Rio Tinto
Kennecott Eagle Minerals
Victoria Peacey
HSE Manager
504 Spruce Street
Ishpeming, Michigan 49849
(906) 486-1257

February 24, 2010

Ms. Rebecca Harvey, Director
Region 5, UIC Branch
United States Environmental Protection Agency
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Re: **Kennecott Treated Water Infiltration System (TWIS) Redesign**

Dear Ms. Harvey:

Per your request, I am enclosing two sealed copies of the submittal we recently provided to the Michigan Department of Natural Resources and Environment (MDNRE) addressing a new design alternative for the Eagle Mine TWIS with the goal of optimizing the TWIS system performance and facilitate easier inspection and maintenance.

As I explained to you on the telephone last Thursday, this design alternative will eliminate any subsurface discharge piping from subsurface, substituting an above-ground discharge with insulative cover appropriate to the climate. In that sense, it is no different than the numerous surface systems used throughout Michigan. Importantly, this alternative:

- Will not change the quality, location, footprint, and dimensions of the TWIS discharge.
- Will not change the maximum discharge volume of 504,000 gallons per day.
- Will not change the maximum loading rate of 10 gallons per square foot per day.
- Will not change the current operational plan to use four cells at any given time and rest one cell.
- Will not change the perimeter ditch designed to prevent surface runoff from the infiltration site.

I will keep you informed of the MDNRE review process for this design alternative and final decision. Please do not hesitate to call me with any questions.

Sincerely,

Victoria Peacey

February 22, 2010 Our Ref.: 083-88572

Kennecott Eagle Minerals Company
504 Spruce Street
Ishpeming, Michigan 49849

Attention: Ms. Victoria Peacey

**RE: PERMIT MODIFICATION LETTER WITH STAMP
TO GROUNDWATER DISCHARGE PERMIT NO.: GW1810162
KENNECOTT EAGLE MINERALS COMPANY, MARQUETTE, MI**

Dear Ms. Peacey:

Golder Associates Inc. (Golder) is pleased to present this application for a modification to the Kennecott Eagle Minerals Company (KEMC) Eagle project Groundwater Discharge Permit No. GW1810162, received from the Michigan Department of Environmental Quality (MDEQ) in December 2007 (the "Permit"). The Permit assumes that treated wastewater is distributed through the infiltration gallery through subsurface perforated pipes. KEMC retained Golder to review and modify this approved design to move this treated water infiltration system ("TWIS") above grade and still prevent freezing of both the piping and the soils within the infiltration field. This letter transmits the findings of the review and presents the modified design.

Background and Design Parameters

KEMC has received final agency approval of the Permit, which is based on an application that included construction and operation of a TWIS that would operate below the ground surface. The principal purpose of this design was to enable operation of the TWIS during the winter months when low temperatures and snow would impede operation of a design that operated above-ground.

Over the past several months, KEMC has determined that designing the TWIS to operate above-grade would have the distinct operational advantages, particularly with regard to system access for routine inspections and maintenance. Accordingly, KEMC retained Golder to review design options to accomplish this goal and prevent freezing of TWIS piping and infiltration basin soils during winter operation.

Based on this goal, Golder's review resulted in the following re-design of the TWIS:

1. Treated water will be discharged through at-grade discharge piping, instead of below grade piping;

2. Lateral piping will be bedded on 8 inches (minimum) of washed stone over native sands instead of 6 inches;
3. Some piping features have been optimized; the most noteworthy include: lateral piping has been increased from 1.5-inch diameter PVC to 2-inch diameter HDPE (this modification was made since 2-inch diameter HDPE is a standard pipe and a size which is readily available, easy to install, difficult to break or damage, and the larger diameter reduces head loss and provides easier access, should that be needed); and the linear footage of laterals included in each cell has reduced from approximately 2,700 lineal feet per cell to approximately 1,800 lineal feet per cell (the larger pipe ensures unrestricted flow to each orifice and in addition to the broad piping and orifice coverage, the gravel, which is more than an order of magnitude more permeable than the in-situ material, will result in a relatively even dispersion of seepage);
4. At least 3-inches of Styrofoam® insulation will be installed over the entire treated water infiltration system;
5. HDPE geomembrane (40 mil) will be installed over Styrofoam® insulation chiefly for wind and placement protection; and,
6. Automated valves and flow meters will be installed within insulated manholes which will replace the weir and dosing siphons from the previous design.

Additionally, it is proposed that inter cell berms be constructed to further ensure that the flow to any given infiltration cell will be accomplished by that cell and will not flow to an adjacent cell. This feature was added to more readily provide access to each cell for maintenance purposes and to allow for resting.

Importantly, this design does not change the chief precepts of the permitted rapid infiltration system. These include:

- The location is unchanged;
- The original footprint and dimensions are unchanged;
- The maximum discharge of 504,000 gallons per day is unchanged;
- The maximum loading rate of 10 gallons per square foot per day is unchanged (a calculation demonstrating this was performed and is attached);
- The operational plan to use 4 cells at any given time and rest 1 cell is unchanged; and
- The perimeter ditch preventing surface run-on and run-off remains unchanged.

The revised design drawings prepared by Golder are included in Attachment 1. A description of the thermal modeling and other distribution considerations follow.

Thermal Modeling

Golder performed a frost penetration evaluation to support the new TWIS design. Frost penetration for the KEMC infiltration system was evaluated using the software program BERG2 that was developed in

1989 by the University of Alaska Fairbanks and the State of Alaska Department of Transportation and Public Facilities. The BERG2 program uses a methodology similar to the Modified Berggren method to estimate thaw and freeze depths in layered soil systems (Attachment 2). Program inputs include site specific climate data (e.g. air thawing or freezing index, mean annual air temperature, etc.), surface N-factors, and material thermal properties (e.g. latent heat, thermal conductivity, and heat capacity). The thermal properties of soils are estimated using moisture content and dry density. The following conservative assumptions were used for the program parameters:

- Design Air Freezing Index (AFI) for Marquette = 1,982°F-days (100-yr return from "Climatic Data for Frost Protected Shallow Foundations " by National Climatic Data Center, online at http://www.ncdc.noaa.gov/oa/fpsf/fpsfpublications.html)
- Mean AFI = 1,600°F-days (from "Technical Manual, Arctic and Subarctic Construction, General Provisions, " ARMY TM 5-852.1, dated Sept. 4, 1987)
- Average Air Temperature = 42.4°F (from "Climatic Data for Frost Protected Shallow Foundations " by National Climatic Data Center, online at http://www.ncdc.noaa.gov/oa/fpsf/fpsfpublications.html)
- N-freeze factor = 0.9 (from "Frozen Ground Engineering" by Andersland and Ladanyi, 1994)
- Default thermal properties for materials from BERG2 program.

