To: Joe Maki 9-21-05

Subject: Regulatory questions

Joe, I have been taking a bit of time to look over the regulatory documents you have provided and have a few questions. I hope they don't make me sound like some of voices of opposition to the project that I read about on the Internet! I'm in the office this week if you'd rather discuss by phone - we could set up a time that would be convenient for you.

HB No. 6243

1. Does the completion of final reclamation in the definition of the "life of the mine" include the 20 years of post closure monitoring?

2. Are roads included in the ancillary facilities defined as part of the mining area? Similarly, will the aggregate/borrow areas and transport areas for mine backfill be considered part of the mine area?

3. Do you anticipate any ordinances or resolutions from local governments or Indian communities regarding the Eagle Project? What about potential additional upkeep and maintenance of county roads resulting from the operation and employee traffic?

4. Do you anticipate or are there already further definitions of such terms as *interim* and *final reclamation*, *pollute*, *impair or destroy,* and *significant change*?

Part 632 Rules

Many of the same questions apply -

1. How do you anticipate the aggregate/borrow source will be regulated under this rule? Would surface disturbances be considered part of the "disposal facility"?

2. I know that wetlands and floodplain protection will be issues of concern for Project Eagle. What other state or local entity has regulatory authority to administer floodplain protection? Does your department have a memorandum of agreement or other instrument in place to share expertize regarding floodplain protection?

3. Wil the aggregate/borrow source be considered part of the "mining activity"?

4. I don't understand the implications and importance of the term "peripheral rock" - is it in anticipation of questions relatted to the geochemistry of host rock?

5. How will the value or utility of riparian lands be established?

6. Does the phrase "contaminated leachate" in the definition of "reactive" mean a liquid that exceeds surface or groundwater compliance limits?

7. Will the department be developing performance standards to further define the phrases *reconditioning or rehabilitiation of the mine area for useful purposes and the protection of the natural resources?*

8. Will aggregate/borrow be included as part of the "storage facility"?

9. Will you further define the contents of a contingency plan?

10. Do you have a list of other permits and hearings that you anticipate will be generated by this project?

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PART 3. FINANCIAL ASSURANCE

Financial Assurance: Requirements

Rule 301

1	Mining permit not effective until financial assurance in place financial assurance approved by department to be maintained during mining operations and post closure monitoring period failure to maintain financial assurance constitutes a violation of the mining permit	Section 9
2	financial assurance to apply to all mining and reclamation operations and be sufficient to hire a third party to implement reclamation, remediation and postclosure monitoring Amount of financial assurance determined by:	Section 9
	a The operator shall provide an itemized list of reclamation, remediation, and postclosure monitoring activities and costs associated with all of the following	
	i Mining activities subject to the mining permit where reclamation has not yet been completed	Section 7.6, Tables 7-6, 7-7
	ii Mining activities that are anticipated to occur under the mining permit	Section 7.6, Tables 7-6, 7-7
	b The department may require financial assurance in an amount larger than calculated by the operator under subdivision (a) of this subrule based upon an analysis of the projected costs under subdivision (c) of this subrule by the department.	
	c The cost estimate required under this subrule shall be based on equipment, materials, and methods normally available to a third party contractor using current handbooks, publications, or other documented costs acceptable to the department. The cost estimate shall include at a minimum the costs for the following:	
	i Reclamation.	Section 7.6, 9.1, Tables 7-6, 7-1
	ii Remediation of any contamination of the air, surface water, or groundwater that is in violation of the mining permit.	Section 9.3
	iii Administrative oversight.	Section 9.2
	iv Reasonable contingencies.	Table 7-7
	v Other necessary environmental protection measures.	Table 7-6
	d The amount of an assurance instrument shall include any possible fees assessed by the issuing institution	Under discussion

for accessing the instrument

3 The financial assurance required under this rule shall consist of an assurance instrument or combination of instruments covering at least 75% of the total required amount. Financial assurance for the balance of the required amount, if any, shall consist of a statement of financial responsibility. When determining the portion of the financial assurance required under this rule that may be satisfied by a statement of financial responsibility, the department shall consider the following: TBD

a The ability of the operator to pay for potential remediation costs in the case of a violation of this part, as demonstrated by the information in the statement of financial responsibility.

b Whether the operator carries pollution prevention or environmental liability insurance, and if so, the amount of the insurance

c Whether the operator has received a recognized third-party certification of an environmental management system for mining operations.

PRELIMINARY EVALUATION OF FINANCIAL ASSURANCE COST ELEMENTS

KENNECOTT EAGLE MINERALS COMPANY EAGLE PROJECT

Keith W. Smith, PG
Senior Project Manager

Constance M. Cole
Associate Project Manager

PRELIMINARY EVALUATION OF FINANCIAL ASSURANCE COST ELEMENTS

Kennecott Eagle Minerals Company
Project Eagle

Prepared for:
Office of Geological Survey
Michigan Department of Environmental Quality

Prepared by:
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Our Ref.:
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Date:
May 23, 2006

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EXECUTIVE SUMMARY

ARCADIS, Inc. (ARCADIS) was tasked to evaluate the financial assurance cost elements prepared by Kennecott Eagle Minerals Company (Kennecott) for their proposed underground nickel and copper mine in Michigamme Township, Marquette County, Michigan. The financial assurance is comprised of costs for reclamation, monitoring, closure, post-closure, agency oversight and contingencies. The purpose of ARCADIS' scope of work is to enable the Michigan Department of Environmental Quality (MDEQ), Office of Geological Survey (OGS), to determine the proper accounting of all such costs had been determined and addressed.

Approach

The evaluation of the Kennecott Project Eagle reclamation and closure costs was conducted primarily by ARCADIS staff Keith Smith, PG, and Connie Cole. Other staff was consulted with on a specific needs basis. The requirements for financial assurance are detailed in the state of Michigan's Nonferrous Metallic Mineral Mining Rules (Rule 301) promulgated to implement the Nonferrous Metallic Mineral Mining Act (1994 PA 451, MCL 324.101 et seq.). The rules require financial assurance for all mining and reclamation operations and to be sufficient to hire a third party to implement reclamation, remediation and post closure monitoring.

The preliminary evaluation was initiated by a site visit to the project area and conversations with OGS staff Steve Wilson, Environmental Manager, Minerals and Mapping Unit, Joe Maki, Upper Peninsula District Geologist, and Melanie Humphrey, Geological Technician. Jonathan Cherry, Manager Environment and Government Affairs, Kennecott Eagle Minerals Company presented information on the proposed mine application and provided the site tour. ARCADIS was provided with a copy of the mine permit application when it was declared administratively complete. All permit application documents and appendices are available on the MDEQ website. Environmental sampling was not performed during the site visit.

