State Agency Response to Public Comments on Draft Authorizations for the Fort Knox Mine Heap Leach Project

July 3, 2007

INTRODUCTION

This document is a synopsis of the public comments on Fairbanks Gold Mining, Inc's (FGMI's) Fort Knox Mine Heap Leach Project that were received in writing during the public notice period from June 29, 2006 through July 31, 2006 and orally at the public hearing held in Fairbanks on July 17, 2006 along with responses to those comments from the Alaska Department of Natural Resources (ADNR) and the Alaska Department of Environmental Conservation (ADEC). Similar comments from different people on the same subject are addressed together and comments on related subjects are grouped together for easy reference.

The responses in this document were used to formulate and finalize the decisions and permits of State agencies. This document is a joint response from the following agencies:

- Alaska Dept. of Natural Resources, Office of Project Management & Permitting
- Alaska Dept. of Natural Resources, Office of Habitat Management & Permitting
- Alaska Dept. of Natural Resources, Division of Mining, Land, and Water
- Alaska Dept. of Environmental Conservation, Division of Water

On June 2, 2006, the U.S. Army Corps of Engineers (ACOE) published a public notice for FGMI's 404 permit application to construct, operate, and then close a heap leach facility. The public comment period for that permit application, POA-1992-574-S was set to close on July 3, 2006 but was extended to July 31, 2006 at the request of EPA.

PROJECT DESCRIPTION

The Fort Knox Mine is an open-pit gold mine, located approximately 26 miles northeast of Fairbanks, Alaska. The operator proposes to add a heap leach gold recovery facility in the Walter Creek drainage. The mine was originally permitted in 1994, and currently produces about 330,000 ounces of gold annually. The mine site is located primarily on lands owned by the State of Alaska and the Mental Health Trust. FGMI employs 400-425 people at the mine and mill, which operate on two shifts, 24 hours per day, 365 days per year.

The valley fill heap leach will be located in the upper end of the Walter Creek drainage immediately upstream from the existing tailings storage facility (TSF). Excluding the haul road and access roads, the heap leach pad with an in-heap storage embankment and base platform will cover approximately 310 acres and will have a total capacity for leaching 165 million tons of ore. The haul road to the pad will cover approximately 40 additional acres. The pad is to be constructed in five stages, which are illustrated on Figure 1.2 of the Heap Leach Facility Project Description. Table 1.0 provides the area and tonnage planned for each stage of development. The clearing of brush and trees, initial earthwork in preparation of liner construction, the site access road, the portion of the in-heap embankment outside the pad limit, and establishment of drainage control will occur over the entire 310 acres at the beginning of the project. Within that

area, 130 acres of lined pad will be constructed for the first two stages and loaded with ore. Each of the three additional stages will be constructed as needed for loading ore.

Table 1.0: Area and Tons for Each Stage of Development

	Lifts	Pad Area [Square Feet]	Pad Area [Acres]	Cumulative Leach Pad Area [Acres]	Capacity By Stage [Thousand Tons]	Cumulative Capacity [Thousand Tons]
Stage 1	1-4	3,034,731	70	70	13,716	13,716
Stage 2	5-7	2,362,850	54	124	21,659	35,375
Stage 3	8-10	2,422,613	56	180	31,567	66,942
Stage 4	11-13	2,392,773	55	234	36,049	102,991
Stage 5	14-19	2,030,238	47	281	58,202	161,193

Ore for the heap leach pad will consist of run-of-mine rock from the Fort Knox Pit as well as lower grade ore that was previously placed in various stockpiles. The Barnes Creek and Fish Creek stockpiles currently contain 29 million tons of lower grade ore that will be loaded on the heap leach pad. The ore is characterized by relatively high permeability that will promote efficient flow in the heap for rapid solution recovery and drainage and for rapid rinsing at closure.

In-heap storage of process solution and storm water will be accomplished uphill of an embankment at the downstream toe of the heap. The rock that will be used to construct the embankment for the in-heap storage pond is sound, durable, and of high strength similar to the quality of the rock that has been used to construct the downstream random fill for the Fort Knox Mine Tailing Storage Facility (TSF).

The valley fill heap leach pad will be constructed with a 12-inch prepared subbase with a coefficient of permeability of less than 1×10^{-5} cm/sec overlain by a geomembrane liner of 80-mil thick LLDPE or similar material. Above the geomembrane liner, there will be an overliner consisting of 3 feet of crushed rock containing a network of pipes to promote rapid drainage. The overliner will protect the geomembrane liner during ore loading and will help promote leachate collection and maintain a low head on the geomembrane liner.

The facility will utilize an in-heap storage pond to collect pregnant (gold-bearing) solution. In addition to providing the necessary operating capacity for pregnant solution, the in-heap storage pond will be sized to contain: (1) solution from a 24-hour drain down, plus (2) the runoff from the 100-year/24-hour storm event.

Beneath the in-heap storage pond, a Leachate Collection and Recovery System (LCRS) will be constructed between an overlying primary geomembrane liner and an underlying secondary geomembrane liner underlain by a 12-inch-thick layered prepared subbase. The LCRS will consist of a drainage layer that will report to a pump back system to return any solution passing through the primary liner back to the in-heap storage pond. The LCRS constructed in conjunction with the double liner in the area of the in-heap storage reservoir will provide leak monitoring and collection. A Process Component Monitoring System (PCMS) will be constructed under the main header lines for the solution collection system, outside of the LCRS, providing additional leak detection. An underdrain system consisting of a network of drainage channels

containing drain rock will route water from baseflow in Walter Creek, and other seeps and springs under the subbase to the tailing impoundment providing a third level of leak detection.

Barren (non-gold-bearing) solution will be applied on the heap leach using drip emitters, or possibly sprinklers during the warm months. The solution will flow through the run-of-mine ore. Pregnant solution will flow to the in-heap storage reservoir, which will have an operating capacity of about 68 million gallons, or 9.1 million cubic feet. The pregnant solution that collects in the solution collection wells in the in-heap storage reservoir will be pumped to the Carbon-In-Columns (CIC) plant using vertical pumps located in the solution collection wells. Barren solution and pregnant solution will be pumped in pipes between the pad and the CIC plant. Loaded carbon will be processed in the existing Fort Knox mill facilities.

The heap leach pad will be located immediately upstream of the tailing impoundment. The tailing dam is a zoned, earth-filled structure designed to hold tailing and process water from the mill as well as surface runoff water. The dam is designed and will be maintained to contain the 100-year/24-hour storm event and the average 30-day spring breakup plus provide 3 feet of freeboard. During the time of operation of the heap leach pad, the tailings dam will remain operational and the minimum allowable freeboard will be increased to include the full volume of the in-heap storage pond, for the extremely unlikely event of a catastrophic failure of the heap leach pad embankment dam. The tailing impoundment is a zero discharge facility. The mill recycles water from the tailing impoundment for reuse in the beneficiation process. The water in the tailing impoundment will also be utilized for the heap leach process.

SUMMARY OF PUBLIC COMMENTS

Ten letters were received in support of the project including:

- Eight letters from vendors, contractors, or consultants
- One letter from another mining company
- One letter from the Alaska Miners Association

In addition, 121 signed form letters were received from individual FGMI employees expressing support for the project and company. Fairbanks Gold Mining, Inc. also submitted a letter with suggested changes to the draft permits and authorizations.

Twelve letters were received expressing questions or concern about specific issues related to the heap leach project including nine letters from members of the public and three letters from agencies.

On the evening of July 17, 2006, a public meeting and hearing were held at the Carlson Center in Fairbanks, Alaska. During the public meeting a PowerPoint project description was presented by FGMI, followed by a question and answer period where nine people asked questions about various aspects of the project. This was followed by a more formal Public Hearing when oral testimony was recorded; six people testified in support of the project and none testified against it. In all, 58 people signed the public meeting roster.

For ease of reference, the following acronyms are used in this document:

- ACOE = Army Corps of Engineers
- ADEC = Alaska Department of Environmental Conservation
- ADNR = Alaska Department of Natural Resources

- amsl = above mean sea level
- CQA/QC = construction quality assurance and quality control
- CWA = Clean Water Act
- EA = environmental assessment
- EIS = environmental impact statement
- FGMI = Fairbanks Gold Mining, Inc.
- GVEA = Golden Valley Electric Association
- HDPE = high-density polyethylene (commonly used in reference to pipe or liner material)
- INCO = International Nickel Company
- LCRS = leachate collection and recovery system
- LLDPE = linear low-density polyethylene (commonly used in reference to liner material)
- LMPT = Large Mine Permitting team
- MDE = maximum design earthquake
- NEPA = National Environmental Protection Act
- OBE = operating basis earthquake
- OHMP = Office of Habitat Management & Permitting
- OPMP = Office of Project Management & Permitting
- PCMS = process component monitoring system
- POA = Plan of Operations Approval
- RCA = Regulatory Commission of Alaska
- RCRA = Resource Conservation & Recovery Act
- TLO = Trust Land Office
- TSF = tailings storage facility
- WAD = weak acid dissociable (commonly used in reference to cyanide, always less than or equal to total cyanide)
- WMP = Waste Management Permit (issued by ADEC)
- WSR = water supply reservoir

The sections below, organized by topic, summarize the written and oral comments and then provide the joint State response to those comments. For reference, copies of all of the written comments that were received are attached.

COMMENTS IN SUPPORT OF THE HEAP LEACH PROJECT

1. **Comments supporting the project.**
    - FGMI's reputation – FGMI is one of the most socially and environmentally responsible mining firms in the mining industry.
    - Resource recovery – FGMI's proposal allows for extraction of gold that is otherwise unrecoverable.
    - Advantage of Walter Creek location – The Walter Creek site is upstream from an existing zero-discharge tailings impoundment that provides for control of point and non-point source drainage from the heap leach facility and the 100-year/24-hour storm event.
    - Sound design – The LCRS and double liner provide for full time monitoring and recovery of unplanned leakage from the system. The proposed design keeps cyanide-bearing pregnant solution from the open air environment

thereby reducing the risk of exposure to fish, wildlife, and humans. The seismic design meets or exceeds regulatory requirements.

- Economic benefit – Extension of the Fort Knox Mine life will provide economic benefit to individuals through employment, to businesses in the community, and to local governments in the form of taxes.

***Response*.** Resource development is important to the State of Alaska. Article 8 Section 1 of the Alaska Constitution states, "It is the policy of the State to encourage the settlement of its land and the development of its resources by making them available for maximum use consistent with the public interest."

PUBLIC PROCESS AND PROCEDURAL COMMENTS

2. **Public process and public awareness.** The project is "sneaking through."

***Response*.** The State of Alaska's public notice, public hearing, and public comment processes are prescribed by statutes and regulations and may be different for each department, permit, or approval. In general, the Large Mine Permitting Team (LMPT) posts on its web site (*http://www.dnr.state.ak.us/mlw/mining/largemine/)* information received from applicants such as project descriptions, baseline data reports, plans of operation, reclamation plans, and applications as well as documents generated by agencies such as draft permits and approvals, final permits and approvals, and responses to comments. The state and federal agencies that participate in the LMPT process generally coordinate their public meetings so that they are held at the same time and place thus making it more convenient for the public. In the case of the Fort Knox Heap Leach Project, a timeline of the state public process looks like this: Information received from FGMI, draft agency documents, and agency contact numbers were posted to the LMPT website at the start of the public comment period on June 29, 2006 including:

STATE OF ALASKA DRAFT PERMITS

- Draft Plan of Operations Amendment Approval (including a Draft Reclamation Plan Approval)
- Draft Addendum to the Fort Knox Millsite Lease
- Fort Knox Millsite Lease (provided not for comment but to facilitate review of the Draft Addendum)
- Draft Waste Management Permit (2006-DB0043)
- Waste Management Permit Application

DEPARTMENT OF THE ARMY SECTION 404 PERMIT

- ACOE 404 Permit Application POA-1992-574-S June 2, 2006
- ACOE 404 Permit Application POA-1992-574-T June 29, 2006

ADDITIONAL INFORMATION FROM APPLICANT

- Walter Creek Valley Heap Leach Facility Project Description

- Walter Creek Valley Heap Leach Facility Closure Plan
- Fort Knox Mine Tailing Facility Closure Management Plan
- Fort Knox Mine Reclamation and Closure Plan *including* Section 9.0 Estimate of Reclamation and Closure Cost (Details)
- Fort Knox Mine Monitoring Plan
- Fort Knox Mine Solid Waste Management Plan

A Public Notice describing the project, stating when and where the public hearing would be held, the period during which written comments could be submitted, and agency contact information was published on June 29th and June 30th, 2006, in both the Fairbanks Daily News-Miner and the Anchorage Daily News. The public comment period began on June 29, 2006 and ended on July 31, 2006 at 5:00 pm. A public presentation explaining the project followed by a public hearing to take oral testimony was held at the Carlson Center in Fairbanks on July 17, 2006. This oral testimony was recorded and transcribed so that the oral testimony could be addressed in this response to comments.

The U.S. Army Corps of Engineers conducts its own public notification and hearing process and is providing its own response to this question about the public process.

