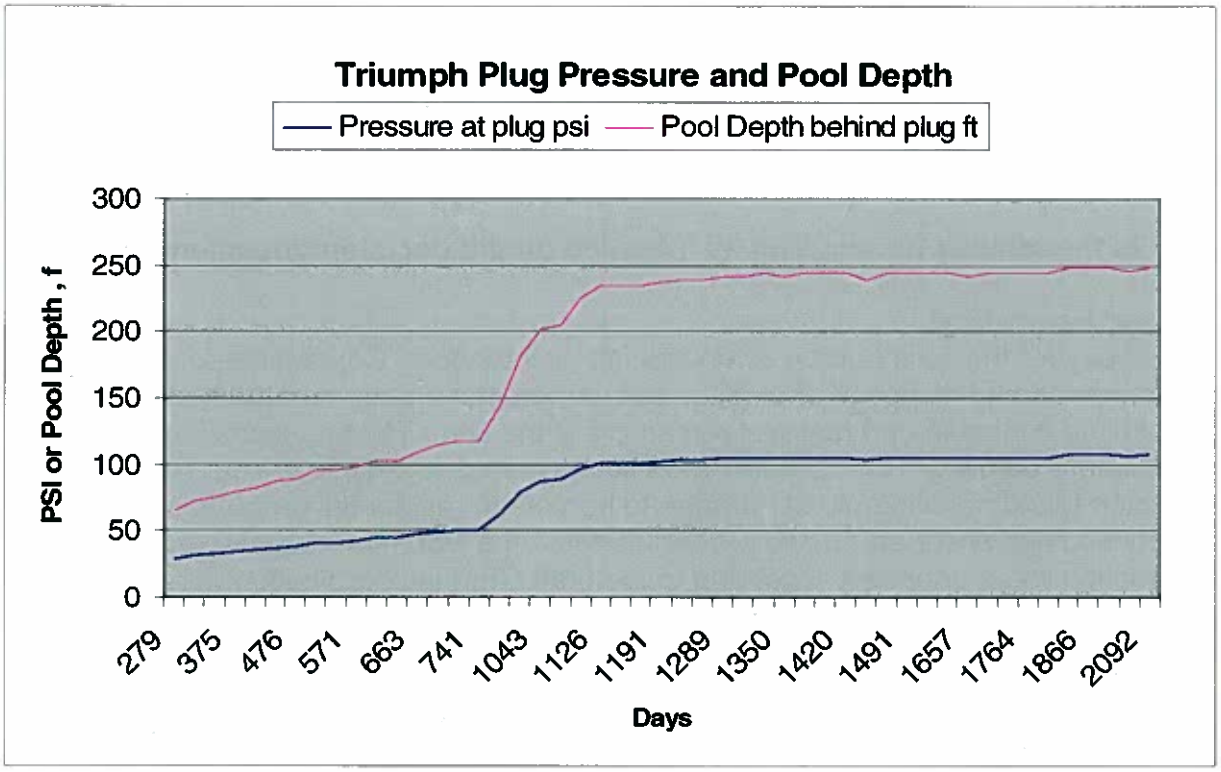


Figure 2. Triumph Mine Plug Pressure and Pool Depth Measurements.

About 4 gallons per minute (gpm) continues to discharge from the mine and flow toward the lined surge pond. The pipe carrying the mine water discharge to the lined surge pond plugged in 2006. Water then flowed in the overflow channel and backed up into the mine. The new land owner excavated a larger pond at the tunnel opening allowing better flow out of the mine and into the ditch. At this time, much of the water infiltrates into the ground prior to reaching the surge pond. Some water does make it to the pond.

VI. Process for This Five-Year Review

DEQ drafted a Five-Year Review Work Plan outline and provided that to each of the Triumph residents in a September 22, 2008, letter (see Attachment A) requesting comments. The letter also requested permission to samples soils, vacuum cleaner bags, and well water from each resident. DEQ received several access agreements to allow sampling and three comment letters.

