

STATE OF ALASKA

DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SOLID WASTE PROGRAM

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FIELD INSPECTION REPORT HECLA GREENS CREEK MINING COMPANY

Inspection Date: July 31, 2008, Thursday
Report Date: August 7, 2008
Report Written By: Ed Emswiler, ADEC Solid Waste Program
Weather: 53 degrees F., 0.17 inches precip., wind 8.2 mph NE, light rain, fog and cloudy (reported at Juneau Weather Forecast Office NWS)

HGCMC Personnel: Eric Sundberg P.E., Gabe Hayden
State Personnel: Ed Emswiler, ADEC Solid Waste Program

Documentation: Photos were taken and are available for inspection at ADEC in Juneau

Purpose of visit: To observe progress on the installation of a liner in the Northwest Pit 5 portion of the tailings disposal site

General Items:

This site visit was conducted as a post-annual report visit. The annual report was presented July 8, 2008. I travelled by US Forest Service arranged float plane, arriving at the Hecla Greens Creek Mining Company (HGCMC) float dock at 08:30am and leaving at 1:00pm.

Prior to going on-site Eric Sundberg, Gabe Hayden and I met in a conference room at the camp facility for approximately an hour to go over the approved construction design and plan for the installation of the liner system and any other items we would want to review during the visit. Eric Sundberg and I then travelled to the Pit 5 area and the rest of the Tailings disposal facility (tailings disposal facility). Gabe Hayden was not present for this part of the site visit.

Pit 5 Area of the Northwest Expansion – Tailings Disposal Facility

At the Pit 5 area of the tailings disposal facility installation of the liner system was put on hold due to weather (light rain). HGCMC was waiting on acceptable weather conditions as the fusion process requires there be no precipitation. Approximately 85% of the liner in the Pit 5 area of

the Northwest Corner of the tailings facility had been placed with about 15% of the area exposing the 6-inch sand bedding layer. Approximately 70% of the liner had been fused and/or extrusion welding completed. Many of the seams of the liner system had been placed at the western portion of the Pit 5 area but had not been fused at this inspection. Because of this a large amount of water was collecting beneath the liner that required pumping to the North to West collection corridor. All areas where the sand bedding layer was exposed made for vulnerability due to erosion. More favorable weather conditions developed in the days following this inspection, which allowed HGCMC to complete the liner installation.



Exposed Sand Bedding Layer



Note: Pumping of Water Below Liner (lower left) to Northwest Corridor

URS was on site to perform 3rd party QA/QC of the liner installation process. URS was reported to be independent of both the contractor and HGCMC. A few of the daily field reports that URS completed for their final report were reviewed and found satisfactory. Typically, if an issue came up during the installation process, URS would let the contractor know so that the necessary changes could be made and noted in the URS reports. Testing of fusion welds involves a pressure test whereby a needle is inserted between two welds in the liner and then tested for the retention of pressure between welds. Fused seams were also “peel” tested.

According to design, an 80-mil HDPE liner is installed over a 6-inch layer of bedding sand (hydraulic conductivity of 1×10^{-2} cm/sec) where a system of several finger drains collect and provide a conduit for non-contact groundwater (and contact water in the case of a leak in the liner). The finger drains consist of 8-inch perforated HDPE surrounded by drain gravel and 100-mil nonwoven geotextile and are connected to non-perforated “hardpipe” in the North to West Corridor that provides a conduit by gravity for this water to the West Buttress surface water collection ditch. According to the design, the 8-inch pipe provides only an enhancement to the finger drain system as the drain gravel (surrounded by geotextile) is designed to fully handle the water coming from the system. The operational strategy for the Northwest Expansion and the tailings disposal facility in general is to route all collected waters to Pond 7 in a manner that will facilitate post-closure gravity flow. This is intended to eliminate the need for pumping water after closure of the tailings disposal facility. Under the liner, a system of vibrating wire piezometers and suction lysimeters are installed for geotechnical and environmental monitoring.