3. **EA versus EIS.** If heap leaching was intended at the outset, it would have been a part of the extensive environmental impact statement process. By seeking a "modification" of the permit, FGMI is avoiding the evaluation process that would originally have been required. Because two separate applications were submitted to the U.S. Army Corps of Engineers the project has been illegally segmented and an EIS is required for the entire project. The Environmental Assessment process does not provide the "big picture" review of the project as a whole. The ACOE and State of Alaska must follow the NEPA process.

***Response*.** An EIS was not required during original permitting of the Fort Knox Mine. The Corps of Engineers is the lead federal agency involved with Fort Knox permitting and it is up to the Corps to address the environmental analyses required by NEPA and determine if an EIS is required. The Corps is keenly aware of the need to follow the NEPA process. Please read the Corps' Record of Decision for more information on this.

4. **Public review of future permit modifications.** ADEC must explicitly state all conditions that are incorporated by reference into the Waste Management Permit and ensure that those conditions are enforceable. Any expansion, modification, or other change in a facility process or operation which might result in an increase in emissions or discharges, or might cause other detrimental environmental impacts from the permittee's facility requires a new permit or variance and an associated public review process.

Response. ADEC agrees that 18 AAC 15.100(c) provides that "[a]ny expansion, modification, or other change in a facility process or operation which might result in an increase in emissions or discharges, or might cause other detrimental environmental impacts from the permittee's facility, requires a new permit or variance." We also recognize that not all modifications to a Waste Management Permit result in increased detrimental environmental impact. For example, conditions such as those included in Sections 1.2.2 regarding ore from satellite pits or 1.6 regarding adjustment of monitoring can be made if there is "insignificant impact on mine closure, reclamation and water quality."

5. **FGMI's answers and responsiveness.** FGMI refused to answer legitimate questions such as what happens if their design expectations fail and how much ore they have already identified of the 165 million tons that will potentially go to the heap leach. FGMI's control of noise, light pollution, and dust from development of the True North Mine was ineffective.

Response. Section 1.3 in the Walter Creek Heap Leach Project Description provides an overview of the heap leach project, including where the ore will come from and how many tons each stage of the heap leach is designed to handle. Decisions on exactly how many tons will come from the pit, the low-grade stockpiles, and waste rock dumps are typically made on a quarterly, monthly, weekly, or even daily basis depending on such things as equipment availability, road construction activities, fuel costs, the price of gold, etc. It is unreasonable to expect a company to make such decisions at the beginning of multi-year permitting and construction of the heap leach facility.

Inspection and monitoring provisions are written into permits and authorizations so that unplanned events will be discovered as soon as possible. Other permit provisions lay out how a company must respond if something unusual occurs or even appears to be occurring.

The following description of a response to the recent seepage of water through the south abutment of the TSF dam is an example of what happens if an event outside of design expectations occurs:

> The Fort Knox tailings storage facility (TSF) dam is an earthen structure used to impound the finely ground tailings and associated water from the Fort Knox mill. The water contains chemical residues from the milling process, including dilute levels of cyanide which is used in the gold recovery process. All dams seep to some degree, so a system of wells intercept below-ground seepage and pump it back to the TSF. Another series of downstream monitoring wells verify that the interception system is working correctly. In December 2006, underground seepage was observed to be surfacing near the south abutment of the dam and freezing at the surface. Water quality analyses indicated that this seepage was from the tailings impoundment and appeared to be traveling along a shear zone in the bedrock.

Fairbanks Gold Mining, Inc. (FGMI) notified the Alaska Department of Environmental Conservation (ADEC) on December 18, 2006. Prompt inspections by Knight Piesold, the dam's engineer, and the Alaska Department of Natural Resources (ADNR) Dam Safety Engineer confirmed the integrity of the dam and found it to be operating according to its design.

Water quality data indicate that surface and subsurface seepages are being captured and returned to the TSF impoundment. Chemical analyses of water samples from multiple ground water and surface water sites confirm that there has been no release of water from the tailings pond to the downstream wetlands.

FGMI notified ADEC and acted in accordance with their permits and plans, and as requested by state agencies. They:

- Increased the frequency of groundwater and surface water monitoring and began sampling at additional sites.
- Increased the frequency of visual inspections of the dam and area around and downstream of the dam.
- Used multiple laboratories to corroborate the data
- Cleaned and calibrated the automatic ground water level sensors below the dam.
- Installed a temporary ditch to divert surfacing water to the original seepage collection system.
- Installed a pump system to transfer surface water to the seepage pump back system at the base of the dam.
- Installed additional groundwater interceptor wells IW7, IW8, IW9, IW10, and are now installing IW11. IW9 and IW10 produced little flow and so were converted to ground water level monitoring wells.
- Installed an additional monitoring well MW8.
- Extended the TSF dam toe drain on its southern end.
- Brought in the following consultants:
    - Knight Piesold – geotechnical and dam engineers
    - Water Management Consultants – hydrologic and water quality consultants
    - Dr. Terry Mudder – cyanide expert
    - Zonge Engineering and Research - geophysical exploration specialists.
- Reviewed training videos provided by the Alaska Dam Safety Engineer on inspection of embankment dams and emergency action planning.
- Updated the TSF Operation and Maintenance Manual.
- Prepared a TSF Emergency Action Plan to supplement the O&M Manual and conducted a tabletop exercise of this emergency action plan.
- Will install three additional pairs of ground water level monitoring wells in the TSF dam near the south abutment.

- Kept the state agencies informed on the issue and their response and they briefed the Corps of Engineers and EPA, even though the project has required no permits from EPA.
- Reported to the agencies and members of the public on the seepage issue and the measures taken to address it at the Fort Knox annual meeting held on March 28, 2007.

Permitting of the heap leach facility was delayed during efforts to assure that this issue was understood and under control.

To our knowledge, FGMI complied with the permits and authorizations relating to noise, light, and dust that were issued for the True North Mine.

The heap has been designed with a capacity of 165 million tons. The company currently has material available from the existing mine plan for the pit and from existing low-grade stockpiles. There is the potential for additional tonnage to come from the material that is currently classified as "waste rock dumps" and from the reclassification of material from the currently planned pit from "waste" to "ore". Corporations have certain restrictions with respect to making "forward looking statements" regarding potential future income. State authorizations allow for up to 165 million tons of ore to be placed on the heap.

6. **Availability of agency analyses for public review.** Agency analyses and evaluations should be available for public review.

Response. It would indeed be helpful if stakeholders, the general public, environmental groups, etc. were more aware of the information, analyses, and thought processes that regulators follow in developing permit stipulations, bond amounts, etc. In this case, agency staff members were available at the public meeting and during the public comment period to answer questions regarding agency analyses, evaluations, and rationale for permitting the Fort Knox Heap Leach Project. For that matter, we are always available to address such inquiries. Suggestions are welcomed for a more effective and efficient mechanism and format to make people more aware of the information, analyses, and thought processes that regulators follow.

7. **Former FGMI employees should not be on the LMPT.** Having former Fort Knox employees on the LMPT results in a public perception that FGMI gets what it wants and confidence in the value of the public process is low. Who is protecting the public?

Response. In order to perform their duties, any inspector, regulator, or overseer must be thoroughly familiar with the business or industry they oversee. The former FGMI employees who are on the Large Mine Permitting Team bring to the state regulatory team considerable familiarity with the history and inner workings of the Fort Knox Mine

and there are those who argue that, if anything, this has resulted in closer regulation of FGMI.

8. **Millsite Agreement changes.** Addition of the heap leach does not constitute a change in use or otherwise necessitate an amendment to the Millsite Lease. Other proposed changes to the Millsite Lease are also unnecessary including changes to the definitions, term, addresses, engineer certification of the plans and construction, annual meeting date, and process for selection of a third-party environmental auditor.

Response. Under ADNR statutes and definitions, a heap leach is without question 'part of a mining operation'; however, when the Fort Knox Project was permitted there was a clear understanding by the agencies that the project did not include a heap leach facility. There was no heap leach 'constructed or in the process of being constructed' or even considered for construction on the Millsite Area. The project, as presented to the public, was for a vat-leaching facility only. ADNR believes that the addition of the Walter Creek Valley Heap Leach represents a "change in use" and therefore that the Addendum is necessary to allow approval of the heap leach facility.

As the Addendum is already needed, it is appropriate to make changes to Section 4 (d) (Term), Section 5 (a)(iv)(c) (Use Charge), and Section 26 (Notice) for 'housekeeping' purposes. Further, since the Addendum is necessary, it is appropriate to provide for an effective date and add definitions of 'heap leach' and 'heap leaching' to the Millsite Lease.

The proposed amendment to Section 9(f) referring to engineer certification of the plans and construction has been removed from the Final Millsite Lease Addendum.

The change in timing of the annual meeting was originally provided for in a letter from DNR dated January 17, 2003. ADNR believes that the addition of the Walter Creek Valley heap leach represents a "change in use" and that the Addendum is necessary to allow approval of the heap leach facility. As the Addendum is already needed, it is appropriate to make the change to Section 5 Use Charge for 'housekeeping' purposes.

ADEC approval of the contractor and scope of audit is a requirement of the ADEC Waste Management Permit. This requirement is also a normal stipulation contained in other ADNR plan approvals. ADNR believes that in the event agreement cannot be reached with FGMI on either the contractor selection or the scope of the environmental audit, it is appropriate for the agencies to have final decision authority. Further, as this is already a requirement of the ADEC Waste Management Permit, modification of the Millsite Lease should be done for housekeeping purposes to eliminate inconsistency between the ADNR and ADEC authorizations.

9. **Renegotiation of the Agreement for Funding Post-Reclamation Obligations.** Renegotiation of the Agreement for Funding Post-Reclamation Obligations should not be tied to issuance of Plan of Operations approval.

Response. ADNR has deleted the requirement for renegotiation of the Agreement for Funding the Post-Closure Agreement from the Plan of Operations Amendment Approval.

10. **Alternative sites for the heap leach facility.** A thorough environmental assessment should be done with full analysis for alternate locations for the heap leach facility within the footprint of the Fort Knox Mine.

Response. FGMI conducted an environmental assessment that included a full analysis of alternate locations for the heap leach facility within the footprint of the Fort Knox Mine.

SAFETY AND RISK COMMENTS

11. **Summarized comment on dam safety and risk assessment.** If the project does not go as planned, the Chena River watershed could become polluted. Enforceable standards for deposition of wastes, including prohibition of activities known to jeopardize containment structures, should be set to maintain the integrity of the TSF.

Response. The project is based on sound engineering and environmental control technologies and proven concepts that have been successfully applied at numerous sites around the world. The environmental monitoring system contains several levels of redundancy and covers many possible scenarios in which solution migration could occur.

The heap leach facility design does not have exposed areas (around the sides of the project or otherwise) where cyanide solution will be allowed to pool and pose a risk to wildlife. Cyanide solution is pumped to and from the heap leach facility in a double-walled piping system. When being dispersed within the heap, wildlife will not have access to the solution because it will be held in the interstitial pore spaces throughout the ore heap. See Section 1.4.16 of the Waste Management Permit.

The embankment dam is designed to the same standards as a water retention dam, even though no free water will be impounded. The hydrologic and seismic design standards are the same as the Fort Knox TSF Dam. A dam failure evaluation determined that the risk of a catastrophic failure of the dam was unlikely, either by an erosion failure or a slope failure. In either unlikely event, no affects on the Fort Knox TSF Dam can be realistically envisioned. The freeboard limits of the Fort Knox TSF Dam located downstream will be increased to retain the total operating volume of the in-heap storage pond including the 24 hour draindown, and the design storm, for the very

low probability event that a release occurred. Furthermore, as a contingency, FGMI will not install the spillway for the Fort Knox TSF Dam before the heap leach pad is closed.

Tailings are deposited into the TSF via a pipeline using subaerial and subaqueous methods. Neither of these methods has the potential to adversely affect the performance of the TSF. In contrast, prior to closure, subaerial deposition is planned along the face of the TSF dam to create a wide beach, reducing the head on the dam and actually enhancing its containment performance and reducing seepage quantity.

12. **Effects of worst case scenario.** Can the TSF handle an additional 30 to 110 million gallons of water if a disaster happened to the heap leach holding system? Do emergency procedures exist to deal with the worst case scenario?

Response. The in-heap storage pond is conservatively designed to include the full volume of the 100-year, 24-hour storm event that falls on the area of the fully developed pad (4.04 million cubic feet). In addition, the storage capacity includes the minimum operational pond (3.66 million cubic feet), an operational flexibility volume (4.3 million cubic feet), the 24 hour draindown volume (1.54 million cubic feet), and an emergency freeboard volume (0.6 million cubic feet). The 24 hour draindown volume assumes that the solution recirculation pumps fail and the leach solution in the heap drains into the in-heap storage pond for 24 hours; however, it is conservatively calculated as the volume from the solution application pumps running at full flow for 24 hours. It is noteworthy that the total design storage capacity as indicated is available at the beginning of Stage 1, even though the full volume is not required until Stage 5; therefore, the design volume is extra conservative for the majority of the operational life. In addition, a number of emergency contingencies are included. The embankment dam includes an emergency spillway for a worst case scenario; if the dam were to overtop, the spillway could safely pass the runoff from a 100 year, 24 hour storm without risk of a catastrophic dam failure. Instrumentation is included to monitor in-heap pond levels. An operations and maintenance manual is required that specifies maximum allowable operating levels, as well as levels that would represent an unusual condition. Emergency contingencies for unusual conditions will be included in the manual. Finally, a trough located between the ore heap and the crest of the embankment dam is approximately 20 feet deep, providing an opportunity to visually monitor the fluid level for unusual conditions because the in-heap pond will never be visible under normal operating conditions. Thus, a catastrophic failure of the heap leach holding system is highly unlikely.

