STATE OF ALASKA

DEPARTMENT OF ENVIRONMENATAL CONSERVATION

SOLID WASTE & WATER PROGRAMS

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FIELD INSPECTION REPORT
HECLA GREENS CREEK MINING COMPANY

Inspection Date:	May 5, 2008
Report Date:	May 21, 2008
Weather:	**C**ool and breezy with temperatures around 45-50F, no rainfall. Snow prevented access to Sites 960 and 1350, otherwise no snow was encountered at the site.
Inspection Objectives:	To accompany the audit team from SRK Consulting Engineers and Scientists. The audit is a requirement of the Waste Management Permit and must be conducted every 5 years prior to renewal of the permit.
Operator Contact:	HGCMC: Bill Oelklaus, Jennifer Saran, Pete Condon
State Personnel:	Ed Emswiler, ADEC; Kenwyn George, ADEC Steve McGroarty, ADNR
Other Personnel:	SRK: Stephen Day, Don Hovdebo, Daryl Hockley, Kathleen Willman USFS: Jeff DeFreest, Sarah Shoemaker
Documentation:	Photos were taken and are available for inspection at ADEC in Juneau

Purpose of visit:

To accompany the audit team from SRK Consulting Engineers and Scientists. The audit is a requirement of the Waste Management Permit and must be conducted every 5 years prior to renewal of the permit.

The tour comprised visits to the following sites or facilities:

a) Site 920; the weir and bridge site adjacent to the portal and the back slope to the mill.
b) Site C with an overview of Pond C.
c) Sites 23 and D with overviews of Ponds 23 and D.
d) Site E
e) Tailings facility with an overview of Ponds 7 and 9.

This site visit was intended to be a "kick-off" meeting with SRK auditors. Issues of concern at each site were discussed. Issues included the ultimate fate of acid generating rock, tracking of metals leaching particles on vehicles along the road, water management, etc. Due to limited time only the main issues were raised by agency personnel during this visit. SRK would return to the mine in following days to conduct their audit without agency personnel present. Don Hovdebo of SRK stayed in Juneau on Tuesday, May 6th to conduct interviews of agency personnel. A "close-out" meeting was conducted in Juneau at ADEC on Friday, May 9th and included both agency, HGCMC and SRK team. SRK is tasked with developing a draft audit report by July 31, 2008 and the Agencies are tasked with having comments back to them by August 31, 2008 for the development of a final report. ADEC will use the audit in drafting a renewed Waste Management Permit and improvements to the General Plan of Operations.

Mine Portal Entrance

This area was observed at the bridge adjacent to Greens Creek where monitoring of the Greens Creek river occurs. At the portal HGCMC stated the mine was being dewatered at a rate of around 30-40 gpm.

Areas of concern included:

1. how to further reduce contamination being tracked around by vehicles and other activities at the mill site and prevent them from entering Greens Creek.
2. how to provide secondary containment of an antifreeze conduit across the bridge from the mill to the portal.
3. A report will be submitted to the agencies in 2008 on the underground hydrology, water chemistry and long-term treatment requirements as long-term water management after closure of the mine is an item of concern.

Mill site (Site 920)

The group drove to the rear of the mill site and climbed the back slope to view both the mill and back slope. Evidence of acid drainage could be seen. Pete Condon explained changes to the piezometric surfaces within the pile and how that may affect stability.

Concerns identified by ADEC included:

1. whether or not water from the backslope and other areas around the mill site were adequately collected and prevented from entering the groundwater and Greens Creek.
2. The SRK team noted vulnerabilities with tanks external to the mill, such as a tails thickener tank.

Site C (870)

Pete Condon explained how water was collected from roads and ditches and transmitted to Pond C. Seepage through the down-gradient berm of the pond was potentially the cause of an elevated lead level in Site 6 (the nearest down gradient freshwater monitoring plan monitoring site) in November 2003. He explained the recent (2007) installation of a sump collection system and

proposed application of glacial till to the outside of the berm as measures to prevent this re-occurrence. ADEC recommended that a plan be submitted for application of the glacial till to the outer bank. This is an action item to this report. Mr. Condon mentioned that Site C would be excavated and placed either underground or at a disposal site at closure of the mine as it contains pyritic material that can cause ARD and metals leaching. This is programmed into the most recent closure cost estimates.

Concern to ADEC was related to:

1. water collection and diversion at the road from the mill and how this could be improved to prevent contamination from entering Pond C.
2. ADEC recommended that the SRK team further analyze the whole water management situation related to Pond C as well as the measures being taken to reduce the likelihood of seepages, and provide recommendations.

Site 23

Pete Condon gave a thorough explanation of the development of the waste rock site 23 and the various issues. The main pollutants from the waste rock are primarily zinc, cadmium and sulfate. Sampling has shown that lead is most predominantly found in samples from tailings. Pete explained how the site was developed with an underdrain system consisting of blanket and finger drains that report to Pond 23 and a curtain drain system that collects and diverts groundwater and contact water to Pond D.

