December 7, 2011

Michigan Department of Environmental Quality
Office of Oil, Gas, and Minerals,
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Sent via US Mail and email:
DEQ-Copperwood@michigan.gov

Re: Comments Of The Keweenaw Bay Indian Community On the Nonferrous Metallic Minerals Mining Permit Application Submitted By Orvana Resources US Corp For the Copperwood Mine Project Under Part 632 Of The Natural Resources and Environmental Protection Act

To whom it may concern:

The Keweenaw Bay Indian Community (Community) submits to the Michigan Department of Environmental Quality (MDEQ), the attached comments regarding a Mining Permit Application (MPA) filed by Orvana Resources US Corp (Orvana) for development and operation of the proposed Copperwood Mine, Gogebic County, Michigan filed by Orvana under the Nonferrous Metallic Minerals Part 632 of the Natural Resources and Environmental Protection Act, M.C.L. § 324.63201, *et seq.* (Part 632) and the corresponding administrative rules, R. 425.101, *et seq.* (Rules).

The Community is a federally recognized Indian tribe that, along with its members, reserved their inherent right to hunt, fish, trap and gather in, on and over the lands and waters that were ceded to the United States under the Treaty of 1842. The proposed Coppperwood Mine is within this ceded territory.

Large scale threats to the land, water and natural environment within the ceded territory are of great concern to the Community and the potential adverse impacts of the Copperwood Mine as proposed are significant.

The Community is opposed to issuance of a mining permit for the Copperwood Mine because, as discussed in the attached comments, the information contained in the MPA is insufficient to justify the issuance of a Mining Permit.

The primary problems with the MPA are as follows:

- The mining permit requested would authorize Orvana to mine to within 200 feet of Lake Superior and would allow collapse of the mined openings and subsidence of the land surface.
- The tailings basin fills in 8,000 feet of existing streams, over 59 acres of wetlands, destroys at least two local watersheds and has the distinct possibility of requiring perpetual care after mining ceases.
- Both the major impacts of subsidence and the large tailings basin could be minimized or eliminated by use of backfill.
- Critical studies and required Orvana decisions are missing from the MPA prohibiting the state agencies or the public to fully assess the adverse impacts.
- The contingency plans contained in the MPA for the post-closure period are inadequate.

Given the dire environmental consequences of this project, MDEQ must deny the Copperwood Mine MPA due to the application's failure to address the requirements of Part 632 and the Rules.

In support of the foregoing, the Community hereby submits the attached comments on the Orvana Copperwood Mining Permit Application. Please be advised that the Community reserves the right to supplement the enclosed comments.

Respectfully submitted,

Keweenaw Bay Indian Community

By_____
Warren C. Swartz Jr., President

Enclosure:

cc: Susan J. LaFernier, Secretary
Todd Warner, Director, Natural Resource Dept.
Chuck Brumleve, Mining Specialist
John Baker, Tribal Attorney

Comments of the Keweenaw Bay Indian Community

On the Nonferrous Mining Permit Application

For the Orvana Copperwood Project

Part 632 of the Natural Resources and Environmental Protection Act

Introduction

The following are the comments of the Keweenaw Bay Indian Community ("Community") to the Michigan Department of Environmental Quality ("MDEQ"), concerning the Nonferrous Metallic Minerals Mining Permit Application (MPA) that was submitted by Orvana Resources US Corp (Orvana) under Part 632 of the Natural Resources and Environmental Protection Act ("NREPA"), M.C.L. § 324.63201, *et seq.* ("Part 632") and the corresponding administrative rules, R. 425.101, *et seq.* ("Rules") for the Copperwood Project.