In the unlikely event that the heap leach embankment failed, the maximum volume of fluid that could be released is 100.5 million gallons. The storage volume in the existing 3 feet of freeboard for the TSF is 206 million gallons, thus the TSF with its freeboard capacity alone provides more than two times the needed storage. However, for the safety of the TSF, it will be operated such that there is always available storage volume for the uncontrolled release event by increasing the TSF freeboard by the volume of the in-heap storage pond. Therefore, it is concluded that if a failure of the Walter Creek in-

heap storage dam were to occur, the water that could flow out of the facility would be completely stored in the downstream TSF without jeopardizing the integrity of the TSF.

Nevertheless, emergency procedures will be in place for the TSF dam and the heap leach pad embankment dam.

13. **Residential well water quality.** The Fort Knox Mine is affecting the water level in residential wells in the Cleary Summit area and could affect the water quality in those wells. The company should test residential well water quality to establish a baseline and then test it during operation of the heap leach facility.

Response. The subject residential wells are located 2 miles away from the heap leach facility and in a different watershed. Review of all three of the case files for existing or applied for water rights for the Cleary Summit area indicates that bottom elevations of the private wells are between ~2060 feet and ~2260 feet amsl. This means that the bottoms of these wells are 457 or more feet higher than the normal operating water level (1603 feet) and 412 or more feet higher than the maximum operating water level (1648 feet) for the in-heap pond. Given the topography, geology, and hydrology of the area, the agencies will require no further study to establish that the residential wells in the Cleary Summit area and the groundwater systems in the vicinity of the heap leach facility are independent of each other.

As a precaution, the ADEC Waste Management Permit will require water quality sampling at the former concrete batch plant well at the head of the Walter Creek drainage in order to monitor for groundwater flow from the Walter Creek to the Solo Creek watershed.

14. **Document logistics.** When saving/converting documents into Adobe Acrobat, the agencies should use the smallest possible document size and employ Adobe's graphics-reducing features to increase portability and accessibility by the interested public.

Response. The state agencies will do this by using the smallest possible document size and employing Adobe's graphics-reducing features in future postings.

15. **Barriers for pit closure.** Adequate warning signage and barriers must be provided to restrict access to the pit area after closure.

Response. The Reclamation Plan includes a provision for the construction of safety berms along the steeper highwall sections of the pit and the placement of warning signs. The placement of boulders on the berm around the pit has not been made a requirement of the Reclamation Plan Approval because the land-owner, the Trust Land Office (TLO) retracted the request to require the placement of boulders on the pit berm at this time. The TLO retained the right to request this in the future.

16. **Limitations on ADNR's reservation of rights.** ADNR's reservation of rights in the Plan of Operations Approval should be limited as in the Uplands Lease and Millsite Lease

Response. ADNR has modified the stipulation within the Plan of Operations Amendment Approval to read: "Reservation of Rights. ADNR reserves the right to grant additional authorizations to third parties for compatible uses on the land under this authorization per terms of the Amended and Restated Millsite Lease (ADL Nos. 414960 and 414961) and the Upland Mining Lease (ADL # 535408)."

SOCIO-ECONOMIC COMMENTS

17. **The project's effects on electrical rates.** It is not likely that FGMI will continue operating the mill after the heap leach is permitted, thus significantly reducing its electrical consumption and eliminating the claimed benefit of reduced electrical rates to other GVEA ratepayers.

Response. Many factors affect FGMI's decision on how long to operate the mill after the heap leach facility becomes operational, including the percent gold recovery in the mill versus the percent recovery in the heap leach, the price of fuel, the price of electrical power, the price of manpower, and the price of gold, etc. It is likely that under current conditions the mill will continue operating due to the high price of gold and the higher recoveries achievable in the mill.

In addition, many factors affect electric rates, the major one being the cost of fuel and others like generation costs, transmission costs, and the availability and cost of power from other producers via the grid. FGMI has a Regulatory Commission of Alaska (RCA) approved contract with Golden Valley Electric Association (GVEA) for the purchase of power under the GS2(3) rate. The contract provides for a portion of the tariff rate to be charged to FGMI which then is credited to all members based on their usage through the cost-of-power-adjustment. If FGMI were to reduce their power purchases, the bill and the cost-of-power-credit would also be reduced. If the mills were shut down, thus reducing FGMI's power purchases, the GVEA rate payers might see an increase of electrical cost to cover the reduction of the FGMI credit.

18. **The socioeconomic aspects of the proposed heap leach.** FGMI pays no significant royalties, taxes, or benefits to the landowners. It is not likely that FGMI will continue operating the mill after the heap leach is permitted. Shut down of the mill will result in a decrease in jobs and economic benefit.

Response. The Fort Knox Mine has provided considerable economic gain to the Fairbanks area and the State. While it is recognized that no mine will operate in perpetuity, the heap leach facility will lower the grade of material that can be

economically treated, thereby extending the mine life and its associated economic benefits for a number of years.

FGMI currently employs about 411 people at Fort Knox and there are about 2.2 times that amount of additional jobs in our community that result directly or indirectly from operation of the mine. The net result is that we have approximately 904 jobs available in the Fairbanks area because of the Fort Knox Mine.

FGMI paid $3.46 million in property taxes in 2005. Income taxes, mining license taxes, and Mental Health Trust royalties are confidential numbers and cannot be released. Considering direct employment only, an additional $1.2 million in property taxes is paid to the municipalities by those 411 employees. Although this will diminish over time due to decommissioning of facilities, the extension of mine life by the heap leach facility will contribute significant value to the community.

The total economic benefit in terms of payroll, purchase of supplies and services, payment of taxes and the economic multiplier amounts to over $180 million per year. This is a very significant contribution to the area and one that benefits all businesses and residents. Extending this benefit is important.

Fairbanks Gold will continue to explore the Fort Knox area in hopes of further extending the life of mining, milling, and leaching operations; however, no guarantee of further extension due to additional discoveries can be provided by the company. When the resource is economically mined out, it is gone and nothing can be done to replace it. By reducing the cut-off grade of ore, such as by adding heap leaching, then the life is extended.

19. **Mine life.** FGMI never anticipated that all ore would be processed in the mill; some was just not going to be processed. There is little actual need to extract gold since 80 percent of the gold used each year is for jewelry and jewelry is a luxury item.

Response. Since before the mill started operating, FGMI has been stockpiling low-grade ore for possible processing late in mine life if economics allow. Gold is an extremely valuable resource for many reasons. As an extremely corrosion resistant and malleable, precious metal, it is used extensively by various industries including television, radio, computer, and aerospace. The heap leach pad will allow FGMI to process a substantial amount of low grade ore that is not economical to mill. Because of the increased costs of shipping, fuel and electricity, without the heap leach, the life of the mine will be shortened. The heap leach pad is a relatively low risk alternative to extend the life of the mine to the benefit of Fairbanks and the State of Alaska.

20. **State dollars to build roads.** One commenter questioned the use of state money to build a road from Nome to the vicinity of the Rock Creek Mine.

Response. There are no state dollars involved in constructing roads or other facilities at the Fort Knox Mine.

RECREATION AREA COMMENTS

21. **Post-closure recreation area.** The original mine life was projected to be 12 to 16 years. Extending the mine life means that the promised recreation area will not be available in the lifetime of many of the people who were promised this benefit. The community was promised that this area would have a reclamation plan to convert this mining area into a recreation area when all projects were done. This heap leach area is situated at the upstream side of the proposed lake area. Can this cyanide solution get into the lake area which would be unhealthy for human usage and not allow people to use the lake?

Response. Extending the mine life would delay the availability of the recreation area to the public; however, the promise that a recreation area would be available after the close of the mine remains unchanged and it is to FGMI's advantage to complete reclamation and closure of each component of the mine as soon as practicable after each component is no longer needed for mine operation. The post-mining land use promise of a recreation area around the water supply reservoir (WSR) was made to the community as a whole, not to specific individuals.

During the period from active operations through the completion of closure and reclamation, the concentrations of cyanide and other solutes have and will be controlled because:

1. The solution containment system in the heap leach facility will minimize seepage losses
2. In the unlikely event surface water discharges from the heap leach facility occur, the TSF will contain them
3. The interception system down-gradient from the TSF has and will contain any groundwater influenced by process solutions

The lake that currently supports the fisheries associated with the Fort Knox Project is the Water Supply Reservoir (WSR), downstream from the tailing impoundment. The mine closure plan dictates that the water discharged to the wetlands and eventually to the WSR through the wetlands must meet water quality standards. FGMI will not receive sign-off on completion of closure and reclamation until the heap is rinsed and the water in the heap leach facility and TSF is treated to the point where it meets State water quality standards and can be discharged without further treatment. Consequently, public and aquatic uses of the constructed wetlands and the WSR area will remain unchanged by the heap leach.

BONDING AND FINANCIAL ASSURANCE COMMENTS

22. **Bonding for reclamation, closure, and long-term liability.** FGMI's estimated bond amount is inadequate by a considerable amount. The State and people of Alaska should not be liable for long-term mining-related problems that could impact the site. Kinross should be required to fully indemnify the State and all parties who could be impacted by posting a bond issued by a solvent independent surety for the costs of the worst case scenario. Appendix A of the Reclamation and Closure Plan (the Agreement for Funding Post Reclamation Obligations) should clearly state what the long-term management will look like.

***Response*.** Section 26 of the Amended and Restated Millsite Lease (ADL Nos. 414960 and 414961) addresses indemnification of the State: "FGMI assumes all responsibility, risk, and liability for all Millsite Operations and other activities conducted by FGMI in connection with the project described in the Project Description, including construction, reclamation, and environmental and hazardous substance risk and liabilities, whether accruing during or after the term of this Lease". ADNR's Plan of Operations Approval does not take effect until FGMI posts a bond in a form and substance approved by ADNR. The State requires a company to bond for an amount that would be needed if the State had to contract for the "anticipated or planned" closure of the site. This amount includes a "contingency factor" to cover unanticipated costs that could reasonably be expected in a reclamation project, but the State does not require bonding for the "worst case scenario".

The company originally proposed a bond amount of $20,551,994. ADNR and ADEC reviewed the closure and reclamation cost estimate for the Fort Knox Mine and as a result of this review the final bond amount was increased to $34,314,418. This includes $21,916,808 for direct costs, $10,753,646 for indirect costs, $579,951 for interim site maintenance and monitoring, and $1,064,013 for inflation. Equipment and labor rates are appropriate for reclamation to be conducted by contractor hired by the State. The Agreement for Funding Post-Reclamation Obligations contains provisions for updating the associated bond amount; this will occur under separate negotiations with FGMI.

The State entered into the Agreement for Funding Post-Reclamation Obligations (Agreement) because the State wanted to retain the fresh-water reservoir post-closure for use as a fishery and a public recreation use area. The Agreement contains terms for the transfer of management responsibility for certain facilities within the Millsite Lease area from FGMI to a State approved entity and a funding mechanism for the costs associated with the long-term maintenance of these facilities. The transfer of these management responsibilities will not be triggered until the tailings facility meets the water quality standards established by the ADEC Waste Management Permit and the requirements of the ADNR Reclamation Plan Approval are achieved. Furthermore, the heap leach facility must be rinsed to ADEC standards and achieve the revegetation requirements of the ADNR Plan of Operations Amendment Approval prior to the tailings facility being considered "closed". Under the terms of the Agreement, the State will not assume post-closure management responsibilities for the heap leach or pit lake. The

Reclamation Plan submitted by FGMI does not modify the Agreement. The State has determined that the Agreement does not need to be revised, and the requirement contained in the DRAFT Reclamation Plan Approval for revision of the Agreement has been eliminated in the Final Reclamation Plan Approval.

23. **State management and liability.** The State should not allow FGMI to transfer responsibility for managing the site to the State until after the facility has met water quality standards and maintained functional wetlands for a period of at least five years.

Response. The State entered into the Agreement for Funding Post-Reclamation Obligations (Agreement) because the State wanted to retain the fresh-water reservoir post-closure for use as a fishery and a public recreation use area. The Agreement contains terms for the transfer of management responsibility for certain facilities within the Millsite Lease area from FGMI to a State approved entity and a funding mechanism for the costs associated with the long-term maintenance of these facilities. The transfer of these management responsibilities will not be triggered until the tailings facility meets the water quality standards established by the ADEC Waste Management Permit and the requirements of the ADNR Reclamation Plan Approval are achieved.

24. **Trust Land Office liability for pit lake.** The Trust Land Office needs assurance that if use of the pit lake as a treatment facility is allowed, it will not create any additional liabilities for the trust, either during the operation of the pit lake as a treatment facility or after official closure.

