

**Five-Year Review Report**

**Third Five-Year Review Report**

**For**

**Triumph Mine Tailings Piles Site**

**Blaine County, Idaho**

**June 5, 2014**

**Prepared by Idaho Department of Environmental Quality  
Boise, Idaho**

**Approved by:**



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**Date:**



# **Third Five-Year Review Report For Triumph Mine Tailings Piles Site**

## **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 third review was conducted using data from the site monitoring program and a Five Year Review inspection. A request for public input into the review was sent out to property owners March 14, 2014. A public comment period was held from April 28 to May 28, 2014. 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 June 5, 2014.

## **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) (See Figure 1).

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



Figure 1

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 withdrew the proposal to add the Triumph Site to 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, Asarco began constructing the Triumph Tunnel plug to control mine water discharge. The work was funded under a national settlement agreement with EPA.

In 2009 Asarco entered into a bankruptcy agreement with the federal government and several states. The State of Idaho received \$1.675 M and some property at Triumph to complete the Mine Water Remedy outlined in the Site ROD.

**Remedial Action Implementation History.** The first phase of the remedial action began October 19, 1998, and ended November 25, 1998, prior to finalizing the second consent order. Construction began again in 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.

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 are 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**

The remedy at the Site was based on residential and recreational use scenarios. Descriptions of the two Operable Units (OUs) are discussed below.

##### **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 and placed on the LTP for disposal. 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.

Small isolated tailings accumulations located adjacent to the main piles were consolidated onto the LTP or UTP. 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. It was decided that an Environmental Covenant under the Uniform Environmental Covenant Act would be the type of CPM implemented at Triumph. A disposal location has been established and is being maintained by IDL to support disposal of contaminated materials resulting from excavation activities.

The selected remedy includes CPMs for potential residential development in the wetlands west of the LTP. The purpose of the CPMs would be to protect for consumption from gardens developed in the wetland areas. The concern is the uptake of COCs by plants and subsequent consumption of produce. 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.

Ground water monitoring is part of the Soils OU remedy to assess effectiveness of the remedy as a source control for tailings and contaminated soil on water quality. 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.

The ROD calls for CPMs for ground water to be established to prevent ingestion of impacted ground water that is downstream of the LTPs. These CPMs have not been established. Additional work needs to be done to evaluate the impact the remedy has had on groundwater and a determination needs to be made to see if CPMs are truly warranted since the wetland area is likely undevelopable without mitigation under the Clean Water Act. The envisioned CPMs would restrict 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.

#### **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. An attempt was made to inspect the plug for leakage and stability but there was a cave-in in the mine and the plug cannot be accessed. Inspections to locate seeps and discharges caused by the plugging were conducted in the area on a regular basis. A reconnaissance of seeps and discharges was performed prior to plugging to establish baseline conditions. Contamination related to seeps that are flowing at rates greater than one gpm will be addressed through collection, treatment, excavation, or other appropriate measures.

The ROD called for in-line aeration treatment of the mine water followed by additional wetland treatment if the mine pool behind the plug did not reach equilibrium, caused large seep flows, or drainage out of another mine opening. None of these conditions have occurred or are expected to occur. Therefore, it is believed at this time that treatment will not be necessary.

### **V. Remedial Action Status and Progress since Last Review**

#### **Soils OU**

All soils-related remedy work at the site was completed in December 1999. As noted in previous Five-Year Reviews, some repairs on the LTP have been necessary.

Residents have continued to use the LTP soils repository for contaminated soil disposal. DEQ is working with IDL to further develop the repository to include better signage and best management practices to control runoff.

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

The IDL and DEQ are utilizing Environmental Covenants (ECs) to meet the CPM requirement of the site ROD. Two property owners have entered into and recorded ECs for a total of seven properties. Covenants are needed for six to eight additional parcels. Once the covenants have been recorded for all properties requiring CPMs, DEQ will certify the soils remedial work to be complete. Additional properties may need to have ECs since new owners have proposed development of residential and other activities on parcels that were not remediated nor have contaminated soil underlying a clean barrier. These owners will be requested to enter into an EC for their property.

The CPMs for drinking water have not been implemented. This is in large part because the wetland area down gradient from the LTP is likely undevelopable. Thus, it is unlikely that a drinking water well would be installed in that area. As mentioned above additional ground water analysis may also help determine the need for the CPMs.

The Triumph community septic drain field is located on the UTP. The current drain field needs to be expanded to address anticipated community needs and is near a source of springs that drains the adjacent foothills. The community's desired alternative is to relocate the drain field at another site on the UTP away from the springs. DEQ hired Strata to assess the new location for the impact of a drain field on metal transport from the tailings to ground water (Strata 2011). This report provides technical information for the community to design, permit and construct a new drain field with associated monitoring to ensure protection against release of metals to ground water. It is recommended that a new system is installed in phases and monitored to allow changes in design or plans if metals release to ground water is detected.

