Centennial & Sun Cup Mine Restoration Project
CLOSEOUT REPORT

COLORADO
Division of Reclamation, Mining and Safety
Department of Natural Resources

CDRMS Contract Routing Number: PKAA 16-770
CDPHE Contract Routing Number FEEA 17-94763
CWCB Contract: CTGG1 PDAA 2017-00128

Prepared by Camille Price, February 2017

EXECUTIVE SUMMARY

The Centennial and Sun Cup Mine Remediation Project relocated approximately 36,000 cubic yards of uranium mine waste to restore an ephemeral drainage through the Centennial Mine Waste Rock Pile; relocated approximately 12,000 cubic yards of uranium mine waste to reduce slopes at the Sun Cup Mine Waste Rock Pile; and stabilized approximately 12 acres of re-graded mine wastes with native vegetation to minimize wind and water erosion, returning the land to the beneficial uses of rangeland and wildlife habitat.

The inactive Centennial and Sun Cup Uranium Mines are located on lands managed by the U.S. Bureau of Land Management (BLM) in Disappointment Valley, approximately 12 miles southeast of the town of Slick Rock and 42 miles southwest of Naturita, in western San Miguel County. The Centennial and Sun Cup mines are located 6 miles south of Hwy 141 on County Road 16R.

The Project was managed by Camille Price, Colorado Division of Reclamation Mining and Safety, Inactive Mine Reclamation Program. Site Characterization and funds sourcing began in 2013. Remediation construction commenced on September 27 and was completed on December 5, 2016 (48 days). Reams Construction (Reams) from Naturita, Colorado, was the lowest bidder meeting the Special Requirements specified for the project.

The project cost totaled $540,268.02 Funding was provided by Colorado Division of Reclamation, Mining and Safety (DRMS) Agreement with Freeport McMoRan (FMMR); a competitive Grant from the Colorado Water Conservation Board (CWCB); an Inter-Agency Agreement with the Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (CDPHE-HMWMD) utilizing Uravan Natural Resource Damage Funds; an Inter-Agency Agreement with the BLM to pay for project management; and, Colorado Severance Taxes, as follows:

	FMMR	CWCB	CDPHE	USBLM	DRMS Sev Tax	TOTAL
Original Allocation	$402,500.00	$75,000.00	$281,478.10	$24,000.00		
Test Pit Excavation (2015)	4,120.00					4,120.00
Aerial Imaging (2015)	5,000.00				5,850.00	10,850.00
Stream Restoration Design (2015)	24,950.00					24,950.00
Remediation Construction (2016)	362,580.00	75,000.00	35,837.56	N/A	2,930.46 Seed Cost	476,348.02
Project Management (2013 - 2017)			Accruing	24,000.00		24,000.00
TOTAL	$ 396,650.00	$ 75,000.00	$ 35,837.56	$24,000.00	$8,780.46	$ 540,268.02
Amount Remaining	N/A	0.00	$245,640.54	0.00	N/A	

SUMMARY OF WORK ACCOMPLISHED

The accomplishments presented correlate to the Tasks specified in the original Bid Document.

TASK 1 SPECIAL REQUIREMENTS

Reams was the lowest bidder demonstrating successful completion of a minimum of three (3) projects that included construction of stream channels utilizing design documents. Reams provided a list of at least three (3) stream restoration projects totaling a minimum of 3,000 linear feet of perennial or ephemeral stream. Reams also demonstrated how work would progress at the Centennial and Sun Cup Tasks of the project to complete the project within the 82 calendar day work schedule. The project was completed in 48 days.

TASK 2 MOBILIZATION/DEMOBILIZATION

Mobilization/Demobilization included moving equipment, personnel and supplies to the project site, minimal improvement of roads, and removal of the remaining supplies, trash and equipment at the completion of the project. Reams checked with the San Miguel County Road and Bridge Department to inquire about the need for a Right of Way or Access Permit.