Response. The Waste Management Permit Section 1.2.10 specifies that decant water may be disposed of to the pit provided that certain conditions are met and ADEC determines that there will be insignificant impact on long-term water quality. A pit lake model was completed that projects pit lake quality over time if decant water is pumped into the pit. Section 1.2.10.1 specifies Profile I water analyses be performed on all water discharged to the pit. Section 1.2.10.2 requires annual updates and reporting of parameters in the Pit Lake model. Section 1.2.10.3 requires ADEC approval of the annually updated pit lake water quality model. Section 1.2.10.4 requires submittal, approval, and implementation of a water treatment or other corrective action plan if the model predicts an Alaska Water Quality Standard exceedance at the time of pit lake discharge. Section 1.2.10.5 requires department approval before each annual discharge to the pit

25. **Removal of mill and buildings.** Project bonding should include a specific line item for demolition and removal of the mill and related millsite improvements.

Response. Mill demolition and disposal costs have not been included in the closure and reclamation cost estimate because the land owner (TLO) retracted the request.

RECLAMATION AND REVEGETATION COMMENTS

26. **Reclamation and closure of various facilities.** FGMI's proposed reclamation plan has many goals and ideals but the agencies should clearly specify the criteria and measurement standards to assess and ascertain where and when reclamation is "successful." All buildings should be removed. FGMI's reclamation and closure plan describes temporary cessation of some/all operations and states that reclamation will proceed if operations cease for three years. Three years is too long for a mine to be closed without reclamation activities proceeding. Road reclamation should include adding organic material and micro-contours to enhance seed and water trapping/holding. The agencies should establish maximum clod sizes to ensure that the roads are sufficiently scarified/ ripped. The frequency of performance monitoring should not be reduced until permitted standards are met for at least two years.

Response. The buildings are located on private land owned by the State of Alaska Trust Land Office (TLO); provided that these facilities do not degrade down-gradient resources on public lands, the post-mining disposition of these facilities is up to the private land owner. The TLO has directed ADNR that they do not wish to require bonding for the demolition and disposal of these facilities at this time. Building materials can be buried under the terms of the ADEC Waste Management Permit. The management of any contaminated soils would fall under the jurisdiction of the ADEC.

With respect to road reclamation, we have inserted a specific stipulation in the Plan of Operations Approval regarding the ripping of roads:

> Section 5.2 General Reclamation Procedures – Seedbed Preparation: The section is modified by the following requirement: Highly compacted areas such as equipment lots and roads will be ripped in a linear fashion. Minimum ripping depth shall be 12-inches of compacted material for a maximum ripper spacing of 2-feet, 18-inches of compacted material for maximum ripper spacing of 3-feet, or as otherwise approved by ADNR. Equipment lots must have growth media applied to a depth of 12-inches unless otherwise approved by ADNR. The placement of growth media on roads will not be required unless necessary to meet the vegetative cover criteria.

ADNR does not believe that the specification of 'maximum clod sizes when ripping' or the 'establishment of micro-contours' are necessary. The reclamation standard for revegetation contained in the Fort Knox Mine Reclamation and Closure Plan and modified by the Plan of Operations Approval requires that a 70 percent vegetative cover remains a minimum of three years after the last application of topsoil, seed, fertilizer, or any water besides natural precipitation.

The only new roads associated with the heap leach facility will be the relocation of the mine access road to the perimeter of the pad and construction of the haul road to the pad around the perimeter of the tailing impoundment. The only additional disturbance is

the 310 acres for construction of the heap leach pad. After completion of reclamation, the mine site will be an environmentally safe area and the freshwater lake will be made available for recreation activities.

27. **Revegetation standards.** The mine should be required to collect native seed from the mine site itself or nearby and test germination and establishment rates, fertilization rates, etc. Acceptable erosion standards should be identified. The vegetative cover requirement of 70 percent should be increased to 85 percent before financial assurance is released for any given area. Some tree planting should be required.

Response. The Reclamation and Closure Plan (June 2006) states that native species will be used, unless otherwise approved by ADNR. The proposed seed mix has been used with success at the Fort Knox Mine to stabilize recontoured areas while allowing for the natural reinvasion of native species. ADNR does not believe that the collection of native seed from the mine site is necessary.

The seed mix listed in the Reclamation and Closure Plan are all northern grass species found in Alaska. The purpose of the grasses is to prevent erosion and stabilize the soil until they are naturally replaced by other local plant species.

The Final Plan of Operations Amendment Approval contains the following stipulation to establish an 'erosion standard': "Erosion features which form in areas that have been recontoured and covered with topsoil must be stabilized if they affect the long-term stability of the reclaimed area or may result in additional erosion or sedimentation. Actions to stabilize erosion features shall be conducted in a manner that minimizes disturbance to adjacent areas. Subsequent inspections shall be completed to verify that rills and gullies do not persist. If chronic or long-term erosion features are identified, then remediation of the site drainage that is contributing to the formation of the rills and gullies shall be completed." The reclamation practices specified in the Fort Knox Reclamation and Closure Plan (June 2006); including seedbed preparation, fertilization, and seeding; have been found to be effective in controlling erosion through the establishment of a vegetative cover that allows for the reinvasion of native species. ADNR believes that the 70% cover criterion is adequate to ensure site stability which will promote the establishment of climax vegetation over time. The Final Plan of Operations Amendment Approval contains the following stipulation regarding the control of invasive plant species: "Invasive Weed Control: FGMI shall inspect revegetated areas to identify invasive plant species and eradicate these species to the extent practicable. If invasive plant species are identified, FGMI shall notify the Authorized Officer."

The 70% cover criterion is used as it is sufficient plant cover to control erosion while allowing enough space for the invasion of other local plant species. Seeding used in revegetation are predominately northern grass species such bluegrass and fescue, mainly due to availability and high germination rates of these plants. Grass seed is

usually screened by the manufacturer to eliminate noxious weeds in the mixture. Seeds for other forbs and native plant species may be available in the near future.

The primary focus of ADNR's revegetation requirements is to ensure site stability which will promote the establishment of climax vegetation over time. The planting of trees would speed this process and would be an acceptable practice; however, it is not a requirement of this Plan of Operations Amendment Approval. Researchers have found that the success rates of planting willow cuttings and other trees on reclaimed soils are fairly low and that these plants tend to move into the area on their own once the soils have stabilized.

28. **Tailings pond reclamation**. An aggressive tailings revegetation program should be required if dust from the tailings pond becomes a problem.

Response. Despite the fact that there will be an aggressive revegetation plan for the tailings and even though fugitive dust is not anticipated to become a problem, Condition 14, Reasonable Precaution to Prevent Fugitive Dust, in ADEC Air Quality Control Permit No. AQ0053MSS01 has specific monitoring, recordkeeping, and reporting requirements associated with fugitive dust control.

29. **Topsoil requirements.** Growth medium on top of potentially contaminated materials should have a capillary barrier to prevent upward migration of contaminants and should be as deep as possible. FGMI's plan does not use the entire volume of stockpiled growth media yet no rationale is provided for failure to use this material. To preserve the soil integrity of topsoil stockpiles, nurse crops should be established on the stockpiles.

Response. The Fort Knox ore is low in sulfides and the heap will be rinsed to meet ADEC permit closure standards; therefore, a capillary barrier to prevent the upward migration of potential contaminants should not be needed. The ADNR Plan of Operations Amendment Approval requires FGMI to submit final closure plans that include consideration of water quality monitoring, (including drain-down quality), required ore geochemical characterization, and the results from any environmental audits. If seepage or run-off from the heap leach facility exceeds water quality standards, ADNR may require infiltration control as part of the reclamation of the heap.

The Reclamation and Closure Plan (June 2006) states that "Reclamation completed during and directly after process component construction includes interim reclamation to stabilize and maintain the viability of topsoil stockpiles". All existing topsoil stockpiles at the Fort Knox Mine support extensive vegetative cover.

The ADNR Plan of Operations Amendment Approval has been revised to require the replacement of 12-inches of topsoil, unless otherwise approved by ADNR. The requirement to replace 12-inches of growth media can be modified in future revisions to the Reclamation and Closure Plan if FGMI conducts mine revegetation studies in

conjunction with ADNR Plant Materials Center on contoured waste rock dumps that demonstrate successful revegetation with less than 12-inches of growth media replacement. Successful revegetation must be determined a minimum of three years after the last application of topsoil, seed, fertilizer, or any water in addition to natural precipitation and it is FGMI's responsibility to meet the revegetation standards. ADNR anticipates that 12-inches of topsoil replacement will be adequate to promote the establishment of a self-sustaining vegetative community. The ripping of recontoured areas has been found to be effective in seedbed preparation by forming a broken, roughened surface that traps moisture, reduces wind shear, minimizes surface erosion by increasing infiltration, and creates micro-habitats that are conducive to seed germination and development. The construction of 'dozer basins', at appropriate locations and densities on slopes during reclamation of the Fort Knox Mine, would be an acceptable practice, but it is not a requirement of this Plan of Operations Amendment Approval.

30. **Definition of "cover".** The definition of "cover" in the Waste Management Permit should be clarified to include soil, vegetation, and water as specified in the Reclamation and Closure Plan.

Response. ADEC agrees and Section 1.11.3.1 has been changed to include soil, vegetation, and water as types of cover.

31. **Synthetic cover over heap at closure.** At closure, FGMI should place a synthetic cover over the heap and followed by organic overburden and vegetation.

Response. The placement of organic overburden on a synthetic liner at a 3:1 grade would not be a stable configuration and the use of a synthetic liner to cover the rinsed heap would not be considered appropriate. Topsoil will not be placed on the recontoured heap leach until seepage from the facility meets closure standards as specified in the ADEC Waste Management Permit. The ADNR Plan of Operations Amendment Approval contains a stipulation that requires FGMI to submit final facility closure plans for review and approval that include consideration of water quality monitoring, required ore geochemical characterization, and the results of any environmental audits. Further, if seepage or run-off from the heap leach facility exceeds water quality standards, ADNR may require the reclamation of the heap leach to minimize infiltration and / or impacts from run-off and may require the cover to include a low-permeability layer.

32. **Organic material stockpiles.** All organic materials should be segregated and stockpiled for use during reclamation. Stockpiles should be stabilized to prevent erosion. No stockpiles should be on wetlands or outside the project boundary.

Response. The FGMI Reclamation and Closure Plan commits to the salvage of topsoil from areas that will be disturbed by project activities. The ADNR Plan of Operations

Amendment Approval requires that during the construction of the heap leach, if topsoil exists in quantities greater than what is required to replace 12-inches of growth media on the heap leach pad at closure, said topsoil shall be stockpiled for use as needed in the reclamation of other facilities.

The salvage of topsoil and other growth media and the protection of this stockpiled material from erosion is already a requirement of the Fort Knox Reclamation and Closure Plan (June 2006). Furthermore, it is a requirement of Alaska statute and regulation.

The placement of fill on wetlands is addressed by the US Army Corps of Engineers Authorization. The Plan of Operations Amendment Approval does not authorize any activities outside of the project boundary.

BIRDS, FISH, AND WILDLIFE COMMENTS

33. **Birds and wildlife protection.** Some drawings show exposed cyanide solution around the sides of this project. How can this be enclosed so that wildlife will not get into this area?

Response. When cyanide solution is pumped to and from the heap leach facility, it is protected from wildlife through a double walled piping system. When being dispersed within the heap, wildlife will not have access to the solution because it will be held in the interstitial pore spaces throughout the ore heap. Section 1.4.16 of the Waste Management Permit prohibits any area of open water from becoming an attractive area for waterfowl or shorebirds.

The exposed water above the heap embankment shown on Figure 2-5 in FGMI's EA is for visual indication of extremely high water in the heap. For open water to appear, all of the following conditions must exist: a maximum operating pool with operational contingency volume, a 100-year/24-hour storm event, and a 24-hour drain down from the heap. The likelihood of all of these events happening at simultaneously is very unlikely. If solution appears in the trough, it is an unusual condition that will cause emergency contingency procedures in the operation and maintenance manual to be implemented. There is an overflow "spillway" at 1650.5 feet elevation for extreme events to protect the integrity of the heap leach embankment.

Use of buried drip emitters and an in-heap storage pond should largely eliminate the potential for wildlife exposure to cyanide and/or other chemicals during the application of the barren solution and during the process. However, sprinklers may be used during the warmer months, potentially increasing wildlife exposure to the barren solution. Ponding of pregnant solution could occur at the liner edge if short circuiting occurs; these areas could attract waterfowl and shorebirds. However, the slope of the liner and heap leach and the high permeability of the ore in this project are such that the likelihood of ponding from short circuiting is low.

While this still leaves potential for wildlife exposure to contaminants in areas upstream from the tailing impoundment, it is unlikely that given the dilution associated with the high volume of water within the tailing impoundment that concentrations of potentially lethal chemicals would be high enough to cause mortality. Additionally, wildlife use has been documented to be much higher in others areas of the mine operation, areas downstream from the tailing impoundment, not in the immediate area of the tailing facility. While the heap leach area itself provides a corridor for moose moving into and out of better habitats in the lower valley, these animals do not tend to remain near the heap leach facility for other than brief periods. Construction of the heap leach should not produce habitats that will attract wildlife and the potential for lethal affects to wildlife that pass through the area is low. The vast majority of waterfowl and terrestrial mammal use will continue to occur in the developed wetlands, the WSR, and habitats downstream from the tailing impoundment. These habitats should not be impacted by activities associated with the heap leach other than a possible delay in final implementation of the north valley wetland construction portion of the closure plan.