In 2009 Golder Associates (Golder 2009) developed a final work plan for Denovo Independence LLC to remediate North Star Gulch, Old Triumph, Independence Mine, and the Triumph Tunnel. This work was done under the Idaho DEQ Voluntary Cleanup Program and certified complete February 13, 2012. A completion report for the work was delivered to DEQ in 2011 (Golder 2011). One of the results of the Denovo work was the addition of one to two feet of uncontaminated topsoil to the area around the Triumph Tunnel. This area was also reseeded. This work further enhanced the six inch protective barrier installed in the tunnel area as part of the Triumph Remediation work.

### **Mine Water OU**

Water pressure behind the mine plug continues to be monitored. Most recent measurements show that the mine pool has stabilized at a depth of 285 feet behind the plug (Figure 2.) This represents a pressure of 123.5 pounds per square inch (psi) behind the plug. The Mine Plug Remedial Design document identified possible seep

expression locations that correlate with four different plug pressures from 30 to 91 psi. Seep surveys were focused on these locations when the corresponding plug pressure was achieved. Two minor seeps were discovered with flow less than one gallon per minute (gpm). The next location for possible seep expression correlates with a pressure of 212 psi. It appears that the mine pool has reached or is coming close to reaching equilibrium and is not likely that the mine pool will reach the depth to create that pressure.

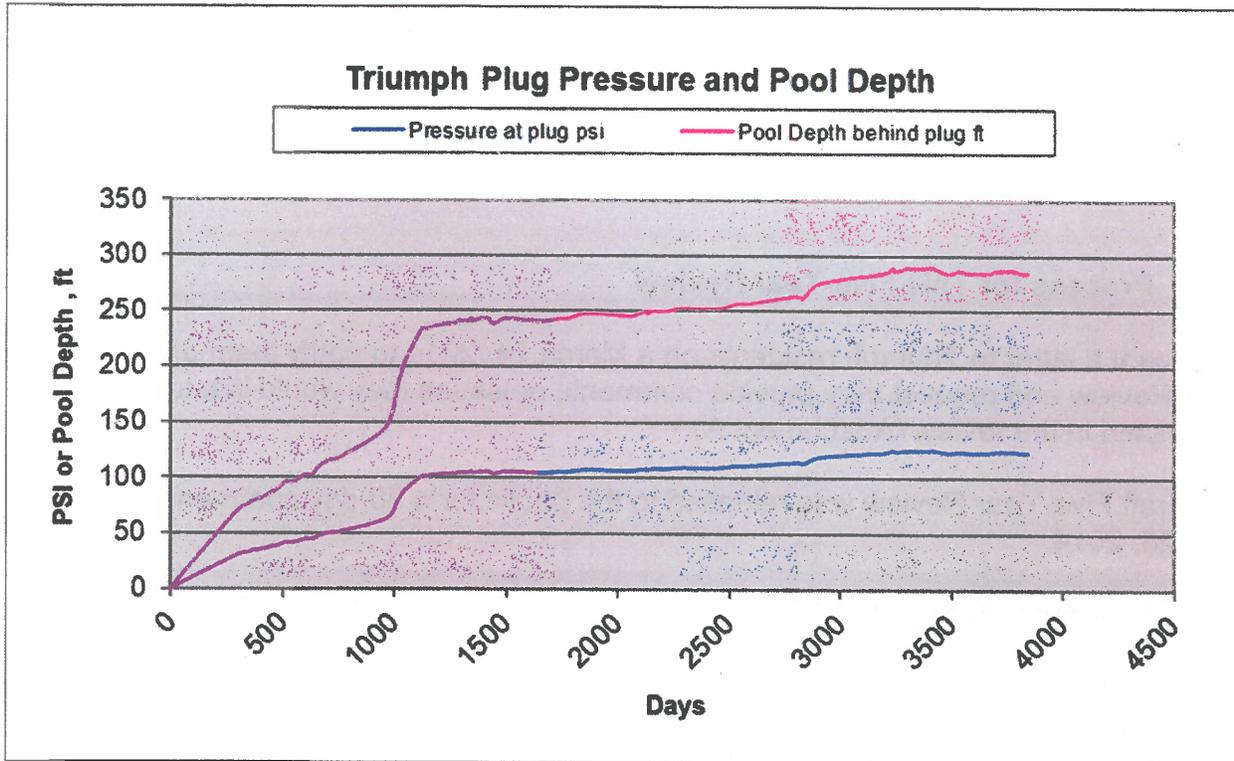


Figure 2. Triumph Mine Plug Pressure and Pool Depth Measurements.

The flow from the mine increased from 4 gallons per minute (gpm) shortly after the plug was installed to the currently seen 15 to 18 gpm. The mine water continues to discharge from the mine and flow into the lined surge pond.

DEQ performed an evaluation of the mine plug to determine the best way to close out the work and move into the O&M phase (Rahe Engineering, Inc. 2011). An initial evaluation found that the tunnel collapsed 285 feet from the tunnel entrance. This prevented access to the mine plug and also may be the cause of the increase in mine water flow. Access to the plug is desirable because it would allow inspection to determine if additional grouting could be used to cut off additional mine water flow.

