STATE OF MICHIGAN
STATE OFFICE OF ADMINISTRATIVE HEARINGS AND RULES

In the matter of:

The Petitions of the Keweenaw Bay Indian Community, Huron Mountain Club, National Wildlife Federation and Yellow Dog Watershed Preserve, Inc.
On Permits Issued to Kennecott Eagle Minerals Company.

File Nos.: GW1810162 and MP 01 2007

Part: 31, Groundwater Discharge 632, Nonferrous Metallic Mineral Mining

Agency: Department of Environmental Quality

Case Type: Water Bureau and Office of Geological Survey

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BRIEF AND CLOSING ARGUMENT OF PETITIONERS NATIONAL WILDLIFE FEDERATION, KEWEENAW BAY INDIAN COMMUNITY AND THE YELLOW DOG WATERSHED PRESERVE

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This case presents a controversy over the first permit issued by MDEQ for a non-ferrous metal mine under Part 632 of Michigan's Natural Resources and Environmental Protection Act. This new law was needed because, as the Michigan legislature put it:

> Nonferrous metallic sulfide deposits are different from the iron oxide ore deposits currently being mined in Michigan in that the sulfide minerals may react, when exposed to air and water, to form acid rock drainage. If the mineral products and waste materials associated with nonferrous *metallic sulfide mining operations are not properly managed and controlled, they can cause significant damage to the environment, impact human health, and degrade the quality of life of the impacted community.*

MCL 324.63202(c)(emphasis added).

Against the backdrop of an abysmal industry track record, Michigan's new law was enacted, with the intention that Michigan would not allow the mining industry to treat mining in Michigan as business-as-usual. In other states, mining companies continue to make inaccurate predictions about the impacts of mining because regulatory agencies continue to allow them to do so. If Michigan's new law stands for anything, it must stand for the proposition that in Michigan, we will not accept industry practices and predictions at face value. To quote the legislature once again, "The economic benefits of nonferrous metallic mineral mining shall occur *only* under conditions that *assure* that the environment, natural resources, and public health and welfare are adequately protected." MCL 324.63202(e) (emphasis added).

Part 632 includes key provisions to make this legislative directive a reality. First and foremost, the burden of proving that the mining operation will not harm the environment is placed squarely on the permit applicant. In line with the legislature's refusal to allow mining unless protection of the environment is demonstrated, the statute requires a permit applicant to submit plans and information which affirmatively prove that the proposed mine will meet all the

requirements of Part 632. Kennecott has failed to meet this burden over and over again throughout its application and evidence proffered in this contested case proceeding.

Second, the statute requires that the permit applicant submit adequate engineering or historic evidence to show that the specific proposed mining methods and materials can in fact be used without harming natural resources. Once again, Kennecott has failed to provide such information for a number of important mining methods and materials, particularly for methods purported to prevent subsidence, releases of acid mine drainage, protection of the Salmon Trout River and wetlands, and releases of heavy metal and acid-forming air pollutants.

Finally, Part 632 incorporates the Michigan Environmental Protection Act's prohibition on activities that pollute, impair, or destroy natural resources or the public trust in those resources. Kennecott has not met its burden of showing that its mining operation will not pollute or impair the Salmon Trout River, area wetlands, aquatic and terrestrial ecosystems and species, or public use of the site itself.

Indeed, the history of nonferrous metallic sulfide mining is a history of environmental damage. A study conducted by one of the expert witnesses in this case found that in 85-90% of situations similar to the one presented here (where the sulfide content of the ore body is particularly high and the site is in a water-rich area), mining has resulted in contamination of water. (Maest) Tr 9: 1858. We have heard no testimony regarding a single example of a mine comparable to this one that has not released acid and/or heavy metals into ground or surface water. The simple fact of the matter is that the mining industry has not yet perfected the mining of sulfide ores. Unfortunately, in an environment as sensitive as the one at risk in this case, mining must be done absolutely perfectly or water will be impacted. And perfection has not been guaranteed by a single Kennecott or MDEQ witness.

Mining companies have every incentive to be optimistic in their predictions. In the case of most modern sulfide mines, if the permit applicant had made accurate predictions about the impacts on water, it would not have been granted the permit. The amount of profit to be made in a mining operation such as this one, coupled with the strictness of water discharge laws, inevitably leads to a bias toward optimism in predicting water quality impacts.

Michigan's law has repeatedly been referred to as the most protective in the nation. However, laws are only protective if they are followed and enforced. In this case, the new law was misapplied or ignored by the Michigan Department of Environmental Quality (MDEQ) in several critical ways. Rather than looking at Kennecott's application materials with the critical eye needed to assure environmental protection, MDEQ accepted Kennecott's assumptions, predictions, and conclusions at face value on a number of important issues. For several of these issues, MDEQ did not even require Kennecott to submit sufficient information to support a decision—information that in some cases is specifically required by regulation. MDEQ did everything possible to ignore and dismiss the cautions of its own contractual experts regarding the stability of the mine. And finally, the MDEQ staff person responsible for the recommendation to grant the permit testified that he did not understand or apply the substantive standards of the act.

In an environment as important and fragile as the one above and downstream of the proposed mine, the outcome of this failure to apply the provisions of Part 632 is potentially disastrous. According to renowned experts in the mining field, including two experts who have never before worked for environmental parties, the mine plan is very likely to result in significant subsidence at some point in the future. (Vitton) Tr 38:7992, Tr 4:632; (Parker) Tr 38:7895. MDEQ's own contractual expert Dr. Sainsbury came to a similar conclusion. Exhibit I-

626, Appendix 5, p. ii. Although the mine's crown pillar was thickened as a result, a number of the most pertinent concerns raised by both MDEQ and petitioners remain unaddressed. Given the location of a unique trout stream directly above and the extremely rare Coaster Brook Trout habitat downstream from the proposed mine, there is no question that subsidence would result in a very significant loss to the State of Michigan and to the nation.

Even without the specter of subsidence, the degree of dewatering of the river and wetlands above the mine is anything but certain. The permit applicant's predictions in this regard are based on extremely scanty information and faulty assumptions; a more realistic analysis predicts a much greater drawdown. If Kennecott's predictions prove wrong, the State stands to lose important, high-quality wetlands and trout streams.

