

Appendix A19

**M. Keenihan, M. Nelson, “*DENR Underground Inspection Report*”,
*June 6, 2003***

HOMESTAKE UNDERGROUND INSPECTION

June 6, 2003

Executive Summary

Department personnel completed an inspection of a portion of the deepest workings in the Homestake Mine on May 28, 2003. This inspection included workings ranging in depth from 4850 feet to 8000 feet. The May 28, 2003, inspection was very rushed in the lower portion of the mine. As a result, it was not possible to sample water entering the mine near the 8000 Level, which was the wettest part of the mine observed on May 28.

A follow-up inspection was completed on June 6, 2003, primarily to return to the lower portion of the mine and sample the water flows missed on May 28. Additional work was also completed including sampling iron hydroxide precipitates associated with some of the water flows, inspecting the 8000 Level pump room, and completing follow-up inspections of electrical equipment observed on May 28.

The inspectors entered the mine via the Ross Shaft and traveled directly to the 8000 foot level via 6 Shaft. The inspection included the 8000 foot workings between 6 shaft and the 31 cross-cut emergency storage sump and the 21 Ledge ramp from the 8000 Level to approximately the 7850 Level. Five water samples and two precipitate samples were collected during the inspection. Water chemistry analyses have been completed, although analyses are not complete on the precipitate samples.

The inspection program at the Homestake Mine was initiated for two primary purposes:

- To determine whether Homestake has done what it said it would do in preparation for mine closure; and
- To determine whether Homestake's mine closure activities comply with environmental law.

Based on the small portion of the mine inspected June 6, the Homestake closure work appears to comply with environmental law. In the areas inspected on June 6, Homestake has followed its internal mine closure protocol, and the work is of similar quality to closure work observed in other portions of the mine. The few remaining closure tasks at the 8000 Level include removing the operable transformers and removing fluids from the pump equipment. This work is planned to be completed immediately prior to abandoning the deep portions of the mine. Homestake will document this closure work as part of its internal mine closure documentation.

Inspection Report

Operator: Homestake Mining Company
Project: Homestake Underground Mine Inspection
DENR Inspectors: Mark Keenihan, Mark Nelson (Minerals and Mining Program)
Operators Present: Randy Carsten
Inspection Date: June 6, 2003

The inspectors arrived at the Mine at 6:30 am on June 6, 2003. After donning the appropriate safety gear at the Homestake safety office, the inspectors met Randy Carsten at the Ross Shaft. The inspectors then proceeded to the 4850 Level via the Ross Shaft and walked to the 6 Shaft (internal winze). The inspectors then proceeded directly to the 8000 Level.

The inspectors proceeded to the planned farthest point from the shaft prior to collecting water samples in order to minimize the distance that water samples had to be carried through the mine. Along the way, inspections were completed at the 8000 Level pump room and several ancillary facilities.

Transformer site. An operating dry core transformer was present on a track siding approximately 500 feet from 6 Shaft. The transformer was mounted on a rail car. Mr. Carsten told the inspectors that the transformer would be removed prior to abandonment of the mine dewatering system. Additional electrical equipment observed included several mine locomotive battery chargers. This equipment will remain in the mine after it is flooded.

Pump Room. The 8000 Level pump room (photo 1) includes a number of very large pumps (700 to 800 hp) and ancillary equipment including pump motors, valves, pipes, an operating dry core transformer, electrical switch gear, and controls. The operating transformer was located on a flat bed cart near the exit of the pump room. Mr. Carsten stated that this transformer will be removed prior to flooding the mine. Abandonment plans for the other pumping equipment consists of oil removal only. Mr. Carsten also said that Homestake planned to remove a number of mercury switches in the area prior to flooding. All other equipment in the area will be abandoned in place.

A former wet core transformer room was located next to the main pump room. These transformers had been removed and the area was decommissioned in compliance with Homestake's closure plan.

The inspectors then proceeded down the 8000 Level drift towards 21 Ledge. Additional equipment observed in the mine included a 12 kv switch box, mine cars, and infrastructure related to the 7 shaft and the former Dunn Bush refrigeration plant. This equipment will remain in the mine after flooding.