The Rahe evaluation concluded that the greatest long term risk for the mine plug remedy is the rupture of the pipeline that runs 1,175 feet from the plug to the tunnel opening. A rupture of the pipeline would result in the release of 200 million gallons of water with possible debris flow from the collapse area. The pipeline was installed to collect pressure data to assess the depth of the mine pool. It was also constructed as

part of the contingency remedy to manage water flow for treatment in the case that the plug did not significantly reduce mine drainage

DEQ hired Tetra Tech to develop an Engineering Evaluation/Cost Analysis (EECA) for Mine Closure Alternatives (Tetra Tech 2014). Prior to completion of the EECA, a well was installed to monitor the mine pool behind the plug. The well was drilled with the goal of intercepting the mine tunnel behind the plug. That goal was achieved and provided the opportunity to pump concrete down the well to see if the inlet to the plug pipeline could be blocked. Concrete was pumped into the well, but did not plug the water inlet structure. The EECA calls for making another attempt to close the inlet structure through another well combined with a second impermeable plug 265 feet into the tunnel. Depending upon the outcome of these projects a second plug at 115 feet and water and precipitate control structures may be installed.

## **VI. Process for This Five-Year Review**

DEQ sent a letter to Triumph residents on a March 14, 2014 to notify them of the Five Year Review and request they provide comments or issues they would like to be addressed in the review (Attachment A).

The draft Five-Year Review was released to the public for a 30-day comment period on April 28, 2014.

## **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 OU**

The remedy for the soils portion is functioning as intended. Contaminated soils have 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. Inspection found no evidence of damage to barriers in residential properties (DEQ 2014). New home construction has occurred on one property since the last Five-Year Review. It is not known if the construction was performed according to the draft CPM since there was not an EC in place for this property. A conversation with the current property owner suggests that additional clean soil was brought in as part of the house construction. This property may be sampled in the future to determine the depth of clean soil. This property will need to have an EC recorded to meet the CPM requirement of the ROD.

No soil samples were collected for this Five-Year Review. Sampling from the previous review showed concerns with soils associated with the Triumph Tunnel bench. As noted above additional clean soil was placed in this area as part of the Denovo Voluntary Cleanup.

The O&M inspections of the UTP and LTP have been performed to ensure that the barrier stays in place and that if the barrier is eroded repairs are made. The IDL has assessed the LTP cap and is planning to take steps to improve vegetative cover. This work is planned to be implemented in the summer of fall of 2014.

Vacuum bag samples were not collected in time to be part of this Five Year Review. Samples will be collected in the summer of 2014 and reported in a separate report.

The outstanding issue that needs to be addressed is the implementation of the CPMs through ECs for individual properties. The CPMs guide property owner excavation work such that a clean barrier is installed on the surface once work is complete. As stated above about half of the properties that need an EC to meet the CPM requirement have them.

#### Surface Water

As part of the remedy the two tailings piles were re-contoured and capped to allow the piles to shed water. The purpose was to eliminate the development of long-term standing water on the piles. This part of the remedy has functioned as planned. There has been the need to perform minor O&M repairs on some eroded areas. The erosion was contained on the LTP and primarily eroded away the clean cap. The LTP will continue to be watched closely because of its proximity to the East Fork of the Big Wood River. Beavers have been observed to build dams that divert water onto the LTP. This hasn't occurred for several years.

The permanent pond located in the northeast corner of the LTP would seasonally contribute to standing water in the area referred to as the ephemeral pond on the LTP. Therefore, the design plan for the LTP included installing a drain from the permanent pond to reduce water levels so that it would not be a source of surface water to the LTP. The drain was installed to convey the water to the pipeline on the west side of the LTP to drain water from the mine surge pond. Since groundwater is high in this area of the permanent pond gradations to the west pipeline did not allow dewatering the pond. An attempt was then made to close the pond by dumping large rocks into it. This work was not completed after placing large rocks into the pond and concluding that a huge volume of rock material at a high cost would be needed to complete the job. Since the pond was not a significant risk driver at the site, the effort was terminated. The risk associated with the permanent pond would be the human consumption pathway. The pond is not used as a drinking water source. The pond was also not found to be a significant pathway in the Baseline Ecological Risk Assessment (Tetra Tech 1997) for the site. It is also sampled as part of the ongoing monitoring plan. One reason for the monitoring is to document impacts the remedy has had on water quality at the pond. Results from 2006 to 2013 are shown in Tables 1 and 2.

