Response to Comments Document
Land Application Permit No. 2010DB0011,
Rock Creek Project

This document summarizes and addresses comments received on the Alaska Department of Environmental Conservation (department), draft Land Application Permit No. 2010DB0011 for applying nondomestic wastewater to the land at Rock Creek Project outside Nome, Alaska. The department received comments from seven parties: 1) Mr. Austin Ahmasuk, 2) the Center for Science in Public Participation, 3) Ms. Christine Rowe, 4) Mr. Derrick Leedy, 5) Ms. Karen McLane, 6) the Northern Alaska Environmental Center, and 7) Ms. Susan Steinacher.

Permit-specific comments on the draft permit and the department's responses are contained in the table on the following pages.

Comment #	Commenter	Comment	Comment Response
1	Ahmasuk	1.6.2 MW06-08a, MW06-08b, MW06-09a, MW06-09b, and MW06-10a are not effective at deterring infiltration from Area A3. They are designed as TSF monitoring wells. There application is limited to tailings storage facility (TSF) runoff from the toe of the TSF. Geochemical profiles must be established for speciation of infiltration from Area A3 as a result of sprayer application. Those geochemical procedures are not detailed in this permit and as such stipulation 1.6.2 cannot be critiqued when and if AGC is permitted to spray.	The cited wells are downgradient of both the A3 area and the Tailings Storage Facility (TSF). There is 18 months of water quality data from the wells assessing how the TSF has affected ground water quality subsequent to the cessation of tailings placement in the TSF. No adverse impacts have been observed to date. Monitoring the wells during and after land application provides data showing whether operation of the land application impacts downgradient ground water quality. These wells have the specific benefit of providing background data that allows well-by-well comparisons to current conditions.
2	Ahmasuk	1.2.3 Monitoring wells were designed for possible TSF runoff or seepage. Since TSF impoundment is now a tremendous problem it is better to detail alternate wells to effectively monitor infiltration from Area A3 from the sprayers. If new areas are detailed as provided for in stipulation 1.2.1.11 because of spongy tundra the public must be afforded the opportunity to critique their effectiveness. The public is currently not provided with well testing feasibility from possible infiltration from Area A3. The current wells are designed for TSF runoff monitoring not infiltration from Area A3.	Please see response to Comment 1. In addition, if subsurface flow is indicated by the presence of water in the three shallow, dry, wells at the area A3 slope toe, the permittee must halt land application and notify the department. To date, no objective evidence exists supporting the claim that the TSF has adversely impacted downgradient ground water.
3	Ahmasuk	I disagree with a 5-year term for this land application permit. 5 years is too long based upon a complete lack of information as to the efficacy of evaporation.	There is no basis for an exception to the department's typical permit term of five years. The permit will not allow land application if new tailings are placed in the TSF. However until tailings are placed in the TSF, land application is a useful method of managing water on site. It is indefinite when or if new tailings will be placed in the TSF. Consequently, it is possible that no new tailings will be placed in the TSF during the next 5 years, and during that time, site water must be managed. The land application system was designed by well-qualified hydrologists and engineers, and its performance was demonstrated in the initial feasibility study and by full-scale operations during fall 2009.
4	Ahmasuk	1.4.2 Alaska Gold Company (AGC) clearly shows with detailed photos that misting will be blown outside of Area A3. ADEC does not address windblown misting, and has no plan for monitoring mist being cast outside of Area A3.	Observed performance of the system during 2009 demonstrated that the sprayers can be successfully placed on the hillside and the direction of spray oriented to prevent drift to areas draining to Glacier Creek, either at the surface or subsurface. The monitoring wells at the slope toe, combined with the other permit-specified best management practices (BMPs), adequately monitor the discharge and mitigate the potential for subsurface saturation to develop. The spray shown in the demonstration photographs fell well on site short of any area that could potentially impact Glacier Creek.