34. **Mitigation for the loss of riparian habitat.** The reclamation plan should include mitigation for loss of riparian habitat and wetlands functional values

Response. Walter Creek is not anadromous and is not fish bearing and as such the OHMP will not implement any riparian standards for disturbance of this drainage. Looking at the mine as a whole, if the riparian zone around Walter Creek is classified in terms of a wetlands functional value assessment and is considered under a Terrestrial Use Support category, then mitigation is probably warranted as this category is predicted to be at a net loss for the entire Fort Knox Mine project at closure. However, if the riparian zone around Walter Creek is categorized into the Aquatic Use Support category, then mitigation for its loss is not warranted because riparian habitat is predicted to be replaced by more than 300 percent at closure.

35. **Lack of information on fish habitat.** There is a lack of information on the location and extent of grayling spawning habitat and other habitat critical for grayling and burbot in the mine site and surrounding area.

Response. Quite to the contrary, there is more information available about fish and fish habitat in the vicinity of the Fort Knox Mine than in most of the rest of the Chena River Drainage. State fisheries biologists have performed annual fish counts in the area near the Fort Knox Mine since before the mine was built, including the baseline fisheries studies.

Fish habitat associated with the Fort Knox Mine occurs entirely downstream from the tailings impoundment. Critical areas for Arctic grayling spawning include the south side of the Fish Creek Valley in the constructed wetlands complex and Last Chance Creek; some spawning probably occurs along the shoreline of the WSR as well. Though burbot spawning research has not been conducted, data gathered from a small scale

telemetry project with burbot at the mine suggest that spawning by burbot likely occurs under the ice in Solo Bay or possibly in Solo Creek just upstream from the Solo Creek culvert. Both Arctic grayling and burbot are dependant on the WSR for winter survival and summer feeding. No fish use the Walter Creek drainage, which lies upstream from the tailing impoundment dam.

Concerning the heap leach facility in particular, rinsing with barren solution (without cyanide) and recirculation will continue for an unspecified period of time and water will not be released to the tailing impoundment until it reaches compliance with standards. The LCRS and PCMS will be monitored weekly, and if flow is present samples from the PCMS will be analyzed for WAD cyanide and pH. Regardless of the source or quality of the water entering the tailings storage facility, the Fort Knox Waste Management Permit requires that prior to discharge from the tailing impoundment, water must meet the standards for discharge. The wetland treatment system exists more for flow mitigation than for any other purpose, the system is not intended to be needed to meet standards for discharge as those standards will be met going into the wetlands.

WETLANDS COMMENTS

36. **Wetlands loss.** Any permit decision should establish actual goals for wetlands, including standards to be met and monitoring and compliance standards, to ensure that opportunities translate into actual wetlands functions. Recognizing the limitations of functions measurement and potential for degradation over time, any permit should maximize replacement wetlands, not just meet pre-mine estimates. This need is underscored by the differences between the methods and focus of the 1993 CH2MHill Environmental Assessment and the FGMI's 2006 Reclamation and Closure Plan. The former discusses quantitative and qualitative conditions and impacts dating to the early 1900s. The latter compares predicted wetlands with those in 2004. Much of the wetlands created are based on wetlands surrounding mine process facilities and therefore wetlands functions assessment is based on the best-case scenario and does not consider mine failures or the potential for future mining problems.

Response. Perhaps the best answer to this comment is contained in the discussion section of the, "Addendum to Re-Assessment of Functions and Values for Wetlands and Aquatic Features associated with the Fort Knox Gold Mine, Fairbanks, Alaska as of July, 2004 – Projections for Mine Closure and Reclamation) by C.A. Moody, PWS and J.W. Buell, Ph.D., which states:

"The 2006 analysis of functional values of wetlands and aquatic features associated with the Fort Knox Mine that is the subject of this Addendum to the 2004 Main Report (Buell and Moody 2005) is based on presently available information, including a technical description of the proposed Heap Leach Facility (FGMI 2006b), the Fort Knox Mine Reclamation and Closure Plan (FGMI 2006a), the Fort Knox Mine Tailing Facility Closure Management Plan (WMC 2005a) and the Fort Knox Mine Closure Management

Plan for Proposed Heap Leach Facility (WMC 2005b). This analysis has been undertaken with the anticipation of certain refinements that will improve the existing information base and make a more precise and reliable analysis possible in the future. Pending the outcome of future re-analysis, this analysis demonstrates five things:

- The projected long-term functional status of wetlands and aquatic features associated with the Fort Knox Mine is significantly above the no-net-loss baseline for the project when scores are aggregated over all three use support categories (aquatic, terrestrial, human).
- Aggregate functional value scores are driven significantly by Aquatic Use Support scores.
- Very significant gains have been made in the functional value scores for all three use support categories in the Tailings Impoundment area by factoring provisions of the Reclamation and Closure Plan into the analysis.
- Significant gains have been made in functional value scores for terrestrial and human use support categories in the Fish Creek Stream Corridor area by factoring provisions of the Reclamation and Closure Plan into the analysis.
- Imbalances among Aquatic, Terrestrial and Human Use Support categories are small compared to overall gains in aggregated functional value scores.

"In consideration of provisions contained in the Reclamation and Closure Plan and on the basis of aggregate functional value scores, FGMI is projected to significantly exceed their "no-net-loss" goal for wetlands and aquatic features. In terms of individual support service categories aggregated over all project element groups, FGMI is projected to replace 334% of Aquatic Use Support, 50% of Terrestrial Use Support and 91% of Human Use Support wetlands-related project induced functional value losses. Changes in the human use support relationship from the 2004 re-analysis result from a more careful accounting of cultural and scientific opportunity costs associated with wetlands that will have been permanently lost. It is possible that these relationships will change significantly following rectification of historical and current aerial photography and a more accurate comparison of actual project-related wetland and aquatic feature disturbances with originally-planned disturbances used in this analysis.

"Much of the discussion in the 2004 Main Report still applies and will not be repeated here. It is important to note here, however, that adjustments made in the 2004 re-analysis to conservative assumptions originally used in the 1993 analysis (Buell 1993) are still considered valid. No new changes are presently considered justified."

37. **Use of the wetlands for polishing.** How will the constructed wetlands receive discharged water already in compliance with water quality standards and simultaneously function as a means to bring discharged water into compliance? If the wetlands is to operate as a contingency measure to bring discharged waters into compliance, FGMI must explain the effectiveness and limitations of this treatment method. Successful wetlands reclamation project areas should not be allowed to turn into a water treatment facility. The same wetlands should not be considered as both fish habitat and a water treatment facility.

Response. Wetlands on the tailing surface are not proposed for chemical treatment but rather to enhance wildlife habitat after closure of the TSF. Likewise, FGMI is not using wetlands or creeks to perform water quality treatment. Any water that reaches the wetlands downstream of the TSF will be of suitable quality to discharge to waters of the State. However, wetlands by their very nature do provide some benefit, at least during a part of the year, to improve water quality. FGMI proposes constructing wetlands where possible and moving water through those wetlands to take full advantage of any benefit that they offer (the "final polishing"). "Final polishing" refers to any minor, incidental changes in water quality subsequent to discharge and has no relationship to compliance with water quality standards. Section 6 of the Fort Knox Mine Facility Closure Management Plan outlines the approach to establishing new wetlands below the tailings impoundment to the north of the existing wetlands. These new wetlands will serve to route the water away from the existing established wetlands and developed fisheries to protect them from any impacts due to increased flow. Water Quality Standards for surface water discharge apply at the tailings facility spillway, and for groundwater at the existing monitoring wells down gradient from the tailings impoundment.

The use of a "wetlands treatment system" has not been approved by the State. The ADEC Permit requires the operation and maintenance of a seepage collection system until seepage from the tailings facility meets water quality standards and any water discharged over the future tailings dam spillway also meets water quality standards. The ADEC Permit specifies monitoring locations and has not approved the movement of the point of compliance. The ADEC Permit requires discharge from the tailings facility to meet water quality standards and it is therefore not necessary for the ADNR Reclamation Plan Approval to specify 'adequate protection of the wetlands'.

TECHNICAL DESIGN COMMENTS

38. **Pipe sizing and containment of cyanide solution.** The agencies must require some method to detect leaks from above the area of the pad with a double liner. The documents are silent on the potential for pipe freezing and how that will be prevented. History shows us that tailing impoundments and cyanide heap leach pads fail, allowing devastating releases of toxic chemicals into our nation's waters.

***Response*.** Documented heap leach pads in the Western Hemisphere range from 135 to 494 acres. These large liner systems are typically built in phases, usually referred to as cells or stages. The area of the Walter Creek heap leach pad is approximately 279 acres, to be built in 5 stages. The Stage 1 area is approximately 70 acres, of which approximately 30 acres is the area designated for the in-heap storage pond. The incremental increase for stages 2 through 5 is approximately 55 acres per stage or less.

All liner installed in the Walter Creek heap leach pad will be subjected to detailed construction quality assurance and quality control (CQA/QC) inspection. A substantial amount of documentation exists to demonstrate that CQA/QC is effective in reducing

the number of leaks per acre in a geomembrane installation. Given the staged construction plan, the size of the proposed facility is not prohibitive in conducting CQA/QC on the geomembrane, reducing the potential for leakage.

Leakage is a function of the pressure head from liquids standing above a liner system, and when a geomembrane is included, the pressure must be at a defect such as a hole or gap through the geomembrane. The area of the heap with the highest potential for leakage is under the in-heap storage pond, followed by the solution collection headers. There are three components of the heap leach pad that are designed to detect leakage:

- The area under the in-heap storage pond will be monitored by the Leak Collection and Recovery System (LCRS). The LCRS includes a secondary liner (80 mil thick LLDPE geomembrane) under the entire area of the in-heap storage pond. It also includes instrumentation to measure pressure, drainage materials, and a riser pipe to remove liquids, limiting head on the secondary liner and recovering leakage through the primary geomembrane and returning it to the process.
- The PCMS, previously described, includes sumps located at the downstream toe of embankment dam. Any leakage trough the primary liner under the solution collection headers will be transferred through solid HDPE pipes to the monitoring sumps. Any leakage reporting to the PCMS sumps will be detected and returned to the process.
- A monitoring well will also be located at the downstream toe of the embankment dam. This well will be regularly sampled to detect any leakage from the overall heap leach pad, including the secondary liner components of the area-specific leak detection systems described.

A thermal model was conducted to determine the potential for frozen ore to develop in the heap, causing a failure of the leaching process. The highest potential for this condition was during the first year of operation. Although the thermal model did not specifically address the solution transport piping, it did model solution temperatures. Utilizing mill water was recommended to reduce the potential for frozen ore to develop. The heat inventory of the heap will assure that the LCRS is not subject to freezing. Heat traces and thermisters are included on the PCMS monitoring sumps to prevent and monitor freezing. Permafrost development is not expected in the underdrain because of its burial depth and base flow.

The historical record of failed impoundments listed in the comments resulted from several contributing factors:

1) All of these facilities were designed and constructed in the 1980s, when design procedures, construction materials and construction techniques were still being developed for cold climate conditions;
2) The construction of these facilities occurred in less than optimal climatic conditions resulting in damage to construction materials; and
3) The design did not adequately estimate the water balance and containment requirements, thus under sizing the facilities.

Since these facilities were built, the designs, construction materials and techniques have been refined and construction materials and techniques have been specifically designed for cold climate applications. Among others, facilities such as Minera Yanacocha, Cripple Creek and Victor, Kemess, Montana Tunnels, and Kidd Creek have been successfully operating without experiencing chemical releases. Like the FGMI heap leach facility, these facilities have been designed and constructed with fail-safe mechanisms, such as leak detection devices, pump back systems, and excess containment structures to ensure compliance with environmental regulations. It must also be noted that since the 1980s, states such as Nevada have developed stringent regulations and design guidance for heap leach pads and tailing dams. The designers of the FGMI heap leach facility used Nevada heap leach pad regulations and standards as guidelines, in addition to complying with Alaska dam safety and solid waste disposal regulations.

39. **Siting the heap on permafrost.** State regulations require that landfills be located on ground free of permafrost unless no alternatives exist, that permafrost under a landfill be preserved in the frozen state, and that water pooling as a result of thaw settlement be prevented or eliminated.

***Response*.** No significant areas of permafrost were observed in the proposed footprint of the heap leach pad. A small area of suspected discontinuous permafrost on the south slope of Walter Creek in the project area will be investigated during construction and removed if high moisture contents are discovered.

40. **Geotechnical stability of the heap.** The side slopes in the Walter Creek Valley are steep which results in a risk of instability in the heap. If the heap moves, it could cause a loss of solution. If the heap moves or breaches, it could harm the TSF.