Five-Year Review sampling occurred October 6, 2008. Six soil samples, five vacuum cleaner bags, three ground water well samples, and three surface water samples were collected for analysis.

The draft Five-Year Review was released to the public for a 30-day comment period on March 20, 2009.

VII. Technical Assessment

Under EPA guidance there are three key questions that need to be answered in the Technical Assessment of the remedy. These questions are listed and answered in this section.

1. Is the remedy functioning as intended by the decision documents?

Soils and House Dust

The remedy for the soils portion is functioning as intended. Contaminated soils had been removed and disposed of on site, and barriers have been created that encapsulate contaminated material remaining at the site. These actions have broken the exposure pathway from contaminated soil to humans. The Five-Year Review inspection found no evidence of damage to barriers in residential properties. New home construction has occurred on two properties since the last Five-Year Review. The construction was performed according to the draft CPM in coordination with DEQ that call for the re-establishment of a clean surface barrier. In most cases, additional fill was brought in and the barrier was enhanced.

Soils samples were collected for this Five-Year Review from a variety of locations representing a variety of situations (Table 1). Sample TRSS1, collected from new fill added on top of the UTP, show that the new soil is very low in arsenic and lead, the two primary COCs for human health protection. The property owner has added a few feet of fill to the original six-inch cap. The result is a much more durable barrier.

The sample collected from East Fork Drive (TRSS2) showed that the remedy remains in-place. Roads can be challenges for barrier remedies because of the wear and tear of traffic, snow plowing, and other road work.

Sample TRSS3 was collected from the repository site on the LTP. The analytical results show elevated levels of arsenic and lead. This was expected since the area was designated to accept mine waste contaminated soil. This is evidence that residents are using the area to dispose of contaminated soil as envisioned by the CPMs.

During the Five-Year Review inspection an erosion gully was found in the south central portion of the LTP. Sample TRSS4 was taken from the material exposed by the erosion of the cap. The material had elevated levels of arsenic (13,100 mg/kg) and lead (2,770 mg/kg). The erosion indicates that the LTP's structural integrality may be in jeopardy as

a result of its proximity to surface water flows in the East Fork of the Big Wood River and its flood plains during seasonal runoff.

Sample TRSS5 was collected outside of the Triumph Tunnel. The soil had an arsenic level of 510 mg/kg and a lead level of 518 mg/kg. These are elevated above the levels in the clean soil used as a barrier. This recontamination was likely due to plug installation work. This area has been recently purchased by a developer who has developed a risk analysis and remedial action work plan that conceptualizes putting home sites on the bench next to the Triumph Tunnel opening. Additional remedial actions and development may occur at this site under the DEQ Voluntary Cleanup Program. The contaminated soils in this area will be addressed as part of the cleanup plan for development of this site.

Sample TRSS6 was collected from a repaired portion of Karst Drive. This road was recontaminated during a dirt-moving operation by a new property owner (not the same as the developer under the DEQ Voluntary Cleanup Program). A 6- to 12-inch lift of contaminated soil was placed on a 100-meter stretch of Karst that fronted residential properties. This section of road was remediated as part of the original cleanup. Subsequent to placement of the contaminated materials, DEQ required the responsible party to re-remediate the road. Sample TRSS6 did not meet the criteria for fill material. The data for sample TRSS6 show an arsenic level of 494 mg/kg and a lead level of 3,370 mg/kg. DEQ initiated a followup sampling effort in which multiple samples were collected on this stretch of Karst Drive. These data show an average arsenic level of

Table 1. Triumph Five-Year Review soil and vacuum cleaner bag results for arsenic and lead