Information obtained during the site visit and through conversations with MDEQ and KEMC personnel was compared with information identified in the following documents prepared by KEMC:

- Kennecott Eagle Project – Mining Permit Application; and
- Kennecott Eagle Minerals Company Response to Completeness Determination.

Financial assurance is to remain in place during mining operations until the department determines that reclamation has been completed and for a postclosure monitoring period to be determined by the department. The department has the authority to review at least every three years, and more frequently as necessary, updates of the statement of financial responsibility and to require permitees to adjust the conformance bond to provide sufficient financial assurance. This provision in the law provides the department, the regulated community and the people of the state of Michigan the ability to react to changing conditions at the site and within the operation.

Kennecott's mine is a new venture both for the company and for the state of Michigan. The way in which the regulations have been developed assure the state has the authority as frequently as necessary, to revise required financial assurance amounts based on the progress of mining, concurrent reclamation and the financial viability of the permitee. The financial assurance instrument will be adjusted accordingly.

1.0 INTRODUCTION

An evaluation of financial assurance costs for reclamation, monitoring, closure, post-closure, agency oversight and contingencies by Kennecott Eagle Minerals Company (KEMC) for Project Eagle was conducted by ARCADIS, Inc. (ARCADIS) for the Office of Geological Survey, Michigan Department of Environmental Quality (MDEQ). Project Eagle is a proposed underground nickel and copper mine in Michigamme Township, Marquette County, Michigan. As part of the permitting process, KEMC applied for a mining permit in accordance with Part 632 of the Michigan Natural Resources and Environmental Protection Act (MCL §324.63201 et. seq.) and rules promulgated under R 425.101 et. seq. of the Michigan Administrative Code. The rules require financial assurance to apply to all mining and reclamation operations and to be sufficient to hire a third party to implement reclamation, remediation and post closure monitoring.

The financial assurance must include costs for reclamation, remediation of any contamination of the air, surface water or groundwater that is in violation of the mining permit, MDEQ administrative oversight, reasonable contingencies, and other necessary environmental protection measures. MDEQ has the ability, through the authority of the rules, to require financial assurance in an amount larger than the costs calculated by the operator.

A site visit of the Eagle Project site was conducted January 31, 2006. Jon Cherry, Manager Environment and Governmental Affairs of KEMC, led the tour and provided information regarding the proposed project. Site tour attendees included OGS staff (Steve Wilson, Environmental Manager, Minerals and Mapping Unit, Joe Maki, Upper Peninsula District Geologist, and Melanie Humphrey, Geological Technician) and ARCADIS personnel (Keith Smith, Senior Project Manager, and Connie Cole, Associate Project Manger). No environmental samples were obtained during the site visit.

1.1 Summary of Proposed Action

The following is a summary of the proposed action as described in the Environmental Impact Assessment (Kennecott, 2006). Mine development features have been designed to limit the exposure of precipitation or infiltrating waters with sulfidic ore and waste materials. Main mine development, operation, and reclamation components include:

- The surface expression of the mine has been designed for a minimum footprint. There will be two main surface disturbance areas; a primary operations area and the backfill surface facility.
- Power will be supplied by on-site diesel-fueled generators.
- The ore body will be accessed via underground mining methods.
- Development rock will be amended with lime and stored temporarily on a lined facility.
- As the lined development rock storage area is filled, it will be covered with a geomembrane to minimize the generation of contact water collected in the storage area.
- Ore will be trucked to the surface and temporarily stored on a contained, coarse ore storage area.
- Ore will be transferred from the coarse ore storage bin to an enclosed crusher where it will be crushed and transferred to storage bins.
- Ore will be transferred from the storage bins to highway-compliant haul-trucks that will transport the ore to a railhead in the Marquette vicinity. Several steps will be taken to minimize spillage and to reduce emissions from the mine site. The haul trucks equipped with secure covers will be washed prior to leaving

the site. At full production, approximately 40 loaded truck will leave the mine site per day.

- Kennecott is working with the Marquette County Road Commission to negotiate road improvements on the Triple A Road and County Road 510 to ensure safe transportation.

- Storm water runoff from operations areas will be routed to lined contact water basins for temporary storage prior to treatment at the wastewater treatment plant.

- Water from underground workings will be pumped to the contact water basins for temporary storage prior to treatment at the wastewater treatment plant. Kennecott has developed two water balance scenarios; one based on 75 gpm groundwater infiltration and one based on 250 gpm. Water storage and treatment facilities have been engineered for the maximum scenario.

- Water from the contact water basins will be pumped to the wastewater treatment plant. The wastewater treatment plant will consist of a hydroxide precipitation process, a reverse osmosis process, ion exchange and an evaporator/crystallizer to meet or exceed drinking water standards for water discharge.

- Once treated water meets compliance standards, it will be discharged through a buried infiltration system.

- Non-contact storm water runoff will be routed to non-contact infiltration basins where it will be discharged through infiltration.

- The backfill surface facility will contain storage silos for fly ash and cement, a clean aggregate stockpile, and the main ventilation shaft.

- Aggregate, fly ash, and cement will be mixed and transported underground to backfill mining stopes. All primary mining stopes will be backfilled with cemented backfill.
- Limestone-amended development rock will be used to backfill secondary mining stopes.
- As part of reclamation activities, cemented aggregate will be used to prevent contact between saline groundwater water, located below the 335 m level in the mine and non-saline groundwater water, located above this level.
- If water quality monitoring indicates impact to upper bedrock groundwaters has occurred potable-quality water will be circulated through the upper bedrock until water quality objectives are met. Wastewater treatment will continue to treat contact waters until water quality has been confirmed.
- Site reclamation will result in the complete removal of all surface facilities not required for post-mining land use.
- Operational and post-closure monitoring will be completed to confirm compliance with protection of natural resources.

The following table outlines major milestones by facility development year.

Facility Development Year	Project Milestone
2	Construction of surface and underground facilities
3	Mine brought into full production
11	Entire project development complete
17	Closure of waste water treatment plant
37	Post closure monitoring activities continuing through year

Construction of surface and underground facilities are anticipated to take two years to complete. The mine will be brought into full production by year three, with entire project development expected to be completed in 11 years. Closure of the waste water treatment plant is anticipated in year 17, with monitoring activities continuing through year 37.

2.0 FINANCIAL ASSURANCE

KEMC developed projected costs for financial assurance based on reclamation, remediation, post-closure, contingency and overhead costs. All reclamation costs are predicated on the goal of re-establishing a self sustaining ecosystem that is consistent with local, post-mining land use goals. As stated in the application documents, reclamation will consist of restoring approximately 90 acres of surface area and the underground workings. The objective of the reclamation plan is to restore the property to approximately the pre-mining condition using native vegetation to promote the enhancement of wildlife habitat. The final land use of the site “will be compatible with existing uses on adjacent properties.” (KEMC, 2006).