Class 1 rock is 50% carbonate and 5% pyrite. The pyrite in this rock is useful when in the outer layer around acid rock because it consumes oxygen, and the carbonate material prevents the seepage waters from this rock from being acidic. Greens Creek initially proposed placing a 5-foot thick layer of Class 1 (net neutralizing) material on the outside slopes of Site 23 at closure. However, because of changes with the mine plan there is now expected to be a shortage of Class 1 material at closure, so the present plan is to place this material to a depth of 2-feet on these outer slopes. Class 2 rock is 10-20% carbonate and 5-10% (or maybe up to 15%) pyrite. Oxidation is expected to occur within 5-10 feet of the outer surface of the pile at closure.

Items of concern were related to:

1. Leachate quality post closure. DEC would appreciate SRK's recommendations for minimizing long-term treatment requirements. Questions related to this include:
   a) What is or are the proposed method/s and duration for post-closure water treatment?
   b) Do long-term water quality predictions appear reasonable
2. Geotechnical aspects.
   a) Are geotechnical assessments complete and accurate?
   b) Are operational practices adequate to insure geotechnical stability over the short and long-term?
3. Whether a spring that was encountered during 2006-2007 at the waste disposal site was properly diverted.
4. Is run-on diversion is adequate?

5. Are there any suggestions as to how to improve grading practices in order to minimize infiltration and facilitate runoff, and minimize sediment from being carried off in the drainage?
6. Is it an effective practice to blend the different rock types (Class II/III) in order to reduce chimney effects and associated oxygen entry into the pile?

Soil Cover System Test Plot

In December 2006, KGCMC began a collaboration with Oregon State University and M.A. O'Kane Consultants to further characterize the hydrology of the cover plot and evaluate how evolution of a native forest vegetation may affect cover system performance. In May 2007, a 10-meter instrumentation trench was installed at the toe of the cover system to help quantify water flows from individual layers of the cover. Standpipe piezometers and TDR moisture probes were installed on the cover up-gradient from the trench. A shelter was constructed over the instrumentation trench to protect the collection system. Pete Condon explained the various issues having to do with a higher rate of precipitation through the cover system than originally modeled and that barometric pressure may contribute to the cause. Adjacent to the instrumentation shelter the structure of the Engineered cap could be seen. Roots from grass were observed to have penetrated the capillary break layer below the growth layer, passing through geotextile above the capillary break. This could adversely impact the cover system over the long-terms. SRK mentioned that the industry is going to more simplistic cover systems than what is being tested at Greens Creek.

The SRK team cautioned entering the shelter that covers the instrumentation trench because of the four fatalities at the Sullivan Mine resulting from reduced oxygen; the oxygen level had dropped to 2%. The oxygen was consumed by pyritic rock and atmospheric conditions brought this oxygen-reduced air into the sampling chamber. Because of these concerns we did not enter to observe the instrumentation.

Questions and concerns related to the cover are:

1. Is the effect of tree blow-down being adequately addressed in the O'Kane and University of Oregon studies?
2. What recommendations can be made regarding the efficiency of the proposed cover system and any recommendation for an alternative cover system?
3. Will the engineered soil cover operate as designed, and is it adequate to protect post-closure water quality, when considering the possibility that percolation through the system is greater than that originally modeled? What impact would additional flow rates through the cover have on the various disposal facilities and treatment of water post-closure? Are there any recommendations to improve the design, monitoring and overall effectiveness of the cover system?

Site D

Pete Condon gave an explanation of the development of the waste rock Site D and the various issues at this facility. Site D was constructed similarly to Sites C and E in that unspecified

characterization of the waste rock was used to develop these facilities during the initial development of the mine. This was prior to regulation by the Agencies which commenced in 1990. All of the materials at these sites will be excavated prior to closure and placed into the tailings disposal site or inside the mine. It was noted by the SRK team that excavation of portions of the glacial till material below the waste rock may be needed as contamination from the waste rock may have influenced the condition of this material. The site was constructed with a pond (Pond D) to collect stormwater and run-off from a curtain drain at Site 23. Pond D contains approximately 12% contact water and approximately 80% of the D Pond flow is from the curtain drain. During a storm event in November of 2005 the flow over-topped the embankment to Pond D and spilled into Greens Creek.

Our chief concerns at Site D have to do with the following:

1. How best to control run-off from a 24-hour, 25-year storm to prevent discharge to Greens Creek during a large storm event. Is the existing mine water transmission system capable of dealing with water from a 24-hour, 25-year storm at Site D and other sites such as the mill, Pond A, Pond 23, etc. at the same time? Is this adequate to prevent over-topping of Pond D? There is a need to update the overall water balance for the mine in doing this.
2. The Site D berm has pyritic material and seeps water. We are interested in the best way to deal with the Site D berm such that contamination and leakages are eliminated, as well as having it withstand a 24-hour, 25-year storm to prevent discharge to Greens Creek. The Site D berm should be re-built using material that does not cause ARD or metals leaching; and, should be made not to create seepages. HGCMC should submit a plan and schedule for this.