5	Ahmasuk	AGC has not demonstrated any evaporative potential and has not provided any empirical data regarding evaporative measures. At this point it appears the land sharks will only provide for diversion of TSF water into diversion channels, directly onto the tundra in Area A3 which may pool, or into recharge areas for Glacier Creek.	Please see response to Comment 4. The permit allows land application of non-domestic wastewater to the A3 area hillside. While evaporators have been employed to maximize any potential evaporation, the application is not designed solely as an evaporative discharge. The department understands that surface soils and unconsolidated subsoils within the discharge area could become partially or completely saturated, but the permit is designed with requirements specifically aimed at avoiding the potential for subsurface saturation downgradient of the A3 area. The performance of the land application in retaining water in the A3 area was demonstrated through the feasibility study and full-scale operations during fall 2009.
6	Ahmasuk and others	1.2.1.12 It is my opinion seepage will occur. If AGC's seepage calculations are correct there will be runoff at the maximum output of the sprayers at 300 GPM, and if little evaporation is experienced. 300 GPM is equivalent to some small tributaries of the Snake River. AGC will in effect be creating runoff equal to small tributaries of the Snake River and will be affecting the hydrogeology during the time period of this proposed permit.	The permit conditions are designed to avoid the potential for developing saturated conditions and prevent observable downgradient subsurface flow of water. The permit requires the sprayers be moved or halted if saturated conditions or surface runoff is noted.
7	Ahmasuk, Leedy, McLane, and others	1.2.1.6 Land application during freezing is contrary to evaporative design. Freezing conditions will make snow or cause rime icing during freezing periods. Evaporators are designed to work in warm arid conditions not freezing conditions.	The permit allows discharge of non-domestic wastewater to the A3 area hillside. While evaporators have been employed to maximize any potential evaporation, the system also relies on the water consuming effects of plant transpiration, soil containment, and ground water recharge. Equipment such as the LandSharks is commonly used as snow making equipment at ski areas and can operate under conditions slightly below freezing. In this case, the permit prohibits land application if snow accumulates. See Condition 1.2.1.6. During the feasibility study and full-scale operations last year, the LandSharks performed well at air temperatures at or below freezing without consistent snow accumulation on the ground surface.
8	Center for Science in Public Participation	Permit Section 1.8 CORRECTIVE ACTIONS, requires the following correction actions should the level of contamination in the ground water monitoring wells exceed the limits in the permit: (1) AGC shall verbally notify ADEC within 24 hours of receipt of monitoring results; (2) AGC shall determine the extent of the exceedance; and, (3) AGC, in consultation with ADEC, shall implement a plan to determine the cause and/or source of the exceedance, and submit and implement a corrective action plan approved by ADEC. It is of note that a water quality exceedance does NOT require land application to cease, even temporarily. Use of land application should cease until the problems that led to the water quality exceedances can by reliably remedied.	In Section 1.8 Corrective Actions, the permit provides a prompt and effective approach to address any observed exceedances of permit limits. This approach requires expedited department notification (within 24 hours of receipt monitoring results) and permittee submittal of a corrective action plan to the department (within seven working days). This balances the need for immediate response with the time necessary to determine, in consultation with the department, the source and magnitude of the exceedance and whether there is any potential harm to the environment. Corrective action clearly could include halting land application, as appropriate. The permit is worded such that halting land application can be required, but it carefully avoids requiring the stoppage of land application when an unrelated circumstance arises. For example, all ground water throughout the mine site does and has for the recorded history of water quality data at the site contained natural arsenic concentrations greatly exceeding water quality standards (WQS). The arsenic concentration in ground water may at the same time exceed WQS but actually show a reduction over pre-mining background conditions. In this case, halting land application would be counterproductive.

9	Center for Science in Public Participation	Land Application Disposal is a poorly understood practice. Management prescriptions meant to prevent contamination from LAD are often inadequate. In Alaska there were significant problems encountered with LAD at the Ryan Lode in Fairbanks. I have personal experience with LAD at the Zortman-Landusky mines in Montana where despite considerable hydrologic study by well respected professionals there has been significant selenium contamination in the LAD area, as well as ground water saturation that has led to seepage into surface waters of a downgradient stream. This has resulted in water quality exceedances for selenium, and potential threats to livestock and wildlife that use this water. The monitoring employed at the Zortman-Landusky LAD site (Goslin Flats) is more extensive than that being proposed for Rock Creek, but all it can do now is monitor the contamination.	Comparing land application at the Rock Creek Project to the Zortman-Landusky and Ryan Lode projects offers a poor correlation for the following reasons. At Rock Creek Project, the land application method is different, the volumes and rates of discharge are much less, and the water quality characteristics are much different than at these other projects. The land application feasibility study and full-scale operations during 2009 demonstrated that the discharge, including the use of BMPs, has been successfully employed at the Rock Creek Project, and the practice of land application at Rock Creek Project is understood to be safe practice under the conditions of the permit.