The following sections of this evaluation will focus on aspects of the proposed operation which are associated with potential risks in terms of human health or the environment.

2.1 Mine Plan

The Eagle Project will include surface and underground facilities required for the mining of the ore body. The area encompassed by the fenced facility area and access road is approximately 145 acres. Within this project area, the total surface disturbance required for project development is approximately 92 acres. The method of mining will be via underground development with backfilling of the voids left by mining and mine development.

The Eagle Project ore body is a nickel-copper sulfide mineralization. Upon contact with water, over a period of time there were concerns that the ore body and possibly the development rock to be used as backfill have the potential to generate an acidic

effluent. As a result, mine development has been planned to reduce or limit contact with infiltrating precipitation water (rain and snowmelt) and to re-flood the mine workings as quickly as possible after the completion of mining. Re-flooding mine workings would saturate the rock faces of any disturbances and limit the amount of oxygen available to drive the acidic-reaction processes.

Construction of surface facilities has been divided into two phases; Phase I would involve construction of the development rock storage area, the water treatment plant, the contact water basins, treated water infiltration systems, and the non-contact water infiltration basins. Phase 2 of the surface facilities construction would include construction of the generator plant and compressor plant, the maintenance shop, warehouse and office buildings, the coarse ore storage area, road improvements and components of the surface backfill system facilities and power line to the generator plan. Miscellaneous construction activities during the second phase would include the truck wash, scales and fuel storage areas.

Approximately six months after surface construction activities begin, underground construction would start. Subsurface activities will include construction of the portal, constructing the main decline, developing the backfill plant, and developing the main exhaust raise from the surface to the 263 level. Additional subsurface activities include developing the main decline and drifts from the 263 m to the 143 m levels; constructing the aggregate raise and cement boreholes, installing the emergency escape elevator, developing sump and pump stations and interlevel return air raises. Surface construction and underground development is anticipated to require 2 years with full mine production occurring in year 3.

The selected method of mining consists of wide transverse blasthole stoping to provide maximum productivity with cemented and uncemented backfill. The mining and backfilling process is designed to eliminate any measurable surface subsidence. Total production is estimated to be 3.4 million tonnes during a nine year operational mine life. Ore will be temporarily stored in the coarse ore stockpile before being loaded into 50 tonne capacity ore trucks for transport to the railhead. Approximately 40 trucks per day will transport the ore to the railhead where it will be shipped by rail for final processing.

The Eagle Project mine will be developed with 10 levels, starting at the lowest mining levels and progressing vertically to the upper levels. The mine design was based on maintaining economic production levels through bulk mining methods and preventing surface subsidence. Initial production will start on mine levels 143 m and 173 m. Mining during the first three and a half years will be at or below mine level 263 m. Upper mine levels will be brought into production once production declines from level 263 m. Mine level 263 m connects with the main mine decline. Mine level 383 m will be selectively mined based on further geotechnical analysis conducted on the crown pillar as mining progresses upward.

- **Portions of the mine excavations will be backfilled to ensure mine stability and to prevent impact to groundwater quality by mingling of various quality groundwaters (page 43). Table 4-4 (page 15) indicates there will be a shortage of backfill rock at the end of mine year 9 of 273,079 tonnes. Where is this shortfall reconciled? This backfill needs to be accounted for in the Financial Assurance.**

- **Table 7-6 (page 83) indicates that in year 10, reclamation costs for 250,000 yd^3 from the TDRSA are recognized. Why is the cost for the TRDSA removal indicated in year 8 if the backfill costs are recognized in year 10?**

- **In the description of the underground mine design, there is a statement that there is an availability of backfill material on site (page 36) for use in secondary stopes for uncemented backfill. In addition, cost for 50,000 yd^3 of material for backfilling stopes is noted. Where is the on-site location for backfill material described and mapped? Are reclamation costs for this borrow source included?**

- **In Table 7-6, the cost for the material to be used for backfilling stopes is identified to include procurement, transportation and backfilling. Where is the shortfall of backfill material identified in Table 4-4 and subsequently accounted for in Table 7-6?**

2.2 Mine Dewatering Plan

The mine dewatering/mine pumping system (Section 4.5.1) was designed to handle a total of 600 gpm pumping requirements during full underground production. This is a very conservative number, based on groundwater modeling estimates of inflow at approximately 215 gpm. Three main dewatering pump stations comprise the dewatering system design; one near the lowest level in the mine, the second at mine level 173 m, and the third at the main mine decline level of 300 m. The mine level 143 m pump station will be equipped with two 58 hp pumps to pump groundwater to mine level 173 m. At mine level 173 m, two 125 hp pumps will be installed with a 10,000 gallon agitator tank. From mine level 173, groundwater will be pumped to the 300 m level, also serviced by two 125 hp pumps with an agitator tank. From mine level 300 m, groundwater will be pumped to the surface contact water basins (CWBs).

2.3 Water Usage, Treatment and Discharge

For design purposes, KEMC calculated two water balance models; one with a design basis of 250 gm of groundwater inflow and maximum annual precipitation and the second model with the expected groundwater inflow of 75 gpm and average annual precipitation. The water balance displays water inputs, water uses, and water discharges associated with the mine and operations area.

The waste water treatment system (WWTP) was designed to treat wastewater collected in the CWBs and will produce an effluent capable of meeting discharge standards for disposal through the treated water infiltration systems. The wastewater treatment process will be a two stage process with reduction of dissolved solids occurring initially, followed by a reverse osmosis system and pH adjustment as a polishing step.

The discharge streams from the WWTP include treated water, metals precipitation sludge, and reverse osmosis sludge. The treated water will be suitable for disposal via the treated water infiltration systems (TWIS).

The metals precipitation sludge will be dewatered in the sludge handling process and the reverse osmosis concentrate will be shipped to the concentrate reduction process (CRP) for treatment and volume reduction. The CRP RO permeate meets the Part 201 Residential Drinking Water Criteria (Wastewater Flows and Pollutant Concentrations Table – groundwater discharge permit application appendix). The sludge handling process will dewater sludge from the main wastewater treatment metals precipitation/sedimentation system and from the concentrate reduction process microfiltration system. A filter press will be used for sludge dewatering. Filtrate will be routed back to the head end of the of the concentrate reduction process. According to the groundwater discharge permit application, "dewatered sludge will be managed in accordance with applicable regulations."

