Environmental Restoration

ENVIRONMENTAL RESTORATION, LLC
ACTION / WORK PLAN

PROJECT NAME: Gold King Mine
PROJECT JOB NO: GK8-51
PROJECT LOCATION: Silverton, CO
CONTRACT NO.: EPS81302
TASK ORDER NO.: 51
DATE: MAY 2015

1.0 SITE BACKGROUND

The Gold King Mine near Silverton, Colorado is a historic gold mine at approximately 11,300' elevation. The mine includes a year around discharge that is a significant contributor of manganese, copper, zinc and cadmium into the Cement Creek drainage of the Animas River watershed. The Gold King Mine has not had maintenance of the mine working since 1991, and the workings have been inaccessible since 1995 when the mine portal collapsed. This condition has likely caused impounding of water behind the collapse. In addition, other collapses within the workings may have occurred creating additional water impounding conditions. Conditions may exist that could result in a blow-out of the blockages and cause a release of large volumes of contaminated mine waters and sediment from inside the mine, which contain concentrated heavy metals.

It is proposed to re-open the Gold King Mine portal and workings to investigate the conditions to assess the on-going releases. This will require the incremental de-watering and removal of such blockages to prevent blowouts. The work is intended to take place in late Summer or Fall, 2015. In addition, the secondary purpose of the work is to attempt to identify and characterize specific water flows into the mine and evaluate potential means to mitigate those flows if possible.

2.0 SCOPE OF WORK

The project work includes improving site access, grading the top of the dump as a work area, directing mine discharge to the pond at the Red and Bonita work site, establishing a water treatment system, removing the material covering the adit, installing a new portal structure and rehabilitating the adit as directed by the OSC. Upon completion of activities the site will be stabilized with the discharge solely directed to its original drainage.

3.0 OPERATIONAL APPROACH

The following sections discuss ER's approach to the execution of the Task Order Statement of Work tasks. Significant tasks are identified with details on how ER will accomplish the SOW requirements. Whenever practical ER will perform concurrent tasks and share resources (both equipment and personnel) with TO62.

3.01 PRE-MOBILIZATION ACTIVITIES

ER will prepare the following plans for submittal, review and acceptance by the US Environmental Protection Agency prior to site mobilization.

- ✓ Work Plan (contained herein)
- ✓ Cost estimate (Attachment A)
- ✓ Project Schedule (Attachment B)
- ✓ Site Health and Safety Plan (HASP) (attachment C)

ER has begun solicitation and procurement efforts to initiate the commencement of on-site operations. The following is an initial list of items to be identified and addressed prior to mobilization;

- ✓ Local authorities, property owners, and mine claim holders will be contacted and informed of site operations and schedule [OSC function –ER will support as requested]
- ✓ Coordinate with respective utilities on clearances/locates to ensure safe Site work zones
- ✓ Lodging, Equipment and material sources will be identified and tentatively scheduled
- ✓ An underground contractor will be procured for underground work and mine construction specific tasks such as portal installation and stabilization of the brow

3.02 MOBILIZATION

Mobilization will occur from ER's Denver office and shall consist of the Site Removal Team. The Removal Team shall consist of the Response Manager (RM), foreman equipment operator, and two laborers. The initial mobilization will include site preparation and set-up activities including the mobilization of required site equipment and materials identified to complete the startup of the project. A complete estimate of equipment, materials and supplies required for the project that are outlined in section 4 (Resources) below.

ER will mobilize additional personnel, equipment, and materials as warranted by site tasks/operations. The RM will directly coordinate with the OSC in determining resources required to perform the identified tasks.

3.03 PHASE 1 SITE PREPARATION

Site preparations will occur as possible during work on the red and Bonita to expedite mobilization of the Gold King subcontractor. Tasks included in Site Preparation are:

- HASP review with site crew
- Restore access road
- Grade portal work area to allow drainage to North
- Drop grade of dump to allow access to adit floor
- Use removed material to create manlift access ramp to area above portal
- Install drainage hose/pipe from the North end of the Gold King dump that proceeds down slope westward to the Red and Bonita settling pond. This effort will involve widening the access road from the last switchback to the portal to allow access by vehicles and heavy equipment, and installing a combination of durable lay-flat hose, PVC and aluminum (if pH adjustment occurs prior) pipe to convey the AMD from the N end of the Gold King to dump to the settling pond at Red and Bonita. The conveyance system will be anchored along its path and inspected daily.