Finally, the area downstream and downwind of the proposed mine site is an internationally important natural area. The property at the Huron Mountain Club is "a continentally significant protected landscape" including an almost uniquely large tract of old growth forest. (Flaspohler) Tr 7: 1313. This property has been meticulously protected for over a century and is therefore "preserved in a virtually untouched condition." (Flaspohler) Tr 7: 1314-1315. As a repository and indicator of the species and ecosystems of the natural forest, this property in its pristine state is beyond valuation. (Woods) Tr 2: 213-14. The Salmon Trout River downstream of the proposed mine contains the last remaining native run of Coaster Brook Trout in the mainland United States. *Id*. at 229. Whether through deposition of air pollutants, release of water pollutants, changes in hydrology, or all three, any impact on the natural environment of the Huron Mountain Club would be both significant and unconscionable.

As described below, petitioners have presented compelling and largely unchallenged evidence first, that the parties have standing to bring this case; second, that information required

of the permit applicant by law has either never been submitted or was not submitted within the required timeframe; third, that MDEQ staff ignored the concerns of its own expert, ignored missing information, and did not apply the Part 632 statutory and regulatory standards in its decision to approve the permit; and fourth, that Kennecott has not met its burden of showing that the mine will not harm natural resources or the environment. Kennecott's application for a permit to mine should be denied.

I. STANDING

Part 632 provides that "a person who is aggrieved by an order, action, or inaction of the department or by the issuance, denial, revocation, or amendment of a mining permit under this part" has a right to a contested case hearing. In Michigan, an organization has representational standing to bring a legal action on behalf of its members if it has members who would have standing as individuals. *National Wildlife Federation v. Cleveland Cliffs Iron Co.*, 684 NW2d 800, 814, 471 Mich 608 (2004). The National Wildlife Federation, Yellow Dog Watershed Preserve, Keweenaw Bay Indian Community, and Huron Mountain Club all meet this requirement.

A. The National Wildlife Federation

National Wildlife Federation ("NWF") is a not-for-profit corporation organized and existing under the laws of the District of Columbia, and is a natural conservation education organization with approximately four million members, supporters, and contributors nationwide. Rico Torreano is one of those members, Tr 1:27, 45, and owns a 40-acre parcel of land downstream from the proposed mine, where he has built a recreational camp. Tr 1:21-22, 25-27. Mr. Torreano uses his camp part of three days of every week and intends to continue to use his

land and nearby public lands for vehicle riding, blueberry picking, and spending time in the woods. Tr 1:28-29.

The camp's water supply is from one of many springs on his property that form the headwaters of the East Branch of the Salmon Trout River. Mr. Torreano's camp is located less than a half-mile down gradient from the proposed treated water infiltration system (TWIS). Tr 1: 30-33, Exhibit P632-8 (Torreano vicinity map), slide 1. Groundwater mounding from the TWIS will raise the groundwater level on his property up to two feet, based on the modeling prepared by Kennecott contained in Exhibit R-148 (Groundwater Discharge Application, Appendix E-3) p16, and shown on Exhibit P632-8, slide 2. *Id*. at 37-38. This mounding is likely to flood his property. *Id*. at 39. Mr. Torreano is concerned that the operation of the mine will pollute the surface water of his property from fugitive dust, pollute his groundwater, raise the water table, flood his privy pit, destabilize soil and kill trees, and generally make the property unusable. Tr 1: 41.

B. The Yellow Dog Watershed Preserve

The Yellow Dog Watershed Preserve's stated mission is to preserve the Yellow Dog watershed in its most natural state now and for future generations. (Pryor) Tr 1:51-52, 54. The Watershed Preserve owns land within 1.3 miles of the proposed mine. *Id*. at 65-67, Slides 32, 33. The Preserve conducts public education activities on the Yellow Dog Plans that are likely to be impacted by the mine. *Id*. at 70.

Gale Hausfeld and Cynthia Pryor are both Yellow Dog Watershed Preserve members who testified at the hearing. Both women regularly visit the public land that is proposed for mining for their own recreational enjoyment. Tr 1:53-55; Tr 1:78. Ms. Pryor uses the area for berry-picking, hiking, birding, skiing and snowmobiling. *Id*. at 51-52, 54. Ms. Hausfeld uses the

area for berry-picking, riding ATVs, hiking, visiting waterfalls and viewing the night sky. *Id*. at 79. Ms. Pryor also brings groups there for public education tours. Tr 1:51-52, 54.

Both testified that their enjoyment and use of the area would be negatively impacted by mining operations. Tr 1:58-59, slide 8 and Tr 1:79. Ms. Hausfeld testified that her enjoyment of the area has already been impacted by truck traffic, increased dust, noise and Kennecott security stops. Tr 1: 79.

In addition, Ms. Hausfeld testified that she owns and operates a motel and is also a real estate agent. Tr 1: 72-73. Ms. Hausfeld cited sentiments expressed by potential real estate buyers for her belief that both businesses will be negatively affected if the mine is permitted. Tr 1: 82. No contrary evidence was presented to indicate that her fears are unfounded.

C. The Keweenaw Bay Indian Community

Petitioner Keweenaw Bay Indian Community ("Community") is a federally recognized Indian tribe. The Community has approximately 3,450 members. (LaFernier) Tr 1:144-146. The Community and its members enjoy the express rights to hunt, fish, trap, and gather in, on and over the lands and waters ceded to the United States ("Ceded Territories") under the Treaty with the Chippewa at La Pointe, Oct. 4, 1842, 7 Stat. 591 ("Treaty of 1842"), which includes the lands upon which the mine is to be located, and the lands upon and waters into which discharges from mine operations would occur. See (Ayres) Tr 1: 136-137; (LaFernier) Tr 1: 147-148, 150-154.