Response. A detailed slope stability analysis was conducted using a 2-dimensional computer model (SLOPE/W) and graph based, seismic deformation estimates (Makdisi and Seed). The site geotechnical investigation concluded that the project area consisted of relatively shallow, colluvial and alluvial soils over weathered schist bedrock that became less weathered with depth. The engineers assumed that the weathered schist existed in a 10 foot thick layer above fresh bedrock, which acted as a boundary layer for the model under the assumption that it could carry any of the loads imposed on the system. This assumption is supported by the introduction of respectively weaker layers in the liner system, and verified with the slope stability model by forcing the failure surface into the liner system and checking the respective safety factors. Laboratory tests using site specific soils and the specified geomembrane were conducted to determine the interface shear strength of this component of the design under the design loads. This testing also confirmed that the liner system is a critical interface for the stability of the heap. Deep seated circular and block sliding surfaces were evaluated through the critical cross-sections of the fully developed heap to determine the minimum static factors of safety. All safety factors exceeded 1.5. The computer model was also used to determine the yield acceleration that produced a safety factor of 1. These

accelerations were then compared to the seismic design standards. All cases were within the standards for the operating basis earthquake (OBE) and only two cases were greater than the OBE but less than the standard for the maximum design earthquake (MDE). All cases were evaluated for deformation using the graphical method which determined that the deformation was negligible for most cases and estimated at 8 inches for the two cases where the acceleration was greater than the OBE. Eight inches of deformation is not expected to cause any detrimental affects to the flexible liner system.

A dam failure analysis was also conducted and the results indicate the chance of a failure occurring are negligible. However, in the unlikely event one were to occur, the solution would flow to the tailing storage facility. The heap leach facility is designed to handle an extreme event. The design is predicated on storing: (1) the process solution, (2) the runoff from the 100-year/24-hour storm event, and (3) the 24-hour draindown from the heap in the freeboard limits provided within the tailing storage facility. The existing tailing storage facility crest is at elevation 1494 feet amsl. As previously described, the minimum freeboard level will be determined to define a maximum allowable operating level for the tailing storage facility such that there is always available storage volume for an uncontrolled release event. Therefore, it is concluded that if a failure of the Walter Creek in-heap storage dam liner system were to occur, the water that may flow out of the facility would be completely stored in the downstream tailing storage facility. (It should be noted that there is a double accounting of the runoff from the 100-year/24-hour storm since it is already included in the flood routing for the tailing storage facility). Owing to the coarse nature of the ore and dam fill, if a debris-type failure occurred at the in-heap dam, the failure time would be very slow. The rock moving into the tailing storage facility would be moving slowly enough so that the likelihood of a “landslide” wave being generated in the tailing storage facility is extremely low to negligible. Essentially, the stored process solution would flow relatively slowly from the in-heap pond to the tailing facility pond where it would be contained.

41. **Liner materials.** The heap liner could leak as a result of "progressive" settlement, degradation of plastics, or effects of earthquakes.

***Response*.** Limited uniform settlement is generally not detrimental to liner systems, whereas excessive differential settlement may be. The proposed geomembrane liner system utilizes a linear low-density polyethylene (LLDPE) which has a specified elongation at yield of 250 to 800 percent, making it relatively tolerant to deformation from settlement. Differential settlement is mitigated by specifying liner subgrade preparation that calls for the removal of unsuitable foundation materials, proof rolling the rough subgrade, and compacting any additional fill including the liner bedding. The greatest potential for differential settlement occurs at the base of the solution riser pipes which is mitigated in three ways: first, the riser pipe includes a spread footing to distribute its load over a wide area; second, the riser pipe includes several compression fittings along its height to allow the pipe to telescope if settlement of the ore occurs; and third, the riser pipe will be wrapped with LLDPE to reduce the friction coefficient in the

interface where stress from settlement drag down forces occurs. All of these factors combine to reduce the potential for leakage through liner tears caused by settlement.

The Walter Creek Heap Leach Pad is designed to withstand a Maximum Design Earthquake consistent with other facilities at the mine, specifically the Fort Knox tailings dam and the Fort Knox water dam. These dams experienced without consequence the M 7.9 Denali Fault earthquake of November 3, 2002, which was the largest inland earthquake in North America in almost 150 years.

The geomembrane component of the liner system specified for the proposed heap leach pad at the Fort Knox Mine is an 80 mil thick, polymeric plastic referred to as linear low-density polyethylene (LLDPE). The required project life for this material is less than 15 years. Engineers currently estimate that the life of polyethylene geomembranes is on the order of at least 400 to 500 years. For this application, the more important question is not one of expected lifespan; but rather, will the material survive construction? In order to assure that it does, the design includes specified subgrade and overliner materials, as well as construction placement specifications to assure careful installation to prevent damaging the material. In addition, laboratory testing was conducted on the geomembrane and adjacent soils to assure the integrity of the geomembrane when subjected to simulated loads imposed by the ore. After the heap leach operation is completed, the heap is rinsed until the cyanide levels are acceptable to the ADEC. At this point, the liner system may be breached allowing seepage to occur, and the integrity of the geomembrane becomes irrelevant.

A dam failure analysis was also conducted and the results indicate the chance of a failure occurring are negligible. However, in the unlikely event one were to occur, the leachate would flow to the tailing storage facility. The heap leach facility is designed to handle an extreme event. The design is predicated on storing: (1) the process solution, (2) the runoff from the 100-year/24-hour storm event, and (3) the 24-hour draindown from the heap in the 3-foot freeboard limit provided within the tailing storage facility. The existing tailing storage facility crest is at elevation 1453 feet amsl. Thus, the available storage volume between elevation 1453 feet and elevation 1450 feet is 27.6 million cubic feet (206 million gallons). Given that the volume of fluid that would be released by the liner failure is 13.4 million cubic feet (100.5 million gallons), this provides more than two times the needed storage. The tailing storage facility will be operated such that there is always available storage volume for the design release event. Therefore, it is concluded that if a failure of the Walter Creek in-heap storage dam liner system were to occur, the water that may flow out of the facility would be completely stored in the downstream tailing storage facility. (It should be noted that there is a double accounting of the runoff from the 100-year/24-hour storm since it is already included in the flood routing for the tailing storage facility). Owing to the coarse nature of the ore and dam fill, if a debris-type failure occurred at the in-heap dam, the failure time would be very slow. The rock moving into the tailing storage facility would be moving slowly enough so that the likelihood of a “landslide” wave being generated in the tailing storage facility is extremely low to negligible. Essentially, the stored process solution would flow relatively slowly from the in-heap pond to the tailing facility pond where it would be contained.

42. **Column leaching results.** The results of column testing to provide more information on the quality of rinse water and the time required for rinsing should have been available for public review and comment.

***Response*.** The additional column testing data was summarized in Section 2.2.6.3, Leach Solution Chemistry of the Walter Creek Heap Leach Pad Facility/Fort Knox Mine Environmental Assessment as follows. "Based on column testing completed to date, gold production would continue for a number of years after reagent addition is stopped. WAD cyanide concentrations would decline to levels at or below 0.2 mg/l prior to reaching the end of economic gold production."

43. **Puncturing the liner.** Page 74 of the reclamation and closure plan states that the liners will be punctured. There appears to be no good reason to puncture the liners but there are many reasons to leave them intact. The heap solution should be cleaned-up/treated at the point of discharge from the heap because it could cause a cascade of problems if heap contamination is shifted to other parts of the mine. The standard established for heap leach discharge should be at the heap leach boundary.

***Response*.** Leaving the liner intact preserves the ability to control drainage from the heap and perform further treatment if required after final rinsing of the heap. It also preserves the opportunity to further leach the ore if future economic conditions allow. Certain standards will apply to discharge from the heap leach facility to the TSF but these will not be as stringent as the standards that apply to the TSF. The liner may not be punctured without written approved from ADEC. See Section 1.2.11.5 of the Waste Management Permit for puncture requirements.

44. **The effects of precipitation events.** What effect will excessive rainfall and snowfall have on the heap leach? How will it affect the cover?

***Response*.** Because spillway discharge from the in-heap storage pond is undesirable, the storage capacity was conservatively designed to include the full volume of the 100-year/24-hour storm event that falls on the area of the fully developed pad (4.04 million cubic feet). In addition, the storage capacity includes the minimum operational pond (3.66 million cubic feet), an operational flexibility volume (4.3 million cubic feet), the 24-hour draindown volume (1.54 million cubic feet), and an emergency freeboard volume (0.6 million cubic feet). The 24-hour draindown volume assumes that the solution recirculation pumps fail and the leach solution in the heap drains into the in-heap storage pond for 24 hours; however, it is conservatively calculated as the volume from the solution application pumps running at full flow for 24 hours. In addition to these volumes, the embankment is designed with 5 feet of freeboard, adding an additional 9.5 million cubic feet of capacity. It is noteworthy that the total design storage capacity as indicated is available at the beginning of Stage 1, even though the full volume is not

required until Stage 5; therefore, the design is extra conservative for the majority of the operational life.

In the unlikely event that these volumes are exceeded, a spillway has been designed to accommodate the flow from an additional 100-year/24-hour event and the excess water would then be contained within the zero-discharge tailings facility. The design also includes adequate diversion of surface water from up gradient of the heap.

Potential impacts from snow and particularly ice are more of an operational rather than environmental concern. It will be in the operator's best interest to not allow large accumulations of snow or ice to be buried within the heap as ore is stacked because lenses of snow and ice could prevent uniform circulation of the heap solution thereby reducing gold recovery.

During any rainfall event, no runoff is expected from the heap; instead, rainfall is expected to percolate into the ore because of it large and coarse grain size distribution. In a worst case scenario, flow could occur along frozen, snow and ice covered ground, in which case it would be diverted along the perimeter berm, down to the embankment and over the spillway to the tailings facility. For this latter scenario to take place the entire perimeter of the heap would have to be frozen and the runoff would have no opportunity to mix with the heap solution.

To minimize the potential for erosion after closure, the heap will be regraded to at least a 3 horizontal to 1 vertical (3:1) slope, covered with 1 foot of growth media, seeded and fertilized. Bond release will be based on successful vegetation established over at least 70 percent of the area.

45. **Ponded water must be removed from landfills.** The solid waste regulations require removal of ponded water in contact with waste. FGMI must be required to remove ponded water from the heap.

***Response*.** Section 7 of the Fort Knox Mine Monitoring Plan states in relation to the heap, "No open pools of process solution were included in the heap leach design; therefore inspections would focus on any unusual occurrences of surface ponding of solution." Proper functioning of the heap depends on it being highly permeable, hence surface water ponding is not anticipated and any such ponding would be considered unusual and would therefore be investigated and dealt with.

The exposed water above the heap embankment shown on Figure 2-5 in FGMI's EA is for visual indication of extremely high water in the heap. For open water to appear, all of the following conditions must exist: a maximum operating pool with operational contingency volume, a 100-year/24-hour storm event, and a 24-hour drain down from the heap. There is an overflow "spillway" at 1650.5 feet elevation to assure the safety of the dam in extremely unusual circumstances.

Section 1.4.16 of the Waste Management Permit states, “Any area of open water in the permitted disposal area must not become an attractive area for waterfowl or shorebirds. Ponding or pooling of process solution water on the Walter Creek Valley Heap Leach Facility without netting or other protection that could endanger birds or wildlife is prohibited. Any wildlife casualties shall be reported to the department and to the appropriate state and federal agencies.”

46. **Reporting standards.** What is considered a minor leak versus a major leak? How are leakage standards set in the mining industry?

***Response*.** Leakage is a function of the pressure head from liquids standing above a liner system, and when a geomembrane is included, the pressure must be at a defect. The area of the heap with the highest potential for leakage is under the in-heap storage pond, followed by the solution collection headers. Based on published data, the number of defects per unit area of geomembrane and the estimated head at normal and maximum pond levels is used to calculate the expected leakage rate through the installed liner system. This information will be included in the project operations and maintenance manual, and the PCMS and the LCRS will be monitored for flow rate and pressure. Contingency plans will be included in the O&M manual in case of an event where leakage rates exceed the estimated values. This procedure is generally consistent with Response Action Plans required for “RCRA Part B” permitted, hazardous waste landfills.

Any leak, regardless of amount, is taken seriously by ADEC. The leak detection response plan is discussed on page 7 of the Fort Knox Mine Monitoring Plan.

The performance of the heap leach and tailing facilities is judged pursuant to the criteria outlined in 18 AAC 70 Alaska Department of Environmental Conservation Water Quality Standards as required in FGMI’s Waste Management Permit.

47. **Rinsing the heap.** The mine should know how many pore volumes it will take to rinse the heap. The plan should identify the target final metals/constituent concentrations.

Response. Rinsing for a specified number of pore volumes is a traditional approach to heap leach decommissioning. However, since heap leaching has become standard practice in the industry, extensive operational experience has demonstrated that defining closure criteria simply based on the number of pore volumes is inadequate to ensure environmental protection. After economic leaching has been completed, solution will continue to be re-circulated on the pad to promote cyanide destruction. Freshwater will be added to the system as required to facilitate rinsing and removal of metals. This process will be continued until the quality is adequate for disposal in the pit, release to the tailings facility, or ADEC determines that additional treatment is needed.

Final concentrations will be suitable for discharge to waters of the State in the event the freshwater pool on the tailings facility is discharging seasonally to surface water.

48. **Heap underdrain system.** If the heap leach underdrain system fails, could this cause the heap leach pad or features such as drains or the in-heap storage pond to fail?

