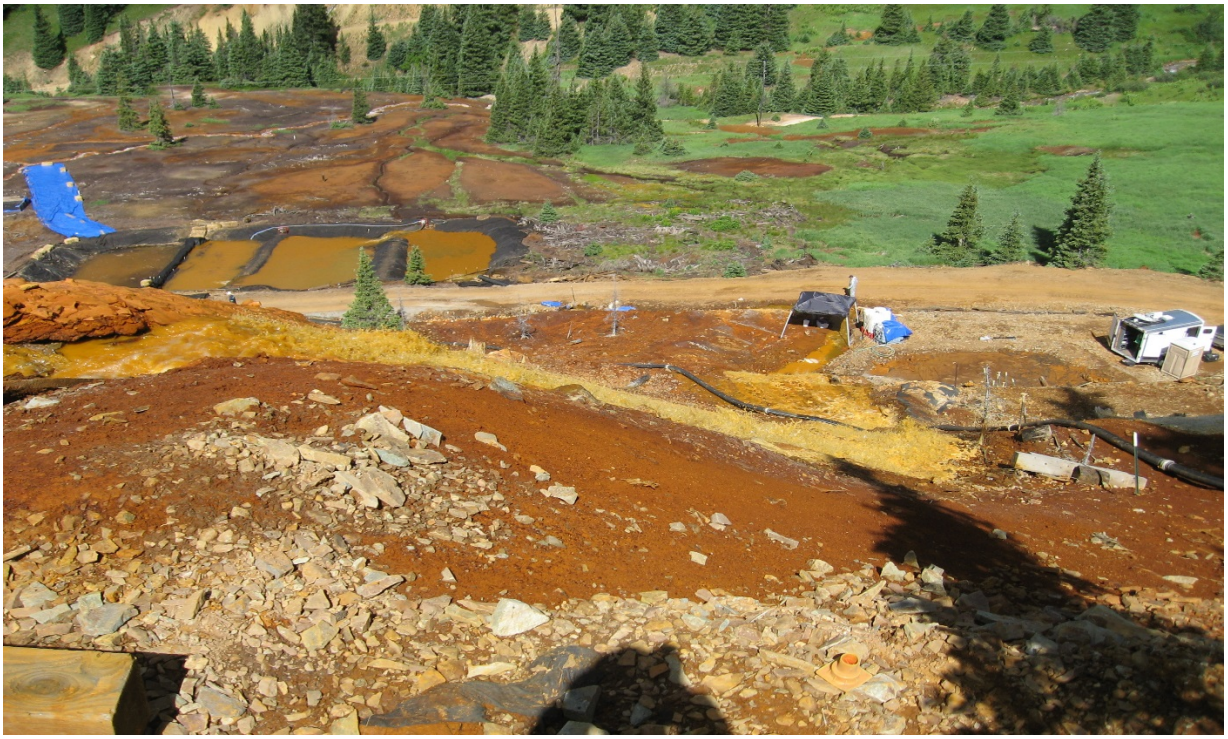
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION 8

PROGRESS POLREP 2

REMOVAL ACTION

Subject:	Red and Bonita Mine Site
To:	Laura Williams, Response Unit Chief David Ostrander, Program Director
From:	Steve Way, On-Scene Coordinator
Date:	July 28, 2015 (finalized 1/8/2016)
Reporting Period:	June 1 to July 28, 2015



1.0 INTRODUCTION

1.1 Background

Site Number:	08UP	**Contract Number:**	
D.O. Number:		**Action Memo Date:**	9/24/14
Response Authority:	CERCLA	**Response Type:**	Time-Critical
Response Lead:	Fund	**Incident Category:**	Removal Action
NPL Status:	Non-NPL	**Operable Unit:**	
Mobilization Date:	10/01/14	**Start Date:**	10/01/2014
Demob Date:		**Completion Date:**	**TBD**
CERCLIS ID: CON000802811		**RCRIS ID:**	
ERNS No.:		**State Notification:**	
FPN#:		**Reimbursable Account #:**	