Triumph Second Five-Year Review Soils and Vacuum Bag Data

Sample #	Location	Arsenic mg/kg	Lead mg/kg	Description
TRSS1	UTP	6.7	15.3	New fill brought in from off site
TRSS2	East Fork Drive	59.6	69.9	Dirt Road
TRSS3	LTP Rep site	607	389	Soil disposed from excavation
TRSS4	LTP S central	13,100	2,770	Gully site on LTP - now repaired
TRSS5	Tunnel bench	510	518	Area outside Triumph Tunnel
TRSS6	Karst Drive	494	3,370	Repaired section of the road
Resample	Karst Drive	109	322	Represents mean of 11 samples
VB1		49.8	86.6	Vacuum cleaner bag dust
VB2		73.2	124	Vacuum cleaner bag dust
VB3		30.8	56.2	Vacuum cleaner bag dust
VB4		52.9	114	Vacuum cleaner bag dust
VB5		145	146	Vacuum cleaner bag dust
Soil Action level		**300**		
EPA lead model Default			**400**	

109 mg/kg (n=11) with a range of 31 to 333 mg/kg. The lead data show an average lead level of 322 mg/kg (n=11) with a range of 107 to 1050 mg/kg. The averages are

below the Triumph arsenic RG and EPA Lead Model Default values. Thus, they would not trigger cleanup of the road. However, they do exceed the clean soil specifications used for remediation. DEQ will continue to monitor this road.
Five vacuum bag samples were collected to evaluate house dust levels in Triumph. Homeowner vacuum bags have been used at the Bunker Hill Superfund site to measure community-wide lead-dust concentrations to assess remedial progress associated with residential soil removals. This same method is being used at Triumph to assess arsenic and lead concentrations in house dust. House dust is the primary source of exposure to young children.

Arsenic in house dust collected for this Five-Year Review averaged 70 mg/kg, with a high of 145 mg/kg (Table1). This compares with data from three homes for the first Five-Year Review that had arsenic levels of 49, 54, and 269 mg/kg. Lead levels for this Five-Year Review average 105 mg/kg in house dust with a high of 146 mg/kg. Results from the last review showed lead levels 180, 363, and 465 mg/kg for the three homes tested. This compares to pre-remediation levels of 163 to 759 mg/kg arsenic and 185 to 1,320 mg/kg lead from four houses tested. The data suggests that the house dust contaminant concentrations have decreased since remediation controlled the primary dust sources. It appears that concentrations continued to decrease since 2003. The number of samples is not large enough to make a statistical comparison. However, data from other sites have shown that source control via residential soil remediation does reduce house dust lead concentrations over time. House dust concentrations will need to continue being monitored as part of the next Five-Year Review. It is expected that ongoing house cleaning and changing out of carpeting will further reduce the metal concentrations and metal loads in the homes.

The outstanding issue that needs to be addressed is the implementation of the CPMs. The CPMs guide active excavation work such that a clean barrier is installed on the surface once work is complete. To date, DEQ and IDL have been working with property owners to make sure contaminated soil is not left on the surface and that clean soil barriers are created. This informal method is not sustainable and the CPMs need to be implemented.

Mine Water
Water samples were tested for total metals that includes the metals suspended and dissolved in the water and for dissolved metals only.

The mine plug continues to limit water discharge volumes to about 4 gpm. This is compared to the pre-plug flows that ranged from 90 to 190 gpm. The quality of the post-plug water was tested September 24, 2003. The results showed that the concentration of total arsenic decreased from 0.648 (milligrams per liter (mg/l) to 0.040 mg/l from November 20, 2002, to the September 2003 sample date. Data from October 8, 2008, show an increase in total arsenic to 0.454 mg/l compared to the 2003 data (Table 2). Total manganese decreased from 3.620 mg/l to 0.170 mg/l from November 20, 2002, to the September 2003. In the October 2008 sampling, total manganese increased above the 2002 and 2003 results with a level of 10.1 mg/l. Data from the ongoing IDL monitoring program show the same trends.