The BERG2 program is sensitive to the number of freezing days that are calculated using the Design AFI, the mean AFI, and the mean average air temperature. The estimate did not consider the insulating effects from snow cover nor possibly higher moisture contents of soils that would decrease frost penetration. The frost penetration estimation results indicate that the proposed design will limit freezing to non-critical depths. The results of the frost penetration exercise are presented along with program outputs, in Attachment 2.

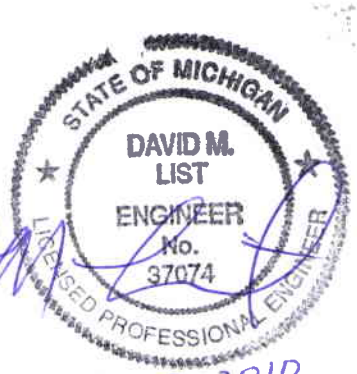
Golder has used insulation to control frost penetration and heat loss for a number of projects in Alaska and in other cold regions. Attachment 3 summarizes other similar applications which have been constructed and are in operation in cold weather regions.

It is noteworthy that should a free-draining material freeze (gravel layer and the underlying sand in the TWIS area), there should be little or no water stored in the pore space to freeze and hence, complete blockage of seepage is very unlikely.

This information is intended to modify the Michigan Department of Environmental Quality Groundwater Discharge Permit No.GW1810162, the approval of which was dated December 2007. Golder Associates Inc. appreciates the opportunity to assist Kennecott Eagle Minerals Company with this project. Please contact us if you have any question or comments regarding the information contained herein.

Regards,

GOLDER ASSOCIATES INC.



Thomas Krzewinski, P.E.
Principal

David M. List, P.E.
Principal

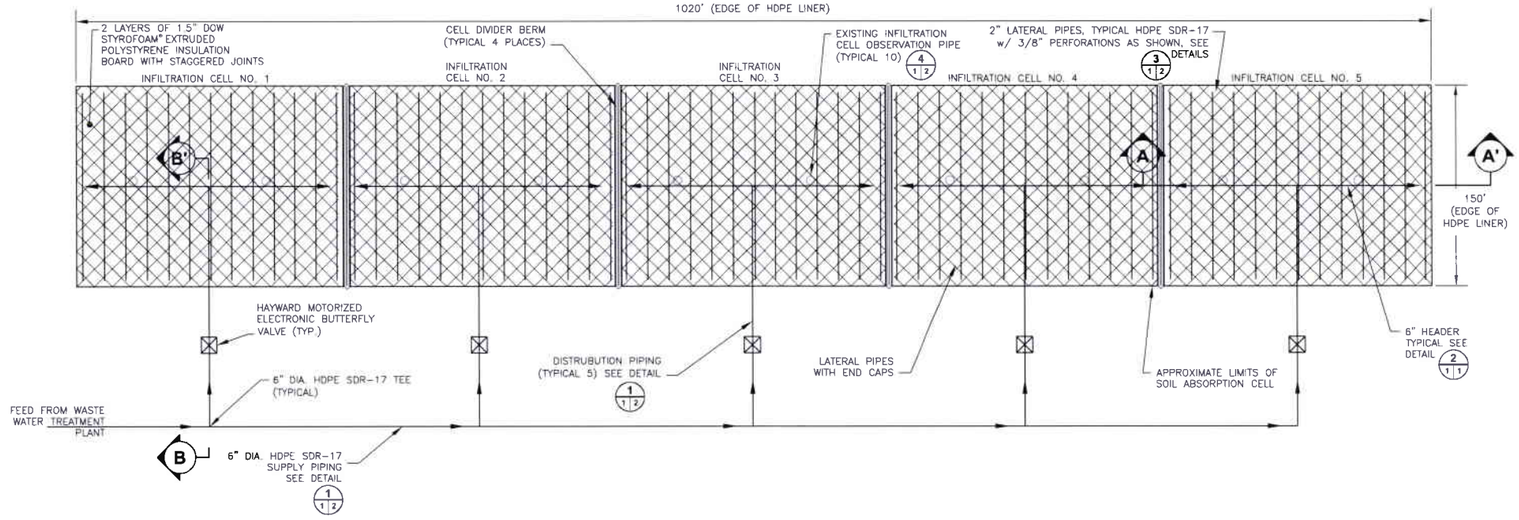
2-22-2010

Attachments:

1. Revised Rapid Infiltration System Design Drawings
2. Thermal Modeling Calculations
3. Cold Weather Regions Similar Applications
4. Calculations Demonstrating Compliance With the Maximum Loading Rate

ATTACHMENT 1

Revised Rapid Infiltration System Design Drawings

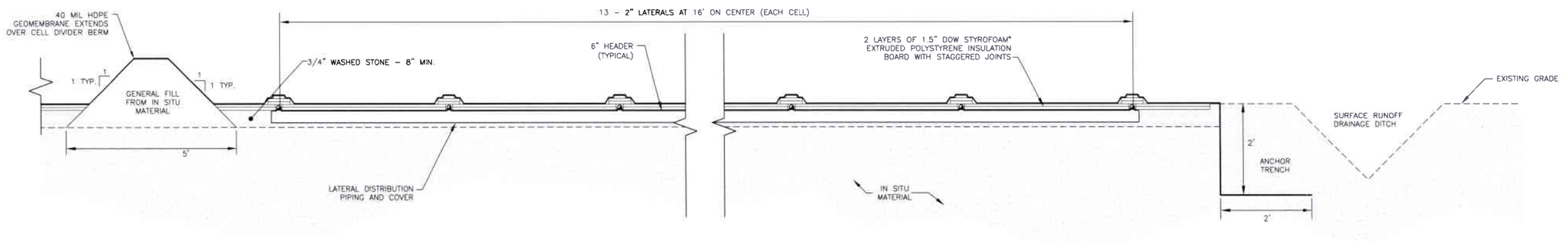


1/1/1 TREATED WATER INFILTRATION SYSTEM - SCHEMATIC

NOT TO SCALE

DETAIL NOTE

1. THE EXACT CONFIGURATION OF THE LATERAL DISTRIBUTION LINES SHOWN ABOVE MAY VARY FROM THE PATTERN SHOWN HERE TO ACCOMMODATE INSULATION PANEL DIMENSIONS, CELL DIVIDER BERMS, AND THE LIKE. THE SAME NUMBER OF LATERALS SHALL BE CONSTRUCTED IN EACH CELL.