In areas where the slope is less than 15%, a 12-inch interlayer of granular sand (hydraulic conductivity of 1×10^{-2} cm/sec) is placed above the liner prior to installation of a 200-mil geotextile material. The thickness was changed from a 6-inch layer (June 21, 2007 URS response to ADNR Dam Safety concern over damaging the liner during construction activities). In this sand interlayer, finger drains similar to those discussed above are installed to collect and transmit contact water to Pond 7 as described above. In areas where the slope is greater than 15%, the geotextile is placed directly over the 80-mil HDPE liner material.

Once the geotextile is placed a 6-inch compacted service layer of sand (hydraulic conductivity of 1×10^{-2} cm/sec) is installed in areas with a slope less than 15% prior to the placement of tailings. In areas where the slope is greater than 15%, this service layer of sand is 24-inches. This sand will be provided as the tailings development progresses vertically.



Sand Service Layer above Geotextile

Stability issues are addressed in the Pit 5 area by having slopes greater than 15% on 3-sides (creating a “bathtub” effect). The 80-mil HDPE liner laps under the haul road that circumnavigates the landfill thereby creating an anchor.

As mentioned previously a series of pipes that travel under the Northwest Expansion area and that exit at a surface collection ditch at the end of the North to West Corridor includes:

1. Underdrain system from below the liner system that collects groundwater – 8-inch
2. Overdrain system from above the liner system that collects contact water – 8-inch
3. Pond 9 (northeast retention pond) – 18-inch
4. DB04 from truck wash at the cannery – 8-inch
5. Several smaller pipes that carry the conduit from vibrating wire piezometers and suction lysimeters



Hardpipes exiting North to West Corridor to Surface Water Ditch within Containment

Note:

- **8-inch pipe above carrying water from below liner in Northwest Pit 5 area**
- **Large 18-inch pipe from Northeast Retention Pond**
- **Medium sized 8-inch pipes carry water from finger drains above and below liner in Northwest Expansion and DB04 from truck wash at Cannery**
- **Smaller pipes carry conduit for piezometers and lysimeters**

A slurry wall was raised and extended in the Northeast section of the landfill from its connection to the B-Road to the Pit 5 area under the road that circumnavigates Pit 5 where it intersects with bedrock. This provides both a water diversionary structure for water run-on as well as for seepage control from the landfill. A slurry wall was also developed under the road at the western aspect of the landfill extending and raising the existing slurry wall to the bedrock excavation at the Northwest Corner. This slurry wall has the purpose of providing seepage control from the landfill. Slurry walls were developed into glacial till and to a direct connection with the bedrock which according to HGCMC is very competent. In addition, drainage structures installed upgradient of the slurry walls lower the water table, thereby minimizing flow through the slurry walls and their contacts with the till and bedrock. The effectiveness of the containment system is evaluated through surface water and groundwater monitoring. The Waste Management Permit renewal process currently in progress includes evaluation and potential modification of the existing water monitoring program for the landfill to ensure compliance with applicable regulations.

Tailings Placement in Northwest Expansion – Tailings Disposal Facility

The placement of tailings was observed at the Northwest portion. There was proper signage instructing drivers about the use of clean and dirty roads. Haulers were instructed to use the truck wash. Barriers were placed between the clean road and the road in which waste (tailings) was hauled and delivered to the site. No vehicles were observed driving from “dirty” roads to “clean” roads at this inspection. HGCMC should continue to be vigilant in maintaining separation between dirty and clean roads and the use of the truck wash for vehicles that come into contact with the tailings disposal site.



Signage Instructing Users



Signage



Barrier Between Clean/Dirty Roads

Because of weather conditions, the tailings disposal area was rather sloppy. Argillite production rock was hauled and laid down in areas that were too sloppy to manage tailings. Sundberg mentioned that these conditions would be alleviated if the planned tailings storage building was constructed and tailings could be delivered to it instead. ADEC supports and encourages HGCMC's plan to construct this tailings storage building to facilitate more effective tailings disposal.

Additionally, Sundberg mentioned the "side stitching" procedure that was used to integrate newer tailings into the excavated old tailings pile in order to provide for increased stability and decreased potential for slippage at the interface between the two surfaces. The procedure cuts into the old tailings in a zig-zag pattern and fills the gaps with new tailings.