The reason for this increase in total manganese is unknown. Previously it was believed that the decrease in arsenic and manganese concentrations demonstrated the difference in water sources. Prior to the plug, the water was largely from the mine workings where the water was in contact with the lead-zinc-silver sulfide ore body carrying associated sulfur and arsenic solutes and particulates. Now that that portion of the flow has been blocked off, the residual flows pass through the non-mineralized argillites/carbonates gangue rock through which the Triumph tunnel penetrates. The plug has not been inspected to evaluate the leakage and potential sources of arsenic and manganese in the drainage. Asarco, who is responsible for the plug, is bankrupt and has not been able to perform the costly inspection. Because the plug is set back from the Tunnel opening by over 1,000 feet, professionals using a supplied air source(s) would be employed to access and assess the plug. As indicated earlier, the current mine water is infiltrating into the ground prior to reaching the lined surge pond. It is no longer migrating to the wetlands below, as it was prior to plug installation.

The plug to this point is functioning as intended. It is not yet possible to determine if this is the final remedy for the mine water. The remaining mine water discharge does not pose a human health or ecological risk, but alternative management options will be assessed as the adjacent properties are developed and remediated under the DEQ Voluntary Cleanup Program.

Surface Water

The other two surface waters tested (other than mine drainage) were associated with the UTP and LTP. The spring arising in the UTP was tested and was found to have levels of arsenic, lead, and manganese above drinking water standards. The pond in the LTP was tested and found to have elevated levels of arsenic and manganese above drinking water standards. Neither of these sources of water is used for drinking water. The remedy was not designed to address these two sources since they were not found to represent significant sources of risk to human or ecological receptors.

Ground water

The three drinking water wells tested all met drinking water standards for arsenic and lead. One private well had water quality above the secondary drinking water standard for manganese at 0.0709 mg/l. The secondary standard is based on the aesthetics of the water and not the health risks. Triumph does have a site-specific risk-based manganese level of 0.840 mg/l. Manganese in this well water is below that level. An attempt was made to sample downstream drinking water wells, but no one was available to provide access to the wells.

Well TRGW1 is one of the two community wells in Triumph that provide drinking water to residents. This is the well at most risk due to mining contamination. Results for the Five Year Review for this well show that the water meets drinking water standards. This is consistent with the water testing results performed as part of the O&M plan being implemented by IDL. The water in the other community well has consistently met water quality standards.

Table 2. Triumph Five-Year Review ground water and surface water results

Triumph Second Five-Year Review Water Analytical Date, mg/l									
Sample #	Location	Arsenic*	Cadmium	Copper	Lead	Manganese	Silver	Zinc	Mercury
	TOTAL								
TRGW1	Community Well	<0.003	<0.0020	<0.010	<0.0075	<0.0040	<0.0050	0.2	<0.00020
TRGW2	Residence	0.00407	<0.0020	<0.010	<0.0075	0.0709	<0.0050	2.19	<0.00020
TRGW3	Residence	<0.003	<0.0020	<0.010	<0.0075	<0.0040	<0.0050	0.197	<0.00020
TRSW1	UTP Spring	0.245	<0.0020	<0.010	0.0195	0.263	<0.0050	0.0858	<0.00020
TRSW2	LTP Pond	0.0857	<0.0020	<0.010	<0.0075	0.0559	<0.0050	0.013	<0.00020
TTAD1	Mine water	0.454	<0.0020	<0.010	<0.0075	10.1	<0.0050	1.19	<0.00020
	DISSOLVED								
TRGW1	Community Well	<0.025	<0.0020	<0.010	<0.0075	<0.0040	<0.0050	0.161	<0.00020
TRGW2	Residence	<0.025	<0.0020	<0.010	<0.0075	0.0905	<0.0050	0.801	<0.00020
TRGW3	Residence	<0.025	<0.0020	<0.010	<0.0075	<0.0040	<0.0050	0.15	<0.00020
TRSW1	UTP Spring	0.212	<0.0020	<0.010	<0.0075	0.168	<0.0050	0.0553	<0.00020
TRSW2	LTP Pond	0.074	<0.0020	<0.010	<0.0075	0.0498	<0.0050	<0.0100	<0.00020
TTAD1	Mine water	0.298	<0.0020	<0.010	<0.0075	10.5	<0.0050	1.03	<0.00020
National Primary Drinking Water Standard		0.01	0.005	1.3**	0.015**				0.002
National Secondary Drinking Water Standard						0.05	0.1	5	

* EPA method 200.8

** Lead and copper are regulated by a Treatment Technique that requires systems to control the corrosiveness of their water. If more than 10% of tap water samples exceed the action level, water systems must take additional steps. For copper, the action level is 1.3 mg/L, and for lead it is 0.015 mg/L.