**Table 1: Summary of field measurements, pH, and total suspended solids for the Permanent Pond on the LTP at the Triumph Mine Site.**

Sample Location	Date Sampled	pH (field)	Specific Conductivity (µS/cm)	Temperature (Degrees Celsius)	pH (lab)	Total Suspended Solids (mg/l)
Permanent Pond	6/7/2006	7.6	1.56	19.1	7.75	3
	10/5/2006	7.7	1.18	12.9	7.76	< 2.83
	11/1/2007	8.1	0.73	9.2	7.60	150
	9/18/2008	7.8	0.68	18.3	7.40	53
	7/2/2010	7.2	0.71	17.4	7.90	3.2
	6/14/2013	8.06	0.742	16.2	8.13 J	17.0
	12/12/2013	NS	NS	NS	NS	NS

Notes:

Data prior to June 14, 2013 from Tetra Tech *Triumph Mine Semi-Annual Monitoring Report, Triumph, Idaho* (July 20, 2010)

U - The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL

J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

**Table 2: Summary of metal analytical results for Permanent Pond on the LTP at the Triumph Mine Site.**

Sample Location	Type	Date Sampled	Arsenic (ppb)	Cadmium (ppb)	Lead (ppb)	Manganese (ppb)	Zinc (ppb)
Permanent Pond	Total (unfiltered)	6/7/2006	16	0.71	0.5	550	150
		10/5/2006	27	0.61	3.8	710	160
		11/1/2007	100	1.3	20	380	160
		9/18/2008	110	<5	60	490	140
		7/2/2010	37	<0.5	<1	69	<10
		6/14/2013	83.7	0.12	1.44	62.7	9.1
		12/12/2013	NS	NS	NS	NS	NS
	Dissolved (filtered)	6/7/2006	12	0.57	0.15	510	130
		10/5/2006	16	0.15	0.17	160	77
		11/1/2007	26	0.084	0.67	17	12
		9/18/2008	32	<5	<5	<10	<30
		7/2/2010	42	<0.5	<1	67	14
		6/14/2013	67.1	0.03	0.2	61.4	3.6
		12/12/2013	NS	NS	NS	NS	NS
<b>EPA Primary Maximum Contaminant Levels</b>			10	5	15	-	-
<b>EPA Secondary Maximum Contaminant Levels</b>			-	-	-	50	5,000

Notes:

U - The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL

Data prior to June 14, 2013 from Tetra Tech *Triumph Mine Semi-Annual Monitoring Report, Triumph, Idaho* (July 20, 2010)

NS - no sample collected

The pH of the pond is slightly alkaline ranging from 7.2 to 8.1 during field measurements. Arsenic concentrations exceed drinking water standards. However, the pond is not used for drinking water. The water also exceeds the secondary contaminant level for manganese. Secondary levels are based on aesthetic uses of the water. This means that the water has a foul taste and is not a suitable drinking water source. The manganese remediation goal for ground water at Triumph is 840 ppb based on human consumption. Water consumed above this level would cause an unacceptable risk to people. The water in the pond does not exceed this level.

### Ground Water

The remedy called for continued monitoring of the community drinking water wells. Monitoring has continued to show that the wells are not impacted by mine waste. The two community drinking water wells are tested as part of the O&M and monitoring plan. Both wells meet drinking water standards for arsenic and lead (Tables 3 and 4). These are the two contaminants of greatest concern for drinking water at Triumph.

Community well GW-1 is located on the east side of the Triumph community (Figure 1). Community well GW-3 is located in the central part of the community and closest to the mining waste.

**Table 3: Summary of field measurements, pH, and total suspended solids for the Community Drinking Water Wells at the Triumph Mine Site.**

Sample Location	Date Sampled	pH (field)	Specific Conductivity (µS/cm)	Temperature (Degrees Celsius)	pH (lab)	Total Suspended Solids (ppm)
GW-1	6/7/2006	7.5	0.56	13.9	7.76	< 2.83
	10/5/2006	7.7	0.56	12.9	7.81	< 2.83
	11/1/2007	7.7	0.51	9.2	7.65	< 5.36
	9/18/2008	7.7	0.58	10.3	7.50	< 1.0
	7/2/2010	7.4	0.61	11.8	8.10	< 1.0
	6/14/2013	7.64	0.819	8.8	7.78 J	5 U
	12/12/2013	7.39	0.633	7.6	7.76 J	5 U
GW-3	6/7/2006	7.5	0.60	13.7	7.50	3
	10/5/2006	7.6	0.55	12.9	7.66	< 2.83
	11/1/2007	7.8	0.50	10.4	7.63	< 5.36
	9/18/2008	7.5	0.66	10.3	7.40	< 1.0
	7/2/2010	7.5	0.66	12.5	8.00	< 1.0
	6/14/2013	7.53	0.809	8.9	7.68 J	5 U
	12/12/2013	6.63	0.740	7.9	7.77 J	5 U
GW-2 (Duplicate of GW-1)	12/12/2013	7.39	0.633	7.6	7.85 J	5 U

Notes:

Data prior to June 14, 2013 from Tetra Tech Triumph Mine Semi-Annual Monitoring Report, Triumph, Idaho (July 20, 2010)