- **The statement "dewatered sludge will be managed in accordance with applicable regulations" provides no specific details regarding the closed cycle process for filtrate – how will it ultimately be disposed of? How will sludge be disposed of? Similarly, brine solids from the crystallizer will be managed in accordance with regulations. (Discharge Permit application – Appendix). What are the associated costs associated with disposal of these waste streams and where are they accounted for in the FA?**

- **How will these waste streams be managed during periods when mine backfill for a disposal method is not available during mine startup when development rock being generated? Also, during mine closure, when WWTP is still operational, there will be a point in time when all underground facilities are backfilled? What alternative methods for disposal are available in addition to mine backfill for these wastes?**

- **Page 30 states that "small quantities" of waste water from the truck wash and crusher system will be discharged to the CWBs and WWTP. How will buildup of sludge in CWBs be managed and where are the costs accounted for?**

2.4 Treatment and Containment of Mine Related Material

2.4.1 Temporary Development Rock Storage Area

During Phase I of the mine construction; KEMC will install most of the mine facilities that will be needed to capture, store, treat and dispose of stormwater, non-contact waters and waters that have come in contact with mine disturbances. Additionally, the lined facility for temporary storage of development rock will be constructed. The Temporary Development Rock Storage Area (TDRSA) will be 5.9 acres and has been designed to store 219,295 m^3 of rock removed during development of underground mine facilities.

The rules promulgated for Part 632 of the Act contain specific requirements regarding characterization, treatment and containment of reactive materials to minimize actual and potential impacts to groundwater and surface water. The construction of the TDRSA has been designed to minimize infiltration of precipitation water into the storage area and the leak detection system will provide for monitoring and collection of any leachate that develops. In addition to the physical design of the TDRSA of the liner and cover, the development rock will be amended with limestone to provide acid-neutralizing capacity to both prevent the generation of low pH water and to raise the pH of water collected in the collection sump.

Both the conservative and expected water balance models indicate 12 gpm are anticipated to be generated via removed ore and development rock. Depending on the point in time of mine development, this entrained moisture will be transported to the coarse ore stockpile and TDRSA, respectively. The model indicates 12 gpm will be returned underground in the form of development rock used as backfill. The models reflect 14 gpm in the form of precipitation for the expected case and 22 gpm in the maximum case to be collected in the TDRSA sump and pumped to the contact water basin prior to treatment in the WWTP.

It is anticipated that the TDRSA will be at final grade by mine year three and that mine backfilling will begin in year 4. KEMC will place a temporary geomembrane cover

system over the TDRSA to limit contact and infiltration by precipitation. The removal sequence for the development rock has been designed to protect the stability of the liner as well as the water collection system. It is anticipated that development rock removal will occur in four stages over a one to two year period.

2.4.2 Coarse Ore Storage Area

The coarse ore storage area will have a storage capacity of 3,000 m^3. It will be located in a three-sided building with a concrete floor and catch basin for collection of contact water. Any water collected in the contact water basin would be pumped to the CWB, then to the WWTP for treatment. As indicated by both the anticipated and conservative water balance models, 12 gpm of entrained groundwater is anticipated to be contained in ore and development rock removed from the underground workings. This residual moisture will either be returned to underground workings as part of mine backfill, or, in the case of the coarse ore stockpile, a negligible percentage would collect in the contact water sump to be pumped to the contact water basins.

2.4.3 Reclamation Plan

- **Table 7-2 – Why are reclamation activities for the main site and backfill site indicated for the time period during the Years 1-2 when mine backfill will continue through active mine life? Temporary reclamation measures and soil stabilization would occur during years 1 and 2, with closure and final reclamation through year 11.**

- **The activity of reflooding the mine is not indicated on Table 7-2.**

- **Is $10,000 each sufficient for landfill disposal (Table 7-3) of 262,000 ft^2 each of geomembrane liner, geotextile/GCL and cover geomembrane?**

- **Section 7.4.2.8.1 – there is no pattern of upward vertical hydraulic gradients within the bedrock – does this statement also apply to rock that has been fractured due to blasting and potential subsidence, specifically the 383 m level development?**

- **Page 77 – No mention is made during the operational description of the WWTP of a necessity to segregate any underground water developed during operation of the mine. Will both saline and non-saline waters be treated similarly by the WWTP?**

- **Was discharge from the WWTP (page 77) considered for source of reflooding mine workings? Why use non-contact potable water from wells drilled specifically for this purpose?**

- **If operation of the WWTP is required for several years post-closure to treat reflooded mine waters, how will sludge disposal be handled and where are the operational and disposal costs accounted for?**

- **Have water rights been obtained for the well water to be used to reflood the mine?**

- **For disposal of the sludges and brines from the WWTP, since portions of the mine below 335 m have saline groundwater, disposal of these materials may require special handling because of accumulated salts and metals. What are the disposal methods proposed?**

- **Where is the connection with the exhaust fan housing with the underground workings displayed on Fig. 4-2? The exhaust fan housing is located, but no indication of its relationship to the overall mine section as in Fig. 4-5.**

3.0 MAJOR FINDINGS

The fact that no processing or beneficiation will occur on site reduces the number of operations that will take place within the permit footprint; limiting the major actions to preparing ore materials to be hauled off site for shipment. The major surface facilities include the main surface facility and the backfill surface facility. The main surface facilities include the contact water basins, non-contact infiltration basins, temporary development rock storage area, coarse rock storage area, crusher and crushed ore storage bins, the wastewater treatment plant, fuel, warehouse and mine support infrastructure. The surface backfill facility includes the covered raise and feed hopper,

silos for fly ash and cement, aggregate storage area, lined binder borehole, a non-contact water infiltration basin, and the exhaust fan housing.

3.1 Water Balance/Water Treatment Questions

- **A more detailed timeline is needed to describe the relationship between closure activities and operation of the wastewater treatment plant – sludge and brine management, and subsequent costs.**
- **If treated water is suitable for discharge to groundwater through the TWIS (Treated Water Infiltration Basins), what are the chemical constituents of distillate from the evaporator (p. 28, discharge permit)?**

There are two basic qualities of groundwater anticipated to be encountered – saline and non-saline. The deeper bedrock water is more saline than the upper bedrock water. During operations, mine drainage will be collected and pumped to the contact water basins for treatment in the waste water treatment plant. At the end of mining, underground workings will be reflooded to reduce aerobic conditions in the mine; reducing the development of acidic by-products from sulfide mineralization. Kennecott has provided little detail regarding scheduling, costs or potential contingencies that may be encountered during reflooding the mine.