A full evaluation of ground water quality was recommended in the last Five-Year Review to measure the effectiveness of the mine water plug and other source control measures to improve ground water quality. This has not yet occurred but is expected to occur in the next few years. Monitoring over the past three years has shown various exceedances of arsenic, cadmium, and lead in the wells located in the wetlands down-gradient of the LTP. In the case of arsenic, the most recent exceedances of drinking water standards was for total arsenic in November of 2007 and October of 2006. Since 2006, dissolved arsenic results have been below the drinking water standard. Lead concentrations show a similar trend as arsenic with exceedances occurring only in total samples and not since November 2007.

Cadmium concentrations have a similar trend, except in one well where all four samples collected since June of 2006 have had exceedances above drinking water standards for total cadmium.

Manganese is the major constituent that continues to consistently exceed the site-specific standard of 0.840 mg/l. Exceedances occur in both total and dissolved samples; however, concentrations are greater in the total samples.

Groundwater down gradient from the LTP is monitored as part of the Triumph semi-annual monitoring plan. There are two sets of nested wells located in the wetlands west of the LTP. The wells are nested such that at each of the two locations there is a shallow well and a well completed to a greater depth. However, the deepest well is only about 20 feet down. Because these nested wells are shallow, they are strongly affected by surface water. Over the years, the mine water discharged directly into the wetlands. Once the mine water was cut off, the water quality in the wetlands was expected to improve with the elimination of the ongoing source. Additionally, spot removals of tailings in the wetlands were performed to remove the most obvious and easily accessible contaminant sources. A potential cause of the observed results is a concentrating effect that occurs as the wetlands become drier without the constant input of mine water flow. This will issue will be evaluated in the ground water quality evaluation mentioned above.

2. Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy still valid? The exposure assumptions remain valid at this site. The one water quality standard that has changed since the time of the ROD is the arsenic drinking water standard. At the time of the ROD the standard was 0.0050 mg/l . The standard has been 0.0010 mg/l. Drinking water wells at Triumph have consistently tested below this level.

3. Has any other information come to light that could call into question the protectiveness of the remedy? DEQ does not have any information that would suggest that the remedy for the site will not be protective once completely implemented.

VIII. Issues

Community Protection Measures. The ad-hoc basis that DEQ and IDL have used to work with property owners to meet the objectives of remedy protection and reinstallation is not a sustainable program. The CPMs for the soil portion of the cleanup need to be implemented for the remedy to be protective in the long term. This issue will affect protectiveness in the future.

The LTP needs to be closely monitored as part of the O&M plan being implemented by IDL to prevent erosion from the East Fork of Big Wood River. If erosion problems continue, it may be necessary to install a more permanent protection system.

House Dust. House dust arsenic levels have decreased to be below the action level for arsenic in the five homes tested. This is the same trend identified qt the Bunker Hill site where house dust metal levels declined after soil remediation. The decline tends to lag behind the decline in soil concentrations resulting from remediation. It is expected that with the control of the contamination source and continued good house cleaning by the

homeowner, arsenic and lead levels in house dust will decrease further. Additionally, as people change out carpets, one of the big residual sources of arsenic- and lead-contaminated dust in the home will be removed.

Mine Water. The remaining components of the first phase of the Mine Water selected remedy need to be performed. During the next five-year period, it is expected that DEQ will likely be able to make the determination whether the mine plug is the final remedy or additional phases of the Mine Water remedy need to be implemented. The time-pressure curves will be developed and monitored to estimate mine pool elevation relative to the mine working and other mine openings.