The proposed Copperwood Project is located within the Lake Superior watershed in Ironwood and Wakefield Townships of Gogebic County in Michigan's Upper Peninsula, approximately 70 miles from the Community's L'Anse reservation and 45 miles from the Community's Ontonagon reservation lands. The Community is a federally recognized Indian tribe that, along with tribal members, retained an inherent right to hunt, fish, trap and gather in, on and over the lands and waters, that were ceded to the United States under the Treaty with the Chippewa at LaPointe, 7 Stat. 591 ("Treaty of 1842"), which included the lands upon which the proposed Copperwood Project, milling operation and permanent tailings disposal facility would be located. Additionally, the Community recognizes international human rights principles recently endorsed by the United States that affirm the Community's right to participate and consent to matters affecting our rights and traditionally owned and used lands and waters.[1]

The site is located between two federally designated Wild and Scenic Rivers, the Black River and the Presque Isle River, and is adjacent to Lake Superior and the Porcupine Mountain State Wilderness Area. The permit requested would authorize Orvana to mine within 200 feet of Lake Superior, intentionally plan for mine subsidence, beneficiate chalcocite-bearing sulfide ore, construct a water-intake system to supply 500,000 gallons of fresh potable water from Lake Superior to the mine operation per day, and discharge wastewater into Namebinag Creek -- a stream flowing directly into nearby Lake Superior. In addition, the permit would allow Orvana to construct a 14-story (140 feet) high permanent Tailings Disposal Facility ("TDF") that would fill in 8,000 feet of existing streams and 59.5 acres of wetlands. The proposed TDF would leave a 346 acre foot-print on the landscape for the total deposition of approximately 32.2 million tons of tailings.

1 See Articles 18, 19, 25, 26, 27, 29 and 32 of the UN Declaration on the Rights of Indigenous Peoples.

After reviewing the MPA, the Community offers comments on the following concerns: (1) inadequate mining method, (2) unacceptable tailings disposal facility, (3) impacts to Lake Superior and water resources, and (4) incomplete MPA. We respectfully request the MDEQ's attention and consideration of these concerns prior to issuing a decision on the MPA.

1. Inadequate Mining Method

The mining method proposed by Orvana for the Copperwood Project does not meet industry standard much less attempt to apply new innovations to the room and pillar mining method. As proposed, the Copperwood Project will result in large permanent impacts to the landscape, destroy at least two local watersheds and be visible from several surrounding viewpoints including the Porcupine Mountain State Wilderness Area. In addition, the tailings basin will require perpetual care long after mining ceases. Many of these impacts should be avoided with changes in the Copperwood Project design and production sequence.

Room and pillar mining is one of the oldest and simplest underground mining methods used to extract mineral resources. In addition, room and pillar mining has been used and is still being used extensively. As such, there has been extensive research on improving its efficiency which has resulted in many variations of this mining method.

One of the major disadvantages of room and pillar is that valuable ore is left in the pillars in order to support the roof during mining and to allow access to other areas of the ore deposit. As a result, most room and pillar operations have a secondary recovery program wherein remaining pillars are removed after all other ore is safely excavated. One way many mine operators safely achieve pillar removal is through the use of backfill. In fact, it is industry standard in technically advanced countries.[2]

The MPA's discussion of tailings disposal alternatives seems to dispel any notion of backfilling (MPA, p. 203). While it is understood that every mining situation is different, there are many room and pillar operations that utilize backfill to maximize the ore extraction ratio and reduce or eliminate subsidence (e.g., the Buick Mine, a room and pillar metal mining operation in Missouri, uses backfill containing 4% cement to maintain roof and pillar stability for mining the remnant support pillars).

The MPA states *"as pillars are pulled, there would be no safe access to place and limit the area the backfill would fill"* (MPA, pg. 203). This implies that the mine operators would wait until *"…pillars are pulled"* (or after?) before placing backfill. If this were done, then of course there would be noth-

2 Brady, Barry H. G. 2007. Rock Mechanics: For Underground Mining, 3rd Edition, p. 423 ***states "The current position in technically advanced countries is that very little metaliferous mining, undertaken using pillar support, is not accompanied by subsequent stop filling and pillar mining."***

ing to hold in or limit the backfill. Usually, backfilling is coordinated with production and the backfill is placed (and cured if necessary) in the mined out areas before secondary pillar recovery. The backfill is then in place to accept loading as support pillars are removed.

The MPA states *"Retreat mining will then occur with secondary mining of support pillars. After secondary pillar extraction, the remaining pillars will not support the roof long term"* (MPA, p. 194). If the remaining pillars were long narrow rib pillars that were left between production drifts, they could contain the backfill in the mined out areas or if a type of drift-and-fill method were used, backfill could be load bearing for secondary pillar recovery. One advantage of using the Continuous Miner ("CM") is that the pillars do not suffer blast damage which allows smaller pillars to remain intact and load-bearing longer.