Tailings Disposal, Grading and Management (wet/sloppy)

Sundberg reported an area of road at the western portion of the landfill between the West Buttress and the Northwest Expansion that was developed with quarry rock from the 2007 Northwest Expansion area. According to HGCMC, some of the rock contains pyrite (up to 2% by volume) which likely has contributed to the increase in dissolved load (notably sulfate and zinc) observed in drainage outside containment (HGCMC 2008 Annual Report). HGCMC reported the sulfate and zinc concentrations have decreased in the monitoring conducted since the pyritic material was placed.



Clean Road (right of drainage ditch), Dirty Road (left of drainage ditch) at toe of West Buttress
Note: material at right is outside of containment and is a source of potential contaminants

An action plan should be provided that deals with the sulfidic rock that was placed outside of containment. This plan should be written for ADEC approval and should comply with all relevant requirements in Sections 2 and 7 of the Waste Management Permit. A sampling plan should also be provided that shows sampling locations, parameters to be analyzed, frequency of sample collection, how data will be analyzed, triggers for notification and triggers for additional action and QA/QC. There should be a projection of future water quality in this area. It should provide a contingency plan in the case that water quality standards are not met in the foreseeable future. All data pertaining to this issue should be provided along with an interpretation of the data in comparison with water quality standards.

HGCMC should provide ADEC with a plan showing the direction of groundwater and surface water flow and the location and justification for compliance monitoring stations that would sample seepage from the tailings facility and Pond 7. Points of compliance should be chosen such that the highest concentration of hazardous constituents migrating off the facility will be detected and interference from sources of pollution unrelated to the facility will be minimized. This also should be incorporated into the next version of GPO Appendix 1.

Another plan should be developed that shows how material that is excavated from rock or borrow sources and is to be placed outside of containment will be characterized so as to prevent problems of this nature from happening in the future. This plan should be incorporated into the appropriate section(s) of the General Plan of Operations for the overall HGCMC facility and included in an Environmental Management System for the mine. The plans should be submitted for ADEC approval prior to institution of the plan. This is an action item to this report.

1.4 Mile Sandpit

The 1.4-mile sandpit is the source of all of the sand for placing the liner system and for performing other functions requiring this material at the mine. This source is nearly exhausted

within the confines of the existing permitted lease boundary. A Federal Environmental Assessment (EA) will be needed to expand the sand source and according to Sundberg, the EA process may take up to a year or longer. Providing the sand material in a way that meets HGCMC demand is a recommendation to this report. A Federal EA should be initiated as soon as possible in order to meet this demand.

Pond 6

We briefly stopped at the Pond 6 area. The pond had been excavated to the hard till layer and a layer of bedding sand was placed above that to protect the till from damage. Approximately 10 finger drains (HDPE pipes) from the southern portion of the landfill inclusive of wet wells were positioned into the pond area where they would eventually be connected to a temporary sump that was in place at the time of this inspection. Their discharge is by gravity into Pond 6. A 30-foot tall caisson (Wet Well “A”) would initially be developed in the area of the sump and would be extended as the landfill increased in height. During operation, water would be pumped from the sump (caisson) to the water treatment plant for treatment and ultimate disposition through the permitted NPDES outfall. At closure, a 14-inch hardpipe would be connected to the sump and be directed by gravity (free draining) through the downgradient slurry wall into the NPDES marine outfall line.



Pond 6: Note Underdrain Pipes and Sump where Caisson (Wet Well) Will Be Installed. Also Note Sand Layer Over Hard Till Layer

Several pipes were observed in the area of the proposed de-grit pad near the bridge between Pond 6 and Pond 7 many of which were discharging water to Pond 7. Although not specifically identified, Sundberg reported each pipe could be identified via plan (each one is surveyed) as to the source of water for each pipe.



Several pipes in the area of the proposed de-grit pad at the bridge between Pond 6 and Pond 7 discharging water to Pond 7

Water Treatment Plant

While in the Pond 6 area a walk-through of the new treatment plant was conducted. The plant was down for repair to a variable speed mixer to the tank that provides ferric chloride addition. Therefore, all contact water was directed to Pond 7 for storage. Sundberg pointed out how flows are handled, where directed and how monitored prior to discharge to the NPDES outfall. Logistics controls were installed for equipment and were functioning.