Members of the Community frequently utilize those areas for recreational, hunting, fishing, trapping, and gathering purposes, including, but not limited to, the exercise of rights under the Treaty of 1842, and also use the natural springs in the area as sources of drinking water. (Ayres) Tr 1: 136. Susan LaFernier testified that she has gathered plant material in the Ceded Territories since she "was a little girl," frequently observes Community members' hunting

activities in those areas, and has herself drunk from natural springs in the area immediately surrounding Eagle Rock. Tr 1: 154-155, 158. Community member Dale Goodreau has personally gathered and hunted in the Ceded Territories near the mine location, and drinks from streams in the area during his activities. *Id*. at 165-166, 168.

The contamination of lands and natural resources within the Ceded Territories would impact Community members' uses of those areas, including the possible prohibition by the Community against Community members' ability to exercise treaty rights in contaminated areas. (Ayres) Tr 1: 138-139. Community member Dale Goodreau testified that groundwater contamination would corrupt the streams, impairing members' fishing activities and use of the streams for drinking water. *Id*. at 168.

Of particular significance to the Community is Eagle Rock, through the base of which the proposed mine's decline tunnel will be drilled. Eagle Rock is a sacred place of worship and gathering area for Community members and has served as the location of tribal ceremonies for hundreds of years. The blasting and drilling associated with construction of the mine will destroy Community members' ability to use Eagle Rock for those purposes, and, in fact, Community members may be physically excluded from Eagle Rock through the construction of a fence. (LaFernier) Tr 1:156-158, 160, 162. Dale Goodreau testified that during visits to Eagle Rock, he and others "have a song and drum, and we light a fire. We feed the spirits … We take the smoke – tobacco and we each take and smudge, purify our bodies and our souls and our spirit. And then we'll take an offering of tobacco tied in red and bring it up. And wherever we sit to pray, we'll tie that above us, offer that to the spirits. And then we'll pray, meditate. Things come to us." He added that if the Mine was allowed to go forward as proposed, Eagle Rock would "be fenced off. It'd probably kill the spirits there." *Id*. at 167-168.

The Community also owns 40 acres of riparian land located approximately 1-½ miles downstream (north-northeast) from the Mine, through which runs a tributary of the East Branch of the Salmon Trout River that is fed by seeps located approximately one mile from the Mine, and which overlies the projected path of groundwater flow from the Mine. The property has been used for residential, spiritual, hunting and gathering purposes by Community members. (Ayres) Tr 1: 132-136; (LaFernier) Tr 1: 159. Environmental impacts from mining operations would impact the Community's and its members' interest in that property, including hunting, gathering, and fishing opportunities, the ability to supply drinking water to the property, and economic interests such as the value of timber on the property, the value of the exercise of riparian rights, and the ability to lease the property to others. (Ayres) Tr 1: 139; (LaFernier) Tr 1: 159-160. In addition, NWF member Rico Torreano testified that the projected groundwater mounding from the proposed discharge, as depicted in KEMC's own documents, will impact the water table beneath the Community's property. Tr 1: 44-45.

Additional facts concerning the rights and interests of the Community and its members are set forth in Petitioners' Proposed Findings of Fact and Conclusions of Law Concerning Groundwater Discharge Permit No. GW1810162.

D. Huron Mountain Club

Petitioner Huron Mountain Club ("HMC") is a Michigan not-for-profit corporation founded in 1889 as a family retreat and wildlife preserve. HMC owns substantial real property, including inland lakes, creeks and rivers, and Lake Superior shoreline, all of which lie downstream and sometimes downwind from the mine. The Huron Mountain Club is 3.38 miles from the proposed mine site. (Townsend) Tr 1:129.

HMC's lands and waters have been preserved by HMC and devoted to scientific research and recreational use by its members for many decades. Their unique natural features include

more than 10,000 acres of virgin and old growth forest through which flows eleven miles of the Salmon Trout River, the only river used by the last breeding population of Coaster Brook Trout on the south shore of Lake Superior. HMC has been the primary conservator of this critical Coaster Brook Trout habitat for over a century.

The carefully preserved lands and waters of HMC are also home to dozens of species of plants, animals, and fungi that are either found nowhere else or are observed elsewhere only rarely. The old growth forests and pristine waters of HMC also preserve rare and unusual habitats and biological communities. The activities of HMC are devoted to preserving the unique natural resources of its property for the use and enjoyment of its members and for the continued study and research by the scientific community.

E. All Petitioners Meet Standing Requirements

Pursuant to Part 632, a party may challenge the issuance of a mining permit if the party is "aggrieved." MCL § 324.63219 (2008). Part 632 does not provide a definition of the term, but Black's Law Dictionary defines the term as "having suffered loss or injury."

The interests described above establish that members of the four organizational petitioners are aggrieved according to this definition. The mine is likely to cause damage to NWF member Mr. Torreano's property. It will disrupt the Yellow Dog Watershed Preserve's programs and is likely to affect the business interests of YDWP's Gale Hausfeld, as well as affecting the quiet and isolation of nearby YDWP property. Members of the Keweenaw Bay Indian Community will no longer be able to hunt and gather or to practice their religion at the site, which is within the area for which they have retained rights by treaty. The mine is also likely to affect their downstream property. The mine will impact the Huron Mountain Club

property as well as the Salmon Trout River running through it for the purposes for which the Club has always used the property.

In addition to meeting the "aggrieved" standard, the Petitioners have clearly sustained imminent injury under constitutional standing requirements, because they use areas that will be adversely affected recreationally and aesthetically by Kennecott's mining operations. *See National Wildlife Federation*, 684 NW2d at 814 (quoting *Friends of the Earth, Inc v Laidlaw Environmental Services (TOC), Inc*, 528 US 167, 183; 120 S Ct 693; 145 L Ed 2d 610 (2000) ("environmental plaintiffs adequately allege injury in fact when they aver that they use the affected area and are persons 'for whom the aesthetic and recreational values of the area will be lessened' by the challenged activity")).