TASK 3 PROJECT SAFETY, HEALTH, AND ENVIRONMENTAL ACTION PLAN (SHEAP)

The job involved working around inactive uranium mine features, radioactive mine waste rock piles and hazards, and it was the responsibility of the Contractor to be aware of all OSHA regulations which applied to the contract. This task included all the Contractors expenses for employee time, labor, materials, and safety equipment and safety training necessary for preparing and executing a job safety plan. Reams prepared the Project Safety Plan (SHEAP) and submitted to DRMS Project Manager for review and approval.

TASK 4 ACCESS ROAD IMPROVEMENT

A corrugated metal pipe (culvert), measuring 36 inches in diameter by 20 feet in length, was installed at the creek crossing encountered on the main access road. A second culvert, measuring 36 inches in diameter by 30 feet in length, was installed at the Sun Cup Mine creek crossing location. The culvert at the first creek crossing was banded to the downstream end of an existing culvert measuring 36 inches in diameter by 20 feet in length. Riprap protection (6-inch median diameter non-acid forming, non-radioactive, durable rock riprap) was constructed at the downstream end of the joined culvert at the first creek crossing and at both ends of the Sun Cup Mine creek crossing. Non-radioactive soil from the immediate vicinity was placed at a depth of six inches (6 in.) inches beneath the newly installed culverts to protect them from punctures, and placed and compacted over the culverts providing a driving surface capable of supporting the heavy equipment utilized for this project. Culverts and roads constructed across them were left in good condition and in functioning order at the completion of the project.

The access road was graded and maintained throughout the project utilizing a Caterpillar 140G Motor Grader to provide a smooth drivable surface from the access gate to the Centennial Mine site, to facilitate worker traffic, equipment and material transport to the Centennial and Sun Cup Mines. The road surface was left in functioning order and good condition at the completion of the project.

TASK 5 CENTENNIAL MINE WASTE RELOCATION AND CONSTRUCTION OF RESTORED DRAINAGE CHANNEL

TASK 5.1 EROSION CONTROL - SILT FENCE AT THE CENTENNIAL MINE

Approximately 800 linear feet of Silt Fence was installed below all areas disturbed during reclamation work, and removed after revegetation was completed.

TASK 5.2 MINE WASTE RELOCATION AT THE CENTENNIAL MINE

Mine waste relocation, site grading and drainage channel excavation was performed as shown on the attached *Drainage Channel Design for the Centennial Mine*. Caterpillar earthmoving equipment consisted of: one 621 E and one 621 B Scrapers; one D8T and one D7R Bulldozers; one 316EL and one 225D Excavators; and one 950K Loader. A 5,000 gallon water truck was available on site, filled from a frack tank located on County Road 16R, approximately 2 miles from the mine site. Any visible dust production during site earthwork was minimized by performing the work simultaneously with applying water by truck. All non-radioactive topsoil exposed during mine waste excavation was salvaged and stockpiled for use as plant growth medium at the Centennial site.

Approximately 36,000 cubic yards of uranium waste rock material was relocated to restore the Centennial Mine ephemeral drainage channel and create stable slopes no steeper than 3H:1V. Excavation of waste rock was conducted to provide the finished channel profiles, elevations, grades, sinuosity, and construction of scour pools and sediment basins.

The restored three-staged drainage channel, measures approximately 700 linear feet long by 55 feet wide. The three stages consist of the “water’s edge”, “bank-full” and floodplain terraces. The “water’s edge” terrace was over-excavated by three feet and back filled with non-radioactive “Angular Compacted Material” salvaged from the site. Seven grade control structures were constructed of large boulders salvaged from the immediate vicinity. A rock-reinforced sediment detention basin was constructed at the terminus of the restored channel.

Waste rock was excavated to construct a drainage channel in native ground and create stable slopes no steeper than 3H:1V in the “East Water Bar”, located south of the restored drainage channel. The East Water Bar channel measures approximately 150 feet long by 30 feet wide. A rock-lined sediment detention basin was constructed at the terminus of this channel. The “West Water Bar” was not constructed, as that area was used to store relocated mine waste.

The final one foot (1’) of mine waste fill material was roughened with bulldozer rippers so that storm-water or snow melt runoff would be contained or travel so slowly that sediment would not be transported from the site, and collect water to promote plant growth.