- **Page 77. There is no pattern of upward vertical hydraulic gradients within the bedrock. Thus, there is little, if any, potential for migration of water in and around the mine up into the alluvial aquifer. This finding may characterize conditions with existing groundwater unimpacted by blasting activities. Once blasting has created a fractured zone around the ore body, would this lack of connection still persist?**

- **Page 77. Why not use water from the WWTR instead of potable water from wells drilled on site for reflooding the mine?**

- **Page 77. Kennecott plans to flush the upper workings with clean water if monitoring indicates impact from lower levels of the mine have impacted upper mine levels. This contingency plan raises several questions: first, there is the difficulty of contacting the upper bedrock workings to flush them with clean water, particularly if backfill has been placed. What is the permeability of backfilled material and how would clean water delivery to impacted mine areas be achieved? Secondly, the source of the clean water would be the WWTP; again this means leaving this facility in place for several years with the accumulated cost of pumping, sludge disposal and brine disposal. RO brine may contain elevated metals content based on the water quality of the mine workings; this may require special handling techniques during the post-mining phase. The metals precipitation sludge will be routed to the sludge handling process for dewatering; what is the method of disposal for the dewatered cake?**

- **Page 28. What is the method of disposal for dewatered sludge from the filter press? The groundwater discharge permit states it will be managed in accordance with applicable regulations – what is the method of disposal?**

- **Page 28. Similarly, what is the method of disposal for brine solids from the crystallizer? The discharge permit application states brine solids from the crystallizer will be managed in accordance with applicable regulations. What is the method of disposal?**

- **Page 77. Would it be operationally feasible to hydrologically separate the two groundwater zones of the mine? Because, if KEMC can't effectively prevent the upward migration of mining related constituents associated with the underground openings from one mine level to the other, what is to prevent this same migration from happening to the wetlands and drainages overlaying the ore body?**

- **Table 7-6 presents an apparent shortfall of mine backfill 273,079 vs. 250,000. What is the reason for the difference in these calculated volumes?**

- **Page 89. There is a potential to load nitrates in groundwater due to residue from blasting. There is a potential for residual nitrates in periphery rock and backfill and draindown pumped to the CWB and WWTP. At cessation of pumping, what is mobility of nitrate? Will clay layer prevent upward migration to shallow groundwater?**

- **Page 98. Unplanned subsidence – Are there any impacts to wetlands/shallow groundwater delineated above the ore body by potential fracturing to ground surface?**

4.0 SUMMARY

The annual and 3 year review process by MDEQ is imperative to monitor the progress of mining, concurrent reclamation and financial viability of the company. Financial assurance is to remain in place during mining operations until the department determines that reclamation has been completed and for a postclosure monitoring period to be determined by the department. The department has the authority to review at least every three years, and more frequently as necessary, updates of the statement of financial responsibility and to require permitees to adjust the conformance bond to provide sufficient financial assurance. This provision in the law provides the department, the regulated community and the people of the state of Michigan the ability to react to changing conditions at the site and within the operation.

The following commitments MAY result in an increase in costs.

Comment No. 1: Provide a plan for non-lethal harassment or exclusion of wildlife at the contact and non-contact water basins.

Response to Comment No. 1: *KEMC will implement a plan for safe, non-lethal harassment of wildlife at the site. The purpose of the plan will be to prevent birds, specifically waterfowl, and deer from entering the various water containment basins within the mine operations by using the least aggressive techniques that are effective. KEMC will evaluate the plan regularly for effectiveness and adjust the aggressiveness of the plan accordingly. Devices and practices that may be utilized include (in order of application by category):*

Physical Barriers

- *Fencing – the site is fenced off to prevent deer and/or small mammals from entering*
- *Netting across the top of the containment basins*
- *Floating covers across the top of the contact water basins.*

Visual Devices:

- *Motion sensor lights,*
- *Flags or eye spot balloons,*
- *Predator decoys, scarecrows.*

Timed or motion sensitive noisemaking devices such as:

- *Air horns, whistles,*
- *Blank pistols,*
- *Bangers, screamers, projectiles, recorded distress calls.*

High Pressure Water Spray Devices,

- *Hose or sprinkler devices,*
- *Motion activated sprayers.*

Trapping and Relocation

- *As needed and as allowed.*

ARCADIS Response: KEMC needs to evaluate the costs contained in Table 7-6 (Reclamation and Monitoring Cost Estimate) in the Mining Permit Application to determine whether adjustments are required as a result of this commitment.

Comment No. 18: Provide analysis of the effects wash-off of acidic salts will have on groundwater composition during mine reflooding.

Response to Comment No. 18: *As with the TDRSA calculations, the purpose of the geochemical modeling was to determine that active water management would be required and to characterize the general nature of the metals, metalloids and other components that would need*

consideration. The operational conditions (Appendix D-4 in Volume IC of the MPA) use the short-term MSU leaching data (Weeks 1-5) as the basis for projecting leachability, in order to recognize that there will be frequent exposure of fresh rock during the mining process to which these calculations are directed.

During operations, water will be channelized and sumped (see Section 4.5.1 of Volume I of the MPA), and the collected water conveyed to the water treatment plant. Therefore, much of that acidity will be managed during the ordinary course of operations. Water is available to flood the entire workings within approximately one year after the end of mining. After mine reflooding, KEMC will monitor the upper mined levels, and, if necessary, water will be withdrawn, treated and pumped back into the mine workings as needed to produce a final chemistry that will protect the overlying Quaternary aquifer (see Section 7.4.2.8.1 of Volume I of the MPA).

The geochemical approach used in Appendix D-4 was to generate the information needed to establish appropriate engineering controls, not to predict short-term performance of sectors of the system. As described in the Groundwater Discharge Permit Application that was submitted to MDEQ on February 28, 2006, the water treatment system consists of multiple treatment components that have the capacity to handle plausible variations in water chemistry by adjusting reagent usage and other aspects of the multi-stage treatment stream.

ARCADIS Response: Comment No. 18 deals with the potential impact of acidic salts on water quality within the underground workings. It is our understanding that the plan of operation is to never have more than four stopes open at any one time and that potable water from two additional wells will be available to flood the mine to restrict additional development of acidic salts on fresh rock faces. The costs reflected in Table 7-6 to backfill the stopes and drill the wells to flood the mine adequately reflect this anticipated cost. This issue of concern is one that will be critical to monitor through the existing mechanism of the agencies periodic bond review.

Comment No. 19: Clarify how the compositions calculated for the underground workings compare to background groundwater compositions.

Response to Comment No. 19: *The following table compares calculated concentrations for the underground mine (excluding background quality) to background groundwater quality in the bedrock. Also provided for reference purposes are Part 201 Residential Drinking Water Criteria. In most cases, the incremental water quality increase in the mine workings is below background water quality in the bedrock. The background water quality in the bedrock is a sodium chloride type water. The salinity of the water in the bedrock increases with depth and bears a distinctly different water chemistry signature when compared to the calcium/magnesium carbonate dominated water in the Quaternary System (see EIA in Volume II and associated Appendices). Due to the saline nature of the water in the bedrock, the concentrations of many water quality parameters are naturally elevated. The data show that the concentrations of iron and nickel in the reflooded mine are likely to be higher than drinking water standards and*

background levels in the bedrock. Based on this KEMC has included in the required reclamation plan (see Section 7.4.2.8.1 of Volume I of the MPA), provisions for monitoring hydraulic gradients and water quality in the upper mining levels, and if necessary treating residual levels of nickel and iron in the reflooded mine water.