In another variation, the main drift could be mined down-dip from the box cut all the way to the Lake Superior 200 foot boundary where cross drifts would be driven in both directions across the orebody. Then the CM could be used to mine up-dip while backfilling down-dip behind the CM. Strategic placement of the remnant pillars would control backfill placement while setting up designated pillars for secondary recovery. The 10 degree slope of the mining horizon (the CBS) would allow the tailings water to drain to a down-dip sump where it could be pumped to surface and reused in the mill. Mining methods can be adapted to allow mining of high-grade ore first.

Backfill can be slurried in, dropped through large borings from surface, moved with loaders, pneumatically or hydraulically placed tight to the roof or placed by any number of other methods. If cross-drifts are need, use shuttering. Researchers have shown that various additives will bind-up tailings enough to make a paste and be load bearing (even Copperwood's fine grained tailings) especially in the confinement of the underground setting. *"One of the common misconceptions about paste thickening is "it won't work at our facility". Experience within laboratory testing facilities and applicationshas shown that well over 95% of tailings materials tested can produce a reasonable quality paste."*[3] In Orvana's own Pre-Feasibility report on the TDF (MPA, Appendix B, p. ES-6), Orvana's consultants state:

> Further engineering studies would be required on potential methods to thicken or filter the tailings in order to produce a suitable material for backfill. The technical feasibility of this alternative would need to be assessed including a tradeoff study of the reduced footprint of the TDF and wetlands implications, construction costs, and operating costs associated with a thickened or filtered tailings plant.

3 Palkovits, Frank. November 23, 2011. "Paste Thickening: Considerations for Backfill vs. Tailings Management." Featured article adapted from a presentation made at the Engineering & Mining Journal's Mineral Processing Conference, October 2011, Lake Tahoe, Nevada, USA. *Available at* http://www.e-mj.com/index.php/features/1443-paste-thickening-considerations-for-backfill-vs-tailings-management.html

It does not appear that Orvana has followed these recommendations and invested in even a basic investigation of this aspect of tailings management. Orvana's alternative analysis is limited to four paragraphs with no materials supporting conclusions that backfilling cannot be done (MPA, p. 203). **The MDEQ must require that the backfill alternative be adequately considered.**

Learning to manage and control pillar failure while maintaining safe and stable openings by transferring load to the backfill are the key to ore recovery and economic viability. Modern underground mining methods utilize some form of backfilling for ground support and / or to eliminate surface tailings impoundments as environmental headaches for decades to come. While underground placement of tailings would cost in engineering and infrastructure, elimination or reduction of the TDF could substantially reduce the tens of millions of dollars in costs associated with the TDF – remediation alone of the tailings disposal area will cost over $18 million dollars – a cost eliminated or greatly reduced if underground disposal is pursued.

In conclusion, the proposed Copperwood Project mining method is low tech, and alternatives are available that will cause less damage to the environment. The current plan is an old-fashion Mining 101 design – just get the rock out and let it all fall in. Orvana needs to invest in some basic mining R&D with the goal of getting the tailings permanently disposed of underground that has less chance of permanently polluting the environment.

2. Unacceptable Tailings Disposal Facility

The MPA compares three different TDF liner scenarios, none of which comply with Part 632 R425.409 (MPA, pp. 297-298). Case 3 shows a much poorer performance than Orvana's preferred system (Case 2) only because it does not incorporate a leachate collection system except for a small portion of the TDF. Orvana uses this as justification to select Case 2. However, Case 2 is inadequate because it does not comply with specifically prescribed liner requirements in Part 632 R425.409(a). R425.409(a)(i)(c) requires a leachate collection system under the entire tailings basin. Orvana must be required to redesign TDF options and present Case 3 with a full liner, leak detection system and leachate collection system.

Further, to qualify as a "disposal facility" under R425.409(b), which is understood by the Community to be intended for the option of permanent *backfill* of tailings, Orvana must demonstrate:

> That the design, construction, operation, and closure of the disposal facility will reasonably minimize the actual and potential adverse impacts on groundwater and surface water by preventing leach ing or runoff of acid-forming waste products and other waste products from the mining process and will not require perpetual care following closure in accordance with MCL 324.63209(8) and with R425.204(b)(vi).