2/1/1 TREATED WATER INFILTRATION SYSTEM - TYPICAL SECTION (A-A')

NOT TO SCALE

GENERAL NOTES:

1. HDPE PIPING IS NOTED WITHIN THE DRAWINGS. THIS PIPE CAN BE SUBSTITUTED WITH PVC PIPE AT THE OWNER'S DISCRETION.
2. SAND BAGS WILL BE PLACED OVER THE GEOMEMBRANE TO PREVENT WIND UPLIFT.
3. ALL DIMENSIONS ARE TYPICAL UNLESS MINIMUM IS SPECIFIED.
4. DIFFERENT EQUIPMENT AND/OR CONFIGURATION THAN THAT SHOWN MAY BE USED IF CAPABLE OF DELIVERING LIKE QUANTITIES TO EACH CELL.

Golder Associates Great Lakes

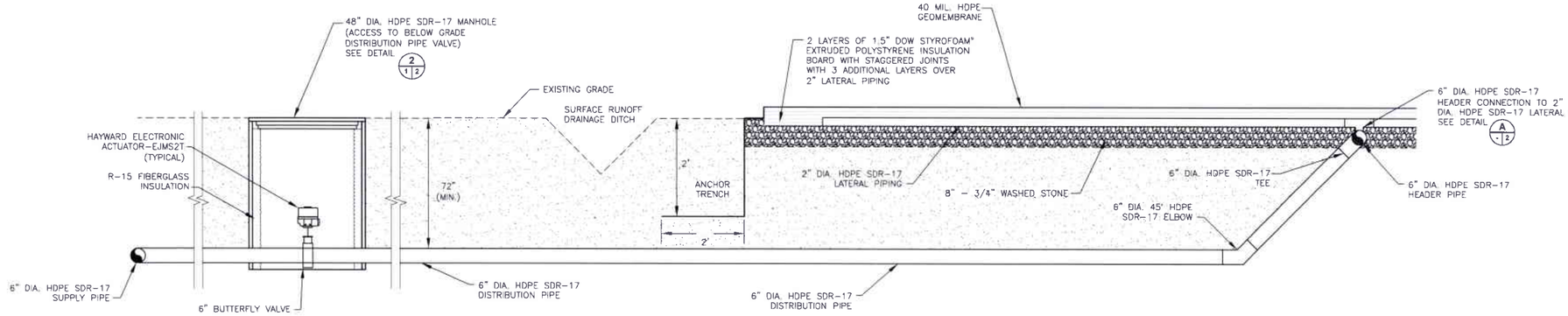
REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW
0	03/11/09	JJS	CLIENT COMMENTS	JJS	ARM	DML
1	04/20/09	JJS	CLIENT COMMENTS	JJS	JJS	DML
2	12/22/09	JJS	CLIENT COMMENTS	MGG	NEV	DML

PROJECT: KENNECOTT EAGLE MINERALS

TITLE: TREATED WATER INFILTRATION SYSTEM DESIGN AND DETAILS

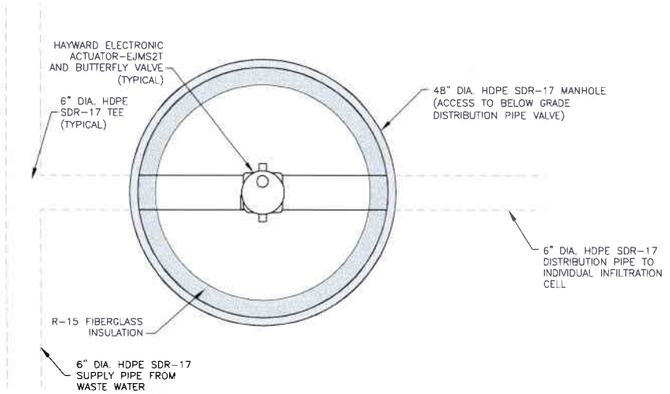
PROJECT No.	083-88572	
FILE No.	08388572A001_R4	
REV. 2	SCALE	AS SHOWN
DESIGN	DML	01/27/09
CADD	JJS	04/20/09
CHECK	TDJ	02/02/10
REVIEW	DML	02/02/10

SHEET 1 of 2

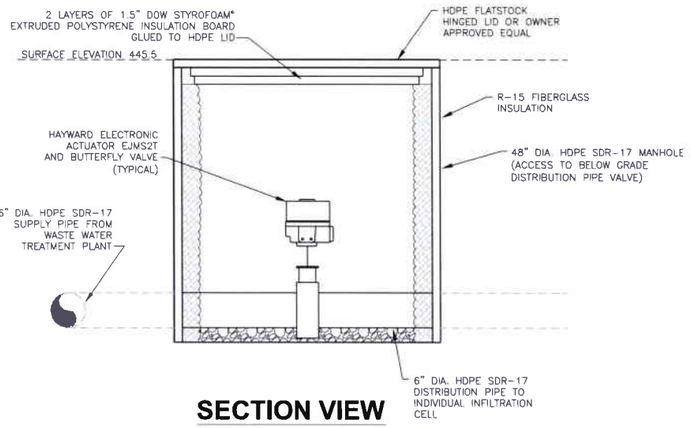


1 | 1 | 2 DISTRIBUTION PIPING SCHEMATIC - SECTION (B-B')