Parameter	***Units***	***Incremental Water Quality for Underground Mine***	***Upper Bedrock[1]***	***Lower Bedrock[1]***	***Part 201 Resident Drinking Standards***
Calcium	*mg/l*	*5*	*16*	*76*	*na*
Magnesium	*mg/l*	*3*	*3*	*61*	*400*
Sodium	*mg/l*	*1*	*39*	*970*	*120*
Potassium	*mg/l*	*2*	*4.4*	*6.5*	*na*
Sulfate	*mg/l*	*28*	*10*	*5*	*250*
Chloride	*mg/l*	*5*	*41*	*2,000*	*250*
Fluoride	*mg/l*	*0.10*	*0.3*	*1*	*2*
Aluminum	*•g/l*	*4*	*<83*	*<50*	*50*
Antimony	*•g/l*	*0.03*	*<5*	*<5*	*6.0*
Arsenic	*•g/l*	*0.06*	*<2*	*19*	*50*
Barium	*•g/l*	*8*	*28*	*<20*	*2,000*
Boron	*ug/l*	*70*	*2,397*	*5,900*	*500*
Cadmium	*•g/l*	*0.08*	*<0.5*	*<5.0*	*5.0*
Chromium	*•g/l*	*0.13*	*<5.0*	*<5.0*	*100*
Cobalt	*•g/l*	*18*	*<10.0*	*<10.0*	*40*
Copper	*•g/l*	*2.1*	*<5.0*	*<5.0*	*1,000*
Lithium	*•g/l*	*1.3*	*15*	*130*	*170*
Lead	*•g/l*	*0.03*	*<1.0*	*<1.0*	*4.0*
Iron	*•g/l*	*780*	*67*	*1,800*	*300*
Manganese	*•g/l*	*1.6*	*20*	*68*	*50*
Mercury	*•g/l*	*0.04**	*0.0018*	*0.00021*	*2.0*
Molybdenum	*•g/l*	*13**	*10*	*<10*	*73*
Nickel	*•g/l*	*1770.0*	*26*	*<25*	*100*
Selenium	*•g/l*	*0.6*	*1.0*	*17*	*50*
Silver	*•g/l*	*4.5**	*<0.2*	*0.5*	*34*
Strontium	*•g/l*	*40*	*131*	*4,800*	*4,600*
Thallium	*•g/l*	*8**	*--*	*--*	*2*
Vanadium	*•g/l*	*0.3*	*--*	*--*	*4.5*
Zinc	*•g/l*	*1.9*	*11*	*19*	*2,400*

**Input value for source rocks is less than detection, assumed ½ detection unit.*
-- data not available
na = not applicable
[1] See Appendix G-1 of Groundwater Discharge Permit Application for derivation of listed values.

ARCADIS Response: KEMC needs to evaluate the costs contained in Table 7-6 in the Mining Permit Application to determine whether adjustments are required as a result of this commitment.

Comment No. 22: Provide a plan describing how fish, fish habitat, and aquatic macroinvertebrate population will be monitored from the time of mine construction through

reclamation. This plan should include information on methods and frequency of monitoring events.

Response to Comment No. 22: *Section 6.6.4 of Volume I of the MPA presents a plan for monitoring fisheries and macro invertebrates on an annual basis at locations within the vicinity of the project. KEMC will employ the Great Lakes Environmental Assessment Section (GLEAS) Procedure 51 for monitoring fisheries, macro invertebrates and aquatic habitat. In addition, KEMC will monitor two additional points on the Salmon Trout River East Branch (see revised Figure 6-6 in Attachment 2). KEMC will evaluate and report the aquatic biota monitoring data on an annual basis and report it to MDEQ as part of the required annual report. Monitoring data from the Salmon Trout River System and Yellow Dog River will be compared to data obtained in the Cedar Creek watershed which will serve as a control point for the monitoring program.*

ARCADIS Response: KEMC needs to evaluate the costs contained in Table 7-6 and Table 7-7 (Summary of Reclamation and Monitoring Costs) in the Mining Permit Application to determine whether adjustments are required as a result of this commitment.

Comment No. 30: Provide a plan for disposing and handling of materials not exempt from the definition of solid waste.

Response to Comment No. 30: *Pursuant to federal rules under 40 CFR 261.4 and MDEQ rules at R 299.9204, certain waste materials are excluded from the definition of solid waste, including many of the activities related to the beneficiation of ores and minerals. For the most part, these would be waste materials are indigenous to the beneficiation process. Materials to be disposed that are not indigenous to the process would be considered to be solid wastes. Examples of non-indigenous materials from this mining operation would be as follows:*

- *Municipal Solid Waste*
- *Used Oil (Including Greases)*
- *Spent Cleaning Solvents*
- *Other Spent Chemicals*
- *Metal Shavings from Machining Operations*
- *Fire Assay Waste*
- *WWTP clarifier sludges and brine solids from the evaporator*

These types of wastes will be characterized, transported and disposed of in accordance with federal and state solid and hazardous waste regulations. Such materials will be properly stored, labeled and containerized prior to shipment and disposal/recycling.

ARCADIS Response: Table 7-6 indicates that during Year 10, 500 tons of material for off-site disposal have been budgeted. Unless there is a material revision in the plan of

operations, this anticipated volume adequately represents the post-operation disposal requirements for KEMC.

Comment No. 36: Clarify what measures will be used to prevent/control leaks in the conveyance systems to the Waste Water Treatment Plant (WWTP).

Response to Comment No. 36: *All conveyance pipes leading to and from the CWBs will be designed as double walled piping systems.*

ARCADIS Response: KEMC needs to evaluate the costs contained in Table 7-6 in the Mining Permit Application to determine whether adjustments are required as a result of this commitment, including decommissioning and disposal.

Comment No. 37: Provide a plan for monitoring water quality downgradient of the Non-Contact Water Infiltration Basins (NCWIBs).

Response to Comment No. 37: *The NCWIBs are an integral part of the plan for managing stormwater runoff from the non-contact areas of the project site. The NCWIBs are designed to infiltrate collected stormwater runoff. However, they are designed with an outfall structure to allow the release of stormwater during extreme runoff events. To assess potential impacts on surface water, KEMC has proposed an extensive surface water monitoring program (see Section 6 of the MPA) that includes monitoring points downstream of the NCWIBs. Additional monitoring will be included in KEMC's Industrial Stormwater Permit Application for the NCWIBs.*

ARCADIS Response: KEMC needs to evaluate the costs contained in Table 7-6 and Table 7-7 in the Mining Permit Application to determine whether adjustments are required as a result of this commitment.

Comment No. 39: Provide a plan to prevent and address any leaks of potential contaminants in concrete floors and sumps.