1.1.1 Incident Category

CERCLA Time-Critical Removal Action

1.1.2 Site Description

The Red and Bonita Mine Site (Site) is located within the Cement Creek watershed, a component of the Upper Animas River watershed in San Juan County, Colorado. These watersheds within the volcanic terrain of the San Juan Mountains were the focus of both large and small-scale mining operations that flourished from 1871 until as late as 1991. Historic mapping and reports of the Red and Bonita Mine indicated that the predominance of activities occurred prior to 1899. Mining operations lasted a short period, but no activity occurred after the initial operations.

Several other mines in the Cement Creek basin also have draining adits. The discharge from Red and Bonita Mine, Gold King (Level 7) Mine, and Mogul Mine all experienced significant increases in flow following the plugging of the Sunnyside Gold Mine workings, including the three plugs in the American Tunnel, that occurred between 1998 and 2002. The Red and Bonita Mine was essentially dry during the period when the Sunnyside Gold Mine operated with

an estimated flow of five gpm. Flow from the American Tunnel was reported to be approximately 1,700 gpm when it was treated, prior to the final bulkhead installation. Active water treatment also was discontinued. Water quality in the Animas River has degraded progressively since that time.

The Animas River and many of its tributaries, including Cement Creek, carry high concentrations of metals from both acid mine drainage and from natural sources not impacted by mining. Water quality studies have indicated that the Red and Bonita Mine is one of the major sources of metals to the Animas River near Silverton. The Environmental Protection Agency (EPA), Bureau of Land Management (BLM) and U.S. Geological Survey (USGS) have quantified the various mine site sources and defuse metals sources within the mining district that contribute to metals loading in the Animas River. These actions contribute to the information needed to identify potential remedies and to reduce or prevent the on-going hazardous substance (metals) releases from the mine sites.

The Red and Bonita Mine consists of approximately 1.25 acres of waste rock and suspected tailings material, and an estimated 3.500 feet of underground workings. The mine adit drains approximately 300 gallons per minute throughout the year. The mine water discharge occurred for an unknown number of years through a collapsed rock debris blockage; the EPA installed a new portal structure in October 2011 after removing 30 feet of blockage at the adit entrance.

Adit discharge flows approximately 200 feet down a mine dump face before channelizing at the toe of the dump. The channel directs flow into an iron bog en route to Cement Creek, approximately 500 feet down gradient of the toe of the dump. The Site lies on a west-facing mountainside slope with an average 44 percent grade, east of Cement Creek. The mine is accessible during non-snow months of the year, typically late June through early October. The mining claims associated with Red and Bonita are on steep terrain and create limiting conditions for operations. Site elevation is approximately 10,800 feet and is adjacent to a county road.

1.1.2.1 Location

The Red and Bonita Mine Site is located in San Juan County, Colorado. The portal is approximately seven miles north of the Town of Silverton, Colorado, at 10,893 feet above mean sea level (AMSL) at 37 degrees 53’49.95”N and 107 degrees 38’38.70”W. Road access is via County Road (CR) 110 from the Town of Silverton to CR53 at the abandoned Town of

Gladstone. CR53 continues northward up the Cement Creek valley to the Site, approximately 0.5 mile north of Gladstone.

1.1.2.2 Description of Threat

Following the installation of bulkheads in the American Tunnel, Red and Bonita Mine adit discharge rates increased to approximately 300 gpm. The pH of discharge water typically ranges from five to six standard units (su). The adit discharge water contains high concentrations of several metals that include (and their approximate concentrations measured over many years): total aluminum (4,000 parts per billion (ppb)), cadmium (35 ppb), iron (90,000 ppb), lead (60 ppb), manganese (34,000 ppb), and zinc (16,000 ppb). The discharge from the adit represents a significant release of heavy metals, including zinc, to the Animas River. The Red and Bonita Mine discharge accounts for approximately 18 percent of the zinc load in the Animas River during low flow periods at a point (sample station A72) one mile below Silverton (USGS presentation, 2013).

