Homestake Mining Company
Grants Project
Large Tailings Facility
Stormwater Downdrains Project

Cibola County, New Mexico

Completed and Prepared by:

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Introduction

The Homestake Mining Grants Project is a closed uranium mill facility located on about 5 miles north of the village of Milan on Highway 605, Cibola County, New Mexico. The facility is located on private lands owned by Homestake Mining Company of California.

Alan Cox, Project Manager and Dan Kump, Senior Project Engineer for the Homestake Grants Project, contracted Duran Bokich Enterprises, LLC (Duran Bokich), to perform the work for the replacement of the existing corrugated steel pipe (CSP) downdrains with HDPE plastic pipes.

The Homestake Mining Grants Project has an existing tailings pile, referred to as the "Large Tailings Pile", which was constructed during operations of the Homestake-New Mexico Partners, Homestake-Sapin Partners and Sabre-Pinon Corporation Uranium Milling operations roughly between 1956 and 1990. Tailings in the Large Tailings Pond consist of about 21 million tons, of which about 7.6 million tons were generated for commercial interests and 13.45 million tons under contract with the Atomic Energy Commission.

The tailing facility was constructed utilizing tradition methods of cycloning the tailings and using the course fraction (sands) to construct the embankment and depositing the cycloned fine fraction (slimes) in the interior of the embankment.

Reclamation of the Large Tailings Pile began in 1990, and generally consisted of regrading to reduce side slopes to an average 5 to 1 grade, covering of the tailings with native, locally sourced soil materials to a depth of 4-plus feet compacted to a minimum 95 to 100 percent maximum dry density (MDD). This compacted native soil cover acts as a radon barrier to control radon emissions to the atmosphere from the tailings. The compacted soil cover radon barrier is then covered with a layer of 10 – 12-inch basalt riprap to minimize and control potential erosion from wind and water.

The top perimeter of the Large Tailings Pile is graded and a berm erected to prevent stormwater from flowing from the top and down the sides to minimize the potential for erosion of the side slope radon barrier layer. This water contained on the top of the pile by the berm is transported down the sides of the tailing pile through 12-inch diameter pipe drains.

This project was to replace the existing CSP downdrain system with a continuous High Density Polyethylene (HDPE) plastic pipe. This was done to further reduce the potential for water erosion of the side slopes due to leakage of stormwater from the joints in the CSP downdrains.

There were 14 existing CSP downdrains on the Tailing Pile, and it was determined that two additional downdrains should be added to ensure adequate stormwater drainage control. Locations of the stormwater downdrains are shown in a schematic provided as Figure 1.

Scope of Work

The Homestake Mining Grants Large Tailings Pile Downdrain Replacement Project (Tailings Downdrain Project) consisted of removal of the existing 12-inch diameter CSP downdrains from the slopes of the

Large Tailings Pile, and replacing them with new 12-inch diameter HDPE downdrain pipes. It was determined, in consultation with Dan Kump, Senior Project Engineer that it would be advisable to construct cast-in-place concrete anchors to secure the tops of the new HDPE downdrains into the perimeter berm. This is due to the physical properties of the HDPE pipe where there can be fairly large movement of the pipe from expansion and contraction in response to thermal change in the pipe due to daily and seasonal temperature changes. Since the downdrains are on a slope, the pipe will tend to migrate down slope, but not back up. Therefore it was determined that the constructed concrete anchor blocks would be necessary to avoid future failure of the system, or significant maintenance to prevent failure due to downward migration of the HDPE downdrains. Size and mass of the concrete anchor blocks was determined by Dan Kump, and ranged from 3 to 5 cubic yards of concrete to ensure that the pipes would not dislodge the concrete anchor blocks from the berms and pull them downslope. The 12-inch diameter HDPE pipe was fused using a Model 412 McElroy pipe fusion machine. To assist in the efficiency of the pipe fusion, a McElroy PolyHorse pipe rack was utilized.

In addition, the concrete anchor blocks were constructed with rebar to provide long term structural integrity, and a culvert apron was placed facing downslope within the poured concrete block to help anchor the pipe within the concrete. To further ensure that the HDPE pipe would not pull out of the concrete blocks due to thermal changes, chains were secured around the pipe downgradient of the anchor blocks, and were attached to rebar and pipe brackets that were tied to the rebar within the anchor block and included in the poured concrete. Further pipe anchoring was provided by the fusion of Central Plastics Brand Electrofusion Flex Restraints to the upstream side of the concrete anchor block.

