

**Homestake Mining Company  
Grants Project  
Collection Ponds and Evaporation Pond No. 1  
Liner Repair Project**

**Cibola County, New Mexico**

**COMPLETION REPORT**

Completed and Prepared by:

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## **Homestake Mining Company Grants Project Ponds Liner Repairs Project Completion Report**

### **Introduction**

The Homestake Mining Grants Project is a closed mineral milling 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.

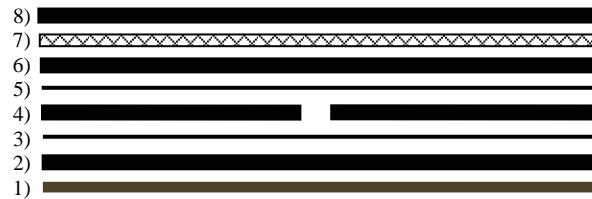
Alan Cox, Project Manager and Dan Kump, Senior Project Engineer for the Homestake Grants Project, contracted Duran Bokich Enterprises, LLC (Duran Bokich), to perform the work for the repair of the liners of the East and West Collection Ponds and Evaporation Pond No. 1. (See Figure 1). Locations where the pond liners were to be repaired were relatively small and isolated, and are shown on Figure 1.

The East and West Collection Ponds are components for management of water flows and volumes associated with the Reverse Osmosis (RO) Water Treatment Facility. These ponds store and recirculate water for treatment through the RO Plant, as well as for brines produced through the RO Plant. Evaporation Pond No. 1 receives water through Evaporation Pond No. 2 which manages waters from the series of groundwater collection wells located within and around the perimeter of the Large Tailing Facility located to the north of the ponds. Water is pumped into Evaporation Pond No. 1 from Evaporation Pond No. 2, spray nozzles are utilized to emit and aerosol spray of water into the air over the ponds to increase evaporation. Additional volumes of water are also pumped from Evaporation Pond No. 1 by HDPE pipeline to newly constructed Evaporation Pond No. 3, which consists of an East and West cell.

The East and West Collection Ponds, and Evaporation Pond No. 1 are all lined with a Deery Oil Liner / fabric liner system, which consists of a non-woven fabric that is impregnated and then overlain with a layer of No. 6 Deery Oil. No. 6 Deery Oil (MSDS included as Appendix A) is a petroleum based asphaltic blend that is applied after being heated to 370 to 400 degrees Fahrenheit, and is commonly used for sealing cracks in road asphalt.

For pond liner applications, the underlying soil is prepared by grading and compaction to develop a stable base and embankment for the liner placement. Then a layer of non-woven fabric is applied to the prepared surface and a layer of Deery Oil is applied at an effective thickness of about 1/8 to 1/4 inch. In locations where existing Deery Oil liner is being mended or patched, the existing liner is then placed over the fresh Deery Oil and then more Deery Oil applied and spread, another layer of filter fabric and then a final surfacing layer of Deery Oil of the same thickness. This is illustrated in the schematic below.

### Schematic of Deery Oil / Fabric Pond Liner System



\*(Spacing between layers exaggerated to show separate layering system)

- 1) Bottom layer is prepared ground surface
- 2) Second layer (from bottom) is non-woven fabric
- 3) Third layer is newly applied, melted Deery Oil
- 4) Fourth layer (where present) is existing Deery Oil/fabric liner to be joined or added to
- 5) Fifth layer is non-woven fabric
- 6) Sixth layer is newly applied surface layer of melted Deery Oil
- 7) Seventh layer (when applied) is a polyethylene webbing for added strength in liner weld areas and areas of potential wave action
- 8) Webbing is then filled with Deery Oil as top layer

Repairs were necessitated due to thirty (30) years of erosion and wear of the Deery Oil due to solar and other climatic effects, or physical damage from equipment and personnel. In other areas, the liner system itself was not damaged or in need of repair, but the underlying foundation material had slumped or was not in its original configuration due to wave action from the impoundments.

In cases where the underlying foundation material required reshaping and recompaction, the Deery Oil liner system overlying those areas was cleaned to remove sediment and scale and then vertical incisions were made at about ten (10) foot intervals and the liner system rolled downhill so that the underlying material could be regraded and compacted. The liner system was then rolled back uphill to its original location and the incisions repaired as shown above.

### Scope of Work

The Homestake Mining Grants Pond Liners Repair Project consisted of locating and repairing those areas of the East and West Collection Ponds and Evaporation Pond No. 1 where the Deery Oil liner system was damaged or otherwise potentially not fully functioning, or where the underlying foundation material has been deformed by wave or other actions that could lead to liner stretch and potential failure if not addressed.