U - The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL

J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

**Table 4: Summary of metals analytical results for the Community Drinking Water Wells at the Triumph Mine Site.**

Sample Location	Type	Date Sampled	Arsenic (ppb)	Cadmium (ppb)	Lead (ppb)	Manganese (ppb)	Zinc (ppb)
GW-1	Total (unfiltered)	6/7/2006	< 0.414	< 0.372	0.97	1	12
		10/5/2006	< 0.517	0.19	0.32	2	8.5
		11/1/2007	< 0.367	0.13	1.2	0.96	740
		9/18/2008	< 20	< 5	< 5	< 10	< 30
		7/2/2010	< 1	< 0.5	< 1	< 2	12
		6/14/2013	0.5 U	0.13	0.66	0.31	7.8
		12/12/2013	0.36	0.202	0.406	0.06	5.07
	Dissolved (filtered)	6/7/2006	< 0.431	< 0.372	0.29	0.61	9.1
		10/5/2006	< 0.517	0.27	0.23	0.9	12
		11/1/2007	0.48	0.14	0.78	1.9	51
		9/18/2008	< 18	< 5	< 5	< 10	< 30
		7/2/2010	< 37	< 0.5	< 1	6.5	11
		6/14/2013	0.5 U	0.12	0.08	3.13	4.6
		12/12/2013	0.38	0.13	0.109	0.1	4.86
GW-3	Total (unfiltered)	6/7/2006	< 0.414	1.6	8	2	720
		10/5/2006	< 0.517	1.2	6.5	16	470
		11/1/2007	< 0.367	0.3	1.1	3	100
		9/18/2008	< 56	< 5	< 5	< 10	200
		7/2/2010	< 75	< 0.5	< 1	< 2	14
		6/14/2013	0.6	0.54	3	0.25	144
		12/12/2013	0.53	0.576	0.539	2.17	145
	Dissolved (filtered)	6/7/2006	< 0.431	0.89	0.46	0.74	250
		10/5/2006	< 0.517	0.91	0.45	1.5	240
		11/1/2007	0.5	0.31	1.2	3.3	81
		9/18/2008	< 94	< 5	< 5	< 10	200
		7/2/2010	< 113	< 0.5	< 1	< 2	30
		6/14/2013	0.6	0.53	0.26	0.37	131
		12/12/2013	0.48	0.561	0.729	0.48	139
<b>EPA Primary Maximum Contaminant Levels</b>			10	5	15	-	-
<b>EPA Secondary Maximum Contaminat Levels</b>			-	-	-	50	5,000

Notes:

U - The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL

Data prior to June 14, 2013 from Tetra Tech *Triumph Mine Semi-Annual Monitoring Report, Triumph, Idaho* (July 20, 2010)

NS - no sample collected

A full evaluation of ground water quality down-gradient of the LTP was recommended in the last two Five-Year Reviews to measure the effectiveness of the mine water plug and other source control measures to improve ground water quality. This has not yet occurred. The four monitoring wells located in the wetlands down-gradient of the LTP that were used to assess the down-gradient ground water wells had to be abandoned due to demands by the property owner. The wells were closed in 2009.

Prior to the closure of these down-gradient wells monitoring showed various exceedances of arsenic, cadmium, and lead. In the case of arsenic, the most recent exceedances of drinking water standards were 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. Dissolved and total manganese consistently exceeded the site-specific standard of 840 ppb. In general, dissolved ground water concentrations are thought to be most representative of aquifer conditions because dissolved metals have the potential to be transported with the ground water. Total concentrations are most representative of conditions at the point of use.

#### Mine Water

The mine plug continues to limit water discharge volumes. Mine flow volumes at the last Five Year Review were about 4 gpm. Current flows are between 15 and 18 gpm. This is compared to the pre-plug flows that ranged from 90 to 190 gpm. It is not known why there was an increase in flow since the last Five Year Review. It is assumed that there is some seepage at the plug. However, because of the cave-in, the plug has not been inspected to see the amount of seepage. The one possible cause of the increased flow is that seepage increased at the plug. Another possible reason is that the mine pool has continued to grow vertically and horizontally over time increasing infiltration into the tunnel between the plug and tunnel opening. It is also possible that the mine cave-in caused water to pond behind the debris and is influencing the flow of mine water. As can be seen in Table 5 there has been no change in water chemistry during the time that flows have increased. DEQ is evaluating closure options that will reduce flows, close the plug pipeline, and control potential movement of debris from a mine tunnel collapse.

When DEQ began evaluation of the mine plug and closure options in 2010, a series of samples were collected at five locations associated with the mine water. These sample locations are shown below and in Figure 3.

- SW-1 Adit Plug pipe water
- SW-2 Portal water at the flume
- SW-3 Portal water at the tunnel opening
- SW-4 Surge pond water influent at weir
- SW-5 Surge pond water effluent at manhole



These sampling locations follow the generalized water flow path starting at the mine water pool measured in the pipe water, into the Triumph Tunnel travelling on the sill (floor) and measured at the flume, exiting the tunnel, flowing into the pond and then out of the pond. Sample results are shown in Table 5.

As a result of a cave-in located about 285 feet from the portal, seepage into the adit that then flows along the sill cannot be directly observed. Based on adit seepage chemistry and abundant ferrihydroxide precipitation along the sill of the adit, it is presumed that adit seepage moves through fractures around the plug or seepage elsewhere within the adit down gradient of the plug. This seepage transitions chemically from a reduced, low oxygen, pool of water impounded behind the adit plug (SW-1), to an area of more highly oxidized and oxygenated conditions outside of the adit plug (SW-2). From there, it travels along the floor of the adit to the portal (SW-3) before entering the drop inlet/piping system to the surge pond. The pond serves as a treatment basin allowing for more oxidation and concomitant precipitation to occur.