NOT TO SCALE



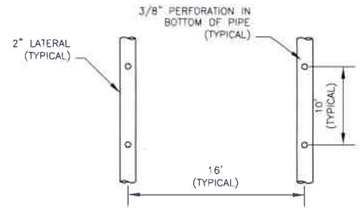
PLAN VIEW



SECTION VIEW

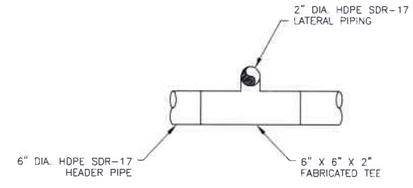
2 | 1 | 2 VALVE ACCESS

NOT TO SCALE



3 | 1 | 2 LATERAL DETAIL

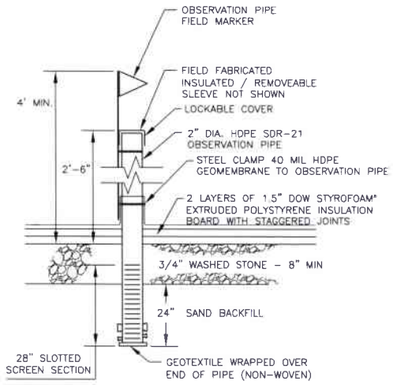
NOT TO SCALE



6" HEADER TO 2" LATERAL CONNECTION DETAIL

A | - | 2

NOT TO SCALE



INFILTRATION CELL OBSERVATION PIPE DETAIL

4 | 1 | 2

NOT TO SCALE

Golder Associates
Great Lakes

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK
0	12/22/09	JJS	CLIENT COMMENTS	MGC	DML
1	04/20/09	JJS	CLIENT COMMENTS	JJS	DML
2	03/11/09	JJS	CLIENT COMMENTS	JJS	ARM

PROJECT
KENNECOTT EAGLE MINERALS

TITLE
TREATED WATER INFILTRATION SYSTEM DESIGN AND DETAILS

PROJECT No.	083-88572	
FILE No.	08388572A001_R4	
REV. 2	SCALE	AS SHOWN
DESIGN	DML	01/27/09
CADD	JJS	04/20/09
CHECK	TDJ	02/02/10
REVIEW	DML	02/02/10

SHEET 2 of 2

ATTACHMENT 2

Thermal Modeling Calculations

TECHNICAL MEMORANDUM

Date: November 16, 2009 **Project No.:** 083-88530

To: David List, P.E. **Company:** Golder Associates Inc.

From: Steven L. Anderson, P.E.

RE: **FROST PENETRATION ESTIMATION FOR PROPOSED KENNECOTT EAGLE MINERALS TREATED WATER INFILTRATION SYSTEM**

This technical memorandum describes an estimate of frost penetration for a proposed treated water infiltration system (TWIS) for the Kennecott Eagle Minerals Project, located about 25 miles northwest of Marquette, Michigan. The proposed design would include 3 inches of insulation placed over an aboveground discharge pipeline that is laying on 8 inches of gravel, which is further underlain by sand.

FROST PENETRATION ESTIMATE

Frost penetration was estimated using the software program BERG2 that was developed in 1989 by the University of Alaska Fairbanks and the State of Alaska Department of Transportation and Public Facilities. The BERG2 program uses a methodology similar to the Modified Berggren method[1] to estimate thaw and freeze depths in layered soil systems. Program inputs include site specific climate data (e.g. air thawing or freezing index, mean annual air temperature, etc.), surface N-factors, and material thermal properties (e.g. latent heat, thermal conductivity, and heat capacity). The thermal properties of soils are estimated using moisture content and dry density.

The following assumptions were used for the program parameters:

- Design Air Freezing Index (AFI) for Marquette = 1,982°F-days (100-yr return from "Climatic Data for Frost Protected Shallow Foundations " by National Climatic Data Center, online at http://www.ncdc.noaa.gov/oa/fpsf/fpsfpublications.html)
- Mean AFI = 1,600°F-days (from "Technical Manual, Arctic and Subarctic Construction, General Provisions, " ARMY TM 5-852.1, dated Sept. 4, 1987)
- Average Air Temperature = 42.4°F (from "Climatic Data for Frost Protected Shallow Foundations" by National Climatic Data Center, online at http://www.ncdc.noaa.gov/oa/fpsf/fpsfpublications.html)
- N-freeze factor = 0.9 (from "Frozen Ground Engineering" by Andersland and Ladanyi, 1994)
- Default thermal properties for materials from BERG2 program

The BERG2 program is sensitive to the number of freezing days that are calculated using the Design AFI, the mean AFI, and the mean average air temperature. The estimate did not consider the insulating

[1] Aldrich, M.P. and Paynter, H.W., 1953, Analytical Studies of the Freezing and Thawing of Soils, ACFEL Tech. Report 42, CRREL, Hanover, NH.

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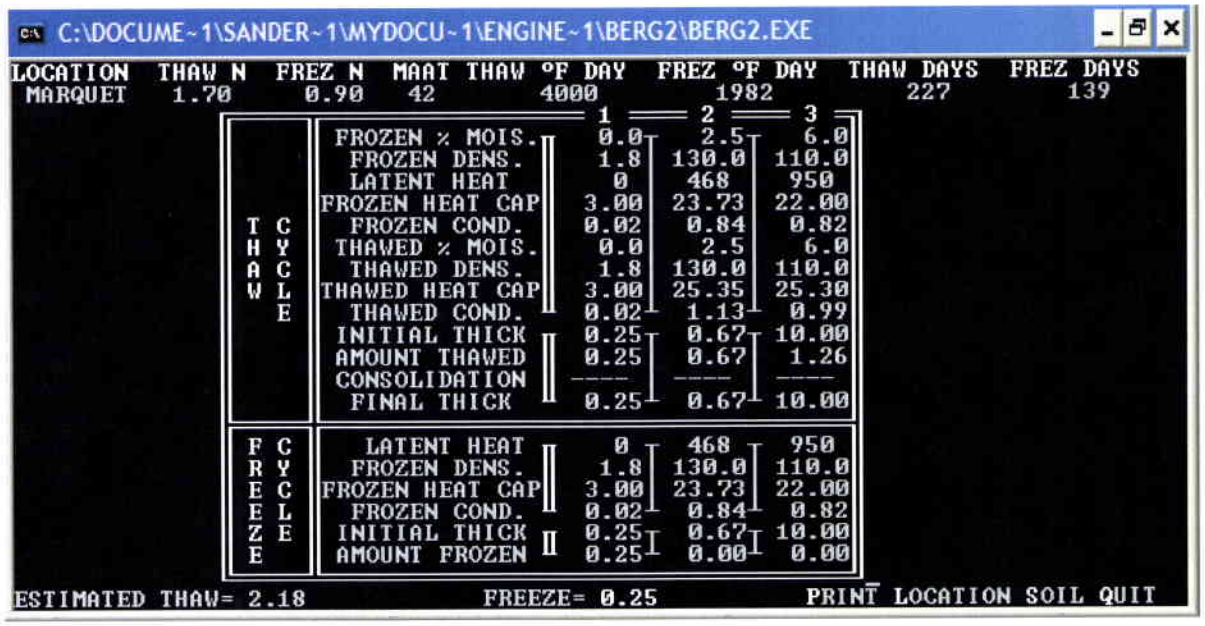
Golder Associates: Operations in Africa, Asia, Australasia, Europe, North America and South America