Ground water. Mine discharge water is believed to be a significant source of manganese and arsenic to the shallow water in the wetlands. Now that the mine plug has significantly diminished the mine water flow, the impacts can be monitored in the ground water monitoring wells in the wetlands. No impact from the mine water pool behind the mine plug on the deeper aquifer that is used for drinking water in Triumph has been observed. This was a concern in the past. Drinking water wells will continue to be monitored over time. Finally, the water quality of ground water in wells down-gradient from Triumph need to be evaluated to make sure that the water quality has remained acceptable for drinking water purposes. Samples from downstream private wells prior to remediation showed no metal concentrations above water quality standards. This issue will affect protectiveness in the future and will determine the need for CPMs for drinking water.

IX. Response to Comments

1. Assumption that Karst Drive will be paved in the future is not appropriate.
   Response: *The reference to the paving of Karst Drive has been removed from the test. DEQ will continue to monitor Karst Drive for damage to the road that may cause release of high concentrations of metal-laden soils.*

2. The mine water is orange, very unsightly and is seeping into the ground.
   Response: *The water continues to flow out of the tunnel coursing through the overflow ditch. Water started following this course a couple years ago when the water line plugged up. Much of the water is seeping into the waste rock pile. Based on history, this does not represent a significant structural or ground water quality concern due the low flow of about 4 gallons per minute (gpm). This is compared to the 90 to 190 gpm prior to mine plug installation. Prior to the plug installation, the 90 to 190 gpm flow of water was uncontrolled, seeping into the waste rock and flowing over the edge of the pile. The seepage from this volume of water did not cause any detectable structural or ground water issues. The orange color is caused by the formation of iron precipitates. As shown in table 2, the water does have high arsenic concentrations and should not be ingested. DEQ is cooperating with the landowner in cleaning out the pipe so that the water will be redirected to the pipe. The Asarco bankruptcy and pending settlement has slowed down*

the resolution of this issue since Asarco is responsible for the mine plug. This issue needs to be evaluated, and a long-term and hopefully final resolution identified.

3. Should houses be built in near the Triumph Tunnel bench area where soils exceed 500 mg/kg for both arsenic and lead? ***Response:*** *DEQ is working with the property owner who is in the Voluntary Cleanup Program (VCP) to make sure that residential soil standards are met as part of the VCP work.*

4. Vegetation on the Lower Tailings Pile and the Waste Rock Pile is performing very poorly. ***Response:*** *These areas are very hot and dry in the summer and the vegetation has not developed to the point where it is providing the desired vegetative cover. The six-inch clean soil cap may also be a limiting factor. DEQ will continue to monitor these locations. At this time, it appears that the vegetation on the Waste Rock Pile has the best chance of improving over time. There is evidence that wildlife are using the area and the soil remains friable. The soil on the LTP has crusted over, making it difficult for new vegetation to thrive.*

X. Recommendations and Follow-up Actions

Soils OU

Community Protection Measures. The CPMs for the soil portion of the cleanup need to be implemented for the remedy to be protective in the long term. DEQ will work with IDL on this task. DEQ will continue to coordinate internally so that work performed under the Voluntary Cleanup Program is consistent with the Triumph remediation project.

The vegetation on the LTP and Waste Rock Pile need to be monitored to see if cover density improves or declines. At this point, the clean soil barrier is intact. However, it may be necessary to take additional steps to ensure the sustainability of the barrier

DEQ will also monitor Karst Drive to make sure that there is not damage to the road that may cause a release of contaminants.

House Dust. Trends show a decrease in arsenic and lead in house dust. It is expected that these trends will be confirmed by data collected for the next Five-Year Review. DEQ, in cooperation with IDL, will collect this data.