10	Center for Science in Public Participation	The easiest way to avoid all of these potential problems is to treat the water before land application.	There is no requirement to treat the water prior to land application when doing so is unnecessary to protect the environment. However, the permit has been changed to only allow the land application of TSF water instead of both TSF and Main sump water. This change maximizes environmental protection and minimizes potential impacts for the following reasons. In February 2009, over two months after the mine closed and stopped placing tailings in the TSF, the chemistry of TSF water was analyzed and characterized. The department then identified a suite of ten constituents of concern for the TSF water. With the exception of inert water treatment plant sludge, no solid waste has been placed in the TSF since November 2008. During that span the concentrations of the ten constituents of concern have diminished. Water quality data taken over the course of the last year indicate that average concentrations for all ten constituents of concern in the TSF water meet or exceed WQS. With regards to constituents of concern, the Main sump water is poorer quality than the TSF water. Consequently, current TSF water quality data indicates that land applying it without treatment poses no threat. As indicated in the application, water can be managed in the A3 area through containment, transpiration, and evaporation. Finally, the quality of TSF water to be land applied is as good or better quality than existing ground water at the site.
11	Center for Science in Public Participation	If the spray-evaporators were operated to spray directly over the tailings pond itself there would be no risk to ground water, except for spray-drift, which should be manageable (and AGC already anticipates spray-drift management in its application). This would not permit the volume of disposal proposed in the application, but should be a cost effective method to supplement the injection wells.	Spray-evaporating TSF water over the TSF pond would not remove enough TSF water. Since the amount of evaporation is limited and soil containment, ground water recharge, and plant transpiration would be eliminated or greatly reduced, this option is not a viable water management activity. Application of TSF water subject to the permit conditions will allow reduction in the TSF water volume while complying with applicable State water quality requirements. The permit specifically designates land application of water to the A3 area hillside, which is as good or better quality than the background ground water. It is important to emphasize that the permit is designed to allow evapotranspiration, storage, and ground water recharge and to prohibit runoff and downgradient subsurface flow.

12	Center for Science in Public Participation, Leedy, Northern Alaska Environmental Center, Steinacher, and others	Even if flow was detected in these wells [at the toe of the slope], it would indicate that ground water had already been contaminated, and stopping land application would only limit the amount of ground water contamination, not prevent it.	Surface soils and unconsolidated subsoils within the discharge area could become partially or completely saturated. However, the permit requirements are designed to avoid creating saturated conditions that result in a significant, downgradient, subsurface, flow of water. The water chemistry from the TSF pond is as good quality or better than the natural background ground water chemistry, as demonstrated by monitoring well data. No effects to ground water chemistry were observed in 2009 from such an application. The permit includes specific monitoring and corrective action provisions if effects on ground water chemistry are detected in the downgradient site monitoring wells.
13	Leedy	The AGC mentions and gives a misleading example saying the Landsharks will deliver a total of 175 gpm for 11 hours each day for 30-45 days. AGC goes on to say that 7 million gallons will be delivered at the nozzle but 5 million gallons will be on the ground. In another area it is mentioned that the Landsharks will only be used during daylight hours. Now in the ADEC permit the limit of delivery is 300 gallons per minute (gpm). There is no mention of time of day, no cap of total gallons delivered per season. I FEEL THE APPLICATION OF WASTEWATER SHOULD BE LIMITED TO DAYLIGHT HOURS. OVER APPLICATION WOULD BE VERY DIFFICULT TO DETECT AT NIGHT.	The comment refers to discussions in the feasibility study regarding the potential volume of application that could have occurred during 2009. This study was prepared prior to the actual operation of the LandSharks, which were originally proposed to operate only during daylight hours. The conditions in the permit, including allowing a 24-hour discharge, are based on the experience that was gained and site observations during actual operation in September and October of 2009. Based on this experience, the department determined that 300 gpm can be safely discharged using this method without incurring adverse environmental impacts. The BMPs are designed to avoid potential impacts to groundwater or the environment.