effects from snow cover nor possibly higher moisture contents of soils that would decrease frost penetration.

SUMMARY OF RESULTS AND PROGRAM OUTPUT

As shown in the BERG2 program output below, the results indicate that frost will not penetrate beyond the thickness of the insulation, a frost penetration of 3 inches.

BERG2 Program Output



ATTACHMENT 3

Cold Weather Regions Similar Applications

Golder has used insulation to control frost penetration and heat loss for a number of projects in Alaska and in other cold regions. The design must consider the regional freeze and thaw indices as well as the thermal properties of the materials. Several examples are shown below.

Insulated Gravel Pad – Red Dog Mine, Alaska

Golder successfully designed an insulated gravel pad to thermally protect a plastic concrete cut-off wall from freeze/thaw degradation at the Red Dog Mine in northern Alaska. The pad consisted of 8 in. of expanded polystyrene (EPS) insulation sandwiched between two 2 ft thick layers of gravel. A width of 28 ft was specified to protect the 32 in. wide cut-off wall from side freezing. Different compressive strengths were also specified for the insulation along the alignment depending on the loading applications, such as in haul truck traffic areas. For the extended design life under closure considerations where the insulation may degrade, the insulated gravel pad will be replaced with 15 ft of gravel.

Insulated Slab-on-Grade Foundation – Buckland, Alaska

Golder has recommended using insulation and thermosyphons below the slab-on-grade foundation of heated buildings that are founded over ice-rich permafrost, such as in Buckland, Alaska. The thermosyphons are intended to keep the thaw unstable ice-rich soil frozen. Insulation is generally used directly below the concrete slab to limit heat loss from the building into the foundation soils and also insulate the building from the frozen ground. The compressive strength of the insulation has been designed to resist crushing forces during construction.

Insulated Pavement over Shallow Utilities – Duluth, Minnesota

Insulation was used to limit frost penetration into highly frost susceptible subgrade soils and to protect shallow utilities (water and wastewater) in an industrial parking lot in Duluth, Minnesota. The project utilized 4 inches of extruded polystyrene insulation placed 2 feet below the pavement surface and within a 4 foot clean granular base and subbase. The utilities were placed at the bottom of the granular layer. The parking lot pavement and the frost protected utilities have performed well since construction in 1989. This project is at Minnesota Power's Hurbert Service Center in Duluth.

Insulated Road Sections – Cold Regions

Insulation is commonly used for road design projects in cold regions to limit the frost penetration into frost susceptible soils. Initially the design considers the maximum frost penetration through the structural section and into the frost susceptible subgrade soils. Insulation is typically more cost effective than replacing the frost susceptible soils with low or non-frost susceptible materials. Varying the insulation thickness or installing the insulation at a slight grade is used to limit the differential heave in transition areas between insulated and non-insulated sections.

Insulated Shallow Foundations – Cold Regions

Insulation is commonly used to limit energy loss through heated building foundations and to maintain a thawed condition below the footings. Vertical insulation can be installed on the inside of the foundation or outside the foundation. Typically fiberglass insulation is used on the inside of the footing and extruded or expanded insulation is used outside the footing. In very cold climates, such as in Fairbanks, Alaska, horizontal insulation is also used outside the foundation to limit frost depth from the sides.

Golder Associates Inc.
15851 South US 27, Suite 50
Lansing, MI 48906 USA
Tel: (517) 482-2262 Fax: (517) 482-2460 www.golder.com

ATTACHMENT 4

Calculations Demonstrating Compliance With the Maximum Loading Rate

Golder Associates	SUBJECT	Maximum Discharge Rate				
	Job No.:	083-88572	Made By	LFG	Date	2/2/2010
	Ref.	KEMC Marquette, MI	Checked	DML	Sheet	1 of 1
			Reviewed	TDJ		

OBJECTIVE:

Demonstrate that the discharge rate to the proposed modified infiltration system is in compliance with the maximum permitted loading rate.

METHODS:

Calculate the maximum daily discharge rate per square foot and compare with the maximum permitted loading rate. The maximum daily discharge rate is calculated by dividing the maximum daily discharge from the waste water treatment plant (WWTP) by the infiltration area of the active cells.

ASSUMPTIONS/ GIVEN:

1- The maximum discharge from the WWTP is 504,000 gallons per day (gpd) (Ref.1, Page 6 of 32).

2- The maximum permitted loading rate is 10 gallons per square foot per day (gal/ft^2/day) (Ref. 1, Page 5 of 32).

3- Based on the treated water infiltration system design, at any given time, four of the five infiltration cells are active and one is in a resting mode. Each cell has an infiltration area of approximately 200-ft by 150-ft (Ref. 2).

CALCULATIONS:

The maximum daily discharge rate is calculated by dividing the maximum daily discharge from the WWTP by the infiltration area of the active cells.