The results of a Screening Level Ecological Risk Assessment (February 2013) strongly suggested that the fish community in the Animas River at and below Silverton is experiencing high stress under current conditions. For example, the surface water hazard quotient for zinc in the Animas River below its confluence with Cement Creek is approximately four, which is four times the expected no-effects level. In addition, the study identified aluminum, copper, lead and zinc as major risk drivers to insectivorous birds ingesting surface water, sediment, and aquatic invertebrates from the Animas River at and below Silverton. Also, metal concentrations highly toxic to benthic invertebrates were measured in the substrate of the Animas River at and below Silverton. Recent fish population studies conducted by the Colorado Parks and Wildlife found no fish in the Animas River below Cement Creek for approximately two miles.

Effects on benthic communities are most notable immediately below Cement Creek but are pronounced at least 30 miles downstream. Fish population surveys (2010), conducted by the Colorado Parks and Wildlife (formerly Division of Wildlife), found no fish in the Animas River below Cement Creek for approximately two miles and observed precipitous declines in fish populations since 2005 as far as 20 miles downstream.

Surface water toxicity tests were performed by the EPA in 2012 and 2013 on Animas River surface water. The tests involved exposing commercially reared juvenile rainbow trout (*Oncorhynchus mykiss*) to water collected from the Animas River under controlled laboratory conditions. Exposures lasted for 96 hours and in both 2012 and 2013, Animas River water collected one mile below Cement Creek, resulted in 100% mortality of fish.

Sediment toxicity tests using the standard test organism *Hyalella azteca,* a freshwater amphipod, were conducted in 2012. Following a 10 day exposure to Animas River sediments collected downstream of Cement Creek, mortality ranged from 24% at Bakers Bridge (about 30 miles downstream) to 95% at Elk Creek (about seven miles

downstream). Mortality was about 64% one mile downstream from Cement Creek at station A72.

1.2 Preliminary Removal Assessment / Removal Site Inspection Results

Initial removal assessment investigations of the Red and Bonita Mine in 2010 were focused on both the discharge from the collapsed adit and the contribution of metals to the discharge that occurred as water flowed over and through the waste dump. The investigation findings showed that there was relatively little addition of metals to the adit discharge water from the waste dump. Mine water drainage flows from the adit over the mine dump face at a typical rate of approximately 300 gpm into Cement Creek. The Cement Creek confluence with the Animas River is approximately seven miles downstream at the Town of Silverton. **The flows measured in June and July from the adit are increased significantly to approximately 500 gpm. The increased flow and required solids retention has caused the need to increase the pond capacity.**

In October 2012, sampling results and related modeling showed that the Red and Bonita Mine discharge accounted for an estimated 18 percent of the zinc load in the Animas River, approximately one mile below Silverton. The relative contribution from the individual mines varies seasonally, depending on flow conditions.

Mine Adit Discharge 2005 to 2011

Mine	Elevation (feet AMSL)	Bulkhead Install	Flow Rate (gpm)				
			July 2005	September 2005	October 2006	Average 2010	Average 2011
Red and Bonita	10,893	None	210	224	233	216	319

gpm – Gallons per minute. AMSL – Above mean sea level.

The mine adit contains yellowboy (iron/metals precipitation) accumulations varying in thickness from 0.5 to 3 feet to at least 900 feet inby, which was the maximum extent of the investigation on the main adit cross-cut. Investigations of the mine allowed access to approximately 2,000 feet of workings. Collapsed ground within the tunnels prevented further investigation.

2.0 Current Activities

2.1 Operations

2.1.1 Narrative

The objective of this removal action is to prevent continued releases of heavy metals into the environment from the mine adit by constructing a concrete bulkhead (plug). This will provide a hydraulic control to prevent and/or manage the ongoing discharge of approximately 300 gpm (500 gpm as of June 2015) of acid mine drainage. The action includes the following elements: (1) Establishing temporary water treatment and settling pond(s); (2) Removing the precipitated solids from approximately 300 feet of the mine adit; (3) Constructing an onsite repository for the solids removed from the mine; (4) Preparing the section of the adit for the bulkhead; (4) Constructing the concrete bulkhead with piping and valves for future management flexibility.