Mine Water OU

Mine Water. The remaining components of the Mine Water remedy need to be implemented. A mine plug expert will likely need to be called in to assess the overall effectiveness of the plug and recommend next steps for ongoing O&M. DEQ intends to use expected Asarco bankruptcy settlement funds to address this task.

Soils and Mine Water OUs

Ground water. A ground water evaluation needs to be conducted to evaluate remedial effectiveness of source controls to reduce metal concentrations in ground water. This is particularly important since the property owner has denied access for continued monitoring of the nested wells in the wetland down-gradient of the LTP. DEQ will work with IDL on this evaluation. Results may call for implementation of CPMs for drinking water wells.

X. Protectiveness Statement

The remedy at the Soils and Mine Water OUs are expected to be protective of human health and the environment upon completion of all remedial actions, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

References used for this Report in Chronological Order of Document Issuance

Kennedy Jenks Consultants. 1997. Final Remedial Investigation Report for the Triumph Mine Tailings Pile Site.

Kennedy Jenks Consultants. 1998. Final Feasibility Study for the Triumph Mine Tailings Pile Site.

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McCully, Frick, and Gilman. 1999. Final Remedial Design Report for the Triumph Mine Tailings Pile Site.

McCully, Frick, and Gilman. 1999. Statement of Work for Remedial Design and Remedial Action for the Triumph Mine Tailings Pile Site.

McCully, Frick, and Gilman. 2000. Final Construction Completion Report for the Triumph Mine Tailings Pile Site.

McCully, Frick, and Gilman. 2000. Triumph Adit Rehabilitation, Plug Construction and Debris/Sludge Disposal Report for the Triumph Mine Tailings Pile Site.

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McCully, Frick, and Gilman. 2001. 2001 Interim Inspection and GroundWater Monitoring Report for the Triumph Mine Tailings Piles Site.

McCully, Frick, and Gilman. 2003. Triumph Mine Adit Plugging Program Seep Monitoring and Operation and Maintenance Plan.

CAS and Associates. 2003. Fall 2002 Site Inspection and Water Quality Report for the Triumph Mine Tailings Piles Site.

McCully, Frick, and Gilman. 2003. Triumph Mine Tailings Piles Site - Triumph Mine Plug System Construction Completion Report.

McCully, Frick, and Gilman. 2003. Triumph Mine Tailings Piles Site - Triumph Mine Plug System Monitoring and Maintenance Plan.

CAS and Associates. 2004. Fall 2003 Site Inspection and Water Quality Report for the Triumph Mine Tailings Piles Site.

CAS and Associates. 2004. August 2004 Groundwater and Surge Pond Water Quality Sampling and Laboratory Analyses.

CAS and Associates. 2005. Fall 2004 Site Inspection and Water Quality Report for the Triumph Mine Tailings Piles Site.

CAS and Associates. 2005. Triumph Mine Tailings Piles Site – June 2005 Site Inspection.

Maxim Technologies. 2006. Triumph Mine Semi-Annual Monitoring Report.

Tetra Tech. 2007. Triumph Mine Semi-Annual Monitoring Report.

Tetra Tech. 2008. Triumph Mine Semi-Annual Monitoring Report.

Attachment A

Dear Triumph Resident:

The Triumph community was part of a State of Idaho lead remediation project in the late 1990's that continued into 2001 with work at the Triumph Tunnel. The bulk of the remediation work at the Triumph Mine Tailings Piles Site was completed in 1999. As part of the process agreed to with the United States Environmental Protection Agency, the Idaho Department of Environmental Quality is required to review the cleanup at least every Five-Years. The last review was completed April 20, 2004. Thus, the next review needs to be completed by April 20, 2009.

I am writing to ask for your input on the Triumph remedy to see if you have any concerns about the ongoing protectiveness of the work. The list below shows the types and locations of the data collection we believe needs to be performed for the review.