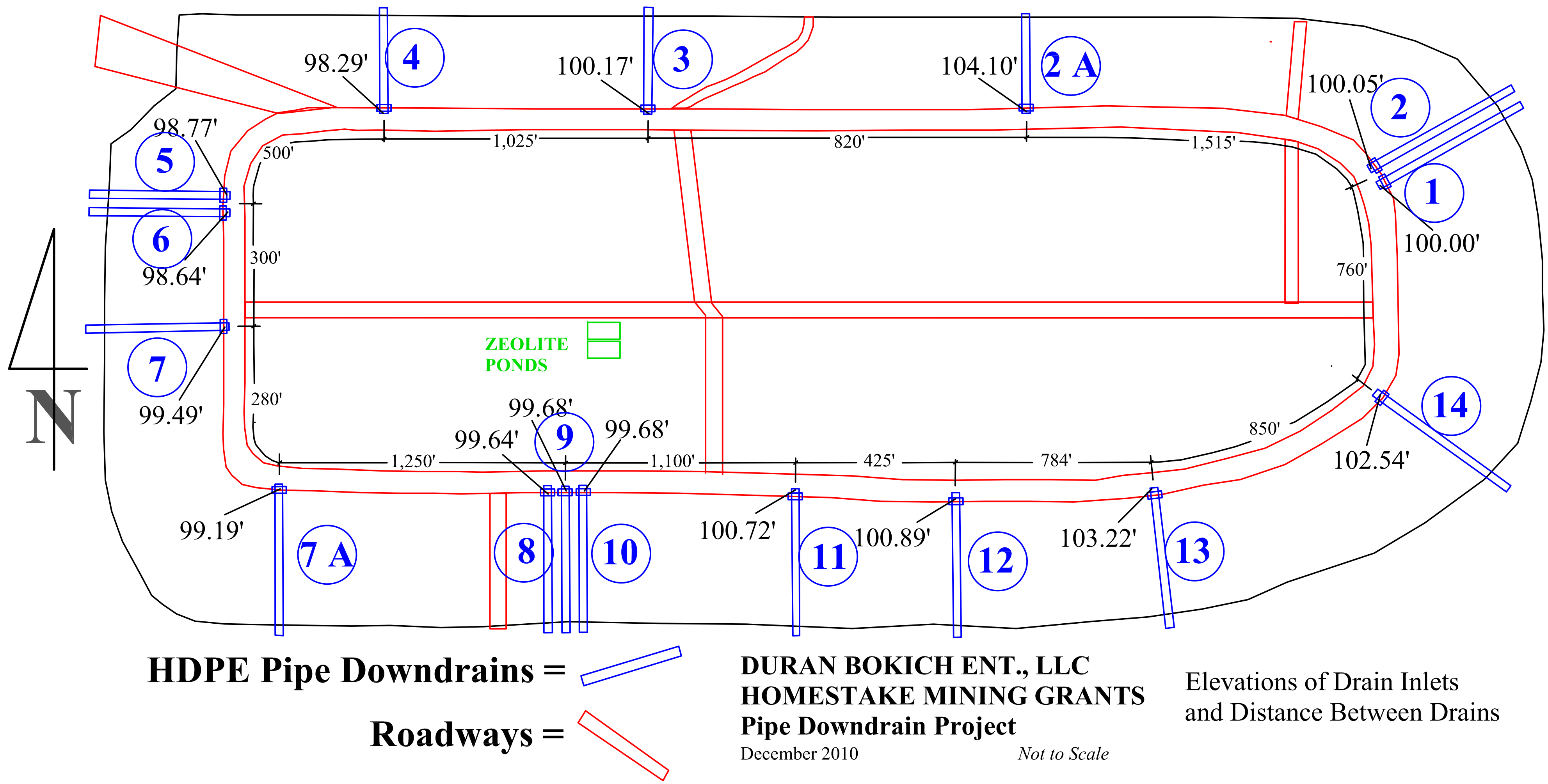
To determine flow patterns on the top of the Large Tailings Pond for design of regrading to ensure fairly even distribution of stormwater to the different downdrains, the perimeter of the pond was surveyed for elevations, and the elevation of each downdrain pipe entry was recorded. It is planned that the perimeter of the top of the tailing facility will be graded in the spring of 2011 as weather allows, to ensure equal distribution of stormwater to each pipe drain. After grading, a nominal 4-inch layer of 2-inch diameter rock will be placed around the concrete anchor berms of the downdrain pipes to minimize erosion around the pipe inlet. At that same time, the perimeter berm will be graded to ensure adequate stormwater containment and also to meet vehicular and equipment safety requirements.