2.1.2 Response Actions to Date

During the week of October 11, 2014, the ERRS contractor mobilized and performed the following actions to prepare the Site for continued response actions in 2015.

Onsite operations started again in July in preparation for the bulkhead installation. The mining subcontractor (Mining and Environmental Services – MES) was selected in May, and performed a site inspection to evaluate the underground conditions June 25, 2015. The OSC, CO-DRMS, START and ERRS were present during the inspection. The ERRS (5) and START (2) contractor remobilized to the site July 13. The OSC was onsite July14th. The following summarizes the operational tasks performed onsite starting in July:

- Settling Pond was extended 20 feet longer during July 6th week, adding a fourth cell for the solids from the mucking. This was performed by subcontractor. (Approximately, 300 feet of the tunnel must be cleared of solids precipitate.)

- Piping from the adit portal to the pond was started during the week of July 13th. The final pond shaping, perimeter and interior berms elevated, and placement of geotextile fabric was completed by ERRS.
- It was necessary to modify the plans to convey water to the ponds from using the 6 inch pipe to allowing a free flow to the roadside ditch and constructing head-gates to direct water to the pond or to continue along the roadside ditch.
- START set up the water treatment system using NaOH and flocculent (Brenfloc)
- A trial run of the treatment was conducted Friday, July 17. Additional preparations were made to the system on July 18 and 19 – including the pond liner, straw-bale berm placement to filter suspended solids and headgate seal improvements.

- MES mobilized to the site on Monday, July 20. ERRS assisted MES with unloading supplies and preparing the platform at the portal to allow equipment entry into the mine.
- Underground operations started on July 21 with installing smaller air-duct/vent bags. The 24 inch ducting was too large to allow equipment passage and oversize for the shorter distance underground.
- Removal of precipitation solids in the mine was started on Wednesday, July 22. The mucker machine was used to start the process. (A compressor malfunction prevented the use of the "blow pipe", which was later repaired.)
- Approximately, 290 feet of the tunnel mine precipitate solids were largely removed by Tuesday, July 28, 2015. Complete flushing of the residual solids in that 290 feet was expected to be complete by July 31st.
- Water treatment operations have been adequate to keep pace with the production rate of the underground mucking operations.

2.1.3 Progress Metrics

Waste Stream	*Medium*	*Quantity*	*Manifest #*	*Treatment*	*Disposal*
Precipitated metals	Solids	150 cy	NA		Onsite
Mine adit discharge	Water	500 gpm	NA	NaOH/floc	NA

2.2 Planning Section

2.2.1 Anticipated Activities

- Continue preparing the tunnel for the bulkhead construction: removing additional sections of 24 inch vent-bag, extending a ¾ inch HDPE injection line into the mine, constructing the coffer dam inby of the bulkhead location and constructing forms;
- The water management operations will continue as needed during mine entry.
- Road improvements are planned to allow cement truck hauling operation to the adit level. This work is anticipated on the county road between Gladstone and Red and Bonita.
- Adit solids removal from the settling pond and placement in onsite cell.

2.3 Issues

None at this time.

2.4 Community Involvement

The Animas River Stakeholders Group is actively involved with the work in the watershed and is routinely briefed on the work at the Red and Bonita Mine. Before approval, the proposed removal action was discussed with many stakeholders including the property owner, citizens, environmental organizations, other land owners, local governmental entities, and state and federal regulatory and land management agencies. Regular meetings are held with the participants.

3.0 RESOURCES ON SITE

4.0 ADDITIONAL SOURCES INFORMATION

Animas River Stakeholder Group website: http://www.animasriverstakeholdersgroup.org/

EPA OSC website: http://www.epaosc.org/site/region_list.aspx?region=8