The new treatment plant will be able to process 2500 gpm. The mill plant can process 1000 gpm, so, if it is possible to move this amount of water out of the marine outfall pipe, the maximum discharge to Hawk Inlet in a large storm event could reach a maximum of 3500 gpm. The treatment plant would produce approximately 10 cubic yards of pressed sludge every 4-5 weeks. The sludge is permitted for disposal into the tailings disposal site.

Conclusions

On July 31, 2008 the HGCMC Tailings Disposal Facility was inspected. The intention of the inspection was to observe the placement of the liner in the Pit 5 area of the Northwest Corner of the tailings disposal facility.

1. Liner placement was halted because of the weather causing the bedding sand layer below the liner to be vulnerable to erosion. The liner should be placed as soon as conditions improve. Underdrain piping and other inputs to both surface water and ground water collection throughout the tailings facility was observed.

Other areas of the tailings disposal facility were observed.

2. Disposal was accomplished at the tailings disposal facility. However, tailings were being disposed in a wet/sloppy condition which could be greatly improved by developing the tailings storage building.

3. Haul trucks were noted to be observing signage for driving on roads designated for clean/dirty conditions.
4. The new water treatment plant was observed to be off-line due to the change-out of a variable speed mixer. Water was diverted to Pond 7.
5. An area of road between the West Buttress and the Northwest Expansion where a slurry wall was installed under the road contains pyritic rock (up to 2% by volume) which likely has contributed to the increase in dissolved load (notable sulfate and zinc) observed in drainage outside containment.

Action Items

1. Continue monitoring the drainage of the area downgradient of the road that has pyrite from the NW expansion area.
2. Submit an action plan that deals with the sulfidic rock placed outside of containment. This plan should be written for ADEC approval and should comply with all relevant requirements in Sections 2 and 7 of the Waste Management Permit. Submit a sampling plan that shows the location of samples, parameters, frequency, data analysis, triggers for notification and triggers for additional action and QA/QC. There should be a projection of future water quality in this area. It should provide a contingency plan in the case that water quality standards are not met in the foreseeable future. All data pertaining to this issue should be provided along with an interpretation of the data in comparison with water quality standards.
3. Submit a plan showing the direction of groundwater and surface water flow and the location and justification for compliance monitoring stations that would sample seepage from the tailings facility and Pond 7. Points of compliance should be chosen such that the highest concentration of hazardous constituents migrating off the facility will be detected and interference from sources of pollution unrelated to the facility will be minimized. This also should be incorporated into the next version of GPO Appendix 1.
4. Submit a plan that shows how material that is excavated from rock or borrow sources that is to be placed outside of containment will be characterized so as to prevent problems of this nature from happening in the future. This plan shall be incorporated into the appropriate section(s) of the General Plan of Operations for the overall HGCMC facility and included in an Environmental Management System for the mine. The plan shall be submitted for ADEC approval prior to it being instituted.
5. Within two weeks of receipt of this inspection report provide dates when you will be able to submit the various plans mentioned above to ADEC.

Recommendations:

1. HGCMC should continue to be vigilant in maintaining separation between dirty and clean roads and the use of the truck wash for vehicles that come into contact with the tailings disposal facility.
2. ADEC supports and encourages HGCMC's plan to construct the tailings storage building to facilitate more effective tailings disposal.
3. The 1.4-mile sandpit is the source of all of the sand for placing the liner system and for performing other functions requiring this material at the mine. The 1.4-mile sandpit sand source is nearly exhausted within the confines of the existing permitted lease boundary.

Providing the sand material in a way that meets HGCMC demand is recommended. A Federal EA has recently been initiated by the USDA Forest Service.

Additional Comment:

The Waste Management Permit renewal process currently in progress includes evaluation and potential modification of the existing water monitoring program for the tailings disposal facility to ensure compliance with applicable regulations.

The Alaska Department of Environmental Conservation appreciates the continuing cooperation of the Hecla Greens Creek Mining Company with the ADEC Solid Waste Program.

** * * End of Report * * **

