

## Lam, Alvin (DEQ)

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**From:** Nutini, Jennifer (EAGLE) <Jennifer.Nutini@lundinmining.com>  
**Sent:** Tuesday, April 15, 2014 5:14 PM  
**To:** Lam, Alvin (DEQ)  
**Cc:** Casey, Steve (DEQ); Mariuzza, Kristen (EAGLE); Carlson, Karen (EAGLE - Contractor)  
**Subject:** FW: Eagle Mine LLC-Humboldt Mill, MI0058649  
**Attachments:** HTDF Water Balance\_4\_8\_14.pdf; Water Balance with Narrative Description 041514.pdf; Antidegradation statement\_rev31714.docx; Eagle Mine NPDES Surface Water Renewal\_Section 1.5.pdf

Mr. Lam,

Eagle has prepared this email response to your questions on our NPDES permit renewal.

Please find the attached revised antidegradation statement and page 2 of the application as requested. Also attached is a flow diagram and narrative description.

Humboldt Township does not have an email address, but they have a website with contact information.

<http://www.humboldttnship.org/>

Please contact me if you have additional questions or requests of Eagle during your review of the permit application.

Regards,

Jennifer Nutini  
Environmental Engineer  
**Eagle Mine**  
4547 County Road 601  
Champion, MI 49814, US

Direct: (906) 339-7029

Mobile: (906) 204-9867

Fax: (906) 339-7005

[jennifer.nutini@lundinmining.com](mailto:jennifer.nutini@lundinmining.com) <http://www.eaglemine.com>

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**From:** Lam, Alvin (DEQ) [mailto:LAMA@michigan.gov]  
**Sent:** Tuesday, April 08, 2014 1:16 PM  
**To:** Nutini, Jennifer (EAGLE)  
**Cc:** Mariuzza, Kristen (EAGLE)  
**Subject:** RE: Eagle Mine LLC-Humboldt Mill, MI0058649

Jennifer,

As indicated in my original email, I believe the correct action should be "reissuance", which is what you said in your application cover letter. Thanks.

Al

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**From:** Nutini, Jennifer (EAGLE) [<mailto:Jennifer.Nutini@lundinmining.com>]  
**Sent:** Tuesday, April 08, 2014 1:09 PM  
**To:** Lam, Alvin (DEQ)  
**Cc:** Mariuzza, Kristen (EAGLE)  
**Subject:** RE: Eagle Mine LLC-Humboldt Mill, MI0058649

Alvin,

We are completing our response to your questions below.

As we discussed over the phone, Eagle has applied for an increase in discharge quantity. Based on that, would you still like us to change the permit action to “reissuance” or is “modification” or another category more reflective of the application?

Thank you,  
Jennifer Nutini  
Environmental Engineer  
**Eagle Mine**  
4547 County Road 601  
Champion, MI 49814, US

Direct: (906) 339-7029  
Mobile: (906) 204-9867  
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**From:** Lam, Alvin (DEQ) [<mailto:LAMA@michigan.gov>]  
**Sent:** Thursday, March 13, 2014 11:41 AM  
**To:** Nutini, Jennifer (EAGLE)  
**Cc:** Mariuzza, Kristen (EAGLE)  
**Subject:** Eagle Mine LLC-Humboldt Mill, MI0058649

Jennifer,


I have reviewed the application for reissuance of the subject permit. The following are comments and deficiencies on the application.

1. \$750 was submitted with the application. Although we are in the process of changing your permit from a minor to a major, but until EPA acts on our recommendations it is still a minor. The application fee for a minor permit is \$400 and we will process a refund of the extra fee.
2. Page 2, Section I.5., the correct permit action should be “reissuance”, not “modification”. I would probably let it slide if this is the only problem. However, since you will be submitting additional information, I would suggest that you revise

this page. For Section I.6., your antidegradation demonstration needs some additional information on alternatives to a direct discharge. Attached is a copy of the previous submittal to address this. In Section I.7., do you have the e-mail address for Humboldt Township? It would be fine if you don't know or they don't have one.

3. Page 3, Section I.10., the water flow diagram and narrative description are missing. It is acceptable to use what were in your previous application. You need to take what you want to use, update if necessary, and submit with this application.

If you have any questions please let me know. Thanks.