The discussion below uses the total arsenic data for the May 2, 2013 sampling event as an example how the mine plug and pond system is functioning. The data for SW-1 showed that the mine pool had a concentration of arsenic of 9.84 ppm. Once the water was exposed to oxygen in the tunnel the arsenic was co-precipitated with iron that precipitated out as a ferrihydroxide. Arsenic levels dropped to 2.05 ppm. As the water traveled out of the tunnel more arsenic dropped out and the level was at 1.6 ppm. At the location where the water entered into the pond, the arsenic concentration was 0.088 ppm. When the water exited the pond the arsenic concentration is less than 0.025 ppm.

**Table 5: Summary of total metal results from sampling points associated with the Triumph Remediation mine water remedy.**

ID	Description	Date Sampled	As (ppm)	Cd (ppm)	Cu (ppm)	Fe (ppm)	Pb (ppm)	Mn (ppm)	Ag (ppm)	Zn (ppm)
SW-1	Adit Plug pipe after purge	June 2010	0.025	0.0022	NM	NM	<0.00040	9.4	NM	22
		Sept 2010	11.9	0.13	NM	83.6	<0.05	9.05	NM	1.82
		10/19/2011	NM	NM	NM	78	NM	9.9	NM	1.3
		6/4/2012	10	<0.002	<0.01	67.2	<0.0075	8.91	<0.0050	1.41
		5/2/2013	9.84	<0.002	<0.01	53.9	<0.0075	7.76	<0.0050	0.912
SW-2	Portal flume	June 2010	1.4	NM	NM	42	NM	8.7	NM	0.76
		Sept 2010	1.5	NM	NM	36.2	NM	7.78	NM	0.6
		10/19/2011	NM	NM	NM	31	NM	7.3	NM	0.24
		6/4/2012	6.4	<0.002	<0.01	87.7	<0.0075	9.52	<0.0050	0.579
		5/2/2013	2.05	<0.002	<0.01	27.2	<0.0075	6.72	<0.0050	0.0952
SW-3	Portal	Oct 2008	0.454	<0.0020	NM	NM	0.0075	NM	NM	1.19
		June 2010	1.8	NM	NM	NM	NM	8.5	NM	0.76
		Sept 2010	1.15	NM	NM	53	NM	7.5	NM	0.52
		10/20/2011	NM	NM	NM	29.5	NM	7.2	NM	0.23
		6/4/2012	2.24	<0.002	<0.01	33.2	<0.0075	7.02	<0.0050	0.299
		5/2/2013	1.6	<0.002	<0.01	22.5	<0.0075	6.55	NM	0.11
SW-4	Pond Influent at weir	9/18/2008	0.037	<0.005	NM	NM	0.0051	5.7	NM	2.9
		10/29/2010	0.056	NM	NM	NM	<0.001	4.6	NM	0.81
		10/19/2011	0.036	NM	NM	NM	NM	5	NM	0.028
		6/4/2012	0.064	<0.002	<0.01	0.17	<0.0075	4.48	<0.0050	0.0189
		5/2/2013	0.088	<0.002	<0.01	0.668	<0.0075	3.86	<0.0050	0.0119
SW-5	Pond effluent at manhole	June 2010	0.034	NM	NM	0.46	NM	4.8	NM	0.12
		Sept 2010	<0.10	NM	NM	0.73	NM	4.55	NM	0.08
		10/19/2011	NM	NM	NM	0.3	NM	2.8	NM	0.022
		6/4/2012	1.27	<0.002	<0.01	26.7	<0.0075	23	<0.0050	1.58
		5/2/2013	<0.025	<0.002	<0.01	<0.06	<0.0075	0.036	<0.0050	0.0144
National Drinking Water Standard			0.01	0.005	1.3*	0.3**	0.15*	0.05**	0.1**	5**
* Action Level for treatment										
** Secondary Standard										

Water exits the pond through a pipe and is discharged in an infiltration gallery that is located off the southwest corner of the LTP. Flows observed in the pipe during the 2013 sampling event were very low. No sample was taken because the appropriate sampling equipment was not available. A syringe type system would have been needed to reach the water for sampling.

The plug is generally functioning as intended. However, the need to close the plug pipe and the occurrence of the mine collapse means that additional work needs to be

completed to ensure the long term function of the mine plug remedy. The mine water discharge does not pose a human health or ecological risk, but alternative management options will be assessed as additional work is performed to address the mine water discharge.

**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.

**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**

**Certification of Completion.** The ad-hoc basis that DEQ and IDL have used to work with property owners to meet the objectives of the CPMs to protect the remedy and reinstallation of caps is not a sustainable program. The CPMs for the soil portion of the cleanup using ECs need to be implemented for the remaining properties. The soils remedy has not been certified complete because this component of the remedy has not been completed.

Additional house dust data is needed to assess the continued success of the soil remedy. Currently available data show that house dust arsenic levels are declining as expected. With the completion of the contaminated soils removal and capping work, the source of arsenic moving into the house as dust has been eliminated.