The MDEQ should require that permanent disposal of tailings on the landscape complies with the more detailed and stringent protection standards found in R425.409(a) unless Orvana intends to dispose of tailings as backfill or adequately demonstrates that the TDF will not require perpetual care.

The MPA claims that *"During reclamation, the site will be developed into a self-sustaining ecosystem which will require no perpetual care,"* (MPA, p. 151). This "no perpetual care" statement seems to be made simply to appear compliant with Part 632, is conclusionary and is not supported by any real evidence to demonstrate compliance. The proposed TDF consists of materials that will remain on site and on the ground long after mining and processing activities have ceased which will leach heavy metals and other contaminants into the environment for centuries -- especially without adequate design requirements appropriate for permanent surface deposition.

In fact, the "no perpetual care" statement above seems to contradict data provided within Orvana's MPA in which the TDF is predicted to release between 24-62 million gallons of leachate into the environment per year (MPA, Appendix B). Much of this excess tailings water will seep near the northwest corner, the lowest point of the TDF, because of the low permeability of tills in the project area. The MPA predicts that at least 15 constituents (including sulfate, arsenic, cadmium, copper, iron, lead, manganese, mercury, selenium and zinc) would violate Lake Superior surface water standards, EPA Maximum Contaminant Levels, EPA Secondary Maximum Containment Levels or MI Part 201 standards (MPA, Tables 203.3.5-4a and 4b). Perpetual water treatment would be required, especially if these constituents migrate to nearby Namebinag Creek.

Heavy metals must be prevented from entering nearby waterways and Lake Superior especially considering the human health effects of the disclosed constituents that would leach from the TDF. Mercury is of particular concern given its capacity to bioaccumulate in fish, shellfish and other animals that eat fish before it enters the human body. [4] Health risks associated with heavy metals released into the environment will disproportionately affect Ojibwe peoples with subsistence traditions and higher rates of consumption of fish and other species. Ojibwa and other peoples may utilize the areas resources and harbors now and into the future.

Furthermore, Orvana should be required to consider the backfill alternative for tailings disposal as discussed above. The placement of tailings underground would reduce environmental impacts and potential long-term perpetual care problems associated with the currently proposed TDF. Orvana's own pre-feasibility studies recommend further investigation into such consideration (MPA, Appendix B, p. ES-6).

4 Martin, Sabine and Wendy Griswold. 2009. "Human Health Effects of Heavy Metals." *Center for Hazardous Substance Research Issue 15:* p. 5.

3. Impacts to Lake Superior & Water Resources

Proposed mining activities could have a number of adverse and cumulative adverse impacts on Lake Superior. First, as mentioned above, **inadequate disposal of tailings on-site poses a perpetual care risk and potential leaching of reactive and heavy metals into area soils and creeks of Lake Superior.**

The Copperwood Project ore deposit is found at the base of the Nonsuch Shale formation which continues down-dip below Lake Superior. Currently proposed mineral extraction would proceed no further than within 200 feet of the lake. However, the Community is concerned with the possibility that Orvana could apply for a mine permit amendment to extract the orebody further down-dip and beneath Lake Superior. **The MDEQ must assure no future mining activity occurs beneath Lake Superior.**

Planned mine subsidence is expected to affect 100-feet beyond the perimeter of the underground mine workings. Collapsed and caved ground will be accompanied by a notable increase in hydraulic conductivity in the bedrock and by local changes to surface drainage. The MPA describes reactive sulfide minerals in the rock of the broken and fractured zones above the mining horizon. This means that upwelling ground water moving through the collapsed mine workings and rubble zone could bring oxidized sulfide minerals to within 100 feet or into Lake Superior. This presents the possibility that the collapsed and fractured area above the extraction zone would generate acid rock drainage which would flow directly into Lake Superior after mining operations cease. While the MPA cites the buffering capabilities of natural calcium, this will only affect groundwater acid neutralization for a short time due to calcium's high solubility and the calcium will not remove the metals from the groundwater. **The MPA must properly evaluate subsidence impacts and potential drainage into Lake Superior.**