14	Leedy	I consider this project a direct discharge (tundra/ground water) of and into the waters of the US that must obtain a NPDES Permit. A representative from the AGC in the supporting documents stated that a portion of the wastewater would penetrate the bedrock entering the ground water.	Area A3 was specifically chosen because it is an uplands area and not wetlands. Beyond that there is no direct hydraulic connection between A3 and a navigable water of the U.S. Additionally, permit requirements for the land application have been imposed to prevent a direct discharge to waters of the State which would require an APDES or NPDES permit. Moreover, as indicated in the application, based upon operating results from 2009, land applied water will be contained within soils, transpired, or evaporated.
15	Leedy	The ADEC must authorize the discharge of wastewater that enters or falls upon all waters and lands of the state. If Injection Wells are part of the Wastewater Disposal Plan, then the requirement of the EPA's Underground Injection Control Class V wells MUST BE MET in Alaska's Non-domestic Wastewater Permit.	Under the underground injection control (UIC) permit, water is being injected directly into the subsurface and such a discharge is governed by the requirements of the federal Safe Drinking Water Act. The State land application system permit is for disposal of water to the ground surface and is not subject to UIC permitting requirements but rather State permitting requirements for non-domestic wastewater disposal under 18 AAC 72.500.
16	Leedy	It appears that existing regulations from the ADEC prevents the on land disposal of the contaminated non-domestic wastewater.	Applicable regulations at 18 AAC 72.500 allow for permitting of non-domestic wastewater disposal via discharges to land.

17	Leedy	When the 3- wheeled Landsharks are moved at least every three days. Rutting of the tundra will occur. Pick-up truck or ATV will need to be used to move the units that will damage the tundra. The potential damage to the tundra needs to be addressed and mitigated in the permit.	The permit requires that the direction of the spray be rotated at a minimum of every three days. To minimize traffic and equipment on the hillside, the permit requires that the units be physically moved if they cannot be operated without causing ponding or spongy soaked ground to occur on the surface, or if surface runoff is noted during a required inspection of the ground. Experience from the September and October 2009 land application indicates that no impacts to vegetation occurred.
18	Leedy	SPRAYING AREA A3 SHOULD NOT BE DONE BELOW FREEZING TEMPERATURES. This permit would allow water to be sprayed on frozen tundra, which would result in surface water flows downgradient.	Please see response to Comment 7. The development of surface runoff is in violation of permit limitations. In addition, runoff over frozen ground was not observed during freezing conditions during fall 2009 operation. Freezing air and frozen ground must be differentiated. It is okay to spray when the air is freezing provided that there is no accumulation of snow. However, snow may accumulate when the ground is either thawed or frozen, but if the ground is frozen, snow would accumulate and spraying must be halted according to the permit. See Condition 1.2.1.6
19	Leedy	The geochemistry between the relationship of the soils, vegetation and the wastewater needs to be determined.	As indicated above, the permit restricts land application to TSF water consistent with actions taken in 2009. The chemistry of the water in the TSF reflects the natural site geology and relates to the natural background ground water chemistry, as is demonstrated by monitoring well data. Neither data nor past experience indicates that this water will react with area soils or negatively impact vegetation, and specific studies are not required.
20	Leedy	Ground water flows from the wastewater may contaminate the drinking water of the residents downstream. UNTREATED WASTEWATER MAY POSE A HEALTH HAZARD.	Monitoring wells have been established downgradient of the mine, TSF, and sumps to detect potential ground water contamination from this and other site activities. These wells are regularly monitored to prevent the potential contamination of ground water downgradient of the land application area. Given that (1) the land applied water quality is exceeds ground water quality, (2) downgradient subsurface flow is unlikely to occur, and (3) the relative distance from the A3 area to any potential drinking uses, available data indicate there will be no impacts to the environment or drinking water uses.