The long term O&M plan will need to continue to closely monitor the LTP. High flow events from the East Fork of Big Wood River and from spring runoff of the foothills have resulted in water on the LTP.

**Mine Water.** Mine water flows have increased to 15 to 18 gpm indicating a need to take additional steps to reduce flow. There has also been a cave-in at 285 feet inside the tunnel. This creates the problem of making sure that the debris does not move as water builds up behind the material. The plug pipe is not needed to implement the treatment contingency as outlined in the ROD. This is because the oxidation in the tunnel and surge pond is greatly reducing arsenic levels in the water. Thus, the plug needs to be closed.

**Ground water.** Mine discharge water is believed to be a significant source of manganese and arsenic to the shallow water in the wetlands. After the mine plug was installed and mine water flow significantly decreased, the impacts were monitored in the ground water monitoring wells in the wetlands. Unfortunately, the wells had to be

abandoned so the timeframe of monitoring is relatively short. No impact on the community drinking water wells from the mine water pool (behind the mine plug) on the deeper aquifer has been observed. Drinking water wells will continue to be monitored. Finally, the water quality of ground water in domestic 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 domestic wells prior to remediation showed no metal concentrations above water quality standards.

## **IX. Response to Comments**

One comment letter was received by DEQ. Many of the comments ask about data collection for the Five Year Review. Although additional data collection specifically for this five year review is not required and was not conducted, routine monitoring of the site does occur to evaluate the effectiveness of the remedy. The data collected during routine monitoring and data collected as part of separate evaluations was summarized and included as part of the five year review. Ongoing and planned data collection to support the evaluation of site conditions will continue and be included in subsequent five year reviews. The specific comments are further discussed below.

1. Community Protection Measures to prevent ingestion of impacted groundwater have not been implemented.

***Response: The area where drinking water protection would be needed is a wetland where there is currently no one using the water as a domestic supply. Additionally, this site is easily and regularly observed so it would be known if development were occurring in the area. Thus, there is not an immediate need to implement the Community Protection Measures. As noted in the Recommendations section of the Review, DEQ will evaluate the need for Community Protection Measure once IDL completes a groundwater evaluation. IDL collected samples for this evaluation in May 2014. The evaluation will be completed in late 2014 or early 2015.***

2. Increase the frequency of monitoring for arsenic in house dust.

***Response: Sampling reported in the 2009 Five Year Review showed house dust arsenic and lead concentrations below action levels and EPA lead default value, respectively. Trends from Bunker Hill have shown that metals concentrations in house dust continue to decline once contaminated soils have been removed or capped. House dust data was collected by IDL in May 2014 but was not available in time to be included in this Review. This data will be used to determine the effectiveness of the remedy and plans for future monitoring of house dust. Data results will be reported in the Request for Certification Report.***

3. Soil samples not collected as part of the Five Year Review.

**Response: Soil sampling was conducted as part of previous Five Year Reviews and indicated that the barriers were remaining intact. The primary reason barriers would be compromised is new construction that requires significant excavation. IDL sampled soil at Triumph in May of 2014 targeting new construction. The purpose of the sampling is to determine if the clean soil barrier was protected or re-installed during new construction.**

4. Environmental Covenants have not been completed for properties that have contaminated soil underneath the barrier.

**Response: DEQ sent a mailing to property owners in May 2014 with the Environmental Covenant for their property. It is hoped that since some property owners have agreed to sign covenants for their property, other owners will feel comfortable signing covenants for theirs. In discussions with property owners about covenants DEQ emphasizes that the covenants help keep their property safe and also protect property values by providing documentation of remediation and how the remedy was protected during homeowner construction/excavation activities. In the interim some property owners have added the Soils Community Protection Measures to their plat map to ensure new development is performed in a safe manner.**

5. Concern about wildlife access to the permanent pond located in the northwest corner of the LTP. (Note: The Review incorrectly located the permanent pond as being in the northwest corner of the LTP. The pond is actually located in the northeast corner of the LTP. The text was corrected in the Review).

**Response: The Ecological Risk Assessment for Triumph evaluated surface water exposures using the meadow vole and moose as the target terrestrial species. The permanent pond was determined to be an insignificant or incomplete pathway for these species. While it is agreed that the pond water should not be consumed by wildlife, it did not represent an ecological risk that required remedial action. Nevertheless, an attempt was made to close the pond, but was abandoned because of excessive cost. The text in the Review was modified to provide a more complete explanation.**

6. Loss of monitoring wells in the wetlands west of the LTP.

**Response: The loss of these monitoring wells does create a challenge for determining the effectiveness of the remedy on the shallow groundwater directly down gradient of the LTP. The IDL is evaluating existing groundwater data and recently collected data from drinking water wells further downstream to determine trends and future groundwater monitoring needs. The evaluation may also trigger the implementation of CPMs for drinking water wells downstream of the site to prevent human consumption.**