3.04 PHASE 2 PORTAL INSTALLATION AND ADIT REHABB

The underground subcontractor [redacted] will be mobilized to provide expertise in mine site related activities. ERRS will support [redacted] by providing earth moving equipment, operators and laborers as necessary for outside operations. It is not anticipated that ERRS personnel will provide underground work other than carrying in supplies as necessary and only under supervision of someone qualified to identify underground hazards. The ERRS team will comprise the OSHA required 5 person rescue team during underground operations. Tasks planned for [redacted]/ERRS after mobilization include:

- Utilize ramp created in site set up to access slope above portal

[redacted]

- Excavate loose material from the top of the high wall.
- Drill in wire mesh anchors.
- Hang wire mesh on the high wall as excavation to the sill of the portal proceeds.
- Excavate to the sill and into the competent rock face at the portal.
- Gradually lower the debris blockage with the appropriate pumping of the impounded water to water management/treatment system (at Red and Bonita and described in TO62 Work Plan), to prevent the uncontrolled release of mine water. If possible a 4" steel stinger will be inserted through the blockage to lower the mine pool prior to any removal.
- Install bedding material for a 20' length of 10' diameter culvert section.
- Install an estimated 20' length of 10' diameter culvert section.
- Install a drain pipe(s) below the portal culvert. The drain will be sized for a minimum capacity of 200 GPM. It will be extended into the adit as necessary to keep the steel sets dry.
- Seal the culvert at the rock face.
- Grout around the portal pipe and brow/adit connection as directed by OSC
- Backfill the portal over the top with 2' of material back 5' from the rock face, and 5' high on both sides for 15' lateral. Non-mineralized material will be used against the pipe.
- Install utilities for underground operations during construction including 2" air line for drilling, a 2" water line for drilling, 2" discharge line for removal of mine water, a 120 VAC power line for lights and small tools, a 480 VAC power line for pumps to control mine water when needed, and if required a 12" ventilation line. All electrical requirements will be supplied by a 100 KW portable generator. A mine phone communication line will also be installed if required.
- Build access road for tunnel mucker.
- Support the brow at the portal.
- Muck and rehab 100' in-by the portal, as determined appropriate by the OSC.
- Install a locking double adit door closure 8'Hx8'W adapted from DRMS Standard drawings #5 and #7.
- Return flow to original path, construct flume and measuring station as directed by OSC
- Remove drainage system from hillside to Red and Bonita
- Remove equipment and debris from site
- Reinstall gully on access road suitable for Spring runoff
- Demobilize personnel and equipment

4.0 RESOURCES

The following table identifies the different resources ER will employ to complete the SOW elements.

PERSONNEL	QUANTITY	COMMENTS
Project Manager	1	[redacted]
Foreman	1	[redacted]
Equipment Operator	1	TBD
Laborers	2	TBD
Truck Drivers	1	As necessary for supply delivery
Field Clerk (offsite)	1	TBD
EQUIPMENT	**QUANTITY**	**COMMENTS**
Truck, P/U	3	ER owned -mobe Denver

Mobile storage placed at Gladstone	1ea	Rental-competitive procurement through local / regional sources
Piping – rental layflat or aluminum	2000 ft	
Excavator shared with TO62	1	Rental-competitive procurement through local / regional sources
6" diesel pump shared with TO62	1-2	Rental-competitive procurement through local / regional sources
Front End Loader shared with TO62	1	Rental-competitive procurement through local / regional sources
Finish Grade Dozer if necessary	1	Rental-competitive procurement through local / regional sources
OFCs	**QUANTITY**	**COMMENTS**
Trash Service	TBD	Competitive procurement through local sources
Lodging	TBD	Lodging at local Hotel
Bulkhead Subcontractor	TBD	Competitive procurement
Underground Contrcator	1	[redacted] Selected through competitive procurement that included local sources
Portable Toilets	4ea.	Competitive procurement through local sources

5.0 OPERATIONAL COSTS

Contained in Attachment A

6.0 SITE SCHEDULE

Contained in Attachment B

ATTACHMENT A

Cost Estimate

ATTACHMENT B

Schedule

ATTACHMENT C

Health & Safety Plan