21	Leedy	It must be remembered that the original purpose of the injection wells was to dewater the mining pit to allow mining to occur. This water was to be processed in the water treatment plant. The pit was abandoned and the wells are now used to dewater the TSF. Now the applicant wants contaminated wastewater to be disposed of without treatment. This changes the original promises made to the public and government on handling wastewater. The original company commitments about how wastewater is treated should be adhered to.	Please see response to Comment 10. Early in production, the mine made an unanticipated shift to care and maintenance status. That change necessitated developing and refining new water management practices to address the shift in status. As indicated above, TSF water quality is as good as or better than baseline water quality conditions, and poses no threat to the environment. Therefore, no need exists to treat TSF water prior to its land application.

22	Leedy	The proposed permit to remove millions of gallons of wastewater from the Tailings Storage Facility (TSF) and sumps is just a temporary Band-Aid to help remedy the problem of excessive water in the TSF. The permit would not even be needed if the NovaGold/Alaska Gold Company would JUST FIX THE PROBLEM IN THE TAILING STORAGE FACILITY AND STOP THE DAMAGE.	During 2009, water management was a significant concern at the Rock Creek Project. However, water levels in the TSF dropped over the last year and land application conducted during September and October of 2009 contributed to the reduction of accumulated of water from precipitation. Previous land application was closely monitored and no indications of harm resulted. Consequently, the land application process has previously proven to be a useful, important, and responsible way to manage water during care and maintenance at the Rock Creek Project.
23	Leedy	Today, sludge from the WTP is being deposited into the TSF. This was the original plan when it would be mixed with paste tailings. Today, 100,000 tons of tails are in the TSF when the RCM was being commissioned. No tailings have been deposited since the mine ceased operation on November 24, 2008. No studies on the sludge leach ability for arsenic; antimony and cyanide have been done. They have been deemed safe based on other water treatment plants (WTP) in the nation. The RTW (Tetra Tech) designed and built WTP is unique in processing the water from the injection wells that justifies the analysis of the sludge. An aqueous environment in the TSF does not optimize long-term sludge stability. The chemical makeup of the TSF is in a constant state of flux.	The water treatment plant (WTP) was specifically designed to remove antimony, arsenic, and manganese as the primary constituents of concern. The WTP applies a proven technology and the characteristics of its sludge were well understood, documented, and a vital aspect of the WTP's design selection. That is to say, sludge produced in the WTP is stable under neutral pH conditions, and water quality data from the TSF, where the sludge is disposed, supports the stability of the sludge as not leaching antimony, arsenic, manganese, or other secondary constituents. During care and maintenance there is no source for addition of cyanide to the system, and there is no cyanide in the sludge. Further, all weak acid dissociable cyanide data collected since September 2009 for the TSF and Main Sump have been below the most stringent water quality criterion of 5.2 ug/L. As noted above, the permit has been changed to only allow land application TSF water, and land application of Main sump water is not allowed. The quality of water in the TSF pond, while variable, has been well defined through sampling performed during the past year. These data are well understood and accounted for in the permitting of the land application system.
24	Leedy	Sludge disposal into the TSF from the Water Treatment Plant should be discontinued if untreated wastewater is sprayed on area A3. The toxicity characteristic leaching procedure (TCLP) test is normally used to evaluate if sludge should be managed as hazardous waste. The sludge may be adding toxic heavy metals and cyanide into the TSF. Adding sludge to the TSF may be an impediment in the future if an engineered breach of the dam is required. It is arbitrary to state that the sludge is "safe". This conclusion is not based on data but circumstantial evidence, which put the burden of proof on the public.	Please see response to Comment 23. There is no evidence to indicate that sludge is adversely impacting water quality in the TSF or the sumps. Since the water quality in the TSF and sumps has been and will continue to be routinely monitored, the sludge is considered stable, and water quality data supports the stable, inert, quality of the sludge, TCLP tests on the sludge are unwarranted.
25	Leedy	The Landshark manufacturer has an onsite weather station available that allows the water pump to be turned on and off based on wind speed and/or direction that will help prevent overspray. I recommend that the permit require the use of the manufacturer's Weather Station. The Weather Station can be viewed at resourcewest.net. I am concerned that mine personal may not be available because the mine is in a Care & Maintenance mode of operation.	Experience gained from the feasibility study and full-scale operations during fall 2009 have demonstrated that the permitted discharge can be successfully operated following the best management practices (BMPs) and monitoring requirements included in the permit. The permittee must provide sufficient on-site staff resources to fully meet its obligations under the permit. However, endorsing and requiring specific products exceeds the statutory and regulatory authority of the department. Use of the Weather Station cited by the commenter is entirely optional.