A series of photographs showing the details of the HDPE pipe downdrains and concrete anchor blocks are provided in Appendix A.

Table 1. List of Stormwater Downdrains, locations and pipe lengths

Duran Bokich Enterprises , LLC			
HOMESTAKE GRANTS PROJECT			
Stormwater Downdrains Pipe Project			
			October - November 2010
Drain No.	**Quadrant**	**Length (ft.)**	**Comment**
1	NE	775	
2	NE	775	
2A	NE	500	New pipeline drain - effect on sumps?
3	N	450	Formerly curved by road, new straight - effect on sumps?
4	NW	450	May need to reroute drain in future - effect on sumps?
5	NW	500	
6	NW	500	
7	W	450	
7A	SW	600	New pipeline drain
8	SW	550	relocated 100' E for radon barrier repair
9	SW	550	relocated 100' E for radon barrier repair
10	SW	550	relocated 100' E for radon barrier repair
11	SW	575	radon barrier repair area
12	SW	600	radon barrier repair area
13	SE	600	
14	SE	500	

Figure 1. Schematic of Large Tailing Pile showing general location of stormwater downdrains, elevations of drains, distance between drains, access roads and Zeolite treatment ponds.



DURAN BOKICH ENT., LLC
HOMESTAKE MINING GRANTS
Pipe Downdrain Project
December 2010

Not to Scale

Elevations of Drain Inlets
and Distance Between Drains

APPENDIX A

PHOTOGRAPHS OF HOMESTAKE GRANTS LARGE TAILINGS PILE STORMWATER DOWNDRAINS PROJECT

Figure 2. Existing Corrugated Steel Pipe Stormwater Downdrains. South side triple pipe. Note CSP joint connectors and potential for leakage. Shown left to right are Drains No. 10, No. 9 and No. 8.

Figure 3. Existing CSP Downdrain pipe inlet, Drain No. 7.

Figure 4. Removal of existing CSP was performed by chaining to a front-end loader and dragging pipe off the slope. Joint connectors held together on all pipes during removal, greatly increasing removal efficiency and project safety by reducing walking on the riprap slopes. Removing CSP Drain No. 7.

Figure 5. 12-inch diameter HDPE pipe was fused on site utilizing a McElroy Model 412 fusion machine and PolyHorse pipe rack shown in background.

Figure 6. HDPE pipe downdrains installed on tailing pile slope with front-end loader. Installation of Drain pipe No. 13.

Figure 7. Footings for concrete anchors were excavated through the perimeter berm, compacted, and prepared for cast-in-place concrete forms. Drains No. 1 and No. 2.

Figure 8. Cast-in-place concrete form showing rebar and culvert inlet within anchor block to help anchor pipe. Drain No. 2.

Figure 9. Two cast-in-place concrete anchor block forms complete and ready to pour. These are 5 C.Y. anchors. Drains No. 2 and No. 1.

Figure 10. Concrete pour into form. Note individual in right foreground is using vibrator to fully seat concrete in form. Drain block No. 1.

Figure 11. Poured concrete anchors were covered after pours to protect from freezing nighttime temperatures. Drains No. 2 and No. 1.

Figure 12. Electrofusion Flex Restraints were installed on the uphill side of the concrete anchor blocks of the HDPE pipe downdrains to prevent pipe movement downhill through the block. Drain No. 7.

Figure 13. Compaction of berm surrounding concrete anchor blocks after construction to ensure berm stability, erosion control and stability of anchor block. Drain No. 12.

Figure 14. Completed concrete anchor blocks showing aprons at pipe inlet, Electrofusion Flex Restraints, recompacted berms, anchoring chains and anchor ears in blocks. Area in front of block aprons not yet regraded. From left to right, Drains No. 10, No. 9 and No. 8.

Figure 15. Downdrain pipe anchored with chains attached to anchor block and recompacted berm. Drain No. 13.

Figure 16. Terminus end of stormwater downdrain pipe showing energy dissipation boulders, plus rocks and "T" fence posts along pipeline to maintain relative position with movement from thermal effects of shrink and swell of pipe. Drain No. 11.

Figure 17. Finished Stormwater Downdrain Concrete Anchor Block Drain No. 4. Note block, pipe anchor chains, concrete apron pipe inlet and Electrofusion Flex Restraints on pipe.