The details of the areas repaired are as follows (Numbers correspond to locations shown on Figure 1):

- 1) Repair Area No. 1 was located in the SW Corner of the West Collection Pond (WC Pond). The existing liner had been damaged above the water line by equipment and natural degradation, and the embankment under the liner in that corner was somewhat depressed due to equipment travel and compaction. The WC Pond was drained of fluid and allowed to dry. The liner was then removed from the embankment and additional fill material imported, placed in 12 inch lifts after the addition of water to bring the material up to optimum moisture, and compacted by excavator bucket and wheel rolling with a front-end loader with the loader bucket full of dirt. After the embankment was brought back up to the desired elevation, the liner was replaced and fused to the existing liner left in place by the process described above for fusing the Deery Oil liner with fabric, Deery Oil and mesh. An additional 3 feet of liner was constructed and fused to the

existing liner at the top to recreate enough liner to go into the anchor trench. The material was laid into the 12 inch deep anchor trench and soil was compacted over the liner to re-anchor it.

- 2) Repair Area No. 2 was the cross-ditch between the West and East Collection Ponds. This ditch allows management of water levels in the two Collection Ponds. The liner system in the cross-ditch was then reconstructed following the above referenced liner repair method.

In addition to the above described repairs to the West and East Collection Ponds, both ponds were inspected and a number of small rips and tears above waterline were identified and repaired with Deery Oil patching.

- 3) Repair Area No. 3 was in the SE Corner of the East Collection Pond (EC Pond). A length of about 130 feet of the existing liner had separated from the liner buried in the anchor trench at the top of the embankment and stormwater had created some erosion below the liner system. The existing liner system had vertical cuts incised from the top of the liner to above the water level (approximately 12 feet), and the liner rolled downhill to expose the embankment. Moisture conditioned fill was then imported and the embankment reconstructed in 12 inch lift and compacted with the excavator bucket and a portable "jumping jack" compactor. When the embankment was reconstructed to grade, the liner system was rolled back into place and the vertical incisions repaired as described above. An additional 3 feet of liner was constructed and fused to the existing liner at the top to recreate enough liner to go into the anchor trench. The material was laid into the 12 inch deep anchor trench and soil was compacted over the liner to re-anchor it.
- 4) Repair Area No. 4, the SE Corner of Evaporation Pond No. 1 (Evap Pond No. 1). The SE Corner of Evap Pond No. 1 was an area where wave action from water in the pond had caused the soil material underlying the Deery Oil liner system to disfigure and slump in some places. Left unaddressed, this could have lead to liner stretch. The area in the SE Corner of Evap Pond No. 1 that was affected and required repair was approximately 700 feet from the SE Corner to the west, along the south embankment. In addition, about 140 feet north from the SE Corner along the East embankment was also affected. The slope is approximately 3H:1V.

The water elevation in Evap Pond No. 1 was drawn down by approximately 12 feet to expose all of the area where repairs were required. The liner was then cleaned using high pressure water spray from a water truck and portable trailer mounted high pressure system, as needed. The existing liner was then cut as in the repairs to the East Collection Pond, where vertical incisions were made in the liner and it was rolled down and the embankment under the liner reconstructed and compacted.

The Deery Oil liner system was then rolled back into place and the sections fused with the Deery Oil patch systems as described earlier.

- 5) Repair Area No. 5, N Embankment of Evaporation Pond No. 1 (Evap Pond No. 1). The N embankment of Evaporation Pond is at a slope of approximately 5H:1V. The Deery Oil liner over the fabric of the liner system has degraded due to apparent under application of Deery Oil over the fabric liner at the original installation, and likely effects from sunlight on this south facing slope.

The liner was then cleaned using high pressure water spray from a water truck and portable trailer mounted high pressure system, as needed. The areas with a thinning Deery Oil layer were then recovered with a 1/8 to 1/4 inch layer of new Deery Oil.

- 6) Construct drainage ditch between Evaporation Pond No. 1 and Evaporation Pond No. 2. A ditch between the two evaporation ponds was constructed at the base of the west embankment of Evap Pond No. 1 to catch precipitation and runoff from the embankment and direct it by the constructed ditch into an armored entry into Evap Pond No. 2.

A series of photographs showing the details of the Construction Projects, including the Pond Liner Repairs methods and procedures are provided in Appendix B.