7. Question about the cause for the increased flow out of the mine tunnel and if there were changes in water quality.

**Response: The text was modified in the Mine Water section on Page 17 of the Review. It reads as follows:**

**“The mine plug continues to limit water discharge volumes. Mine flow volumes at the last Five Year Review were about 4 gpm. Current flows are between 15 and 18 gpm. This is compared to the pre-plug flows that ranged from 90 to 190 gpm. It is not known why there was an increase in flow since the last Five Year Review. It is assumed that there is some seepage at the plug. However, because of the cave-in, the plug has not been inspected to see the amount of seepage. The one possible cause of the increased flow is that seepage increased at the plug. Another possible reason is that the mine pool has continued to grow vertically and horizontally over time increasing infiltration into the tunnel between the plug and tunnel opening. It is also possible that the mine cave-in caused water to pond behind the debris and is influencing the flow of mine water. As can be seen in Table 5 there has been no change in water chemistry during the time that flows have increased. DEQ is evaluating closure options that will reduce flows, close the plug pipeline, and control potential movement of debris from a mine tunnel collapse.”**

8. Concern about the catastrophic release of the mine water if the plug pipeline was to be ruptured.

**Response: DEQ shares this concern and has identified that the plug pipeline is the greatest risk of failure at the site. The risk of pipe failure is not viewed as an immediate risk, but is one that should be addressed as soon as possible. DEQ and its contractor plan to implement actions this summer to seal off the pipeline.**

9. High flow events from the East Fork of the Big Wood River should not mobilize contaminants.

**Response: The Triumph ROD does not include flood control measures for the East Fork of the Big Wood River. Nor did it include design requirements to withstand flood events. The tailings piles are outside of the floodway for the East Fork. Although the potential of a catastrophic flood event that mobilizes contaminants is low, this type of situation would be addressed by federal and state response authorities similar to any natural disaster.**

## **X. Recommendations and Follow-up Actions**

### **Soils OU**

**Community Protection Measures.** IDL and DEQ need to work with property owners to get all of the necessary ECs recorded with Blaine County. A major effort will be made in the summer of 2014 to accomplish this by working closely with property owners to explain the need for the ECs and how they protect they are designed to protect the remedy and the value of their property.

**Lower Tailings Pond.** The vegetation on the LTP has failed in some areas. An analysis of alternatives has been performed by IDL. An alternative needs to be selected and implemented in the next year or two.

**House Dust.** Additional sampling of house dust needs to be performed to confirm the assumption that the soil caps are protecting against arsenic and other metal transport into homes. Sampling is planned for the spring of 2014.

**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. The ground water evaluation is planned to be completed in 2014.

### ***Mine Water OU***

**Mine Water.** The objectives of the additional mine work as outlined in the EECA are to safely close the plug pipe to reduce risks of rupture, reduce mine water flow, and protect against any debris from collapse moving out of the mine. Initial implementation of this work is planned for the summer of 2014 using the Asarco bankruptcy money. The first step will be to try and close the mine plug pipe by pumping concrete down a new well. The next step will be to install a second water tight plug right below the cave-in area at 275 feet from the mine opening. This second plug will help protect against a pipe rupture if it is not sealed up by pumping concrete and also hold back additional mine water and debris from the collapsed area.

## **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**

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Golder Associates. 2011. Voluntary Remediation Completion Report.

Rahe Engineering, Inc. 2011. Triumph Mine Adit Plugging Program Assessment Report.

Strata. 2011. Drainfield Relocation Investigation Report Triumph Village Drainfield Relocation.

DEQ. 2014. Triumph Five Year Review Inspection Report.

Tetra Tech. 2014. Engineering Evaluation/Cost Analysis for Mine Closure Alternatives Triumph Mine Adit Plugging Project.

## 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 every five years. The last review was completed June 5, 2009. Thus, the next review needs to be completed by June 5, 2014.

The purpose of the Five Year Review Report is to see if the remedy is still working as planned and if it's not, determine what needs to be fixed. A draft report will be available for public comment before it is finalized.

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 information we will be reporting on in the review.

1. Vacuum cleaner bags will be collected and analyzed to assess house dust arsenic and lead concentrations
2. Visual inspection of soil barriers – roads, residences, waste rock pile, old process area, both tailings ponds
3. Status of Community Protection Measures- This applies to properties adjacent to the tailings piles and the process areas.
4. Status and use of the Lower Tailings Pile soil repository
5. Summary and evaluation of ground and surface water monitoring
6. Triumph Tunnel Plug Evaluation

If you have recommendations for additional areas to be evaluated or sampled, please see the attached Triumph Five Year Review Input Form. You can also email your recommendations to me at [rob.hanson@deq.idaho.gov](mailto:rob.hanson@deq.idaho.gov) or you can mail them directly to Rob Hanson at 1410 North Hilton, Boise, Idaho 83076. I need your feedback no later than March 31.

If you have any questions about the Five Year Review, please feel free to call me at 208-373-0290.

Sincerely,

Rob Hanson  
Mine Waste Program Manager

**Triumph Five Year Review Input**

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Phone: Day \_\_\_\_\_

Evening \_\_\_\_\_

Comments related to the Triumph Five Year Review:

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