TASK 5.3 EXCAVATE BORROW AREA

An area measuring approximately 180 ft. by 135 ft. by 4 feet deep was excavated from the native hillside north of the Centennial waste rock pile to provide additional area for the re-located mine waste to be placed. Grubbed vegetation was salvaged and later distributed over revegetated areas.

The top 2 feet of non-radioactive material (approximately 1,100 cu. yds.) were salvaged and stockpiled for use as plant growth material. The bottom 2 feet of material (approximately 1,100 cu. yds.) was used as "Angular Compacted Material" in the restored drainage channel.

TASK 5.4 CONSTRUCT DRAINAGE CHANNELS AT THE CENTENNIAL MINE

Approximately 1,100 cu. yds. of non-radioactive "Angular Compacted Material", comprised of six-inch (6 in.) to two-feet (2 ft.) diameter rock and fines, was placed and compacted to a depth of three (3) feet in the "water's edge" channel-stage.

Approximately 785 cu. yds. of non-radioactive boulders, each measuring approximately three feet (3 ft.) long, by two feet (2 ft.) wide, by two feet (2 ft.) high, were salvaged from the site to construct instream vane and cross vane arms, scour pools, bank stabilization and sediment pond inlet and outlet structures at the restored drainage channel.

TASK 5.5 PLANT GROWTH MEDIUM PROCUREMENT AND PLACEMENT AT THE CENTENNIAL MINE

Approximately six (6) acres of re-graded and roughened surface areas were covered with six inches (6 in.) of non-radioactive, native soil (approximately 4,840 cu. yds.) salvaged from sediment basins originally constructed in the drainage channel, from the repository south of the waste rock pile, and maintenance of the existing upland diversion ditch.

TASK 5.6 REVEGETATION AT THE CENTENNIAL MINE

Approximately 9 acres of disturbed ground at the Centennial Mine were revegetated by hydro-seeding with a native seed mix, and hydro-mulching with fertilizer and wood fiber mulch. The mulch was applied at a rate of 1,500 pounds per acre. The plant species and rate of seed and fertilizer application is presented in Table 1.

TASK 6 RELOCATION OF SUN CUP MINE WASTE ROCK PILE EAST

Caterpillar earthmoving equipment consisted of: one 621 E and one 621 B Scrapers; one D8T and one D7R Bulldozers; one 316EL and one 225D Excavators; and one 950K Loader. A 5,000 gallon water truck was available on site, filled from a frack tank located on County Road 16R approximately 2 miles from the mine site. Any visible dust production during site earthwork was minimized by performing the work simultaneously with applying water by truck.

TASK 6.1 EROSION CONTROL MEASURES - SILT FENCE - AT THE SUN CUP MINE WASTE ROCK PILE EAST

Approximately 60 feet of silt fence (reinforced with metal-fence and fence-posts) was installed in the ephemeral channel below the Sun Cup mine prior to ground disturbance, and was removed after revegetation was completed.

TASK 6.2 HYDROLOGIC CONTROL ON ROADS ABOVE THE SUN CUP MINE WASTE ROCK PILES EAST AND WEST

An erosion feature (gully) in the road located south of the Sun Cup Mine Waste Rock Pile East was backfilled and compacted with mine waste relocated form the toe of the waste rock pile.

A natural drainage channel located approximately 1,000 feet further along this road was re-graded to prevent flows from over topping the stream bank and flowing down the road. The road (approximately 200 feet long, by twelve (12) feet wide) was re-graded to slope toward the stream channel. Dead trees and sediment that obstructed the channel, were removed to re-establish channel dimensions. Excavated material from the road and obstructed stream channel was used to build an elevated stream bank at the downstream terminus of the re-graded area. Two rolling dips were constructed along this road to control runoff resulting from precipitation events.

A second erosion feature (gully), located on the road north of the Sun Cup Waste Rock Pile West, was backfilled and a new channel was excavated and four (4) water bars or rolling dips were constructed on the road located south of the Sun Cup Waste Rock Pile West to direct runoff into the main tributary channel.