 Environmental Engineer  
Permits Section, Water Resources Division  
Michigan Department of Environmental Quality  
517-284-5597, 517-241-9003 (fax), [lma@michigan.gov](mailto:lama@michigan.gov)

Michigan Department of Environmental Quality – Water Resources Division  
**WASTEWATER DISCHARGE PERMIT APPLICATION**  
**SECTION I – General Information**

PLEASE TYPE OR PRINT

FACILITY NAME Eagle Mine, LLC Humboldt Mill	NPDES PERMIT NUMBER MI0058649
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5. PERMIT ACTION REQUESTED (Check one box only). Instructions for this item are on Page 2 of the Appendix.

**NEW USE.** A proposed discharge.

**EXISTING DISCHARGE** that is currently unpermitted.

**REISSUANCE** of current permit.

**MODIFICATION** of current permit. Attach a description of the proposed modification.

**Note:** Applications for **New Use** discharges, **Existing Discharges** that are currently unpermitted, and for either **Reissuance** or **Modification** that include an increased loading of pollutants to the receiving water are required to submit a Rule 98 Demonstration with the Application. See Item 6.

6. RULE 98 – ANTIDegradation REQUIREMENTS. Instructions for this item are on Page 2 of the Appendix.

In accordance with Rule 323.1098 of the Michigan Water Quality Standards, the applicant is required to submit an Antidegradation Demonstration for any new or increased loading of pollutants to the surface waters of the state. An Antidegradation Demonstration must contain the information specified in Rule 1098, outlined on Pages 8-9 of the Appendix. For assistance in completing this item, contact the Permits Section.

Will this discharge be an increased loading of pollutants to the surface waters of the state?  Yes, continue below.  No.

Antidegradation Demonstration provided.  Increased loading of pollutants is exempt from Antidegradation Demonstration as indicated below:

- A short-term (weeks to months) or temporary lowering of water quality
- Bypasses that are not prohibited by regulations set forth in 40 CFR 122.41(m)
- Response actions undertaken to alleviate a release of pollutants into the environment that may pose an imminent and substantial danger to the public health or welfare
- Discharges of pollutant quantities from the intake water at a facility if the intake and discharge are to the same body of water
- Increases in flow at a POTW if the increase is within the design flow of the facility, there is no increased loading of BCCs that are not specifically limited in the current permit, and there is no significant change expected in the characteristics of the wastewater collected
- Intermittent increased loading related to wet-weather conditions
- New or increased loading due to DEQ-approved controls related to wet-weather conditions
- Discharges authorized by Certificates of Coverage (COC) and Notices of Coverage
- Increased loadings within the authorized levels of a limit in an existing control document, except those loadings that result from actions by the permittee that would otherwise require submittal of an increased use request
- Increased loadings of a pollutant which do not involve Bioaccumulative Chemicals of Concern and which use less than 10 percent of the unused loading capacity that exists at the time of the request

7. ADDITIONAL FACILITY LOCATION INFORMATION. Instructions for this item are on Page 2 of the Appendix.

A	Local Unit of Government (LUG) Humboldt Township	LUG e-mail address 906-339-2927						
B	County Marquette	Township Humboldt						
C.	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Town 47E</td> <td style="width: 15%;">Range 29W</td> <td style="width: 15%;">Section 2&amp;11</td> <td style="width: 15%;">¼ SW/SE &amp;</td> </tr> </table>	Town 47E	Range 29W	Section 2&11	¼ SW/SE &	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">¼, ¼</td> <td style="width: 70%;">Private (French) Land Claim</td> </tr> </table>	¼, ¼	Private (French) Land Claim
Town 47E	Range 29W	Section 2&11	¼ SW/SE &					
¼, ¼	Private (French) Land Claim							
D.	Latitude 46 deg 29'37"	Longitude 87 deg 53'49"						

8. CERTIFIED OPERATOR

Does the facility have a DEQ-certified operator?  Yes  No Instructions for this item are on Page 2 of the Appendix.

First Name Amanda	Last Name Zeidler
Certification Number I-11689	Certification Classification(s) ISWO
Address 1 4547 County Road 601	Address 2
City Champion	State MI
Zip Code 49814	
Telephone Number 906-339-7076	Fax Number 906-339-7005
e-mail address amanda.zeidler@lundinmining.com	

## **Compliance with Antidegradation**

In accordance with Rule 323.1098, an antidegradation demonstration must be submitted for all new or increased facility water discharges. Rule 323.1098 requires a NPDES application so submit a demonstration that identifies the social or economic development and benefits that will be foregone in the area where the waters are located if a permit is not issued.

