

Executive Summary

SRK Consulting (SRK) was retained by Hecla Greens Creek Mining Company (HGCMC) to conduct an environmental audit of the Greens Creek Mine. The audit was directed by the Alaska Department of Environmental Conservation (ADEC), in coordination with the Alaska Department of Natural Resources (ADNR) and the United States Department of Agriculture Forest Service (USFS).

Facility environmental audits are required by HGCMC’s Waste Management Permit 0211-BA001, dated November 7, 2003, and the Memorandum of Understanding between the USFS, ADEC, ADNR and HGCMC, dated May 23, 2007. The Waste Management Permit specifies that the audits be conducted every five years, prior to the renewal of the permit, and at the expense of HGCMC.

The audit was conducted in two separate visits. The geotechnical portion of the audit occurred at the Mine site from April 28 to April 30, 2008, with the remainder of the audit conducted at the Mine site and in the offices of ADEC and USFS from May 5 to May 9, 2008.

In general, the Greens Creek Mine was found to be well managed with respect to oversight by HGCMC personnel and the agencies and in compliance with the majority of the applicable permits, plans, approvals and regulations. Most of the major findings were issues that both HGCMC and the agencies were aware of as areas of concern prior to the audit, and in many cases, were already actively addressing.

It should be noted that the findings shown in this report are those found at the time the audit was conducted. The audit findings were ranked based on the criteria shown in Table A-1, with each finding assigned a Significance Level between 1 and 3.

Table A-1: Significance Levels for Ranking of Findings

Significance Level	Environmental Systems		Management and Permits		Cost to Operation
1	Currently causing an environmental effect	OR	Management systems fail to protect environment and reputations of mine and agencies	OR	Items exceeding \$5 million
2	Has potential to cause an environmental effect or result in non-compliance or is non-compliant with permit requirements, policies or standards	OR	Contradictory or ambiguous management and permit requirements	OR	Items between \$1 million and \$5 million
3	In compliance but opportunities to improve practices	OR	Management improvements at mine or agency oversight	OR	Items less than \$1 million

Findings that were assigned Significance Levels 1 and 2 are summarized in Table A-2, which includes the report section number where the detailed discussion associated with each finding can be found. Significance Level 3 findings are included in Section 4, “Audit Findings”.

Table A-2: Summary of Major Findings

Level	Finding	Report Section
<i>Tailings Disposal Facility</i>		
1	It is not clear if fugitive dust is causing an impact to surrounding soils, water, vegetation and biota. This should be evaluated.	4.2.1.7
2	The tailings are potentially acid generating, leading to a potential for acidification of surface runoff at some point in the future. Placement of covers will mitigate this issue.	4.2.1.5
2	Water chemistry predictions in the EIS indicated that water treatment may not be required following mine closure. However, the full benefit of treatment with organic matter and the effect of soil covers have not been evaluated.	4.2.1.5
<i>Production Rock Site 23/D</i>		
1	Seepage from D Pond Berm contains some constituents above ADEC Water Quality Standards and is discharging directly into Greens Creek.	4.2.2.5
2	Site D material is potentially liquefiable and, consistent with current plans, Site D material needs to be removed prior to or during closure.	4.2.2.2
2	During relocation of Site D production rock, mobilization of oxidation products can be expected by meteoric water. The potential for water quality to exceed standards needs to be evaluated and managed accordingly.	4.2.2.5
2	It is not known if native soils beneath Site D contain products of production rock weathering. Reclamation of native materials should consider measures to limit leaching of these weathering products when they are exposed.	4.2.2.5
<i>Inactive Production Rock Sites and Quarries</i>		
2	During relocation of rock fill, mobilization of oxidation products can be expected by meteoric water. It is not known if water quality could exceed standards and result in a need to manage runoff accordingly.	4.2.3.1
2	It is not known if native soils beneath the rock fill contain products of production rock weathering and if there is a need to reclaim native materials to limit leaching of these weathering products when they are exposed.	4.2.3.1
2	Rock fill in 920 and 960 areas has not yet acidified to the expected extent. The potential for acidification to result in greater contaminant loads reaching Greens Creek in the future needs to be evaluated.	4.2.3.2 4.2.4.1
2	The potential for mill backslope instability needs to be addressed due to its potential to affect the operation of the mill.	4.2.3.3
<i>Underground Mine</i>		
2	Drainage points from the mine during flooding at closure are unknown.	4.2.5
2	Water quality trends at closure are unknown, leading to uncertainties about the need for water treatment and the decommissioning of the site access.	4.2.5