Orvana plans to cap the mined area with flooded freshwater from Lake Superior (MPA, p. 154). The MPA goes on to state that the surrounding formations will remain unaltered and thereby isolate the highly saline groundwater within the mined and fractured zone. However, support for these assumptions is lacking in the MPA and supplemental appendices. Saline intrusions are a well-known environmental risk associated with copper mining in the Nonesuch Formation. **Given the experience with historic mining operations in the region, notably at White Pine, more rigorous analysis and modeling must be provided in order to determine the feasibility of an influx of freshwater from Lake Superior to act as a passive, perpetual cap.**

Proposed discharge of treated waste water is into the West Branch of the Namebinag Creek which has abundant beaver habitat, a state endangered fish species (Redside Dace), and is a creek that flows directly into Lake Superior. Planned waste water treatment technologies are stated to be 95-

99% effective at removing contaminants, not 100% effective (MPA, Appendix C, pp. 8-11). And, the potential for carbon to absorb a significant amount of mercury is known to be uncertain. (MPA, Appendix C, p. 9). Golder & Associates recommended that Orvana conduct bench-scale and pilot-scale testing *"to verify the treatment assumptions and to confirm the final effluent quality is achieved with a process or series of treatment processes"* (MPA, Appendix C, p. 13). However, **these critical recommended studies to test waste water treatment technology were not included in the MPA.**

Furthermore, Orvana indicated that its End-of Pipe Treatment Goals for water quality were based on those permitted at the Kennecott Humboldt Mill (MPA, Appendix C, p. 6) which fails to take into consideration two important differences: (1) water discharge goals for the Lake Michigan watershed are different than those for Lake Superior and (2) Copperwood Project's point source discharge is much closer to Lake Superior.

The proposed water-intake system would pump 500,000 gallons of fresh water from Lake Superior per day for mine operations. This system is noted to possibly be maintained after mine closure by the Gogebic Range Water Authority. Recognizing Lake Superior is a source of potable drinking water, **any potential mining and waste water discharge impacts to Lake Superior must be evaluated before a mining permit is granted. Waste water collection, treatment and discharge operations must be designed to eliminate the potential for discharge of contaminants to Lake Superior.**

The water intake structure proposed by Orvana would be built for one dedicated purpose -- to supply the Copperwood Project with water for their mining and ore processing operations. Permitting for construction of the water intake structure will be by the U.S. Army Corps of Engineers under Section 10 of the Rivers and Harbors Appropriation Act of 1899 and Section 404 of the Clean Water Act for any fill or dredging below the ordinary-high-water-mark (OHWM) associated with the water intake structure and pipeline.

It is clear that the water intake structure is for the sole purpose of supplying the Copperwood Project regardless of the involvement of the Gogebic Range Water Authority. Considering the proposed extensive filling of wetlands, the filling of stream channels in multiple sub-watersheds and the rerouting of streams, it is also clear that **the proposed water intake structure is a "connected**

action" to the entire Copperwood Project for the purpose of applying the National Environmental Policy Act (NEPA) to all aspects of the project.

In as much as the State of Michigan is a principal party to national and international Great Lakes and Lake Superior water quality and ecosystem goals, the MDEQ must take into account agreements that would be compromised by the Copperwood Project. These agreements include: (1) the Lake Superior Binational Program's Zero Discharge Demonstration Program, particularly targeting mercury (which is recognized as a Contaminant of Potential Concern, see MPA, Appendix C, p. 6), (2) the Great Lakes Water Quality Agreement goal to "restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystems," and (3) the Great Lakes Restoration Initiative which seeks to (a) clean up existing Areas of Concern and avoid creating more, (b) ensure that near shore aquatic, wetland and upland habitats will sustain the health and function of natural communities, and (c) plan and implement development activities in ways that are sensitive to environmental considerations and compatible with fish and wildlife and their habitats, with particular emphasis on wetlands.

