

MEMORANDUM

State of Alaska

TO: Distribution List

DATE: June 28, 2004

FROM: **Ed Emswiler**
ADEC, Solid Waste Section

SUBJECT: Kennecott Greens Creek Site
Visit, May 26, 2004

Kenwyn George
ADEC, Water Quality Section

Attendees:

Kenwyn George, ADEC-AWQ
Ed Emswiler, ADEC-SW
Carl Schrader, ADNR/OHMP
Laurie Thorpe, USDA/FS
David Cox, USDA/FS
Bill Oelklaus, KGCMC
Kerry Lear, KGCMC

On May 26, 2004, ADEC, ADNR and USDA/FS conducted a site visit to the Greens Creek Mine. The above mentioned attendees were present for this visit. The purpose was to review items of interest to the facilities covered under ADEC's Waste Management Permit, and other sites not covered under the permit. The items of greatest interest to the permit were actions taken to expand the facility according to the October 24, 2003 Forest Service Record of Decision approving the expansion to the existing tailings area using Alternative "C" in the Greens Creek Tailings Disposal – Final Environmental Impact Statement ("2003" FEIS)(USFS 2003).

Carl Schrader (ADNR/OHMP) was in attendance in order to make a determination for a water rights request from KGCMC. He conducted fish studies in a Zinc Creek tributary during the visit. KGCMC plans to relocate their wheel wash operation as part of the tailings expansion for this year. Currently the wheel-wash is located within the facility and uses water from Tank 6. The wheel wash area will be moved because the expansion of the active tailings placement area will include the present site. Due to the potential for water to drip from the trucks onto the B haul road and the decreased distance from the truck wash to the B-Road, wash water used in the wash system needs to be free of metals. There are also problems associated with solids in Tank 6 water that could adversely affect the new spray system in the upgraded truck wash facility. Please refer to Carl Schrader's report on his inspection.

Upon arrival at the Cannery, we convened to review maps and recent correspondences that relate to the sites we were to visit. Dave Cox hand delivered to Bill Oelklaus two co-signed approval letters from ADEC and the USDA/FS. The first letter, dated May 7, 2004, regarding Greens Creek Mine monitoring changes under waste management permit #0211-BA001 and GPO, Appendix 1 – FWMP; the second letter, dated May 13, 2004, regarding Greens Creek Mine Site 23 production rock placement modification under waste management permit #0211-BA001 and GPO Appendix 11. After discussion of issues, we were given a very comprehensive presentation of water sample results from seeps and wells at Site E. This presentation will be discussed in greater detail below in item 4.

1. Site 960

Approximately 2/3 of the material has been removed. Much of the site has been excavated to original ground. KGCMC plans to remove the remainder of the material within the next few months when they have a safe place to deposit it back underground. The site will then be left as-is for a year or two to monitor the effects of the cleanup effort, then it will be reclaimed. There will continue to be some production rock under the 1350 road in this area that will be removed and placed underground at reclamation. There were areas of orange staining that are presumed to be iron oxides from the oxidation of iron in the production rock and probably from upgradient natural anoxic groundwater. At the time of the inspection a small flow of approximately 2-3 gpm was leaving the site. This discharge continues to be monitored. Monitoring was reported to have high sulfates and zinc. pH continues to be neutral indicating sufficient neutralization capacity.



Site 960 showing excavation and iron staining

2. Site 23/D

Here we observed surface and groundwater FWMP sites 54, 46, 56 and 6 that are associated with Site 23/D. We then walked to observe the area just to the west of Site D where a series of

springs are located. It was reported that monitoring of the springs has not shown significant flow with chemical signatures attributed to Site 23/D.

There was a discussion of the cover system data that indicates 18-20% infiltration. The numerical modeling of the design predicts 5-15% infiltration after the establishment of a vegetative growth cover on the growth layer. KGCMC has discussed the higher infiltration rate with the designer, Ward Wilson, of Unsaturated Soils Engineering Ltd and Mike O'Kane of O'Kane Consultants Inc. KGCMC and O'Kane Consultants are evaluating the potential causes for the difference between the numerical model and field performance of the cover.

We observed the current Site 23 waste placement regime that includes a 5-foot layer of Class I rock at the outer periphery of the site. In the earlier referenced May 13, 2004 letter, the Department and the USDA/FS approved a revised waste placement regime. This change will reduce the requirement of 5 ft. of Class 1 production rock to 2 feet on the outer surface of the pile (with blended Class II/III allowed under the Class 1 rock layer, in the center of the pile, *see photo below*).

It is yet to be decided whether or not Site D production rock material will be removed or left in place and capped. KGCMC is evaluating potential impacts of Site D removal on the geotechnical stability of the curtain drain, road and Site 23 above this pile. A closure cover system may be more expensive than moving the material. It was reported the post-closure flow of contact water from this site would be between approximately 5 and 15 -gpm. In March 2004, KGCMC submitted their Site 23/D Hydrogeology and Geochemistry Analysis that is yet to be reviewed by this agency. In that report cadmium is reported to be a metal that may exceed the WQ standard (as modeled the infiltration rate would have to drop to 2% to prevent a cadmium exceedance).



Site 23 – waste placement regime showing progressive placement of a 5-foot layer of Class I production rock at the lower aspect of the facility (upgradient FWMP well #57 in background near treeline)

3. Site C

We drove to Area C and reviewed the 2-water catchment structures (ponds) and plans to do work in this area. Some storm water associated with a stretch of the B-road from the crest of the B-Road flows to this site, as well as storm water from the Site C area. The stormwater runs to two ponds just below the safety building - partially on, mostly off Site C production rock material.