1. Vacuum cleaner bags to assess house dust arsenic and lead concentrations
2. Soil Sampling – roads, residences, waste rock pile, old process area, both tailings ponds
    a. Depth of clean soil barrier measurements
    b. Sample soil for arsenic and lead concentrations to see if the barrier is still intact
3. GW monitoring wells to test water quality for arsenic and lead
    a. Triumph monitoring wells
    b. Down gradient drinking water wells
    c. Other private wells
4. Observe changes caused by development activities to see if barriers were protected or re-installed. This would apply to properties between the tailings ponds and those near the old Triumph facilities that were the in the proposed overlay district.
5. Tailings Piles
    a. Repository operations at the Lower Tailings Pile
    b. Survey settlement monuments to see if slopes have changed due to settlement that would impact drainage
6. Triumph Tunnel Plug Evaluation
    a. Plug pressure measurements to determine pool depth behind plug
    b. Seep Survey to see if water from the mine is coming out somewhere else
7. Sediment samples from tunnel discharge, wetlands, and Upper Tailings Pile discharge
8. Surface water samples
    a. Mine plug
    b. Seeps (if found)
    c. Surge pond
    d. Permanent Pond
    e. Upper Tailings pond drainage

If you have recommendations for additional areas to be evaluated or sampled, please see the attached Triumph Five-Year Review Input and Sample Access Form and complete the portion under "Other Areas to Sample." Sampling will be limited to those areas that were impacted by the historic mining activities of the Triumph Mine. This includes tailings, waste rock piles, soils, house dust, and water impacted by these materials.

We need to sample up to five vacuum cleaner bags and five residential yards. If you would like to participate in this sampling, please complete and sign the second page of the attached form. We will also be taking groundwater samples and need your permission to sample your well if you have one. You can grant us permission by completing and signing the form. You will be provided analytical results for any samples taken from your property. Please give your completed forms to Dan Tucker who has agreed to collect the forms for IDEQ or you can mail them directly to me at 1410 North Hilton, Boise, Idaho 83076. Mailed forms will need to arrive at my office by Friday October 3 for them to be of use to us.

The purpose of the Five-Year Review is to see if the remedy is still working as planned and if its not determine what needs to be fixed. After DEQ collects the data, we will write a draft report that will be available for public comment. If you are interested the last Five-Year Review report for Triumph can be found at the following link to the DEQ web site: http://www.deq.idaho.gov/waste/data_reports/mining_waste/publications.cfm

If you have any questions about sampling or the Five-Year Review, please contact Rob Hanson at 208-373-0290 prior to October 6, 2008 if possible.

Sincerely,

Rob Hanson
Mine Waste Program Manager

Triumph Five-Year Review Input and Sample Access Form

Name: _____

Address: _____

_____

_____

Phone: Day _____

Evening _____

Other Areas to Sample: *Please describe areas that you would like us to evaluate or sample to determine the effectiveness of the Triumph remedy.*

_____

_____

_____

_____

_____

Other Comments related to the Triumph Five-Year Review:

_____

_____

_____

_____

_____

The Idaho Department of Environmental Quality will be performing the field review of the Triumph remedy on Monday October 6 starting at about 11:00 AM. You do not need to be present for the sampling. If you agree to provide a vacuum cleaner bag for us to sample and you will not be home, please place the vacuum bag, removed from your vacuum cleaner, on your front porch in a plastic bag and we will pick it up. You will be provided the analytical results of any samples collected off of your property.

I, _____, the undersigned agree to have the following samples collected from my property:

- Soil in my yard Yes ___
- Vacuum cleaner bag Yes ___

If you agree to provide a vacuum cleaner bag, please answer the following questions that will help us better understand the results of the house dust analytical results.

1. Do you have pets that live both in and outside the house?
   Yes___ No___
2. Has carpet been replaced in your house in the last Five-Years?
   Yes___ No___
3. Has the vacuum cleaner been used outside of your house? For example has it been borrowed by a friend, used in your car?
   Yes___ No___

- Groundwater Well Yes___ Don't have a well___

Please describe the location of the well on your property._____

_____

_____

_____ _____
Property Owner Signature Date