4. Incomplete Mining Permit Application

During review of the MPA, it became apparent that numerous aspects of the application were insufficient, undetermined or missing altogether. This includes monitoring data, metallurgical and geochemistry studies, milling operations, mitigation plans, contingency plans, reclamation, cumulative impact assessment, health impact assessment, financial assurance and mine collapse. For these reasons, **the MDEQ should deny the MPA as insufficient and reconsider its September 26, 2011 determination that the application was "Administratively Complete."**

Monitoring Data

Part 632 R425.202(3) requires *"at least 2 years at the monitoring site…."* **However, six of the surface water sampling locations seem to be missing the required 2 years of data** (MPA, Appendix F 202.2.8-1; Figure 202.2.5-1).

Metallurgical and Geochemistry Studies

A November 20, 2011 Ashland Current news article stated that Orvana is currently continuing work on a feasibility study for the proposed Copperwood Project.[5] The article revealed that Orvana's final metallurgical tests are not yet finished despite early submission of their MPA on September 23, 2011. **Without final metallurgical studies identifying the total amounts and characteristics of the ore and subsequent waste streams, the MPA should be considered incomplete.**

5 *Available at* http://www.ashlandcurrent.com/article/11/11/20/copper-company-releases-project-update.

Furthermore, the MPA applies various methods to determine the various geochemical reactions which may occur, with primary focus on the potential for acid generation. The MPA provided a limited humidity cell testing duration of 29-weeks and only 5-week averaged reaction rates (Tables 203.4-10a and 203.3.4-10b). However, studies have found that sulfate and nickel concentrations in leachate don't begin to increase until after 20 weeks with peak concentrations not being reached until 60 to 120 weeks.[6] **The MPA's geochemistry studies must ensure that reaction data is collected for an appropriate duration. Furthermore, regardless of acid generation, problems associated with other constituents leaching should also be considered.** Heavy metals and sulfate may not show up unless testing is conducted for a long enough time period. The historic 50-year Copperwood Project rock pile is still leaching significant levels of metals and sulfate, which indicates there will be environmental problems at the site due to heavy metals and sulfate leaching to the surrounding environment.

Milling Operations & Transportation

Initial on-site milling is proposed in which chalcocite sulfide-bearing copper ore would be delivered to a newly built processing facility to be crushed, milled and processed by Conventional Froth Flotation methods in order to remove chalcocite and recover copper. As mentioned in the comment above, final metallurgy studies for the Copperwood Project are not completed yet, which shows that the MPA was submitted prematurely and does not allow for accurate characterization of the total amount and type of waste that will be associated with the project.

The MPA also does not identify, or disclose, the transportation mode and route of the copper concentrate that would be leaving Copperwood and simply notes that the buyer would *probably* be located outside of Michigan. The non-disclosure of the buyer of the Copperwood mill concentrate leaves the transportation mode, direction and probably overland routes undetermined. **Again, the MPA is incomplete because Michigan's Part 632 R425.203(c)(xviii) regulations clearly require disclosure of the ore and mill concentrate transportation. The MPA must disclose transportation routes and provisions to prevent release of contaminants during transportation.**

Mitigation Plans

The MPA does not adequately identify or mitigate impacts in the affected area. This includes: (1) identification of mitigation measures through equivalent restoration of other streams and wetlands in compensation for wetlands that would be destroyed by the proposed TDF, (2) view-shed impacts associated with 140 foot high berms and a 346 acre tailings dump visible from high points within the Porcupine Mountain State Wilderness Area, including the Lake of the Clouds lookout, and (3) mitigation plans to protect the State Endangered Redside Dace.

6 Maest et al. 2005. Predicting Water Quality at Hard Rock Mines. *Available at* http://www.earthworksaction.org/files/publications/PredictionsReportFinal.pdf?pubs/PredictionsReportFinal.pdf

The TDF footprint alone expects to impact 59.5 acres of wetlands and fill in 1.5-2 miles of streams, tributaries, and other water channels. Only brief mention of wetland mitigation is found in the MPA because the MPA states that wetland mitigation will be addressed in a separate permit application and will not include wetlands created by subsidence (MPA, p. 330 and Appendix 203.3.11, p. 8-9).
The MPA states that *"Populations of redside dace within the Copperwood site should be protected from human-related impacts."* (MPA, p.2 and Appendix F 202.2.15-2). However, it is not clear how the company will protect the endangered Redside Dace. Aside from monitoring, little can be found in the MPA to ensure that the Redside Dace will not be harmed by NPDES discharges.