Response to Comment No. 39: *Certain structures at the facility may include concrete floors and/or sumps. These structures could include the crusher building, the wastewater treatment plant, the truck wash area and fuel storage area and the coarse ore storage area. Concrete floors and sumps will be constructed to meet industry standards, including use of rebar where necessary to ensure proper strength. This will in turn reduce the possibility of cracks and fissures in the material that could be conduits for liquids. Floors will be inspected monthly for cracks. If cracks are noted, they will be sealed to reduce the possibility of leaks. Where sumps are used, the sumps will be wrapped with a plastic geomembrane to reduce the possibility of leaks from occurring. In addition, joints between concrete floors will be sealed.*

ARCADIS Response: KEMC needs to evaluate the costs contained in Table 7-6 in the Mining Permit Application to determine whether adjustments are required as a result of this commitment.

Comment No. 42: Clarify what measures will be taken to stabilize stockpiled soil that will be in place for less than one year.

Response to Comment No. 42: *KEMC will implement a stockpile and soil erosion program at the facility. The mining operation will involve moving quantities of soil and granular materials regularly to and from stockpiles, berms, and open areas. During the winter months, snow and frozen ground will prevent seeding and the initiation of vegetation, however, both snow and frozen ground passively prevent stockpile and soil erosion. For the months between March and November, active management will be implemented. Depending on the use and need of the stockpiled or stored material, one or more erosion management methods can be used.*

For materials to be used within nine months of storage – silt fences and hay bales will be installed on all sides where access is infrequent and a lined rock area will be used to filter the directed stormwater flow to prevent sediment movement from the area.

For materials stored longer than nine months silt fences and appropriate vegetation will be established. An evaluation of the area would be done before selecting the appropriate vegetation. This will be accomplished by seeding and mulching by one of many commercially-available methods (application of seed and straw mulch, stabilized or bonded fiber matrix mulch, flexible growth medium mulch, and hydroseeded mulch).

As appropriate in any and all areas, silt fences and/or hay bales can be installed to prevent sediment movement from piles and to direct the water flow. This issue is also addressed in the stormwater management plan.

ARCADIS Response: KEMC needs to evaluate the costs contained in Table 7-6 in the Mining Permit Application to determine whether adjustments are required as a result of this commitment.

Comment No. 46: Clarify how water will be managed during the postclosure monitoring period if the TWIS is removed 5 years prior to removal of the WWTP.

Response to Comment No. 46: *As described in the reclamation plan, the wastewater treatment plant will be left in place for approximately 5-years after closure and reflooding of the mine. In the event that hydraulic head measurements and water quality data from the reflooded drifts of the upper most levels indicate that water quality in the Quaternary aquifer could be affected by the reflooded mine, water will be pumped from the reflooded open drifts of mining levels 383 m and 353 m. The water will be routed to the WWTP for treatment. Treated water will be pumped back into the reflooded drifts on mine levels 383 m and 353 m. Thus the TWIS is not needed.*

Cycling of treated water through the reflooded open drifts will facilitate the removal of soluble sulfide oxidation products from the walls of the mine workings. This process will remove oxidation products that formed during operations. These oxidation products represent a finite source of constituents. Since the workings will be backfilled and flooded, further generation of oxidation products will be terminated.

The walls and fractures of the reflooded workings are readily accessible to treated water that would be flushed through openings in the event the contingency is implemented. By flushing the treated water back through the reflooded workings of mine levels 383 m and 353 m, no discharge is required at the TWIS. It is estimated that the rate of cycling treated water through the open drifts on mine levels 383 m and 353 m would occur at a rate of between 100 gpm and 250 gpm. Over a 5-year period this represents approximately 38 to 95 pore volumes of water that would be flushed through the reflooded open drifts of mine levels 383 m and 353 m. This is clearly more than adequate cycling of water through the targeted drifts to remove soluble constituents. Note that at the time of reclamation, KEMC may elect to retain one or two of the infiltration cells for the discharge of a small volume of the treated water.

ARCADIS Response: The WWTP is to be left in place for approximately five years after closure and reflooding of the mine. If it appears that water within reflooded drifts of the upper most mine levels indicate the Quaternary aquifer could be affected, water would be routed to the WWTP for treatment. Treated water would be pumped back into the reflooded drifts on mine levels 383 m and 353 m; thus, the TWIS may or may not be needed. Not included in the KEMC response was recognition of grading, revegetation and removal of piping and mechanical systems in Year 12 to reflect the removal costs for the TWIS. KEMC needs to evaluate the costs presented in Table 7-6 to include an adjustment or an explanation of where these costs are represented.

Comment No. 53: Provide analysis for potential changes in upward vertical hydraulic gradients due to the removal of the ore body and subsequent backfill partially using uncemented rock.

Response to Comment No. 53: *The MPA identifies that vertical passes and raises within the mine will be sealed to isolate the upper mine workings (mine levels 383 m and 353 m) from the lower mine workings. This will minimize the potential for vertical movement of water after reflooding of the mine. To further enhance the reclamation plan for the underground mine, KEMC will backfill all secondary stopes on mine levels 383 m and 353 m with the same cemented mixture that is used for backfilling primary stopes. Refer to Figure 7-2 in Attachment 2.*

ARCADIS Response: KEMC needs to evaluate the costs contained in Table 7-6 and plan for reclamation of underground workings displayed in Figure 7-2 (Reclamation Plan for Underground Workings) in the Mining Permit Application to determine whether adjustments are required as a result of this commitment.

Comment No. 79: Clarify what measures will be taken to control fugitive dust at the loadout facility and from haul trucks in their return route to the mine from occurring.

Response to Comment No. 79: *Details on controlling fugitive dust at the facility are discussed in the "Fugitive Dust Control Plan" dated December 2005 which is included as Appendix D in the Air Use Permit – Permit to Install Application that was submitted to MDEQ on February 20, 2006. This Plan was included with the Michigan Air Use - Permit to Install Application that was submitted to MDEQ. Section 5.2 discusses how fugitive dust at the load-out facility (Crushed Ore Bins) will be controlled. Trucks will be loaded from two storage bins that are located inside a building. Each of the two individual load-out stations will in turn be partially enclosed to reduce the potential of fugitive dust being generated from the loading area. This partial enclosure, along with the relatively large particle size of the crushed ore material is expected to reduce emissions from this area by up to 90%.*

During periods of time during the year when snow cover is not present and freezing conditions are not occurring, fugitive dust from all traffic areas at the site will be controlled through a detailed watering program. This program addresses trucks leaving and entering the site. It will include use of an on-site watering truck to distribute water evenly across roadways. The objective will be to maintain traffic areas in a wet state during operational periods of the day when truck and other equipment traffic will occur. In addition, the immediate area around the load-out facility will be paved as an additional measure to assist in road dust removal. Unpaved areas (including the mine access road) will be maintained with coarse aggregate material. This material should also aid in reducing fugitive dust by keeping the silt content to a minimal level.