**APPENDIX A**

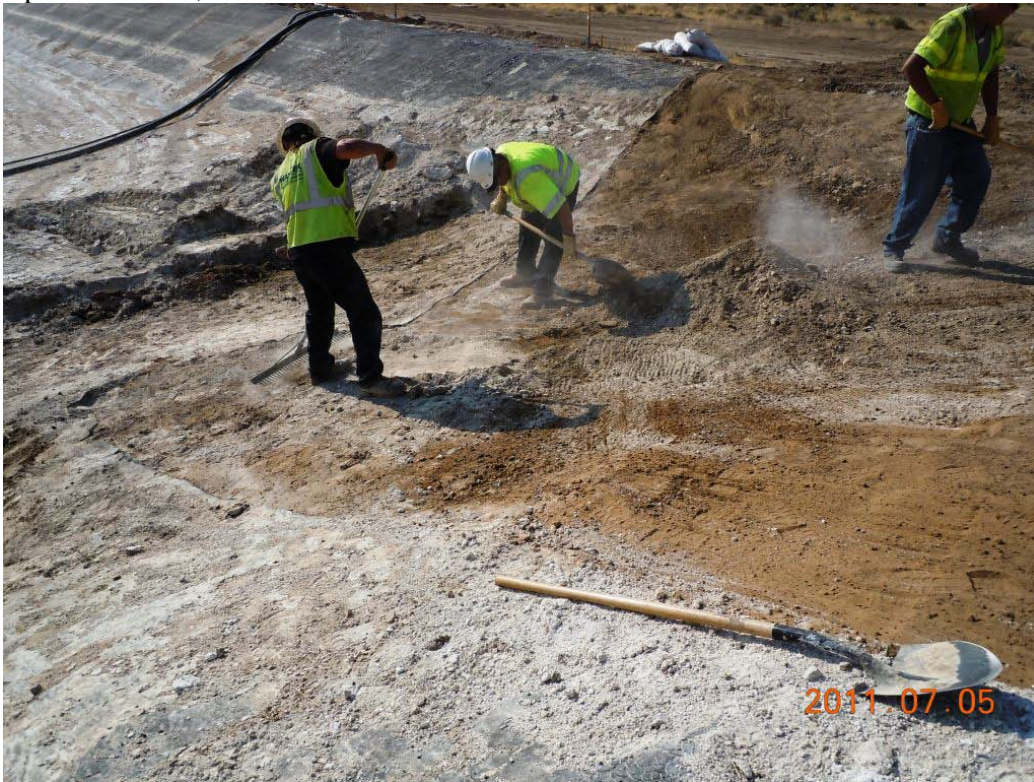
**Deery Oil MSDS**

**APPENDIX B**

**PHOTOGRAPHS OF HOMESTAKE GRANTS  
EAST & WEST COLLECTION PONDS  
&  
EVAPORATION POND NO. 1  
POND LINER REPAIR PROJECT  
COMPLETION REPORT**



Repair Site No. 1, SW Corner of West Collection Pond



Liner Removed and sub-base prepared for liner replacement / repair

Repair Site No. 1, SW Corner of West Collection Pond



Reconstruction of Deery Oil Liner System in W Collection Pond SW Corner



Repair Site No. 1, SW Corner of West Collection Pond



Reconstructed Deery Oil Liner System in W Collection Pond SW Corner

Repair Site No. 2, Cross-Ditch between East and West Collection Ponds



West – East Collection Ponds Cross-Ditch excavated for Liner Reconstruction



Repair Site No. 2, Cross-Ditch between East and West Collection Ponds



Installation of felt fabric material in Cross-Ditch

Repair Site No. 2, Cross-Ditch between East and West Collection Ponds



Application of Deery Oil over fabric



Repair Site No. 2, Cross-Ditch between East and West Collection Ponds



Completed Cross-Ditch between West and East Collection Ponds

Repair Site No. 3, SE Corner of East Collection Pond



Reconstructed sub-base embankment, spreading of fabric and Deery Oil application



Repair Site No. 3, SE Corner of East Collection Pond



Adding fabric and Deery Oil to extend liner system at top

Repair Site No. 3, SE Corner of East Collection Pond



Fusion of section of existing liner system with fabric and Deery Oil & completed sections

Repair Site No. 3, SE Corner of East Collection Pond



Rolling existing liner back into place for fusion with sides and top

Repair Site No. 3, SE Corner of East Collection Pond



Adding additional liner to top of existing liner where top had been damaged



Repair Site No. 3, SE Corner of East Collection Pond



“Conditioning” of existing liner prior to fusion by Deery Oil liner system

Repair Site No. 3, SE Corner of East Collection Pond



Deery Oil liner system repaired



Repair Site No. 4, SE Corner Evaporation Pond No. 1



Evaporation Pond No. 1, SE Corner looking W. Pre-Existing Condition – wave benches

Repair Site No. 4, SE Corner Evaporation Pond No. 1



Evaporation Pond No. 1 SE Corner, washing sediment from liner with water truck



Repair Site No. 4, SE Corner Evaporation Pond No. 1



Evaporation Pond No. 1 SE Corner, washing sediment from liner with high pressure washer

Repair Site No. 4, SE Corner Evaporation Pond No. 1



Applying Deery Oil to seams in liner after recompaction of subbase.

Repair Site No. 4, SE Corner Evaporation Pond No. 1



Deery Oil Liner System after repair. Note subbase recompact and seams sealed.

Repair Site No. 5, N Embankment Evaporation Pond No. 1



NE corner Evap Pond No. 1, reapplication of Deery Oil top layer over weathered areas.



Repair Site No. 5, N Embankment Evaporation Pond No. 1



North embankment reapplication of Deery Oil top layer over weathered areas.

Site No. 6, Construction of Drainage Channel between Evap No. 1 and Evap No. 2



Initial construction of drainage ditch, looking South.

Site No. 6, Construction of Drainage Channel between Evap No. 1 and Evap No. 2



Completed drainage channel between Evap No. 1 and Evap No. 2, looking North.

Site No. 6, Construction of Drainage Ditch between Evap No. 1 and Evap No. 2



Completed drain pipe at South end of drainage channel, directing water into Evap No. 2