Contingency Plans

The MPA is missing contingency plans. The contingency plan section of the MPA does not adequately address assessment of risk from accidents or failures, and resulting response measures. For example, the MPA states that *"accidental releases of material, such as tailings, ore, concentrate, etc. from TDF or the mill could impact soil/sediment, but site will be monitored and contingency plans in place."* However, no details follow or are provided regarding aspects of any monitoring or contingency plans. (MPA, p. 195). Similar additional examples include: (1) no reportable quantity identified for spills of tailings or fuel (MPA, p. 319, 320, 322), (2) no specified frequency of monitoring of ore storage leaks or erosion of the TDF embankment, (3) no specified corrective actions to prevent the overtopping of embankments of the TDF (MPA, p. 324), and (4) no information regarding plans related to post-closure needs.

The MPA should include more detailed contingency plans, including worst-case scenario contingency plans such as in the event of tailings berm failure due to excessive pore water pressure and the resulting "mud flow" of tailings into the environment.

In addition, the MPA does not consider risk management uncertainties associated with scientific projections related to climate change. The MPA's climatic projections were based on previous 34 year data in Ontonagon. However, lake-effect weather in the future may be more intense at the Copperwood Project than this historical data implies. In addition, the TDF was designed based upon 1978 U.S. Department of Commerce data for a 72-hour/one-half Probably Maximum Precipitation storm event (16.4 inches) (MPA, Appendix B, Text 4). Climate change science is revealing that the Great Lakes will face more intense storm and precipitation events.[7] **Climate change information should be expected and considered within the MPA's contingency plans in order to adequately manage, mitigate and adapt proposed large-scale mining development activities to increasingly recognized climate change risks and uncertainties within the region.**

7 See (1) Hayhoe, K., VanDorn, J., Croley, T., II, Schlegal, N., Wuebbles, D. 2010. Regional climate change projections for Chicago and the Great Lakes. *Journal of Great Lakes Research* 26, 7-21 and (2) Intergovernmental Panel on Climate Change (IPCC). 2007b. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K.B., Tignor, M., Miller, H.L., eds. Cambridge University Press, Cambridge, United Kingdom.

Reclamation

There is reference to the proposed water intake structure potentially being utilized in the future by the Gogebic Range Water Authority (GRWA) (MPA, p. 206). However, there is no mention in the reclamation plans on how this system would be reclaimed or managed if at closure the GRWA does not become involved. In addition, the water intake structure is also not included in Financial Assurance plans as an item for post closure monitoring if it is not disassembled. Although the U.S. Army Corps of Engineers will be negotiating a permit for the nearly mile long intake structure, **the MPA should include reclamation plans for all structures that may remain upon closure of the mine.**

Furthermore, the reclamation plan does not clearly explain how potentially reactive material would be managed. It will either be placed in the TDF, run through the milling process, or be disposed of according to hazardous waste regulations (MPA, p. 312). It is also unclear whether or not the Waste Water Treatment Plant (WWTP) will continue to process TDF leachate after five years and who will determine when the volume of water coming out of the TDF has slowed to a rate that can continue indefinitely (MPA, p. 313). In addition it is not clear whether or not the reclaimed containment pond near the mill building and the overflow pond near the TDF will be viewed as a wetland or backfilled and graded.. (MPA, p. 313). **Such aspects of reclamation planning should be more fully explained within the MPA.**

Cumulative Impacts

Part 632 R425.202(1)(b) requires an analysis of the potential cumulative impacts of mining activities within the mining area and affected area. While the MPA reasonably seems to address the local mining area, it does not adequately consider Lake Superior as an "affected area." The Copperwood WWTP will discharge water containing contaminants that will discharge to Lake Superior. The company says that *"discharges of water will have negligible impact to Lake Superior and no other sources of regulated discharges are near the mine site to combine for a cumulative effect"* (MPA, p. 192). Regardless of being negligible or not, **the cumulative impacts associated with historical activities and current expansion of proposed mines and land uses within the Lake Superior basin should receive closer attention and evaluation from regulatory agencies.**

Specific consideration should also be given to the cumulative impact of this project in regards to mercury. In 2010, mining and metals production accounted for 65% of mercury released in the Lake Superior basin. Increased mercury emissions from mining developments in the basin would hinder progress toward the Lake Superior Binational Program goal of zero mercury releases by 2020.