26	Leedy	Tetra Tech estimated how many inches an hour will be delivered to Area A3 from the Landshark 45. The LS (125 gpm) had NO values. This important data is missing. The coverage area in square feet and the water depth per hour delivered is also absent from the feasibility study.	The original feasibility study estimated an average approximate rate of discharge to the A3 area using the LandShark 45, which was used for the study. Experience gained from the land application during the fall of 2009 has shown that additional LandShark sprayers can be successfully deployed without causing overlap of sprayed discharges or the development of runoff or saturated conditions on the A3 area hillside.
27	Leedy	Time should be allowed to adhere to the manufacturer's recommended maintenance schedule. This would be considered one of the BMP's that should be included in the permit. The Land Shark/LS 45 maintenance recommends that the units need to be inspected including the spray ring for scale build up and plugged nozzles, remove scale build up with sulphamic acid and check pumps for leaks and flow volume.	The permittee must operate the spray evaporators consistent with permit requirements. The conditions and monitoring requirements in the permit are adequate to verify that the system is operated properly.
28	Leedy	Both Landshark models come with an internal pump and blower fan. Both units have a rated capacity and ability to pressurize the inlet water to 80-100 psi. The feasibility testing was done at 200 PSI on only the LS45. If the pump on the unit was used the pressure would be 80-100 PSI. When the pressured is doubled as was done in the tests the flow rate WOULD INCREASE by 40-50%. During the tests in 2009 the fan was not used because an electrician could not be found. Also, as the nozzle size increase says from the LS 45 to the LS (125 gpm) the droplet size would increase. The LS (125 gpm) was not included in the feasibility study. I would recommend that the pressures on the LS and LS45 be limited to the manufactures specifications of 80-100 psi.	The LandShark and LandShark 45 are capable of delivering 125 and 45 gallons per minute (gpm), respectively, when the pressure in the ring manifold is at least 80 to 100 pounds per square inch (psi). Increased line pressure slightly above 100 psi does not necessarily increase the rate of discharge. The exact rate of discharge is dependent on the particular nozzle that is used for the units. The nozzles employed for this project are designed to minimize spray droplet size and maximize the potential for evaporation prior to the droplet hitting the ground.
29	Leedy	If an external pump is used a flow gauge should be used to measure the water flow to each of the 3 units. Application volumes are required in this permit therefore flow gauges would make this data accurate. Each Landshark unit should not exceed 45 or 125 gpm depending on the model. If the pressures were doubled to 200psi the total flow rates would increase for 295 gpm to 450 gpm! The 300 gpm in the permit could be easily exceeded. MEASURING FLOW RATES AND RECORDING THEM DAILY IS IMPORTANT.	An in-line flow gage was employed during the 2009 feasibility study and full-scale operations, and the permittee intends on continuing to monitor the volume of discharge in that fashion. This is necessary to comply with Section 1.7 permit requirements, which require reporting of the total volume of water land applied.
30	Leedy	Characterization of soil hydraulic behavior using traditional methods is very time consuming and very costly. Slope, evaporation, up and down slope altitude as well as the slope gradient and rainfall were was not apparent in the feasibility study. Soil depths in original environmental assessment varied from 2-8 inches (topsoil) in the study area.	The original environmental assessment reported depths of topsoil. The feasibility study characterized the depth and condition of both topsoil and unconsolidated subsoils. Hydraulic properties were studied using both ponded infiltration tests to estimate saturated infiltration rates, and slug tests in wells to determine the hydraulic conductivity of the subsoils. The accuracy of these tests was sufficient to demonstrate that water could readily infiltrate into the soil column without causing ponding on the surface and that a land application system was technically feasible. This was then further verified through the full-scale operations in fall 2009.

31	Leedy	A scaled dimensional plot revealing the location and coverage of the Landsharks, the location of all surface water and the location of the cuts and outcrops. The feasibility study does not include a detailed plot BUT SHOULD BE PROVIDED BY THE APPLICANT.	The A3 area hillside does not exhibit any cuts or outcrops but is continuously vegetated. The historic ditches identified in the feasibility study are also vegetated. Based on the permitted operations and BMPs, the direction of spray and aerial coverage of the discharge will be rotated depending on site conditions. The facility map in Section 3 of the permit shows the location of Rock Creek in relation to the A3 area. All land application will be to the Rock Creek drainage area.