The following information is provided:

- An analysis of the economic and social development contribution to the area by the proposed Humboldt Mill Project per R 323.1098(4)(a)
- Documentation satisfying R 323.1098(4)(b)(i) and (iii) that any bioaccumulative chemicals of concern (BCC) in the discharge are being reduced through cost-effective pollution prevention alternatives and by the application of best technology in process and treatment (BTPT) that has been adequately demonstrated and is reasonable available in the market place.

### *Economic Benefits*

The purpose of this section is to address R 323.1098 (4)(a). The development of the Humboldt Mill Project will result in a variety of economic benefits for the Marquette County area. Specifically, the Humboldt Mill will increase employment, will encourage industrial, commercial, and residential growth, and will provide social benefits to the project area. A 2013 economic impact report estimates that the Eagle project provides an approximate \$4 billion boost to the Marquette County economy during the life of operations. The project will also generate revenue for state and local taxing entities which in turn will promote economic and social benefits for the local area. These benefits are summarized below:

### *Employment*

The project personnel requirements during operations are based on an operating schedule of 24 hours per day, 365 days per year. On-site personnel requirements during operations at the Humboldt Mill are expected to be approximately 100 to 150 employees during full production.

### *Economic Improvements*

The economic effects of the Humboldt Mill on Humboldt Township and Marquette County include:

- Capital investment;
- Jobs, salaries, and benefits;
- Local, state, and federal taxes; and,
- Local and state royalties.

Eagle has estimated that a \$400 million capital expenditure is to be spent between July 2013 and July 2014, most of which is required to be invested to bring the mill to a production state. Much of the capital and operating purchases will be from local vendors and suppliers. Approximately \$570 million will be spent in local procurement for the project. This will stimulate economic growth as increases in sales and employment typically lead to increase spending on consumer goods. Approximately 300 total mine and mill personnel are expected to be employed at full production. This employment level will be

sustained until the end of mining. About 75% of those hires are expected to be local, with a total annual payroll of \$24 million.

State and local revenues that will be positively impacted by the Humboldt Mill project include individual income tax, general sales tax, transportation tax, road tax, and property tax. Projected payments to the state and local governments during the life of the operation are expected to be \$240 million.

#### *Social Benefits*

Employment, real disposable income, and state and local revenue are forecasted to increase as a result of the operation of the Humboldt Mill. These economic changes will have a positive benefit to the local economy. Eagle intends to fill 75% of its workforce from the Upper Peninsula area. The remaining 25% will be filled from outside the area representing a small local population increase. An increase in employment and population is viewed as a positive economic stimulus to the local economy.

#### *Environmental Improvements*

The Humboldt Mill rehabilitation is not only a new economic feature of Marquette County, but the project (which the discharge enables) it is a brownfield cleanup and redevelopment project, substantially improving upon pre-existing environmental conditions at the site. Former operations left residual contamination from ore and material processing activities within the building and storage structures, buried wastes, and wastes exposed on the ground surface that could migrate from the site via storm water. The site has undergone in excess of \$2 Million in cleanup effort including removal of approximately 15,000 tons of waste material and 25,000 tons of contaminated soil which represented a former environmental threat to the area. Eagle delineated the extent of underground storage tank contamination, disposed of liquid industrial wastes, completed asbestos, lead, and PCB abatement, and Eagle continues to conduct ongoing due care activities to ensure that the Humboldt Mill site is a properly regulated brownfield site and will maintain financial assurance for new activities and for eventual closure of the site.

#### **Bioaccumulative Chemicals of Concern**

Bioaccumulative chemicals of concern, including mercury, will not be used in any aspect of the Humboldt Mill project operation, but may be present in waters of the HTDF via natural means. The estimated surface water concentrations of mercury is 0.3 nanogram per liter (ng/L) or less under expected conditions. Under the HTDF complete mix condition (provided in the original 2008 NPDES permit application, unchanged), the mercury levels at the surface could exceed the permissible exposure limit (PEL) of 1.3 ng/L, however, the water treatment plant (WTP) has been designed for this complete mix scenario and has treatment capability for this condition to reduce the effluence concentration below 1.3 ng/L.

#### **Technical Evaluation of Best Technology in Process and Treatment**

R 323.1098 (40(b)(i) requires that an applicant implement cost effective pollution prevention measures as a first step in reducing potential discharges of mercury. As previously stated, mercury will not be used in the Humboldt Mill operations and is only present in the mill discharge and treatment plant wastewaters as a byproduct of natural materials. There are no additional pollution prevention measures that can be implemented for the Humboldt Mill beyond those that are already incorporated

into the project plan. As such, the requirements of R 323.1098(4)9b)(i) are already factored into the operational plans for the Humboldt Mill.