Financial Assurance

P632 R425.301(2)(b) allows the MDEQ discretion to require financial assurance in an amount larger than calculated by the operator. Orvana does not clearly identify a proposed financial assurance amount with the MPA. Supporting documents estimate reclamation and post-closure costs, but do not include Part 632 R425.301 financial assurance requirements for potential remediation costs of contaminated air, surface water or groundwater that may accidentally violate the mining permit at any time during the operation, and possible fees associated with accessing the financial assurance (MPA, Table 301.2.1a-2a).

Orvana states that an acceptable Financial Assurance Estimate will evolve, without opportunity for public and tribal government review and comment, and be determined as a condition to the issuance of the permit (MPA, p. 338). **A committed financial assurance amount must be disclosed within the MPA and open to public review.**

The company further proposes that *"upon final reclamation of the TDF the full release of the Financial Assurance should be made"* (MPA, p. 340). This is ill conceived since the cost of the really big-ticket items are likely to occur after reclamation of the mine facilities. These include groundwater remediation for decades, mitigating releases to Lake Superior, or cleaning up a massive failure of the tailings berms after the under drains are closed. **Part 632 R425.309 does not provide any rules regarding such proposed proportional release of a financial assurance that Orvana is requesting and therefore it should not be permitted.** Considering any risks associated with uncertain market demand, potential for corporate bankruptcy, and potential long-term perpetual care associated with surface deposition of tailings, **the financial assurance should be required in full, must be received by MDEQ prior to granting a permit and must remain in place until at least the end of the 20-year post-closure period contingent upon no further monitoring or remediation needs.**

Mine Collapse

Planned mine collapse does not adequately assess or discuss potential impacts associated with seismic activity upon the tailings basin and water intake structure. Seismic activity from sudden mine collapse has the potential to cause landscape changes in both the mining and surrounding areas, that can result in such occurrences as stream bank and slope failures and damage to roads or other man-made structures. In a study regarding controlled collapse at the previous White Pine Mine, it was noted that natural collapse occurred in the north-central portion slowly over many years. In addition, a catastrophic White Pine fault failure was documented to cause a locally felt earthquake and extensive damage to underground mine structures.[8] Despite this quick collapse of a mined out area and the reaction of the overlying rock formations all the way to surface, the MPA implies that the

8 Craig Pearson, D., Brian W. Stump, and W. Scott Phillips. 1996. "The White Pine Mine Explosively Induced, Controlled Collapse Experiment." Submitted to the 18th Annual Research Symposium on Monitoring a Comprehensive Test Ban Treaty. Annapolis, Maryland. Available at www.osti.gov/bridge/servlets/purl/395596-5aJzIl/webviewable/395596.pd, (see page 5).

collapse will somehow occur at a controlled predictable rate and disregards any potential for seismic activity at Copperwood Project associated with planned mine collapse (MPA, p. 191-192). **Orvana should be required to consider seismic activity associated with the most reasonably comparable mine, the White Pine Mine, and should be required to reconsider initiating a seismic monitoring plan at the site.**

Furthermore, the collapse design for the Copperwood Project was largely compared to different types of mines in areas with different geology and geography, notably coal mines in West Virginia. This is not likely to represent the conditions in Gogebic County and even if it did, coal mines in West Virginia have a decidedly negative environmental impact track record which includes thousands of miles of lifeless streams and watersheds with perpetual acid rock drainage.

Conclusion

In conclusion, the proposed Copperwood Project and the adverse impacts associated with the project present a significant concern to the Community. The primary inadequacies of the Mining Permit Application and proposed plans include: (1) inadequate industry standard mining methods of back-filling tailings, (2) the large size of the proposed tailings basin, its permanent destruction of streams and wetlands within the Lake Superior watershed, inadequate design and leachate collection system, and the strong likelihood that it will require perpetual care, (3) adverse and cumulative impacts on Lake Superior and water resources within this ecologically important area, and (4) numerous incomplete MPA decisions, critical studies, and contingency plans. For these reasons, the Community is opposed to the issuance of a mining permit for the Copperwood Project.