Level	Finding	Report Section
Storm Water Management and Effects		
1	The 920 Portal, mill, tailings load-out, Site 23, waste dump haul road, mine access road, and Tailings Disposal Facility have increased potential for contamination of storm water due to high concentrations from mine production rock or quarry materials used in construction of roads, dikes, and drainage structures and tracking of material on transport vehicles.	4.2.6
Bond Review		
2	Equipment ownership, insurance, maintenance labor, overhead and profit need to be checked in some cases and equipment types need to be defined.	4.2.7.2
2	Overtime labor costs should be added.	4.2.7.2
2	Contractor profit and freight components relating to materials need to be checked.	4.2.7.2
2	Requirements for a one-year "Holding Period" need to be better defined and costed. Long-term treatment costs need to consider possible changes in influent chemistry. Additional supervision of foreman during Years 1 and 2 should be included.	4.2.7.3
2	Efficiency and correction factors need to be documented for production rock sites. A constant fleet needs to be assumed rather than an optimal fleet for each task. Costs for keeping the underground mine open while backfilling Class 3 or 4 rock should be considered.	4.2.7.3
2	A wastage factor should be included in the cover construction for the Tailings Disposal Facility to allow for covers that do not meet specifications and need to be re-built.	4.2.7.3
2	A contingency of 20% is more usual for costs that are not based on detailed design.	4.2.7.4
2	Post-closure costs should be discounted using a net present value method.	4.2.7.4
Closure and Reclamation		
2	The need for long-term water treatment represents the greatest uncertainty in the Reclamation Plan and cost estimate. The site should continue to collect the data needed for assessing long-term water quality, treatment requirements and treatment options.	4.2.8.2.4
Fresh Water Monitoring Plan		
2	Evidence of compliance with subsections 2.6.5 and 7.1.2 of the Waste Management Permit was not evident during the audit (reporting to ADEC of an exceedance of a water quality standard during surface or groundwater monitoring at points of compliance or a statistically significant change in water quality).	4.2.9.5
Spills and Releases		
2	The HGCMC Spill Reporting Procedure flow sheet and Small Spill Report appear to apply requirements for spills of oil to spills of chemicals, which have more stringent reporting requirements.	4.2.10.1.2
2	HGCMC was not able to produce documentation from ADEC supporting current procedure for managing underground mine as secondary containment.	4.2.10.1.3
2	Approximately 40 to 50% of lined ditch immediately below equipment wash area at mill was blocked by gravel/sediments, significantly reducing the flow capacity (Photo 23 and Photo 24).	4.2.10.5

Level	Finding	Report Section
2	The area of construction for a temporary fresh water intake line (near the potable water treatment plant) poses the potential to impact the quality of Greens Creek due to flushing of fines directly into the creek upstream of the weir (Photo 25).	4.2.10.5
2	The secondary containment on the transformer located behind the old water treatment plant at the Tailings Disposal Facility was found to be full of water, eliminating the containment capacity. Inspections of secondary containment of transformer areas could not be verified during the audit (Photo 3).	4.2.10.5
2	The tailings thickener containment would direct any unanticipated discharge into the road area west of thickener. There is a risk for puncture of the thickener based on indications on side of wall of tank (Photo 26 and Photo 27).	4.2.10.5
2	The various pipelines crossing Greens Creek between the underground mine and the mill area do not have appropriate secondary containment to contain material and prevent it from entering the creek in the event of a rupture or other type of failure (Photo 28).	4.2.10.5
2	HGCMC cannot substantiate that sufficient storage to contain and control the 24-hour, 25-year storm event is provided at all locations requiring such containment, as required Section 3.4.3 of the Waste Management Permit.	4.1.11 4.1.13.3 4.2.10.5
Audit of the Agencies		
1	The large number of permits and authorizations (>50) imposes significant administrative burden, which has the potential of distracting from the efficient and effective management of environmental risks.	4.2.11.4.2
2	There is no evidence of any regulatory agency conducting independent compliance sampling.	4.2.11.3.1
2	Agency follow-up on ensuring that required reporting is submitted, reviewed and responded to in a timely manner requires improvement.	4.2.11.3.1
2	Inconsistencies between requirements specified within the Waste Management Permit and the General Plan of Operations were identified.	4.2.11.3.1 4.1.13.3 4.2.9.5
2	A significant lag time was noted between the date of ADEC inspections and the delivery of the inspection report to the Greens Creek operation.	4.2.11.3.2
2	A significant imbalance between the frequency of USFS and ADEC site compliance inspections exists. Representatives of ADEC should increase the frequency of compliance inspections and the USFS should consider reducing the frequency of inspections.	4.2.11.3.2
General Compliance		
2	Waivers from sampling Synthetic Organic Contaminants (SOC) and other organic contaminants (OOC) for PWS 119205 and PWS 113560 expired on December 31, 2007 and require extension.	4.1.10
2	Temporary Water Use Authorization #J2000-10 expired and ADNR needs complete adjudication of the application to approve a Water Appropriation.	4.1.12
2	The tree blow-down study required by subsection 2.4.8 of the Waste Management Permit has not been submitted.	4.1.13.3
2	A number of monthly inspections required by the Waste Management Permit were not on record.	4.1.13.3
2	Tailings and production rock have not been analyzed for paste pH since 2005, which is required by the Waste Management Permit and General Plan of Operations (GPO) Appendices 3 and 11.	4.1.13.3

Level	Finding	Report Section
2	Hazardous waste storage areas were being inspected monthly rather than weekly as required in 40 CFR 265 Subpart I.	4.1.13.4
2	A container of hazardous waste at the 920 Area was not labeled as required in 262.34.	4.1.13.4

Environmental Audit Of the Greens Creek Mine

FINAL REPORT

**State of Alaska Department of Environmental Conservation
State of Alaska Department of Natural Resources
The United States Department of Agriculture Forest Service
Hecla Greens Creek Mining Company**

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