32	Leedy	In Table 1 of the ADEC Permit no upper limits are established for arsenic or mercury. This should be added. Also, pH values are important and also should be added.	The levels in Table 1 are consistent with the Temporary Closure Plan. They are designed to indicate if the TSF and land application operations are affecting overall ground water quality. Therefore, they are based on parameters that have historically been found in both background ground water quality and TSF water such that any exceedances of the triggers suggest that the TSF was affecting the wells. The department calculated Table 1 trigger levels to indicate a statistically significant impact by the TSF water on local ground water. Mercury and pH were excluded from consideration because there was and is no discernable difference between wastewater and background water quality regarding those substances. Additionally, permit Condition 1.7.1 requires compliance with WQS in addition to the trigger levels listed in Table 1.
33	Leedy	Under the EPA Radionuclide Rule I am asking the ADEC have the water tested in the TSF and sump for Radionuclide's that is required by the EPA because wastewater will enter the ground water.	In the spring of 2009, mine area water was tested for radionuclides, and none were detected. Since no evidence of radionuclides in the area was discovered last year and no source of radionuclides has been introduced to the area, there is no reason to test.
34	Leedy	In my comments I asked for the southern 500 feet of the southern triangular be eliminated from the wastewater disposal area that drains toward Glacier Creek. The map below should clarify my comment. The map was provided by Tetra Teck and was not included in the original application from the Alaska Gold Company.	The permit prohibits introduction of land applied water to outside the A3 area, and the A3 area is situated entirely in the Rock Creek drainage and entirely outside the Glacier Creek drainage. The permittee is required to comply with the permit, and experience gained during the fall 2009 discharge demonstrated that the sprayers can be placed on the A3 area hillside and the direction of spray oriented to prevent drift of spray to areas draining to Glacier Creek either at the surface or subsurface.
35	Leedy	The southern part of A3 is roughly triangular in shape. The slope is less than in the northern section. There are no monitoring wells in this section as the three shallow dry monitoring wells are in the northern half. From the topo map is looks like the southern 500 feet of area A3 will drain toward Glacier Creek. An additional 5 monitoring wells should be added to area A3 to provide ample monitoring. I AM ASKING THE SOUTHERN 500 FEET OF AREA A3 WITHOUT MONITORING WELLS SHOULD BE DELEATED FROM THIS PERMIT. SOIL BEHAVIOR/GROUNDWATER FLOWS	Please see response to Comment 34. As discussed above, no additional monitoring wells are required based upon an analysis of the site characteristics conducted to date.

36	Leedy	It must be remembered that some of the water will be vaporized leaving behind all of the dissolved solids. The tundra will act as a filter to remove these solids. There is certainly the possibility of overloading from the infiltration of precipitation together with the wastewater, making this system very difficult to regulate.	Based on the constituents of concern in the TSF water, the chemical makeup of the water to be land applied is high quality and satisfies WQS. Total dissolved solids values measured in the TSF are low, generally less than 300 mg/L during non-freezing conditions, and less than background ground water concentrations, and will not adversely affect surface water, ground water, or vegetation. The BMPs in the permit are intended to prevent runoff from the land application area. Condition 1.2.1.9 of the permit specifically requires halting of land application if any adverse impacts to vegetation, such as those that could be caused by deposited solids, are observed.
37	Leedy	The change in elevation or slope of the hill was never included in the feasibility study. My estimate based on the topo map is that there is a change of around 650 feet in area A3. This was not factored in. The effects of precipitation on the even steeper slope above A3 were also not considered.	The elevation change was considered in designing the land application system. For example, Condition 1.4.1 of the permit requires the permittee to minimize run-on to the land application area and Diversion Channel 1 located immediately uphill of A3 diverts a significant portion of the water that would run-on. The results of the feasibility study and full-scale operations last year show that the system can be operated in the A3 area. Finally, the BMPs and monitoring actions included in the permit enforce prohibition of land application when runoff from the land application area occurs as verified through twice daily visual monitoring required in Condition 1.5.4.