The first requirement of standing calls for an injury in fact – an invasion of a legal interest that is concrete and particularized as well as actual or imminent. *Nat'l Wildlife Fed'n*, 471 Mich. at 628; *see Maxwell*, 264 Mich.App. at 570-71. In *Mich. Citizens for Water Conservation*, Nestle Waters North America, Inc. obtained several permits to pump water from some Tri-lakes area bodies of water. 479 Mich. at 286-87. A nonprofit group brought suit on behalf of its members seeking an injunction because the pumping was causing property and environmental harm to its members. *Id.* The Michigan Supreme Court held that the members of the nonprofit group had established injury in fact with respect to two lakes because Nestle's pumping activities impaired their riparian property rights to those bodies of water. *Id.* at 297. As to the other bodies of water, the court denied standing because the members did not show that they had "used or had access to th[ose] areas or that they enjoyed a recreational, aesthetic, or economic interest in them." *Id.* According to the court, "environmental plaintiffs adequately allege injury in fact when they aver that they use the affected area and are persons 'for whom the

aesthetic and recreational values of the area will be lessened' by the challenged activity." *Id.* at 295-96 (citing *Nat'l Wildlife Fed'n,* 471 Mich. at 629 (quoting *Friends of the Earth, Inc v Laidlaw Envtl Servs, Inc,* 528 US 167, 183; 120 S Ct 693, 705 (2000)).

Here, the mining permit issued to Kennecott will cause imminent injury to the Petitioners and their members. Consistent with the standard laid out in *Cleveland Cliffs* and *Mich. Citizens for Water Conservation,* the Petitioners and their members meet the requirements for injury in fact because they actually have access to, use, and in some instances own the areas that will be adversely affected economically, recreationally, and aesthetically by Kennecott's mining operations.

The second and third requirements for constitutional standing are causation and redressability. *Nat'l Wildlife Fed'n* 471 Mich at 684. The causation requirement demands that there be a fairly traceable link between the conduct complained of and the injury in fact. *Id.* The redressability requirement asks whether the Petitioners injuries will be redressed by a favorable decision. *Id.*

The Petitioners and their members meet the causation requirement because there is a direct causal link between the mining permit and the imminent property and environmental injuries.

The Petitioners and their members also meet the redressability prong because a favorable decision will stop the imminent property and environmental injuries from occurring. Should Kennecott not be allowed to mine as the current permits allow, the property and environmental harm directly caused by Kennecott simply will not occur.

In short, the second and third requirements for standing are met because the mining permits issued to Kennecott will be the direct cause of the imminent property and environmental

injuries incurred by the Petitioners and their members. The permits directly and substantially lessen the recreational, aesthetic, and economic interests the members and the YDWP have in those properties. A favorable decision, such as denying or adjusting the permits, will redress the injuries.

Finally, any attempt by Respondents or Intervenors to challenge standing at this point should not be countenanced. In its February 15, 2008 Order Adjourning Hearings and Amending Deadlines, this Tribunal set a deadline of March 14, 2008 for the filing of all motions other than motions in limine. "The purpose of setting a filing deadline for motions is to avoid threshold issues like standing," *Petition of Jeffrey Roberts*, 2002 WL 908940, *12 (Mich Dept Nat Res April 22, 2002) and if Kennecott or MDEQ found Petitioners' averments lacking, they were given ample time to prepare a challenge. Aside from Kennecott's March 14, 2008 motion arguing that Petitioners could not be "aggrieved" by the administrative incompleteness of Kennecott's Groundwater Discharge Permit, which was rejected by this Tribunal's April 9, 2008 Order Addressing Various Pending Motions, neither MDEQ nor Kennecott filed anything contesting Petitioners' standing or status as an aggrieved party by the March 14, 2008 deadline. Any challenge to Petitioners' standing or status as an "aggrieved" party at this late date would be untimely and should not be entertained.

II. KENNECOTT HAS NOT MET ITS BURDEN OF PROOF

Part 632 places the burden of showing that all regulatory requirements have been met squarely on the permit applicant. MCL 324.63205(3). *Thus for each of the requirements of Part 632, the applicant must affirmatively show that the mine will meet the statutory requirement, including that the mine will not pollute, impair, or destroy natural resources*. MCL 324.63205(11)(b).

This case involves some prediction of the future, and future events that stem from conditions in the natural world are notoriously difficult to predict. The truth of the matter is that neither MDEQ, nor Kennecott, nor the petitioners, nor this tribunal can know for certain the extent of subsidence, the degree of drawdown of the water table, or whether acid mine drainage will be released into groundwater or the Salmon Trout River. Not one of Kennecott's witnesses was willing to guarantee their predictions. Of course, the more accurate information we have about the underlying natural conditions, the better our predictions can be – and this is the very reason petitioners have stressed so heavily the scarcity of data concerning many critical safety issues at the proposed mine site.

Again, Part 632 squarely places the burden of proof on the applicant. MDEQ was not asked to merely take its best guess as to whether the mine would harm the environment. Rather, MDEQ was to determine whether Kennecott demonstrated that the mine *will not* harm the environment. The permit must be denied if, at the end of the day, any questions remain as to whether the mining operation will pollute, impair, or destroy natural resources. And they certainly do.

When it comes to natural resources, especially resources as valuable as those at risk in this case, this is a necessarily high bar. When "accidents happen" as Kennecott's Dr. Carter admitted, we cannot simply close the mine and put the natural environment back as it was. (Carter) Tr 17: 3649. If the Salmon Trout River and associated wetlands, or the Coaster Brook Trout and the forest and aquatic ecosystems of the Huron Mountain Club are impacted, it is unlikely that they would ever be restored to their current condition, despite Part 632's requirement that the affected area impacted by mining be restored to its pre-mining conditions. In balancing protection of Michigan's resources against the potential economic benefit of mining,

the Michigan legislature has chosen to allow mining only when it is clear that the State's natural resources will not be harmed.