### *Alternatives Evaluation*

The following alternatives were evaluated for the Humboldt Mill project:

- Water minimization and reuse/recycling;
- Discharge to available sewerage systems;
- Groundwater discharges;
- Chemical precipitation using metal hydroxide technologies, and
- Chemical precipitation using metal chelating polymer technologies.

### Water Minimization and Reuse/Recycling

The major sources of water to the HTDF include precipitation, groundwater inflow, and displaced water from the tailings. Since the majority of water is derived from natural inflows due to precipitation and groundwater inflow, these sources of water cannot be reasonably reduced. Many types of wastewater reuse and recycling options such as agricultural irrigation, landscape irrigation, anon-potable urban use, and potable reuse are no viable options since there is no defined need due to lack of typical users. Another major input of water into the HTDF is the water used for conveyance of the tailings to the HTDF. This water will be recycled for beneficial industrial reuse with an average of 116 gallons per minute (gpm) of water being pumped from the HTDF to the mill and reused for conveyance.

### Discharge to Available Sewerage Systems

The Humboldt Mill is located in Humboldt Township, Michigan, and there are no available sewerage systems or municipal wastewater treatment systems in the vicinity of the mill. The closest municipal wastewater treatment system is located in the town of Ishpeming, Michigan, which is located 14 miles east of the mill. Conveyance of this water to Ishpeming would be cost prohibitive due to the long distance and need to actively pump the water to overcome elevation differences. Additionally, the Ishpeming treatment facility discharges to the Carp River, which is still a discharge to surface water, but in simply a different location. As discussed in the NPDES permit application, Eagle will be building an on-site water treatment plant and the effluent will meet all surface water discharge criteria.

The town of Michigamme, approximately 12 miles to the west, has a large scale septic system and the town of Republic, approximately 6 miles to the south, has sewage lagoons, but neither system has the capacity to handle the volume of effluent from the Humboldt Mill.

### Groundwater Discharges

The area surrounding the Humboldt Mill is characterized by an abundance of low permeability bedrock outcrops and shallow bedrock subcrop as well as saturated unconsolidated material with relatively low permeability (silt, clay, and wetland deposits). The water table in most of the area is covered by unconsolidated material and is shallow, typically less than 10 feet below ground surface. Given the nature of the geology and hydrogeology of the area, suitable locations for groundwater discharge have not been identified and are not likely to exist.

### Chemical Precipitation

Treatment of the wastewater using the aforementioned treatment technologies was evaluated. Metal hydroxide precipitation is commonly used for reduction of metals in the wastewater. Metals such as nickel and copper have reduced solubility at elevated pH levels and produce a metal hydroxide solid precipitate.

As an advanced technology consisting of a metal chelating polymer with a chelating group based on sulfur chemistry bonded to an organic molecule was also evaluated. The solubility of metal sulfide compounds are considerably lower than the solubility of metal hydroxide compounds. Therefore the treated water using the sulfur chemistry will have lower metal concentrations than treating with metal hydroxide precipitation alone. Further information on the process and design of the HTDF is provided in **Attachment D** of this application.