Both ponds used to have separate discharges. The upper catchment area was once lined (it no longer is lined). Both ponds contain sediment.

During a high rainfall event in January 2004 a sample of water from Greens Creek just below this site (FWMP Site 6) had a dissolved lead level of 0.915 mg/l, higher than the WQS of 0.905 mg/l. They noted another peak (about 2 years ago) at about 2 mg/l. In response to this KGCMC diverted the upper pond's water into the lower one to increase settling capacity.

They are planning a way to remove sediments from these areas. KGCMC thinks the high lead is from the road runoff - tracked sediment off the mill site by trucks. KGCMC plans to create a catch basin in the ditch beside the road. They will then consider pumping most if not all storm water to the NPDES treatment plant. This may also involve diverting a ditch that flows at the back of the mill site. That flow has elevated zinc levels of between 300-400 ug/l. KGCMC will keep us apprised of their plans with these modifications and seek approval as needed to make the changes.



Site C – upper and lower catchment areas

4. Site E:

We were given a presentation of water sample results from wells and surface sites around Site E. This was a very comprehensive and useful presentation. It shows that most of the landfill associated water leaves the site near the toe of the pile at the outer perimeter. This flow pattern is due to a till aquitard that comprises most of the base of the pile (site development materials that will later be used for reclamation/capping of the tailings pile). The water then infiltrates into the natural sands & gravels and is expressed as seeps (in the 3 gullies associated with the southern aspect of the site) at an aquitard approximately 400-feet down-slope from the facility (about half way to Greens Creek). During the wet season water may also be transmitted by surficial flow into one of the 4 gullies that lead to Greens Creek. The seeps have been high in sulfate and exceeded the limits. Surficial flows have been high in zinc and have also exceeded

applicable limits. Historically zinc levels exiting the pile have remained near constant, but at some downgradient locations are now trending downwards. Both seeps and surface flows continue to show near-neutral water conditions. Water downgradient in Greens Creek has shown an increase over background, although the concentrations are well below water quality standard.

KGCMC plans to remove the waste rock over the next 2 years to the tailings facility. There should be a reduction in metal concentrations and sulfate levels over the long term. Because this is an acceptable management practice DEC does not intend to incorporate this site into the Waste Management Permit. KGCMC will continue to closely monitor all seeps from the site and report the results in the annual report on waste sites.



Site E – Sample Site #708, seep at southern aspect of the facility

5. Tailings Facility

Blasting and rock removal was under way at Pond 7 under the 2004 expansion plans. Pond 7 will replace Pond 6 that is located at the toe of the tailings pile (head of Tributary Creek). Tank 6 that receives all water (storm + mill) will remain in place for at least the next year. A planned Pond 8 will be developed to the West of the site, with a planned Pond 9 developed to the North at a later date. These will be used for storm water retention in order to provide sufficient surge capacity to contain a 24-hour, 25-year storm. These ponds may be useful as constructed wetland treatment systems, post-closure. Rock from the blasted area for Pond 7 is reported to be very low in pyrite with some carbonate. Initial lab results are reported to be positive in NNP, all making for good quality construction material.

We observed the Duck Blind area and the NPDES 002 outfall pipe. Some small rock fragments from one Pond #7 blast made it to these structures but no damage was noted.



Tailings Site – southwestern aspect showing Pond #6 (left), newly blasted Pond #7 (center) and Duck Blind area (right)

We observed the area where monitoring changes have been approved down-gradient of the saddle embankment at the southern aspect of the facility, at the head of Tributary Creek. In the earlier referenced letter dated May 7, 2004, the Department and the USDA/FS approved the discontinuation of FWMP Site 34. This site was in a pond below a road that contained pyretic rock. In 2002 the majority of the pyretic material in the road was removed. With the removal of the road the majority of the water previously retained in the pond now drains as diffuse surface flow through the natural muskeg. Results from internal monitoring between Site 34 and the containment structure indicate that recovery is occurring in this area.



Tailings Facility – Historic Site #34 area

6. Pit #5 and NPDES Treatment Plant

We went to Pit 5 and observed the relocated reclamation material/peat, as well as the stockpiled aggregate from Mile 1.4 of the A road. Volvo haul trucks were actively delivering screened aggregate to this site.



Pit #5 – stockpiling of aggregate for Pond #7

We had a brief tour of the Water Treatment Plant (WTP). We learned that the WTP treats 1.2 – 1.3 million gallons of water daily, with an increase during wet weather. The plant is reported to have performed very well, with metals levels some order of magnitude below the permit limit.



Pit #5 – Water Treatment Plant

7. Sand Pit

We drove the A Road to Mile 1.4 to observe progress on aggregate removal. Aggregate found here is of high quality with very little to no fines, an excellent source of material for the tailings facility expansion construction material. Approximately one acre of land had been worked so far.

Trees had been cut, stumps grubbed out, overburden removed, the aggregate exposed, screened, then hauled to and stockpiled at Pit 5. A screening unit and excavator were on site but no operations were occurring at the late hour of the day.

A small fuel spill was noted as a result of a broken fuel filter from a backhoe. KGCMC was aware of this and corrective action was to take place.



Sand Pit

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