Response. A potential failure of the underdrain system is not expected to have any affect on the stability of the heap leach pad or embankment dam. The stability analysis assumed fully saturated conditions to the crest of the embankment dam inside of the lined area, plus a 10 foot deep saturated layer within the heap above the level of the crest of the embankment dam. The base platform was assumed to be saturated to within three feet of the bottom of the containment system, which is approximately 8 feet above the maximum tailings elevation on the outside slope of the base platform. Because the ore heap, the base platform and the embankment dam will consist of relatively coarse, free draining, fill, these conditions are believed to be sufficiently conservative for the slope stability models. The satisfactory factors of safety resulting from those models indicate that a complete failure of the underdrain or the internal solution collection network will have no adverse consequences on the static or dynamic stability of the heap or embankment dam.

49. **Use of the tailings pond.** The tailings impoundment will be an integral part of the long term solution management plan but that plan is not available for public review and comment.

Response. The long term solution management plan is contained in public documents that were available for public review and comment. The solution management plan for the heap leach facility is contained in Section 6 of the “Fort Knox Mine Closure Management Plan for the Proposed Heap Leach Facility” dated June 2006. The solution management plan for the tailings storage facility is contained in sections 6 and 7 of the “Fort Knox Mine Tailing Facility Closure Management Plan” dated June 2006.

METALLURGICAL AND OPERATIONAL COMMENTS

50. **Standards for geochemical monitoring.** Section 1.6.1.4 of the draft Waste Management Permit must explicitly state or reference standards for measuring acidity of leachate or levels of metals.

Response. Section 1.6.1.5 of the Waste Management Permit requires that FGMI conduct geochemical testing of mine rock for acidity and metal leaching in its monitoring plan, and Section 1.6.1 requires ADEC approval of that plan.

51. **Kinetic ARD tests.** the draft Waste Management Permit does not define "adequate duration" for humidity cell (kinetic) tests

Response. The ADNR Plan of Operations Approval requires that FGMI obtain approval prior to the termination of any required humidity cell tests. Humidity cell tests should be run until the chemistry of the leachate has stabilized. This is a "site-specific" and even a "cell-specific" period of time; it is not appropriate to specify a "set duration" for humidity cell tests.

52. **Tonnage to be processed on the heap.** FGMI has not told the public how much of the 161 million tons of ore it has identified and where it will come from. The commenter seems to imply that FGMI knows the answer to this question but is keeping it secret from the public.

Response. FGMI intends on building the heap leach pad to process and recover gold from low grade run of mine rock that is currently not economic to be processed through the mill. This would include numerous low-grade stockpiles, run-of-mine rock from the Fort Knox pit, and may include rock from dumps that were formerly considered "waste".

It is important to understand how a heap leach facility may change the classification of ore and waste. A higher grade increment of ore tons will continue to go to the mill but low-grade ore below a certain "cutoff" will go to the heap. A lower cutoff yet determines what is "waste" but even this material may contain some value. These cutoffs are variable and based on numerous economic conditions that change over time, such as gold price and fuel costs. Consequently, these cutoffs have changed many times since mine startup in 1996 and will change in the future. Since the potentially lower costs of a heap leach facility improves the economics of lower grade ore, many of the tons mined since startup that were classified as "waste", may now be considered "low-grade ore". FGMI is currently evaluating its low-grade stockpiles and waste rock dumps to determine how many of these tons would be economically processed on the heap.

FGMI continues to expand the Fort Knox ore deposit and the maximum limits have not yet been fully defined. It is common for gold mines to report an initial ore "reserve" but tons are routinely added with additional drilling and new information throughout the mine life. Publicly Traded companies are required by law to report only those "reserves" with a high degree of certainty. However, for planning and design purposes, it is common and prudent for companies to account for future additions to reserves at there own risk.

For all the above reasons it is difficult to precisely say how many tons will go to the heap but a reasonable estimate can be made. It is prudent for FGMI to design a maximum best guess scenario to accommodate all of the tons that could potentially go to the heap. While FGMI intends to fully utilize the entire designed volume, the proposed phased approach to the construction of the heap leach facility would allow the operator to adjust the maximum volume if future considerations warrant.

The current proposal allows for only Fort Knox ore to be processed in the heap leach facility. If in the future, different sources of ore are proposed for placement on the heap, additional agency review, public notice, and permitting would be required.

The Division believes the estimated tonnage used to design the heap leach pad, is a reasonable estimate of the potential future needs. Furthermore, the Division also believes the heap leach facility maximizes the use of State resources by allowing the recovery of a resource that would otherwise be lost.

In the "Walter Creek Valley Fill Heap Leach Facility Project Description" dated June 23, 2006, FGMI states that, "the ore for the heap leach will consist almost exclusively of Fort Knox granite with only trace amounts of Fairbanks schist." Loading will occur year-around at a rate of about 40,000 tons per day. Some ore will be taken directly from the pit to the heap leach pad and some will come from the low-grade stockpiles. From a regulatory standpoint, if FGMI wanted to place anything other than Fort Knox ore on the heap leach pad, they would have to get a revised Plan of Operations approved, the Waste Management Permit would have to be reissued, and the bond amount would have to be re-evaluated. All of this would take time and reissuance of the Waste Management Permit would require another public notice and comment period.

53. **Ore from the True North Mine.** Ore from True North should be prohibited from the heap leach. What will be the cumulative effects of ore from different mines being processed on the heap leach?

Response. Only Fort Knox ore is planned for use in the heap leach facility and the Draft Waste Management Permit currently allows only ore mined from the Fort Knox pit to be processed in the heap leach facility (see Section 1.2.1). Should a plan develop for use of other ore, Section 1.2.2 of the Waste Management Permit requires additional ADEC review and approval prior to processing of ore from satellite pits.

Although not all modifications to a Waste Management Permit will result in increased detrimental environmental impact, 18 AAC 15.100(c) provides that "[a]ny expansion, modification, or other change in a facility process or operation which might result in an increase in emissions or discharges, or might cause other detrimental environmental impacts from the permittee's facility, requires a new permit or variance." Conditions such as those included in WMP Section 1.2.2 regarding ore from satellite pits or Section 1.6 regarding adjustment of monitoring can be made if there is "insignificant impact on mine closure, reclamation and water quality."

The analysis of cumulative effects is available in Section 4.0 (Environmental Consequences) of the Walter Creek Leach Pad Facility/Fort Knox Mine Environmental Assessment.

54. **WAD cyanide limit.** Changing the WAD cyanide limit for the discharge of tailings into the TSF from a monthly average of less than 10 ppm to less than 10 ppm for 90

percent of the samples will increase the frequency of use of the INCO process and thereby increase the quantities of copper, sulfates, and nitrates discharged to the TSF.

Response. ADEC agrees with the comment. Section 1.2.4 was removed and Section 1.2.5 was replaced with the language from the previous Solid Waste Disposal Permit. In the process, Section 1.2.5 was renumbered to Section 1.2.4.

WATER QUALITY AND MONITORING COMMENTS

55. **Control of surface runoff and cyanide toxicity.** Measures must be incorporated to control polluted runoff. What will be the effect of sublimation on air quality? Could the cyanide solution have an acid rain effect? Cyanide is toxic and could kill fish in the Chena, Tanana, and Yukon rivers downstream from the mine.

Response. Section 1.4.8 of the Waste Management Permit prohibits offsite exceedances in surface water including Fish Creek and associated wetlands, ground water, and seepage. Under 18 AAC 60.830, if a statistically significant increase in a ground water pollutant parameter has occurred, then assessment, monitoring, and corrective action are required under 18 AAC 60.860. Facility runoff is also regulated through a separate requirement for a storm water pollution prevention plan.

The heap leach will not impact air quality and cyanide solution does not create or promote acid rain. Hydrogen cyanide can form if pH is allowed to fall to low levels, and the gaseous product dissipates into the atmosphere. However, in the pH range at which the pad will operate (10 to 11) there is essentially no loss of cyanide to the atmosphere.

Diversion ditches for the proposed heap leach pad are designed to prevent run-on from the precipitation falling in the Walter Creek valley up-gradient of the heap. These ditches are designed to carry the flow from a 100-year, 24-hour storm around the heap leach pad and discharge into the supernatant pond of the TSF. In addition, the in-heap storage pond is designed to contain the full volume of a 100-year, 24-hour storm that falls on the entire area of the fully developed pad, assuming that all of the precipitation infiltrates the ore because of its extremely coarse nature. This represents the base case scenario. As a contingency for the case that the surface of the ore is frozen and runoff from the heap occurs, a surface storage area (approximately 1 million cubic feet) is available in the trough between the heap and the embankment dam, which will allow some ponding to occur and force infiltration through the 1×10^{-1} cm/sec permeability ore into the in heap storage pond. In the event the trough capacity is exceeded, an emergency spillway is included on the embankment dam sufficient to pass a 100-year, 24-hour storm. Any use of the emergency spillway from run-off would be compared with the actual in-heap storage pond elevation to assure that overtopping of the solution had not occurred. In this case, the run-off would be considered non-contact water and would be contained in the supernatant pond in the TSF.

At heap closure, cyanide in the heap leach circuit will be destroyed and the heap leach pad will be rinsed with fresh water. Heap leach pad water quality will be monitored. No water will be allowed to escape the heap leach containment system until permit conditions are met. At that time, the liner system will be breached and seepage from the lined containment system will be allowed to enter the TSF.

Cyanide can be acutely toxic to fish and waters from the Fish Creek drainage do reach the Chena River. However, waters from the Fish Creek drainage upstream from and including the tailing impoundment do not reach any downstream drainage including lower Fish Creek. A significant spill or failure at the heap leach, located within the confines of the tailing impoundment, not contained by the safety features built into the heap leach, would be contained by the tailing impoundment and the tailing impoundment pump back system. This comment relies on a catastrophic failure of both the heap leach system and the tailing impoundment; there is no indication from the routine monitoring of the tailing storage facility dam that any catastrophic failure of the tailing impoundment is imminent or foreseen. Additionally, the tailing dam has undergone independent review by and has been approved by the State's Dam Safety Engineer. However, if both were to occur simultaneously, there could be significant short term adverse impacts and long term adverse impacts to the downstream aquatic environment, including fish.

56. **Adequacy of hydrology baseline information.** Groundwater flow in fractured bedrock will likely be controlled by the fractures. More surface water sampling should occur, particularly in Solo Creek.

Response. Data on the hydrology of the Fish Creek drainage is provided in the Tailing Facility Closure Management Plan (WMC, 2006). Hydrologic and hydraulic analyses and layout of the proposed storm water management system or the heap leach facility also was investigated and evaluated. Groundwater flows within the fractured bedrock down-gradient along the axis of the Fish Creek drainage. Flow from the upland areas near the drainage divides generally follows the topography. There is no indication of groundwater flow between basins via regional structures in the area of the Fish Creek drainage. The groundwater flow system reports to the interception wells below the tailings dam, which produce a cone of depression, which is the lowest point in the hydraulic system near the dam. While there is some variability in the bedrock groundwater flow system due to its fractured nature, based on existing groundwater elevations and the lack of changes in groundwater quality at the down-gradient compliance wells, the interception system appears to be effectively capturing all flow in the fractured bedrock aquifer. This is known with a high degree of confidence.

ADEC and FGMI understand the critical importance of understanding and controlling seepage through subsurface fractures. During the winter of 2006-7, aufeis formed on the south abutment below the dam, and seepage was suspected as the source of water. FGMI responded in accordance with Section 1.9 of the Waste Management Permit. Consequently, FGMI, with Agencies' guidance, began evaluating the hydrogeology and subsurface flow patterns and bolstering the seepage containment system below the

tailings dam. As a result, the seepage collection, monitoring, and pump-back systems have been expanded and improved. Any future surface seepage will receive the same diligent attention as required by Section 1.9.

Solo Creek is located far down-gradient of the proposed heap leach facility and is not on the flow path for either surface water or groundwater emanating from the site. Monitoring of this drainage is not necessary to ensure environmental protection.

Sampling the top and perimeter of the heap will not provide useful information regarding the potential for cyanide contamination because sampling should not occur at locations where solution will be present. Similarly, sampling at the tailings pond surface will not yield representative results due to the presence of mill tailings. There are currently five surface water monitoring locations within the Fish Creek drainage. Surface water sampling locations and frequencies were set in conjunction with the ADEC and have not changed since the project was commissioned. These locations provide ample opportunity for detection of changes in water quality and to take any required response actions. Additional monitoring locations will not increase environmental protection.

57. **Metals mobility and groundwater monitoring.** The potential for neutral pH or basic pH mobilization of metals such as antimony or arsenic should be considered. Not only should water quality not be degraded below water quality standards but it should not be degraded at all (non-degradation). ADEC should require groundwater monitoring for the heap leach facility.

Response. The monitoring program includes sampling locations at the down-gradient margin of the facility. In addition, the interception system and existing compliance monitoring wells below the tailings dam represent down-gradient monitoring points, which are sampled on a regular basis. Monitoring above the heap leach pad in the old batch plant well is required by Section 1.6.1.3 of the Waste Management Permit.

Groundwater will be collected in the underdrain system and will be monitored in accordance with Section 1.6 of the Waste Management Permit.

To date no metals have been reported at concentrations above the water quality standards in the down-gradient compliance wells. The majority of interception wells are also below standards for metals. The water quality will only improve over time after closure, and therefore, if standards are being met during operations when concentrations would be expected to be the highest it is likely that the potential for exceedances of metals standards will only diminish as water quality improves.