Max. Discharge Rate from WWTP = 504,000 gpd

Infiltration Area = 4 cells * (200 ft * 150 ft)
Infiltration Area = 120,000 ft^2

Discharge rate from the infiltration system = 4.2 gal/ft^2/day < 10 gal/ft^2/day $\Rightarrow$ OK

Note: The design accounts for an 8-inch thick (minimum) gravel layer directly beneath the discharge distribution piping. The approximately 1,800 linear feet of discharge piping with uniformly spaced orifices and the high permeability of the gravel results in an even seepage distribution.

CONCLUSIONS:

The discharge rate from the proposed modified infiltration system is less than the maximum permitted loading rate, as shown in this calculation, and therefore acceptable.

REFERENCES:

1- Groundwater Discharge Permit No. GW1810162 received from the Michigan Department of Environmental Quality (MDEQ) in December 2007, Part I, page 5 of 32.

2- Golder Associates (2009), Revised Rapid Infiltration System Design Drawings, dated January 27 of 2009, prepared for KEMC.

Reference # 1

pg 1/6

PART I

PERMIT NO. GW1810162

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
GROUNDWATER DISCHARGE PERMIT

In compliance with the provisions of Michigan's Natural Resources and Environmental Protection Act, 1994 P.A. 451, as amended (NREPA), Part 31, Water Resources Protection, and Part 41, Sewerage Systems,

Kennecott Eagle Minerals Company
1004 Harbor Hills Drive, Suite 103
Marquette, Michigan 49855

is authorized to discharge 504,000 gallons per day, 184,000,000 gallons per year, of process wastewater from the Eagle Project Mine Wastewater Treatment System located at:

Michigamme Township, Marquette County
Section 12, T50N, R29W of Michigamme Township, Marquette County

to the groundwater of the State of Michigan in accordance with effluent limitations, monitoring requirements and other conditions set forth in this permit.

Rule Authorization:	**2218**
Wastewater Type:	Mine Contact Water
Wastewater Treatment Method:	Metals precipitation/sedimentation, filtration, reverse osmosis, microfiltration, ion exchange, evaporation/crystallization
Wastewater Disposal Method:	Rapid Infiltration Basins

The issuance of this permit does not authorize violation of any federal, state or local laws or regulations, nor does it obviate the necessity of obtaining such permits, including any other Michigan Department of Environmental Quality (Department) permits, or approvals from other units of government as may be required by law.

Unless specified otherwise, all contact with the Department required by this permit shall be made to the Upper Peninsula District Supervisor of the Water Bureau. The Upper Peninsula District Office is located at DEQ-Water Bureau, 420 5th Street, Gwinn, Michigan 49841. Telephone: 906-346-8300. Fax: 906-346-4480.

In accordance with Section 324.3122 of the NREPA, the permittee shall make payment of an annual permit fee to the Department for each December 15 the permit is in effect regardless of occurrence of discharge. The permittee shall submit the fee in response to the Department's annual notice. The fee shall be postmarked by March 1 for notices mailed by January 15. The fee is due no later than 45 days after receiving the notice for notices mailed after January 15.

Any person who is aggrieved by this permit may file a sworn petition with the Office of Administrative Hearings of the Department, setting forth the conditions of the permit which are being challenged and specifying the grounds for the challenge. The Department may reject any petition filed more than 60 days after issuance as being untimely.

Reference #1
pg 2/6

PART I

This permit is based on an original application submitted on February 22, 2006, as amended through December 14, 2007.

This permit takes effect on January 1, 2008. The provisions of this permit are severable. After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term in accordance with applicable laws and rules.

This permit and the authorization to discharge shall expire at midnight, January 1, 2013. In order to receive authorization to discharge beyond the date of expiration, the permittee shall submit an application which contains such information, forms, and fees as are required by the Department by July 5, 2012.

Issued December 14, 2007.

James R. Janiczek, Chief
Groundwater Permits Unit
Permits Section, Water Bureau

PART I

Reference # 1 pg 3/6

1. Initial Effluent Limitations

During the period beginning on the effective date of this permit and lasting until at least 90-days after start-up of the wastewater treatment system and the wastewater treatment system has demonstrated compliance in meeting initial permit effluent limitations, the permittee is authorized to discharge a maximum of 504,000 gallons per day, 184,000,000 gallons per year, of Mine Contact Water from the monitoring points listed below to the groundwater in the NW ¼ of the NE ¼, Section 12, T50N, R29W, Michigamme Township, Marquette County, Michigan. The discharge shall be limited and monitored by the permittee as specified below.

Parameter	Monthly Ave Limit	Maximum Daily Limit	Units	Frequency of Analysis	Sample Type
INFLUENT: Monitoring Point **IF-1**					
Flow		Report	GPD	Daily	Report Total
EFFLUENT: Monitoring Point **EQ-1**					
Flow		504,000	GPD	Daily	Report Total
Flow		184,000,000	GPY	Annually	Calculation
Biochemical Oxygen Demand (BOD_5)		10	mg/l	Daily	Grab
Dissolved Oxygen		Report	mg/l	Daily	Grab
Ammonia Nitrogen		Report	mg/l	Daily	Grab
Nitrate Nitrogen		Report	mg/l	Daily	Grab
Nitrite Nitrogen		Report	mg/l	Daily	Grab
pH (Minimum)		6.5	S.U.	Continuous	Grab
pH (Maximum)		9.0	S.U.	Continuous	Grab
Total Phosphorus		Report	mg/l	Daily	Grab
Total Chloride		Report	mg/l	Daily	Grab
Total Sodium		Report	mg/l	Daily	Grab
Specific Conductance		Report*	umhos/cm	Continuous	Measurement
Total Aluminum		Report	mg/l	Daily	Grab
Total Antimony**		Report	ug/l	Daily	Grab
Total Arsenic**	6.0	10	ug/l	Daily	Grab
Total Barium**		Report	ug/l	Daily	Grab
Total Beryllium**		Report	ug/l	Daily	Grab
Total Boron***		250	ug/l	Daily	Grab
Total Cadmium**	3.0	5	ug/l	Daily	Grab
Total Chromium**		Report	ug/l	Daily	Grab
Total Cobalt**		Report	ug/l	Daily	Grab
Total Copper**	10	21	ug/l	Daily	Grab
Total Fluoride		Report	ug/l	Daily	Grab
Total Iron		Report	ug/l	Daily	Grab
Total Lead**		Report	ug/l	Daily	Grab
Total Lithium**		Report	ug/l	Daily	Grab
Total Manganese**		Report	ug/l	Daily	Grab