In this case, Kennecott has not met its burden. At the very least, the testimony of Petitioners' witnesses, and even Kennecott's and MDEQ's, revealed immense uncertainties about the stability of the mine's crown pillar, likelihood of subsidence, the amount of groundwater inflow into the mine, the level of drawdown around and above the mine and the Salmon Trout River, the potential for releases of acid mine drainage into ground and surface water; the impact of the deposition of air pollutants on a pristine ecosystem and the cumulative impacts of transportation, noise, lights, seismicity, human presence, and pollution on wildlife. *Kennecott and MDEQ cannot deny that at least three eminent rock mechanics experts agree that collapse of the crown pillar is likely.*

III. THE PERMIT APPLICATION DID NOT INCLUDE INFORMATION REQUIRED BY PART 632

As noted above, the availability of adequate information is critical to enable MDEQ to judge with any degree of accuracy whether a mine will operate without impacting the environment. Part 632 is thus carefully designed to ensure that all of the information necessary to make an informed decision will be available to MDEQ and to the public before the application review period begins. Kennecott failed to submit information on a number of issues for which information is required by the statute and rules. On other issues, it submitted less data than the regulations require. Some of this information has not been submitted to this day. Part 632 very clearly requires MDEQ to deny a permit application if the application does not meet the statutory and regulatory requirements. MCL 324.63205(11), (12).

A. Environmental Impact Assessment is Not Adequate

Much of the missing information is required by the provisions governing the Environmental Impact Assessment ("EIA"), which must accompany the permit application. MCL 324.63205(2)(b). The specific requirements of the EIA are detailed in Rule 425.202. The rule lists a number of subject areas and features that must be covered, but also notes that the EIA is not limited to the listed items. Rule 425.202(1). If important features of the environment or of human use of the environment become apparent during the course of the application review period, these issues should be incorporated into the EIA process even if they are not specifically listed. For example, Kennecott has now, post-permit approval, publicized its development of a new power line, a different haul route with new roads, and most recently, its plans to mill Eagle ore at the Humboldt Mine facilities. The EIA that was submitted in this case is insufficient for a number of reasons.

1. Potential impacts not assessed

The most basic requirement of the EIA is that it describe the potential impacts of the proposed mining operation on environmental features. MCL 324.63205(2)(b); Rule 425.202(1)(a)(iii). The EIA in this case completely ignores some of the most critical potential impacts of the mine. The key word here is "potential." Kennecott has unacceptably limited its discussion of risks to the environment by ignoring the possibility that its assumptions regarding rock stability, rock fracturing, hydrology, and the efficacy of its mining methods may prove to be overly optimistic. This has enabled Kennecott to ignore potential impacts, not just on the Yellow Dog Plains area surrounding the mine site, but also on the very delicate and extremely important resources downstream and downwind from the mine.

KEMC appears to take the position that if it plans to use methods or take actions to reduce or mitigate the impacts that could occur, those impacts do not need to be discussed. However, the rules state first that the potential impacts must be described, followed by the requirement that the EIA must describe "the measures proposed to be taken . . . to reduce or mitigate the potential impacts." Rule 425.202(1)(a)(iv). Thus the environmental assessment must indicate not only the environmental impacts that could occur if everything goes as planned, but also the environmental risks if measures to reduce or mitigate potential impacts do not perform perfectly.

a. Potential impacts of subsidence

We heard testimony in this case regarding a number of potential impacts that the EIA does not discuss. Perhaps the most egregious of these is the complete failure to reveal what the impacts would be if subsidence occurs at this site, especially in light of the Petitioners' strong case that it will. *See* Exhibit R-31, EIA, *e.g.*, p.24-27 (no mention of potential subsidence in Potential Groundwater Impacts), p. 27-32 (no mention of potential subsidence in Potential Surface Water Impacts); p. 35 (no mention of potential subsidence in Wetland Impacts). As explained below at pages 46-50, there is absolutely no doubt that there is at the very least *potential* that significant subsidence will occur, particularly after the mine closes and the backfill has broken down and settled. Despite the obvious fact that significant subsidence would result in pollution, impairment or destruction of natural resources, to this day we have no description of what those impacts would be.

b. Potential impacts of water table drawdown

A second important issue for which the discussion of impacts is completely insufficient is the potential drawdown of the water table above and around the mine. *See* Exhibit R-31 (EIA), p.

28-29 (Potential Changes in Stream Flow), p. 35-37 (Potential Impacts to Wetland). The testimony in this case reveals that the parties have arrived at a wide range of possibilities as to what the drawdown will be.

For the purposes of the adequacy of the EIA, this tribunal is not being asked to decide which of these scenarios is more likely. Rather, if there is any potential that the predictions of a greater drawdown will prove accurate, the impacts of that greater drawdown must be revealed in the EIA.

c. Potential impacts of acid mine drainage

Third, the EIA fails to discuss what the impacts would be if acid mine drainage or other pollutants inadvertently leave the mining area and migrate to groundwater or surface water. *See* Exhibit R-31(EIA), p. 25-26 (Potential Groundwater Quality Impacts); p. 30-31 (Potential Surface Water Quality Impacts). The mining of metallic sulfide ore has in 85-90% of instances where water was close at hand, released acid mine drainage into that water. (Maest) Exhibit P632-65. In the vast majority of those cases, the release (or the extent of the release) was not predicted before it occurred. Releases occur through a wide range of mechanisms, and often involve human error. Tr 9:1859.

Thus while we cannot necessarily predict the mechanism by which acid mine drainage might be released in this case, we can state with certainty that there is potential for such a release. In fact, Mr. Maki of MDEQ agrees that the mine has the potential to leach sulfuric acid and heavy metals into ground and surface water. Tr 31: 6423-24. The impacts of that potential must be discussed in the EIA.

d. Potential impacts of air deposition of pollutants

Fourth, the EIA does not reveal the potential impacts of airborne dust and pollutants if controls do not operate perfectly. *See* Exhibit R-31 (EIA), p. 41 (Potential Impacts to Habitat and Wildlife Species), p. 57 (Potential Impacts to Aquatic Species). The testimony in this case firmly establishes that there is at the very least a *potential* that airborne dust and pollutants will impact terrestrial and aquatic habitat. *See infra* at pages 54-55.

Kennecott's primary response to Petitioners' concerns about the deposition of air pollutants has been to assert that a fabric filter on the air vent raise will reduce deposition to the point where it will not have an impact. However, the efficacy of the fabric filter on the air vent raise is uncertain at best. Information on the filter has not yet been provided. Mr. Maki of MDEQ has never heard of another mine using a cloth filter over the top of a vent raise. Tr 31: 6369. Mr. Maki admitted that Kennecott has submitted no information about how the filter will work. Tr 31: 6369-70. Thus it cannot be determined at this point that there is no potential that the air pollution control will not work as planned.