In general, most metals are insoluble at circum-neutral or basic pH values and hence the potential for contamination is minimal. Even before FGMI began mining in the Fish Creek drainage, trace elements such as chloride, iron, manganese, and selenium were shown to be above numerical standards and reflect pre-Fort Knox conditions under circum-neutral pH conditions

Gold is currently mobilized and extracted from the Fort Knox ore as part of the beneficiation process. As part of this process the ore is treated with reagents specifically designed to interact chemically with the rock. The seepage reflects these geochemical reactions. However, no other metals are being mobilized from rock not treated in the beneficiation process. Extensive water quality monitoring indicates no change in metals concentrations in groundwater or surface water downstream from the mine.

58. **Use of the pit lake.** Mine water should be treated before disposal. Dilution should not be used as the treatment method. Reactions and stratification should be considered in pit lake water quality modeling. DEC must explain the required elements of a corrective action plan for the pit lake if the water quality in the pit lake does not achieve benchmark values in the years it is being used for treatment. How will wildlife access to the pit lake be prevented during the time that it is used for treatment and does not meet the water quality standards? An investigation should be conducted on the effects on fish and wildlife of creating a large lake in an area that does not have many such lakes. Could freezing conditions cause cyanide to escape over the top of the divide between Walter Creek and Solo Creek?

Response. Definition of a viable treatment system before establishing the feed water quality is not possible. Consequently, Section 1.2.10 requires annual sampling, analysis, modeling, reporting, and corrective actions for any predicted exceedances. Alaska Water Quality Standards are not imposed before discharge, but they must be achieved before any pit discharge. The Waste Management Permit section 1.2.10 specifies that decant water may be disposed of to the pit provided that certain conditions are met and the department determines that there will be insignificant impact on long-term water quality. A pit lake model was completed that projects pit lake quality over time if decant water is pumped into the pit. Section 1.2.10.1 specifies Profile I water analyses be performed on all water discharged to the pit. Section 1.2.10.2 requires annual updates and reporting of parameters in the Pit Lake model. Section 1.2.10.3 requires department approval of the annually updated pit lake water quality model. Section 1.2.10.4 requires submittal, approval, and implementation of a water treatment or other corrective action plan if the model predicts an Alaska Water Quality Standard exceedance at the time of pit lake discharge. Section 1.2.10.5 requires department approval before each annual discharge to the pit. In these ways, ADEC reserves the flexibility to address every possible future scenario through approval based upon circumstances as they arise.

The addition of large bodies of water to the area such as the final pit, freshwater reservoir and reclaimed tailings will increase the diversity of the area. These additional bodies of water will provide opportunities for water dependent species to flourish and for increased species diversity. Specifically, the pit will not permanently impact natural flows or patterns because all pre-mining flow paths for groundwater and surface water will be re-established when the pit lake equilibrates. The new bodies of water will impact some species that are dependent on climax vegetation, but considering the extent of climax vegetation in the area the impact from displacement should be negligible. A

comprehensive impact analysis can be found in the Sections 4.5 (Vegetation & Wetlands), 4.6 (Wildlife), and 4.4 (Water Resources) of the Walter Creek Heap Leach Pad Facility/Fort Knox Mine Environmental Assessment. The freshwater reservoir will also be present after closure, and water use patterns in the drainage already have been largely re-established by wildlife.

A thermal model was conducted to determine the potential for frozen ore to develop in the heap, causing a failure of the leaching process. The highest potential for this condition was during the first year of operation. Utilizing warm mill water was recommended to reduce the potential for frozen ore to develop. During the winter time, the solution distribution system will be buried. Because of the coarse nature of the ore, it is highly unlikely that sufficient ice could build up to cause the flow paths to rise. If an unusual condition developed where solution reported to the surface of the ore, it would be intercepted in a swale that will exist between the outside slope of the ore and the upper edge of the geomembrane lined pad. This would be visible to operators allowing time for appropriate contingencies to be employed.

The discharge of decant solution and seepage from the tailings facility and any solution from the heap leach is regulated under the ADEC Waste Management Permit: "this permit (ADEC Permit) covers reclamation and closure activities of the TSF and heap leach facility, including disposal of wastewater to the pit at closure after departmental approval to commence discharge". Section 1.2.10 of the Final ADEC Waste Management Permit addresses the use of the pit lake as a treatment works. Limitations on the use of the pit lake as a treatment works are appropriately contained in the ADEC Waste Management Permit; rather than the Final Reclamation Plan Approval.

59. **Pollution prevention standards.** Pollution prevention standards should be clearly stated by ADEC.

Response. See pollution prevention Section 1.14 of the Waste Management Permit.

60. **State water quality certification.** A short term variance of state water quality certification is not warranted in this case.

Response. No short term variance has been requested or approved.

61. **Visual monitoring requirements.** Visual monitoring for damage or potential damage from thermal instability, frost action, or thawing of waste must be included in the permit.

Response. Section 1.6.1.1 of the Waste Management Permit has been amended to include thermal instability, frost action, or thawing of the waste.

62. **Water balance and water use.** Seasonal water flow volume and quality data should be presented for the agencies and public to use in evaluating the relationships between mine withdrawals, water quality, water quantity, etc. Averaging should not be used in a comprehensive water balance model, especially not for water quality.

Response. Seasonal water flow and quality data are presented in the Fort Knox Mine Tailing Facility Closure Management Plan (WMC, 2006) in Sections 3.0 and 5.0, respectively. There have been no impacts as a result of the mine's use of water and this is supported by the monitoring data collected from the downstream wetland areas. ADEC receives quarterly water quality reports from FGMI.

Currently, averaging is not utilized to evaluate regulatory compliance. Furthermore, the performance of the proposed closure management plan is not based on average conditions. Protocols for monitoring compliance during and after closure are defined in Section 1.6 of the Waste Management Permit.

63. **Water quality and monitoring.** Groundwater monitoring should be done by someone other than Fort Knox employees because they cannot be trusted. Seepage water collection at the toe of the TSF dam should not cease until releasing it will not degrade downstream water quality. More data should be available to the public to evaluate this issue. The agencies should require that FGMI define success as meeting specific water quality criteria including non-degradation and achieving pre-mine levels or better.

Response. Monitoring wells collaboratively with local residents may not be feasible from the company's perspective due to schedule changes on short notice as a result of equipment availability, manpower availability and weather. While ADEC is not opposed to community participation in monitoring, we cannot require it. Severe criminal penalties for tampering with samples or falsifying data are an effective means of assuring that valid data are reported by Fort Knox employees.

As referenced in the Reclamation and Closure Plan in Section 11.0, the Water Management Consultants Report 2005a is the same document as the Fort Knox Mine Tailing Facility Closure Management Plan, which was released with the June 29, 2006 public notice. The documents are currently available on the ADNR website and were available to the public during the public comment period. Natural condition-based site specific criteria may not be available due to previous human caused disturbance from placer mining in the Fish Creek valley.

The performance of the closure management plan is currently based on the most stringent standards for aquatic life and human consumption. Use standards have not been employed to evaluate compliance. The predicted performance of the proposed closure management strategy for the heap leach and tailing facilities is relative to the criteria outlined in Alaska Water Quality Standards for fresh water uses, growth and

propagation of fish, shellfish and other aquatic life, and wildlife. The Reclamation and Closure Plan (p. 51) provides that seepage collection at the toe of the tailings will not be discontinued unless it will not impact the surface water quality in Fish Creek. Under Section 1.6.1.2 of the Waste Management Permit, Alaska Water Quality Standards will be met in the compliance monitoring wells down-gradient from the tailings impoundment.

Section 1.2.8 of the Waste Management Permit requires maintenance of water quality in the groundwater monitoring. No statistically significant increase is allowed. Otherwise stated, termination of seepage pump-back must be performed in responsible manner to prevent degradation of groundwater. Additionally, Sections 1.4.2 and 1.4.4 require operation of the seepage pump-back system below the dam to insure containment of seepage.

64. **Water quality compliance point.** The compliance and monitoring points should be at the actual mine discharges, not downstream wetlands areas.

***Response*.** Since this is a zero-discharge facility, the most appropriate locations to monitor tailings facility discharge water quality compliance are designated in the Waste Management Permit at the tailings facility spillway for surface water and at the compliance monitoring wells below the tailings dam for groundwater. These locations are up-gradient from the wetlands. Any water that reaches the wetlands system between the tailings dam and the water supply reservoir will be of suitable quality to discharge to waters of the State. However, monitoring of contained mine process water is required for the following: tailings slurry, tailings pond decant, heap discharge to the tailings impoundment, the heap's Process Component Monitoring System, and the heap's underdrain system. See Section 1.6.1.3 of the Waste Management Permit.

65. **Water quality in the tailings pond.** The impact of the heap leach pad on the TSF pump back system and the time required to flush the tailings in the TSF should be considered. Reasoning and technical documentation should be provided to justify the prediction that water quality in the pool will meet water quality standards by the time that the freshwater pool is allowed to reach the spillway elevation.

Response. No impacts are expected to the tailings pump back system (also referred to as the seepage collection system or interception system) as a result of the heap leach pad. The pump back system collects tailings water that reports to the alluvial/fractured bedrock groundwater system, and was designed to capture significantly more flow than it is currently producing. All potential discharges from the heap leach facility will report to the tailings facility, but will not result in significantly more water reporting to the alluvial/fractured bedrock groundwater system, even during a 100-year/24-hour storm event. Therefore the performance of the pump back system is not expected to be affected by the existence of the heap leach pad and the system has the capacity to

handle any increases in the unlikely event of significant leakage from the heap leach facility.

The water quality of the freshwater pool will continue to improve due to the inflow of water from the upgradient portion of the drainage. As the volume of fresh water increases, the proportion of fresh water becomes greater which has a positive impact on water quality in the pool. The pool will not be allowed to reach the spillway elevation unless and until enough fresh water has entered the tailings pool to achieve water quality standards. Monitoring in the spillway is required by Section 1.6.1.3 of the Waste Management Permit. All discharges from the spillway to the wetlands, which are waters of the State, must not exceed Alaska Water Quality Standards as specified in Section 1.4.8 of that permit.

66. **Water quality monitoring in the heap.** Monitoring the barren solution, pregnant solution, LCRS, PCMS and the underdrain system is not adequate monitoring for the heap leach pad and does not sufficiently protect water quality. Monitoring wells could be placed near and/or below the organics and growth media stockpiles either directly through the stockpiles or by means of angular drilling.

***Response*.** Monitoring the underdrains will provide data regarding the performance of the heap leach facility. There is no other point in the system that can more adequately address water quality under the heap. The underdrains are intended to pick up any impacted water before it infiltrates to the subsurface and will provide the most rapid means of detection. Sampling at the tailing surface will not yield representative results due to the presence of mill tailings. Installation of monitoring wells in an area that does not provide conclusive information regarding the facility's performance is not in the best interest of the environment.

The proposed monitoring points include the underdrain system and the down-gradient wells in the vicinity of the interception system below the tailings impoundment. The underdrain monitoring at the heap will provide the best information regarding potential leakage from the facility.

Because the ore and reagents used in the mill and heap leach processes are essentially the same, both processes have similar constituents and compositions. The analytes proposed for the monitoring program are the most appropriate to detect process related changes in water quality.

FGMI carefully designed the heap leach facility to prevent leaks as well as collect and monitor leaks in the unlikely event that any solution is released. These include the underdrain system, which will provide notice of any potential leaks, the PCMS and the LCRS. Heap leach operators have two compelling reasons to ensure full containment of the processing solution. First and foremost, complete containment means surface water and groundwater resources are fully protected. Secondly, the processing solution contains the gold, which is the product of the efforts at the Fort Knox Mine. From both environmental and production perspectives, leakage detection and sound heap leach

operation are critical. FGMI will contain and collect the solution so they can recover the gold while simultaneously keeping the environment safe.

67. **Point of compliance.** The point of compliance should be immediately below the tailings dam and the goal should be no degradation of downstream water quality.

Response: The Waste Management Permit specifies that the compliance monitoring points are at the tailings facility spillway for surface water and at the compliance monitoring wells below the tailings dam for groundwater. These locations are up-gradient from the wetlands. Any water that reaches the wetlands system between the tailings dam and the water supply reservoir must be of suitable quality to discharge to waters of the State.

68. **Definition of "waterbody".** The definition of "waterbody" in the Plan of Operations Approval should be clarified to not include the TSF.

Response. ADNR has revised Subsection (c) of the Fuel and Hazardous Substances stipulation to read: "c. Storing containers within 100 feet of waterbodies. Containers with a total capacity larger than 55 gallons which contain fuel or hazardous substances shall not be stored within 100 feet of a waterbody. (Note - This stipulation (Subsection "c" of Fuel and Hazardous Substances) does not apply to the tailings storage facility during mine operations.)

AIR QUALITY COMMENTS

69. **Dust control.** Section 1.4.5 of the draft Waste Management Permit states, "The permittee shall take reasonable measures to control dust and/or particulates that may occur from the TSF, Walter Creek Valley Heap Leach Facility, roads, or other mine components by wetting or other effective measures." This provides no clear standards or guidance as to what is required by the permit. ADEC must make the permit clear and enforceable.

Response. Condition 14, Reasonable Precaution to Prevent Fugitive Dust, in ADEC Air Quality Control Permit No. AQ0053MSS01 has specific monitoring, recordkeeping, and reporting requirements associated with fugitive dust control.