(continued on following page)

PART I

Reference: pg 4/6

Parameter	Monthly Ave Limit	Maximum Daily Limit	Units	Frequency of Analysis	Sample Type
Total Mercury	0.0021***	Report	ug/l	Daily	Grab
Total Molybdenum**		Report	ug/l	Daily	Grab
Total Nickel***		Report	ug/l	Daily	Grab
Total Potassium		Report	ug/l	Daily	Grab
Total Selenium**	5	25	ug/l	Daily	Grab
Total Silver***	0.4	17	ug/l	Daily	Grab
Total Strontium**		Report	ug/l	Daily	Grab
Total Sulfate		Report	ug/l	Daily	Grab
Total Thallium**		Report	ug/l	Daily	Grab
Total Vanadium**		Report	ug/l	Daily	Grab
Total Zinc**		Report	ug/l	Daily	Grab

* **Specific Conductance**

a) The permittee must monitor specific conductance continuously, record the daily average and submit the results to the Department along with the monthly Compliance Monitoring Reports. The permittee must calibrate the specific conductance meter weekly, and keep a log on site of the calibration results. The log must contain the calibration results, date of calibration and the person that performed the calibration. The log shall be made immediately available to the Department upon request.

b) On or before any discharge to the rapid infiltration beds, the permittee shall correlate results from the continuous specific conductance testing to an effluent quality that meets the Effluent Limits in Part 1, Section 1 of this permit and Expected Effluent Quality described in Attachment I. The permittee shall submit written verification of the correlation, including all related effluent quality and specific conductance data, meter sensitivity and error, and the range of specific conductance values whereby the treatment system will meet the Expected Effluent Quality. The authorized range of specific conductance values from this testing will be referred to as the "Allowable Operational Range" for specific conductance.

** **Method Quantification Level**

a) The appropriate Method Quantification Levels and Methodology are listed in Attachment II unless a higher level is appropriate because of sample matrix interference. Justification for higher quantification levels shall be submitted to the Department within 30 days of such determination. Upon approval of the Department, the permittee may use alternate analytical methods.

Reference #. 1
pg 5/6

PART I

*** **Mercury**

a) Compliance with the Total Mercury Effluent Limit (TMEL) shall be determined as a 12-month rolling average. The 12-month rolling average shall be determined by adding the present monthly average result to the preceding 11 monthly average results then dividing the sum by 12. The monthly average is the sum of the results of all data obtained in a given month divided by the total number of samples taken. If the 12-month rolling average for any month is less than the TMEL the permittee will be considered to be in compliance for total mercury for that month.

b) The analytical protocol for total mercury testing requirements shall be in accordance with EPA Method 1631, Revision E, "Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry". The quantification level for total mercury shall be 0.5 ng/l, unless a higher level is appropriate because of sample matrix interference. Justification for higher quantification levels shall be submitted to the Department within 30 days of such determination.

c) The use of clean technique sampling procedures is strongly recommended. Guidance for clean technique sampling is contained in: EPA Method 1669, *Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels (Sampling Guidance)*, EPA-821-R96-001, July 1996. Information and data documenting the permittee's sampling and analytical protocols and data acceptability shall be submitted to the Department upon request.

d) The permittee may request a reduction in the monitoring frequency if the data indicate that the 12-month rolling average mercury concentration is less than the TMEL. This request shall contain an explanation as to why the reduced monitoring is appropriate and shall be submitted to the Department. Upon receipt of written approval and consistent with such approval, the permittee may reduce the monitoring frequency for total mercury indicated in Section1 of this permit. The Department may revoke the approval for reduced monitoring at any time upon notification to the permittee.

LAND APPLICATION

Parameter	Limit	Units	Frequency of Analysis	Sample Type
Monitoring Point LA-1				
Application Rate	10	gallons/sq ft	Daily	Calculation

a) Sampling Locations
Influent flow, effluent flow, effluent quality and land application rate shall be measured in accordance with the approved sampling plan. The location and method of collecting and analyzing effluent quality and soil samples shall be in accordance with the approved sampling plan. The Department may approve alternate sampling locations which are demonstrated by the permittee to be representative.

Reference #1 pg 6/6

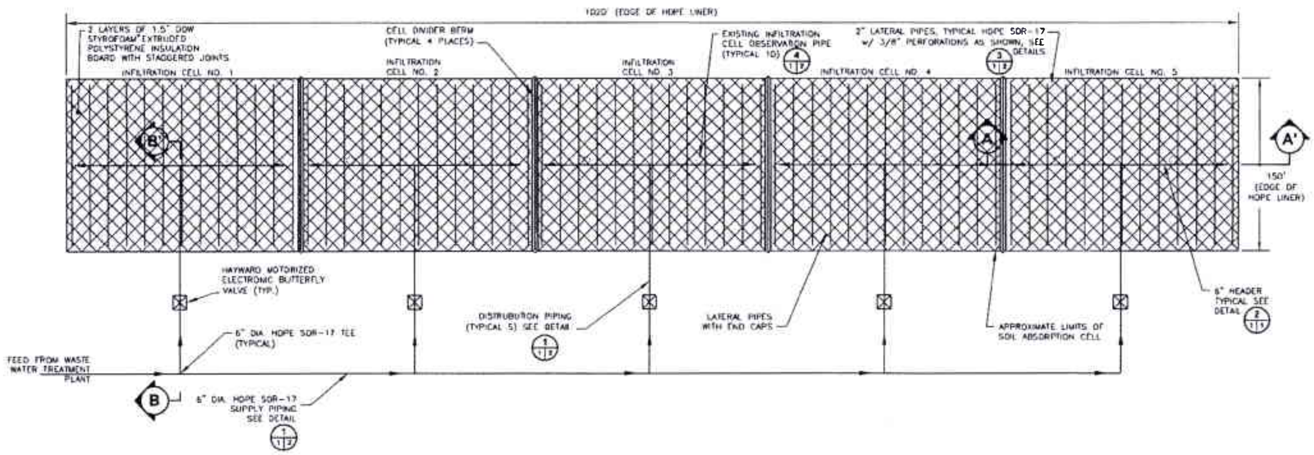
PART I

2. Final Effluent Limitations

During the period beginning at least 90 days after start-up of the wastewater treatment system, and the wastewater treatment system has demonstrated compliance in meeting initial permit effluent limitations; the permittee is authorized to discharge a maximum of 504,000 gallons per day, 184,000,000 gallons per year, of Mine Contact Water from the monitoring points listed below to the groundwater in the NW ¼ of the NE ¼, Section 12, T50N, R29W, Michigamme Township, Marquette County, Michigan. The discharge shall be limited and monitored by the permittee as specified below.