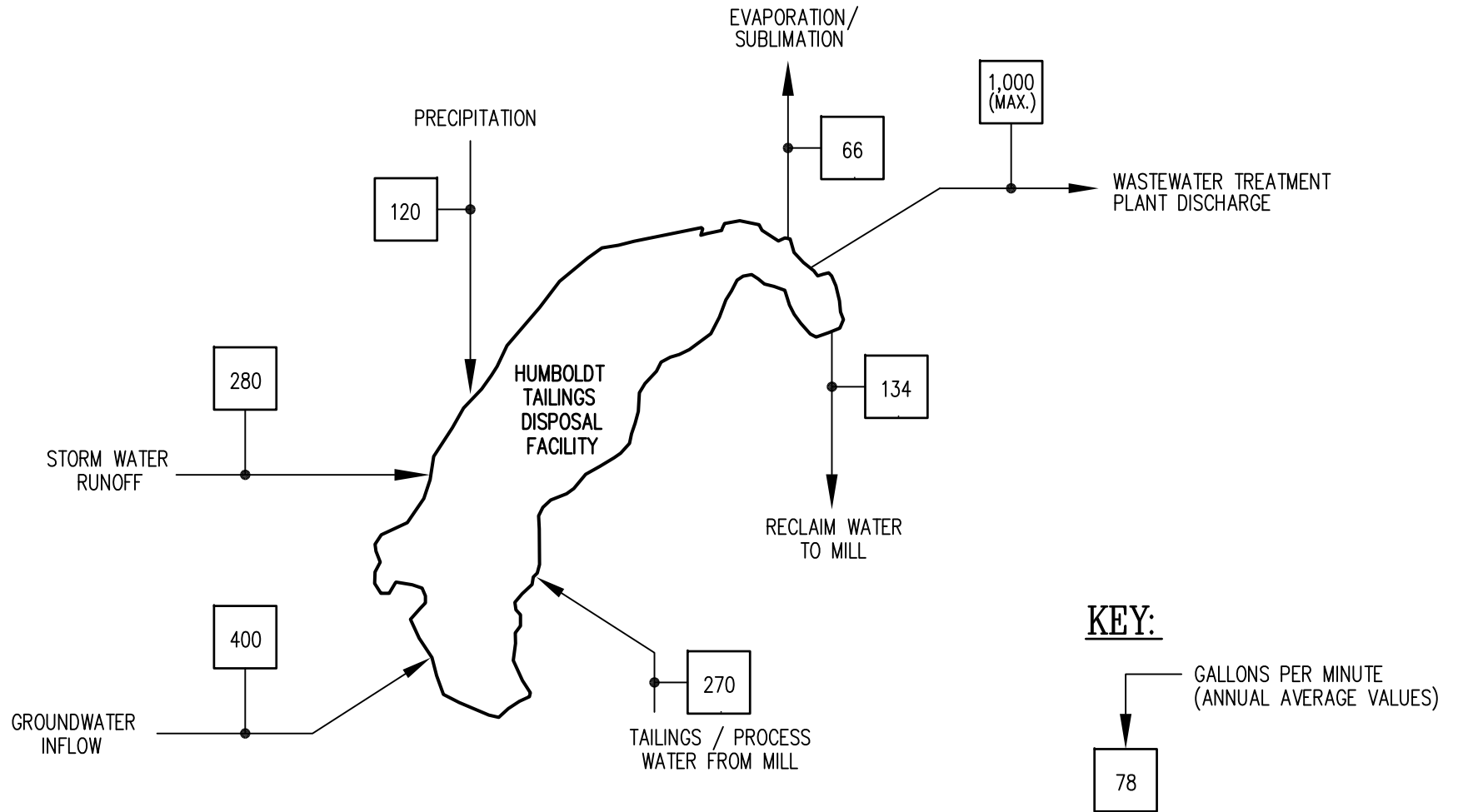


## Water Balance with Narrative Description

The following is a summary of the HTDF water balance for average and maximum annual precipitation. Normal annual precipitation used in the water balance calculations is 34.29 inches, with a high of 46.9 inches. Annual evaporation is estimated to be 19.2 inches. The total HTDF catchment area used in the calculations includes the 67-acre HTDF, 157.6-acres of undeveloped land surrounding the HTDF, and 32 acres of developed mill facility land which drains to the HTDF via a storm water conveyance.

Details of the flow balance under average annual precipitation conditions are presented in **Figure 1 Water Balance Humboldt Tailings Disposal Facility**. Under average annual precipitation conditions the sum of inflows to the HTDF is estimated as 1,070 gallons per minute (GPM), comprised of groundwater inflow (400 GPM), tailings solids and process water (270 GPM), storm water runoff (280 GPM), and precipitation (120 GPM). The HTDF outflows are expressed to the wastewater treatment facility (1,000 GPM maximum), as reclaim water to the mill facility (134 GPM) and as evaporation/sublimation (66 GPM).

Under similar conditions but with maximum annual precipitation, the sum of the inflows would increase due to additional surface water runoff and increased groundwater inflow. Outflow from the HTDF expressed as 1,000 GPM maximum allows for seasonal variations in precipitation and groundwater inflow. The nominal expected wastewater treatment plant effluent flow is 850-900 GPM, with a maximum of 1,000 GPM as indicated.



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**HORIZON ENVIRONMENTAL**

PROJECT NUMBER:  
KEX-0102

**Eagle Mine, LLC - Humboldt Mill Facility**  
Humboldt Township, Marquette County, Michigan

FIGURE:

**1**

WATER BALANCE  
HUMBOLDT TAILINGS DISPOSAL FACILITY

APRIL 2014