Furthermore, the air raise vent filter was added at a late stage in the permitting process to reduce or mitigate the impacts of the deposition of air pollutants downwind from the mining site. Yet the EIA, which was written and submitted long before the pollution control equipment was suggested, says nothing about what the potential impacts are. It was left for nearby landowners, at their own expense, to determine what the rate of deposition would be. Following this analysis, MDEQ and Kennecott decided to add pollution control equipment that was not originally called for. If local citizens had not taken it upon themselves to assess this impact, it is very likely the impact would never have been revealed, the additional pollution control device would not have been added, and there would be no attempt to mitigate this impact. This situation illustrates

exactly why MDEQ must require the permit applicant to provide the necessary studies, data, and analysis to reveal all of the potential impacts of its operation.

Finally, Petitioners do not concede that if the filter performs as hoped, the degree of air deposition that will still occur will have no potential to impact terrestrial and aquatic ecosystems. As explained below, the level of heavy metals and acid-forming constituents in run-off into the Salmon Trout River, especially at snowmelt, will still be high enough to impact trout and other aquatic species.

2. Affected area remains undefined, or at the least, artificially so

A key concept in Part 632 is the delineation of both the area that will be directly impacted by mining, and the "affected area" extending beyond the mining property. MCL 324.63205(b) ("The environmental impact assessment shall define the affected area.") "Affected area" means an area "outside of the mining area" where the land surface, surface water, groundwater, or air resources are determined through an environmental impact assessment to be potentially affected by mining operations within the proposed mining area." MCL 324.63201(b). The EIA in this case completely fails to delineate the affected area.

Once again, a key phrase in the affected area delineation is "potentially affected." Kennecott's strategy of ignoring the potential that its assumptions will prove overly optimistic has in turn unacceptably narrowed the affected area. The EIA must cover the entire area that could be impacted if the permit applicant's assumptions and analysis prove wrong, or if its control methods are less effective than predicted, whether through human error or otherwise.

We heard testimony in this case as to a number of potential impacts far beyond the boundary of the mining area. Some of these impacts are discussed thoroughly in other sections of this brief, including the impacts of spills, windblown dust, movement of invasive species, and

general impacts of transportation on wildlife along the transportation route, *see infra* at pp. 52-53; and impacts of deposition of air pollutants downwind of the mine, including the Huron Mountain Club, *see infra* pp. 120-122.

In addition, Dr. Roger "Mac" Strand, a fisheries biologist who teaches at Northern Michigan University and knows the Salmon Trout River well, testified that releases of acid-forming and/or heavy metal pollutants into the Salmon Trout River near the mine, and changes in hydrological conditions in the Salmon Trout River headwaters, would have impacts along the entire length of the Salmon Trout River and even in the near shore zone of Lake Superior. (Strand) Tr 7:2045, 2084, 2091-2096. Finally, Dr. Flaspohler testified that the mine would disrupt an important wildlife corridor between the Huron Mountain Club and the McCormick Wilderness Preserve, and that the loss of such a corridor would impact the value of these wilderness areas to species such as moose, wolves, coyote, and bobcat. Tr 7: 1327-1328.

Clearly, many areas outside of the immediate vicinity of the mine have the potential to be affected by the mine. The permit cannot be granted until an impact assessment has been prepared that addresses all of the potential impacts to these areas.

3. Migi Zii Wa Sin (Eagle Rock) is a Place of Worship[1]; neither Kennecott nor MDEQ took that or tribal land use into account as required by Part 632

Eagle Rock, through which Kennecott proposes to drill and blast a tunnel to access the ore body, is a place of worship for the members of the Keweenaw Bay Indian Community and other "Anishnabe" tribes. (Curtis, Blaker, Downwind) Tr 8: 1498, 1518, 1536 and 1515.

[1] Despite Kennecott's protestations at trial, they were clearly on notice that Petitioners' arguments about Eagle Rock as a "place of worship" were not waived. At Ms. Cohen's deposition, Petitioners' counsel stated "I will note for the record that Petitioners are calling [Ms. Cohen] … *in relation to the question of whether or not Eagle Rock is a place of worship* within the meaning of Section 2(p) of Rule 202."

According to Anishnabe belief, Eagle Rock is marked by God as a place for prayer and ceremony. Tr 8: 1514, 1526-27. KBIC members and other Anishnabe tribes have used Eagle Rock for these purposes since time immemorial, and continue to conduct ceremonies, prayers, fasting, and vision quests there to this day. (Curtis) Tr 8: 1480-81; (Blaker) Tr 8: 1509-14; (Downwind) Tr 8: 1531. One of the listed features that must be assessed in the EIA is "[r]esidential dwellings, places of business, places of worship, schools, hospitals, government buildings, or other buildings used for human occupancy all or part of the year." Rule 202(2)(p).

According to Kennecott's application, Eagle Rock would be fenced off, precluding any public entry or access. (Maki) Tr 30:6291. This would also preclude the Native American religious and cultural ceremonies, feasts, praying and other religious activities that regularly occur there now and have since "time immemorial." (Curtis) Tr 8: 1480-81 and 1484-85; Exhibit R-118, p. 5, Provision 10; Exhibit R-31, Fig. 4-2 (gray line signifying fence).

Furthermore, Eagle Rock will be subject to and surrounded by drilling, blasting and the noise and din associated with mining activities. (Maki) Tr 31:6436. The Anishnabe tribes, including KBIC, consider blasting and other mining operations at the base of the outcropping to be a desecration. Even if the surface areas of Eagle Rock were to be "available" to members of KBIC, the Tribe and its members would still consider the blasting and tunneling to be a desecration of their place of worship. (Downwind) Tr 8: 1535. Tribal members liken the blasting of a tunnel and mine portal into Eagle Rock to "boring through a public cemetery" or "digging up Calvary Hill." Tr 8: 1486 and 1535-36.