Parameter	Monthly Ave Limit	Maximum Daily Limit	Units	Frequency of Analysis*	Sample Type
INFLUENT: Monitoring Point **IF-1**					
Flow		Report	GPD	Daily	Report Total
EFFLUENT: Monitoring Point **EQ-1**					
Flow		504,000	GPD	Daily	Report Total
Flow		184,000,000	GPY	Annually	Calculation
Biochemical Oxygen Demand (BOD_5)		10	mg/l	Weekly	24 hr composite
Dissolved Oxygen		Report	mg/l	Monthly	24 hr composite
Ammonia Nitrogen		Report	mg/l	Monthly	24 hr composite
Nitrate Nitrogen		Report	mg/l	Monthly	24 hr composite
Nitrite Nitrogen		Report	mg/l	Monthly	24 hr composite
pH (Minimum)		6.5	S.U	Continuous	Grab
pH (Maximum)		9.0	S.U	Continuous	Grab
Total Phosphorus		Report	mg/l	Monthly	24 hr composite
Total Chloride		Report	mg/l	Monthly	24 hr composite
Total Sodium		Report	mg/l	Monthly	24 hr composite
Specific Conductance		Report**	umhos/cm	Continuous	Measurement
Total Aluminum		Report	mg/l	Monthly	24 hr composite
Total Antimony***		Report	ug/l	Monthly	24 hr composite
Total Arsenic***	6.0	10	ug/l	Weekly	24 hr composite
Total Barium***		Report	ug/l	Monthly	24 hr composite
Total Beryllium***		Report	ug/l	Monthly	24 hr composite
Total Boron***		285	ug/l	Weekly	24 hr composite
Total Cadmium***	3.0	5	ug/l	Weekly	24 hr composite
Total Chromium***		Report	ug/l	Monthly	24 hr composite
Total Cobalt***		Report	ug/l	Monthly	24 hr composite
Total Copper***	10	21	ug/l	Weekly	24 hr composite
Total Fluoride		Report	ug/l	Monthly	24 hr composite
Total Iron		Report	ug/l	Monthly	24 hr composite
Total Lead***		Report	ug/l	Monthly	24 hr composite
Total Lithium***		Report	ug/l	Monthly	24 hr composite
Total Manganese***		Report	ug/l	Monthly	24 hr composite
Total Mercury	0.0021****	Report	ug/l	Weekly	Grab
Total Molybdenum***		Report	ug/l	Monthly	24 hr composite

Reference #2

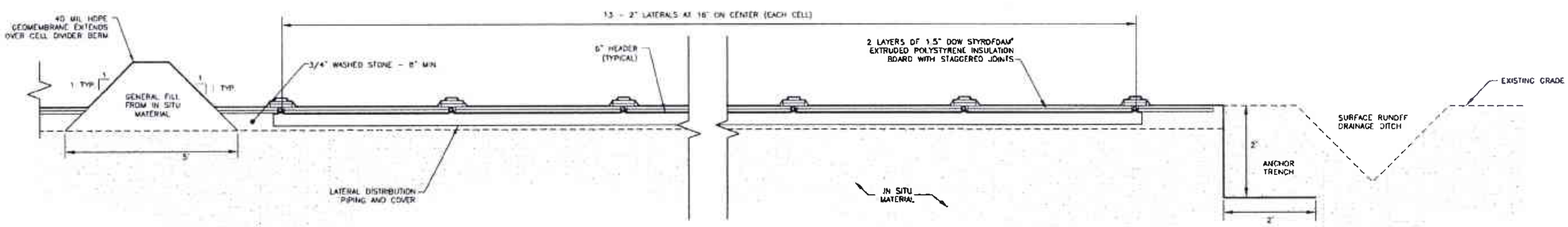


1 TREATED WATER INFILTRATION SYSTEM - SCHEMATIC

NOT TO SCALE

DETAIL NOTE

1. THE EXACT CONFIGURATION OF THE LATERAL DISTRIBUTION LINES SHOWN ABOVE MAY VARY FROM THE PATTERN SHOWN HERE TO ACCOMMODATE INSULATION PANEL DIMENSIONS, CELL DIVIDER BERMS, AND THE LIKE. THE SAME NUMBER OF LATERALS SHALL BE CONSTRUCTED IN EACH CELL.



2 TREATED WATER INFILTRATION SYSTEM - TYPICAL SECTION (A-A')

NOT TO SCALE

GENERAL NOTES:

1. HDPE PIPING IS NOTED WITHIN THE DRAWINGS. THIS PIPE CAN BE SUBSTITUTED WITH PVC PIPE AT THE OWNER'S DISCRETION.
2. SAND BAGS WILL BE PLACED OVER THE GEOMEMBRANE TO PREVENT WIND UPLIFT.
3. ALL DIMENSIONS ARE TYPICAL UNLESS MINIMUM IS SPECIFIED.
4. DIFFERENT EQUIPMENT AND/OR CONFIGURATION THAN THAT SHOWN MAY BE USED IF CAPABLE OF DELIVERING LIKE QUANTITIES TO EACH CELL.

Golder Associates
Great Lakes

PROJECT: KENNECOTT EAGLE MINERALS

TITLE: TREATED WATER INFILTRATION SYSTEM DESIGN AND DETAILS

PROJECT No.	083-88572	
FILE No.	08388572A001_R4	
REV. 3	SCALE	AS SHOWN
DESIGN	DML	01/27/09
CADD	JJS	04/20/09
CHECK	TDJ	02/02/10
REVIEW	DML	02/02/10

SHEET 1 of 2

REFERENCE #2
Pg 1/1