38	Leedy	Visual Monitoring. Visual monitoring and inspection of area A3 needs to happen every 2 or 4 hours. The present ADEC proposed permit does not have this included. This should require direct on-site inspection rather from a distance. Inspection every 12 hours is insufficient.	Experience gained during the fall 2009 discharge demonstrated that a 12-hour inspection period is sufficient to monitor the discharge and site conditions.
39	Leedy, Steinacher and others	Additional monitoring wells should be added in the area below the 3 wells pictured. A minimum of 6 additional wells should be added. One north northeast of the most northern well. Three more below the line of the three existing wells and two more on the most southern boundary that is closest to Glacier Creek. The wells would be about 200 feet apart.	The three wells strategically placed at the toe of the slope offer a first line of defense in protecting against shallow ground water flow, combine that with the other monitoring and BMP requirements in the permit, and they sufficiently ensure adequate monitoring of land application system performance. Please see response to comment 34 relating Glacier Creek.
40	McLane	Also, the A3 area is directly above the TSF, which is lined. If water escapement happens won't it seep down and go underneath the TSF? Are the diversion ditches deep enough to capture all seepage? If memory serves, the TSF is lined to keep the sludge (and now water) from getting out. Any seepage that comes out of the A3 area could feasibly go under the ditch and TSF and get into Alaskan clean waters.	The land application system has been designed and must be operated (consistent with the BMPs in the permit) to prevent releases to ground water. The quality of the TSF water is consistent or exceeds the background ground water quality at the site.
41	McLane, and Ahmasuk	In the "Background" section in the first paragraph of the application it states that the Rock Creek Mine/Mill Complex is "20 miles north of Nome". This is incorrect; it should state that the RCM is approximately 8 miles north of Nome. In that same paragraph it states that the mine/mill complex is in the "Snake Creek Drainage". This too is incorrect. It should read that it is in the Snake River Drainage.	The permittee corrected its application to correctly identify the mine location as well as the references to the Snake Creek drainage.

42	McLane	I suggest that AGC/NG include all of the below analysis in their application prior to implementation of the evaporation units. pH, FEED TEMPERATURE RANGE, HISTORICAL EVAPORATIVE DATA, (if available), TSS,TDS, COD, TSS, PARTICLE SIZE RANGE, DESIRED EVAPORATION RATE, CHEMICAL MAKEUP OF TDS (mg/L or ppm), GEOGRAPHIC WATER SOURCE LOCATION, HISTORICAL MONTHLY WEATHER DATA SUCH AS, Temperature, Humidity, Wind speed range, Pan Evaporation, ALKALINITY (as CaCO3), CONDUCTIVITY, OIL (hydrocarbons), RELATIVE DENSITY, REFRACTIVE INDEX	The monitoring and reporting requirements in the permit are designed to track the performance of the land application system and ensure compliance with specific permit conditions. On the other hand, unfocused monitoring, monitoring for the sake of monitoring, would only serve to trivialize the relevant aspects of the permitted activity.
43	Steinacher	Why is arsenic, a known problematic contaminant in the location of the RCM, not being regulated?	Please see response to comment 36. The levels in Table 1 are simply used as trigger levels that would show that ground water is being affected by TSF water. From this perspective, arsenic data is difficult to evaluate because it is found at elevated and highly variable levels in both the TSF and natural ground water at the site, and on an average TSF water contains less than half the arsenic of that in the Main sump AGC is required to report any exceedance of water quality standards, including arsenic, under Condition 1.7.1 of the permit.
44	Steinacher	"If trigger levels for these parameters are exceeded, AGC will notify the State and propose any necessary corrective actions to address the TSF and land application system, as appropriate." Shouldn't a contingency plan be addressed prior to permitting the proposal?	The land application system has been designed to avoid adverse impacts on ground water and its performance was demonstrated through the feasibility study and full-scale performance during fall 2009. The permittee is required to monitor and implement BMPs to avoid impacts to the environment. In addition, upon detection of any problem or exceedance, the permittee must implement corrective actions in consultation with the department that addresses a specific issue as it arises. Given that no issues arose in 2009, no specific corrective actions can be identified at this time.