Site E

A brief stop was made at this site at the entrance to the site, where the fate of the material was discussed. Site E will be removed to the tailings facility in 2009 following the results of a study that discusses the geochemical effects of depositing this material into the tailings facility. This report is due at the end of 2008. According to a geotechnical report the deposition of this material into the tailings may enhance the stability of the tailings under the prescribed condition of mixing tailings and Site E waste rock. According to Pete Condon, the northwest portion of the tailings will receive this waste.

Items of concern over Site E include:

1. Ensuring that all of the material within Site E are delivered to tailings including any contamination that may be contributed by the glacial till material.

Road B

Various storm water management features were pointed out to the SRK staff alongside this road, such as the rock check dams, bales and small sedimentation ponds. We await conclusions of the SRK audit in helping to guide further action concerning stormwater BMP's and management of

stormwater. We are also interested in any recommendations for the management of rock from road cuts and bridge abutments at the closure of the mine and whether any treatment of acid generating cut faces is necessary.

Tailings site

Pete Condon described how this facility has been designed, constructed, and operated over the life of the mine. There has been much study and work done to ensure both geotechnical and geochemical stability at this site. Initially the team observed Pit 5 where excavation was in progress for expansion of the tailings pile into this area. The geomembrane liner system in the NW corner expansion area was inspected. An explanation was given of the excavation of the tailings in this area of the landfill to allow the liner system to cover a bedrock outcropping then tie in to the glacial till layer more central to the landfill, thus promoting a more effective drainage system below the facility. It was explained that a drainage corridor and Pond 9 was provided in the northern part of the landfill as part of this project to allow contact water in the northern section to drain by gravity to the collection system on the western side. We travelled to the top of the pile where explanations were given of both the operational aspect of applying and compacting tailings, and of the SRMP test plot. We briefly drove by Pond 7 and the water treatment plant under construction.

Items of concern at the Tailings Site include:

1) Post-closure water management
   a) Have the modeled and predicted volumes and quality of seepage water post-closure been sufficiently determined?
   b) Are the proposed methods of water management and treatment post-closure the most suitable and practicable?
   c) Are there ways to reduce the need for long-term treatment?
2) Geotechnical
   a) Are geotechnical assessments complete and accurate?
   b) Are operational practices adequate to insure geotechnical stability over the short and long-term?
3) If elevated metals levels in shallow down-gradient wells around the tailings facility are from tailings blown off the tailings pile, what management practices should be used to reduce the amount of tailings blown off the pile?
4) What will be the long-term consequences of materials blowing off the pile for the life of the mine?
5) Are there any thoughts as to future compliance monitoring sites as the facility expands? Are the existing compliance monitoring sites adequate?
6) Do the existing seepage and run-on control structures appear adequate over the long-term?
7) What is the efficacy of using Class IV waste rock at the tailings site? Are there any thoughts as to how to use Class IV production rock for use in constructing roads at the tailings site in order to prevent this material from becoming a conduit for oxygen and water should the pile or cover system experience a disturbance following closure?
8) Does the peat disposed at the northern section of the landfill pose any geotechnical stability risk? What is going to be the ultimate fate of this material?

9) Is the practice of placing tailings on steep slopes problematic with regard to stability, erosion and dust control?

Agency left the site at 2 PM via a USFS plane and the SRK team remained on the site, returning to Juneau via the evening ferry.

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Conclusion

This portion of the Greens Creek Environmental Audit was successfully performed. The auditors were provided sufficient information to begin the "field" portion of the audit.

Action Items

1. Please see items above regarding the items of concern for each site visited.
2. Seepage through the down gradient berm of Pond C was potentially the cause of an elevated lead level in Site 6 (the nearest down gradient freshwater monitoring plan monitoring site) in November 2003. Application of glacial till to the outside of the Pond C berm is proposed as a measure to prevent seepage. A plan should be submitted for application of the glacial till to the outer bank and approval should be given prior to construction.
3. There is a need to update the overall water balance for the mine.
4. The Site D berm should be re-built using material that does not cause ARD or metals leaching; and, should be made not to create seepages. HGCMC should submit a plan and schedule for this.

Final Note.

The Alaska Department of Environmental Conservation appreciates the cooperation of the Hecla Greens Creek Mining Company with the Solid Waste and Water Programs.

Photographs from the visit

SRK team, agency staff and HGCMC personnel at the water treatment plant / Greens Creek near the mine portal.

Pond C. Note sump and berm

Site D and Pond D

SRK team, agency staff and HGCMC personnel at Site 23.

Pit 5 excavation in progress.

Geomembrane, geotextile and lower protective granular layer at the tailings NW expansion site.

Tailings pile NE corner expansion area

Tailings pile, SRMP cells to the left, Northwest expansion area in the center, Pit 5 to the right.