Peace and quiet in the natural environment are vital characteristics of Eagle Rock as a place of worship for members of KBIC and for the Anishnabe. (Curtis) Tr 8: 1482-83; (Blaker)

Tr 8: 1511, 1517. Even if the site remained accessible, tribal members would be unlikely to use it in the midst of the noise and rumbling of a mining operation. (Blaker) Tr 8: 1517.

MDEQ was put on notice during the public review period that Eagle Rock is a place of worship. Mr. Curtis and Ms. Cohen, the Tribal Historic Preservation Officer for the Keweenaw Bay Indian Community, both testified that they attended government-to-government consultations with both the MDEQ and MDNR, the purpose of which was to inform MDEQ and MDNR as to what Eagle Rock means to KBIC from a cultural perspective. Tr 8: 1499. Cohen: 38. This information was never communicated to the mining team. (Maki) Tr 31:6433. Neither Kennecott's application nor testimony from Kennecott or MDEQ has ever addressed the potential impacts of mining on Eagle Rock as a place of worship. (Maki) Tr 31:6334. Mr. Creal, head of the permit section in the Water Bureau of the MDEQ, has no knowledge of any follow-up occurring after a government-to-government consultation between the DEQ and the Keweenaw Bay Indian Community about the importance of Eagle Rock and the tribe's cultural, historic and religious use of that site. (Creal) Tr 37: 7762.

During the hearing, Respondents raised the argument that only buildings of worship are covered by this requirement. Respondent's reading of the rule introduces a bias against indigenous religions that should already be left in the past. A plain language interpretation of both "places of business" and "places of worship" includes discrete outdoor areas as well as buildings used of places of worship. The purpose of the rule is best served by such an interpretation.

Part 632 does not define "place of worship." "Place of worship" is defined by Wikipedia: A place of worship or house of worship is a building *or other location* where a group of people (a congregation) comes to perform acts of religious praise, honour, or devotion. Webster had

ideas, too; while the Webster's Collegiate Dictionary (4th ed.) does not define "place of worship" is does provide pertinent definitions as defines "place" as "a building *or space* devoted to a special purpose" and "worship" as "reverence or devotion for a deity; religious homage or veneration." Even these plain language, common definitions reject DEQ's outdated notions about what qualifies as a "place of worship."

Furthermore, as explained above, the list of environmental features in Rule 202 is not intended to be exhaustive; if something is brought forward by third parties during the environmental review that is clearly an important feature of the environment within the purpose of the rule, that feature should be covered in the EIA. In this case, the EIA must assess potential impacts to Eagle Rock as a place of worship and to the use of Eagle Rock for that purpose.

In addition to religious activities, Eagle Rock and the surrounding areas are, in accordance with the terms of the 1842 Treaty, used by members of KBIC for hunting, fishing, blueberry picking, and gathering traditional medicines. According to Rule 425.202(2)(x), the applicant must assess potential impacts to land uses and land access. Kennecott has not assessed tribal land uses at Eagle Rock and in the vicinity of the mining and affected areas. The proposed Kennecott Eagle Mine is located within territory ceded in 1842 and upon which the tribes retain hunting, fishing and gathering rights. (Coleman)Tr 13: 2745. Tribal members testified that they exercise these rights on the land proposed for mining operations. Mr. Curtis hunts in the area four or five times each year and fishes in the area every spring. (Curtis) Tr 8: 1502. His family also gathers wild blueberries there. *Id.* at 1479.

Ms. Blaker gathers berries and medicines on the Yellow Dog Plains and on Eagle Rock. (Blaker) Tr 8: 1511 and 1515. Mr. Downwind also gathers medicinal plants used for healing on

and in the vicinity of Eagle Rock. (Downwind) Tr 8: 1533. These plants are used for treating diabetes and cancer and are unique to Eagle Rock. *Id*. at 1533-34.

Although the EIA acknowledges that the area is currently used for recreational purposes, it completely *ignores* these uses of the area by members of KBIC and other Anishnabe tribes. These land uses must be identified and analyzed in the EIA, and Kennecott must provide an assessment of the impacts of mining on these uses. It is insufficient to simply say that the public will be excluded from the fenced area for the duration of the mining operations. The EIA must also identify and analyze the impact this exclusion will have on the ability of people who currently use the area to maintain their spiritual practices, to gather berries and medicines, and to maintain their hunting and fishing activities.

4. Bedrock groundwater quality dismissed by Kennecott

One of the data sets almost completely missing in the EIA concerns groundwater in the bedrock. The permit application conceptualizes groundwater at the site as divided into water in the unconsolidated deposits above bedrock, which it terms the quaternary or alluvial aquifer, and water that saturates the bedrock. Water in the quaternary aquifer meets all drinking water standards, as does water in the higher levels of bedrock. Water deep in the bedrock (depth) does not meet drinking water standards. See Mining Permit Application Vol. 2, Appendix B-3 (Phase II Bedrock Hydrogeologic Investigation). Almost no work was done to characterize the bedrock groundwater. The bedrock testing that was done in this case, and an explanation of the shortcomings of that testing, are provided later in this brief. *Infra* pp. 80-82.

The Part 632 regulations require that the EIA include a description of and discussion of potential impacts on:

> Groundwater occurrence that may impact, or be impacted by, mining activities, including the following:

(i) Thicknesses of aquifers, hydraulic conductivity, and interconnections between multiple aquifers and between aquifers and surface water.

(ii) Depth to groundwater, groundwater recharge areas, groundwater flow direction, hydraulic gradients, groundwater velocity, and 3-dimensional flow paths.

(iii) Seasonal variations of the items in paragraph (ii) of this subdivision.

Rule 425.202(2)(d). A description and discussion of potential impacts is also required for groundwater quality. Rule 425.202(2)(g). Conclusions about both flow and quality must be supported by two years of data. Rule 425.202(3).

The EIA completely ignores these requirements for groundwater in the bedrock. As is clear from the discussion on the limited testing that was done, nothing close to two years of data has been collected. Furthermore, the EIA contains no discussion of the potential impacts of the mine on groundwater in the bedrock, and provides virtually no information about movement of water through the bedrock either before or after mining. The EIA does not explain this omission other than to state:

> The Quaternary deposits of glacial alluvium described in Section 3.4.1.1 form the aquifer for the Yellow Dog Plains. The Quaternary deposits possess sufficient hydraulic conductivity and saturated thickness to yield significant quantities of water to wells and or springs to meet the definition of an aquifer in R 425.102(1)(c).