ARCADIS Response: KEMC needs to evaluate the costs contained in Table 7-6 in the Mining Permit Application to determine whether adjustments are required as a result of this commitment.

The following commitments will result in an increase in the Financial Assurance calculations.

Comment No. 25: Provide a plan for increasing the thickness of the contact water collection layer to 2 feet of granular material.

Response to Comment No. 25: *An additional 1 foot of granular drainage material has been added to the TDRSA contact water collection system design bringing the total thickness to 2 feet of granular drainage material. Figures 5-3, 5-4 and 5-5 have been revised to show this change and are provided in Attachment 2.*

ARCADIS Response: Table 7-6 should be adjusted by $35,000 to reflect this additional cost.

Response to Comment No. 55: *The timeline for closure of the mine and WWTP is described in Table 7-6, Figure 4-4 and Section 7. Reflooding of the mine will take place in year 12. Reclamation of the WWTP will occur in year 17 of the project. The WWTP clarifier sludges and material from the evaporator will be disposed at an off-site landfill per state and federal rules regulating industrial waste. (See also Response to Comment No.30) The annual operating costs for the WWTP are estimated to be approximately $840,000 (which includes $58,000 for disposal of clarifier and brine solids). These costs will be incurred up to the point in time that reflooding occurs in year 12. The basis for the annual operating costs are as follows:*

Operating Cost Estimate for Wastewater Treatment Plant

Item	***Units***	***Unit Cost***	***Quantity***	***Item Total***
Offsite Treatment Solids Disposal	*ton*	*$ 170*	*341*	*$ 58,000*
Caustic Soda	*lb*	*$ 0*	*103,718*	*$ 30,100*
Soda Ash	*lb*	*$ 0*	*16,647*	*$ 2,700*
Hydrochloric Acid	*lb*	*$ 0*	*51,859*	*$ 7,800*
Sodium Hypochlorite	*lb*	*$ 0*	*2,741*	*$ 1,200*
Polymer & Misc Chemicals	*lb*	*$ 4*	*9,299*	*$ 37,200*
Resin and Membrane Replacement	*annual*	*$ 20,000*	*1*	*$ 20,000*
Electricity Evaporator	*$/kw-hr*	*$ 0*	*534,360*	*$ 79,100*
Electricity Main RO Feed Pumps	*$/HP-yr*	*$ 967*	*12*	*$ 11,600*
Electricity Main RO Units	*$/HP-yr*	*$ 967*	*183*	*$ 177,000*
Electricity Microfilters	*$/HP-yr*	*$ 967*	*31*	*$ 30,000*
Electricity CRP RO Feed Pumps	*$/HP-yr*	*$ 967*	*12*	*$ 11,600*
Electricity CRP RO Units	*$/HP-yr*	*$ 967*	*31*	*$ 30,000*
Electricity Treated Water Infiltration System Pumps	*$/HP-yr*	*$ 967*	*12*	*$ 11,600*
Electricity Misc users, (mixers, small pumps, facility, etc.)	*$/HP-yr*	*$ 967*	*50*	*$ 48,400*
Heating/Lighting Costs	*annual*	*$ 25,000*	*1*	*$ 25,000*
General maintenance costs	*annual*	*$ 140,000*	*1*	*$ 140,000*
Labor, 2 full-time	*ea*	*$ 60,000*	*2*	*$ 120,000*
Annual Operating Cost				***$ 841,300***

ARCADIS Response: The information provided by KEMC indicates that operation of the WWTP is $841,300 annually. The company has committed to operation of the WWTP for five years during the post closure period to primarily treat water from underground workings. The annual cost for five years of WWTP operation needs to be added to the Financial Assurance, with contingencies.

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Joe Maki
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Subject:
Kennecott Eagle Minerals Company
Response June 21, 2006 Comments to Eagle Project Mining Permit Application

Date:
November 3, 2006

Contact:
Keith Smith

Phone:
406.449.7001 Ext. 11

Email:
kwsmith@arcadis-us.com

Our ref:
AZ002400.0001

Dear Mr. Maki:

This document is prepared as a continuation of the contract ARCADIS, Inc. (ARCADIS) was tasked with to evaluate the financial assurance cost elements prepared by Kennecott Eagle Minerals Company (KEMC) for their proposed underground nickel and copper mine in Michigamme Township, Marquette County, Michigan. The financial assurance is comprised of costs for reclamation, monitoring, closure, post-closure, agency oversight and contingencies. The purpose of ARCADIS' scope of work is to enable the Michigan Department of Environmental Quality (MDEQ), Office of Geological Survey (OGS), to determine whether the proper accounting of all such costs have been determined and addressed.

KEMC submitted a Mining Permit Application in February 2006. ARCADIS prepared a Preliminary Financial Assurance Evaluation report which requested clarification of several items in the KEMC Mining Permit Application documents that could have potentially impacted the amount required for the Financial Assurance. These items were combined with comments from several additional agency reviewers into the document ultimately submitted to KEMC June 21, 2006.

ARCADIS has reviewed KEMC's response to those comments, particularly noting any commitments which could potentially affect the costs which comprise the amount required for the Financial Assurance; costs for reclamation, monitoring, closure, post-

closure, agency oversight and contingencies. Responses which contained additional commitments for activities taking place during the operating phase of the mine were not called out in the ARCADIS response document (Attachment A). ARCADIS has noted each instance where a commitment has been made in the KEMC response document and noted the cost for adjustment or noted that a review for a potential cost increase is required by KEMC.

Attachment A contains the following specific cost increases:

- An additional $35,000 is needed for removal of an increased 12" of drainage layer during removal of the Temporary Development Rock Storage Area (TDRSA); and

- ARCADIS finds that 5 years of the annual operating costs for the Waste Water Treatment Plant (WWTP) will result in an addition to the financial assurance of $4,206,500. MDEQ will need to reconcile these costs with costs displayed in Table 9-1, which include oversight and contingency percentages, to arrive at a final increased amount for the Financial Assurance.

ARCADIS did not assign a dollar value to other increased commitments reflected in KEMC's response to comments; these costs should be developed by KEMC. ARCADIS has suggested in Attachment A that the company review the specific commitment in comparison to the costs presented in the Mining Permit Application to determine whether adjustments are required.

Financial assurance is to remain in place during mining operations until the department determines that reclamation has been completed and for a postclosure monitoring period to be determined by the department. The department has the authority to review at least every three years, and more frequently as necessary, updates of the statement of financial responsibility and to require permitees to adjust

the conformance bond to provide sufficient financial assurance. This provision in the law provides the department, the regulated community and the people of the state of Michigan the ability to react to changing conditions at the site and within the operation.

Thank you for the opportunity to work with your staff in review of this project. We look forward to responding to any questions or comments you might have.

Sincerely,

ARCADIS G&M, Inc.

Keith W. Smith, PG
Senior Project Manager

Enc: Attachment A