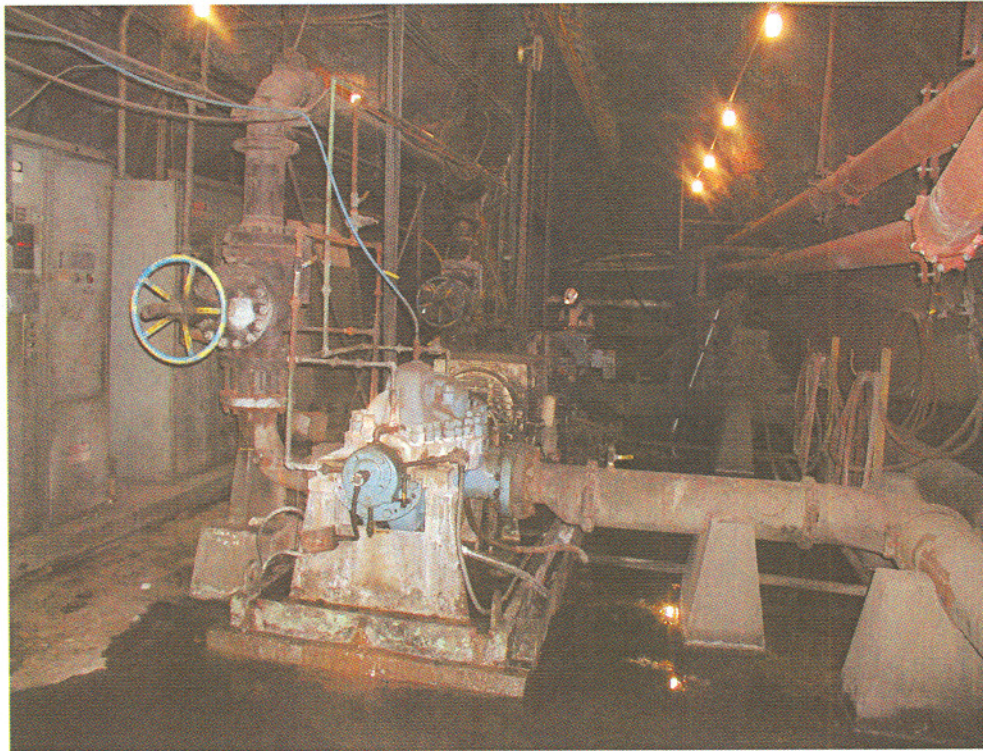


Photo 1. 8000 ft. Level pump room.

Water and precipitate sampling. The inspectors walked up the 21 Ledge ramp system approximately 150 vertical feet to begin sampling. Orange iron hydroxide precipitates observed in this area during the proceeding inspection were sampled in order to provide some general understanding of the geochemistry of the mine (photo 2). These precipitates are evidence of dissolved iron migrating through the mine rock prior to precipitating from solution after exposure to the oxygen-rich atmosphere of the ventilated workings. Analyses are planned to evaluate these precipitates for potential contaminants such as arsenic, which could be re-dissolved after the mine is flooded and the current ventilated oxygen-rich conditions are no longer present. One additional precipitate sample was collected approximately 50 vertical feet below the first site, although the main concentration of precipitate deposits in this area could not be accessed due to dangerous rock conditions.

The inspectors proceeded back down the ramp to the 31 cross-cut emergency storage sump. This is a temporary water storage location built prior to flooding the mine. Mr. Carsten reported that this water is a combination of water entering the mine from drill holes and water pumped back from the main pump system. An approximately 10 inch diameter pipeline was draining into the retention dam at the time of the inspection. Mr. Carsten stated that this water was pumped from the main 8000 Level retention ponds.

The inspectors then proceed back on the 8000 Level drift towards 6 Shaft. The second water sampling station was a diamond drill hole of approximately 2" diameter. Water was draining from the drill hole. This water was quite hot at 113° F, indicating that the water had limited interaction with mine workings prior to discharge from the drill hole. This hypothesis is

supported by analytical results from a sample of the water indicating it has very low total dissolved solids and sulfate concentrations. This sample provides data regarding the background water chemistry of the deep Precambrian aquifer prior to interaction of the water with the mine rocks.



Photo 2. Iron hydroxide precipitates observed in the 21 Ledge ramp approximately 7850 feet below the surface.

The third water sample was collected from the 7 Shaft drainage. This is an inoperable shaft (winze) that passes from the 6800 Level down to the 8000 Level. This location presented an opportunity to sample water that has interacted with mine rocks. This water was much cooler than the previous water at 79° F. The chemistry of this water contrasts markedly with the diamond drill hole water and contains very high total dissolved solids and sulfate concentrations.

The fourth water sample was collected at the location of the former Dunn and Bush refrigeration plant. This was water flowing down the drift so it is likely a mixture of water from various sources.

The fifth sample was collected from water leaking out of the main pump back pipeline near the 6 shaft. This sample location presented an opportunity to sample the overall blended water that is being pumped from the mine at the 8000 foot level.

Additional analyses and discussion of the data from this inspection as well as the May 28 and subsequent June 13 inspections will be discussed in a separate mine water quality report.

Conclusions and Findings

The inspection program at the Homestake Mine was initiated for two primary purposes:

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- To determine whether Homestake's mine closure activities comply with environmental law.

Based on the small portion of the mine inspected June 6, the Homestake closure work appears to comply with environmental law. In the areas inspected on June 6, Homestake has followed its internal mine closure protocol, and the work is of similar quality to closure work observed in other portions of the mine. The few remaining closure tasks at the 8000 Level include removing the operable transformers and removing fluids from the pump equipment. This work is planned immediately prior to abandoning the deep portions of the mine. Homestake will document this closure work as part of its internal mine closure documentation.

In general, the inspectors did not look specifically for potential contaminants related to backfilled tailings or other mine rock geochemical issues. Opportunity water samples were taken that may provide information on ground water quality and water draining from mine workings. The deepest levels of the mine inspected on June 6 represent one of these opportunity water sampling locations. Department personnel are continuing discussions with Homestake personnel and contractors regarding ongoing modeling of the ground water quality that may occur following closure and flooding of the underground mine.