TASK 6.3 EXCAVATE BORROW AREA

Approximately 3,300 cu. yds of material was excavated from the native hillside south of the Sun Cup Mine Waste Rock Pile East (300 ft. long by 30 ft. high by 9 ft. deep) to provide additional area for the re-located mine waste to be placed. The 6 foot depth of material was salvaged and stockpiled for use as plant growth material at the Sun Cup Mine.

Another area measuring approximately 200 ft. long by 25 ft. wide by three feet (3 ft.) deep, was excavated from the bottom land located immediately east of the east-facing toe of the Sun Cup Mine Waste Rock Pile East to provide additional area for the re-located mine waste to be placed. The three (3) feet of soil excavated from the bottom land (approximately 555 cu. yds.) was salvaged and stockpiled for use as plant growth material at the Sun Cup Mine East.

TASK 6.4 MINE WASTE RELOCATION AT THE SUN CUP MINE WASTE ROCK PILE EAST

Site Grading

The north facing toe of the Sun Cup Mine Waste Rock Pile East was relocated approximately 20 feet away from the adjacent ephemeral drainage channel, leaving it at a slope no steeper than 3H:1V. Approximately 15,500 cubic yards of material was relocated away from the stream channel.

Approximately 3,900 cu. yds. of the excavated material was placed on the east facing slope to create compacted fill slopes no steeper that 3H:1V. Prior to placing the fill, the existing surface of the east facing slope was scarified using dozer-mounted rippers to provide a roughened and un-compacted surface to minimize a slip plane and subsequent sloughing of the new fill. The remaining 11,600 cu. yds. of the excavated material was be placed on the top surface of the Sun Cup Mine Waste Rock Pile East, blending into the hillside above it.

TASK 6.5 PLANT GROWTH MEDIUM PLACEMENT AT THE SUN CUP MINE WASTE ROCK PILE EAST

Approximately 3,800 cu. yds. of non-radioactive topsoil and subsoil salvaged from the site was placed on approximately 3 acres of re-graded and roughened surface areas at an approximate depth of 9 inches.

TASK 6.6 REVEGETATION AT THE SUN CUP MINE WASTE ROCK PILE EAST

Approximately 3 acres of disturbed ground at the Sun Cup Mine were revegetated by hydro-seeding with a native seed mix, and hydro-mulching with fertilizer and wood fiber mulch. The mulch was applied at a rate of 1,500 pounds per acre. The plant species and rate of seed and fertilizer application is presented in Table 1.

ADDITIONAL TASK 7.1 CONSTRUCTION OF ROLLING DIPS

An additional 3 rolling dips were constructed on the Centennial Mine access road to control runoff.

ADDITIONAL TASK 7.2 EQUIPMENT RENTAL – EXCAVATOR

Ten hours of machine time using a turbo-charged excavator were utilized to distribute boulders on revegetated areas.

ADDITIONAL TASK 7.3 EQUIPMENT RENTAL – BULLDOZER

Ten Hours of machine time using a turbo-charged bulldozer were utilized to conduct additional site grading and revegetation.

Table 1. Revegetation Specifications

Species		Pounds Pure Live Seed per Acre
Western Wheatgrass	*Agropyron smithii*	3.0
Galleta	*Hilaria jamesii*	2.4
Bottlebrush Squirrel tail	*Sitanion hystrix*	2.0
Indian Rice grass	*Oryzopsis hymenoides*	1.2
Blue Grama	*Bouteloua gracilis*	0.9
Winterfat	*Ceratoides lanata*	0.5
Four-wing Saltbush	*Atriplex canescens*	1.0
Mountain Mahogany	*Cercocarpus montanus*	0.75
Shadscale	Atriplex canescens	0.75
Big Basin Sage	*Artemisia tridentata*	0.25
Scarlet Globemallow	*Sphaeralcea coccinea*	0.2
TOTAL		**12.95 (broadcast seeded)**

Commercial diammonium phosphate (18-46-0) fertilizer was applied at the rate of 300 pounds/acre.

The seed mixture was purchased from Southwest Seed, Dolores, Colorado.

Centennial Drainage Channel Before and After

Centennial Before and After

Sun Cup Profile Before and After

Sun Cup Stream Bank Profile Before and After