EIA § 3.4.1.2. At no point does the EIA provide a justification for excluding bedrock groundwater from its discussion, especially since conclusions about velocity of bedrock groundwater are drawn from only one data point.

Furthermore, although "aquifer" is defined as a water supply "capable of yielding significant quantities of groundwater to wells or springs," Rule 425.102(1)(c), for the most part the rules require identification and analysis of baseline conditions and potential impacts to *groundwater*, not to aquifers. The regulatory definition of groundwater is "water below the

ground surface in a zone of saturation." Rule 425.102(1)(p). Water in the bedrock meets this definition, and therefore the EIA must describe baseline conditions, mining operations with the potential to impact those conditions and the potential impacts on that water. R. 425.202(1)(a).

Underlined by the absence of data is the fact that Kennecott does not plan to protect groundwater in the bedrock. Its stated intention is to protect only water in the alluvial aquifer. Any actions taken to stabilize water movement and quality within the mine workings after mining ends is only as needed to protect the alluvial aquifer. Despite the fact that the upper bedrock groundwater currently meets all drinking water standards, and despite an almost complete lack of information about the potential yield of a well driven in bedrock, Kennecott and MDEQ have no plans to ensure that water at this depth does not become contaminated.

Furthermore, the lack of data on bedrock groundwater seriously compromises Kennecott's conclusions regarding protection of the alluvial aquifer. The data is so scant that the degree of movement between that water and water in the alluvial aquifer is simply unknown. When Dr. Coleman of the Great Lakes Indian Fish and Wildlife Commission attempted to predict impacts on the alluvial aquifer from contaminated water left in the mine, he was unable to create a valid model because of the lack of data regarding the bedrock. Tr 13: 2758-59.

According to Mr. Wozniewicz, who testified on behalf of Kennecott, dissimilarity in the water quality of the bedrock versus overburden, and upper versus lower bedrock, measured during the Phase II investigation indicates poor hydraulic communication between those zones. (Wozniewicz) Tr 24: 4856. The assumption that these zones are isolated from each other was incorporated into modeling done in support of the permit application. Tr 8:1597-1598; 40:8289-8291. However, the evidence that does exist does not support this assumption. As the permit application materials themselves state,

> Groundwater sampled from 05EA-107 has overall lower TDS concentrations that decrease at the shallower interval. The sample collected at the shallower 18.20 to 34.90 m interval has similar anion chemistry to the Quaternary deposits, falling between the bedrock and Quaternary deposit chemistry with respect to anions and cations, as shown on the Piper diagram in Figure 9.1. The anion-cation signatures indicate that at this shallow interval the groundwater may be influenced by both bedrock and Quaternary deposit groundwater. Combined with the lower TDS of both bedrock borehole samples, these factors indicate that some water from the Quaternary deposit may influence or dilute the TDS concentrations at both depths, though the specific mechanism of influence this cannot be determined using chemistry alone.

EIA Appendix B-3 § 9.2.3.

Furthermore, Dr. Karasaki's testimony indicates that a difference in water quality does not rule out a connection between aquifers. In fact, where (as here) a uniform environmental head exists, a connection between those aquifers is indicated. Tr 39: 8107, 8109-8110; Ex P-188, Slides 32, 33. Dr. Prucha testified that several testing logs included in Appendix B-2 to the EIA indicate that, based on total dissolved solids (TDS) measurements, the upper bedrock groundwater may in fact extend significantly lower than assumed by Kennecott. Tr 8: 1593-1594. Moreover, Kennecott's Exhibit 214 indicates that several faults extend between the upper and lower bedrock, which would act as a pathway for flows from the lower bedrock. This is inconsistent with assumptions Kennecott has made about the flow of groundwater through the bedrock. Tr 8: 1597-1598; 40: 8289-8291.

In sum, the EIA does not provide sufficient information on bedrock hydrology to support Kennecott's conclusion that potential drinking water sources will not be impacted by mining. A description and analysis of the entire bedrock groundwater regime is required by the regulations and is missing from the EIA.

5. Impacts from transportation never discussed

One of the issues on which both the EIA and the mining plan are most incomplete is transportation. The EIA completely fails to provide information on potential impacts on the environment from transportation, as is clearly required by the statute and rules.

Part 632 requires that the EIA describe "the potential impacts on [natural features] from the proposed mining operation." MCL 324.63205(2)(b). The rules elaborate:

> The environmental impact assessment . . . shall include . . .
>
> (a) For each of the conditions and features listed in subrule (2) of this rule:
> . . .
>
> (ii) An identification of the proposed mining activities that may impact the condition or feature, and the process or mechanism through which the impact may occur.
>
> (iii) An analysis of the potential impacts of proposed mining activities on the condition or feature . . . .

Rule 425.202(1). "Mining activity" is defined to include "transportation of overburden, waste rock, ore, and tailings," "transportation of chemical reagents," and "construction of haul roads." Rule 103(a)(vi), (viii), and (x). Thus for each feature that transportation is likely to impact, the EIA must include a discussion of those impacts.

Features that may be impacted by transportation include water quality, land uses, species and abundance of aquatic and terrestrial flora and fauna, fish and wildlife habitats, non-native or invasive plant species, ecological systems, air quality, and noise. Dr. John Coleman has reviewed mining operations and permit applications for the Great Lakes Indian Fish and Wildlife Service for fifteen years, (Coleman) Tr 13: 2753, and generally works closely with state and federal permitting authorities when doing so. *Id*. at 2747-48, 2761. Based on this experience, Dr. Coleman testified that the environment along the transportation routes may be impacted from

contamination due to the loss of ore dust along the route. Dr. Coleman pointed out that the proposed haul route between the mine site and the rail loading area is 65 miles long. *Id*. at 2828. The ore is high in sulfur and minerals. *Id.* If these materials escape onto the haul road, particularly the fine materials which have a large surface area compared to their volume, they would readily react with air and water to leach materials along the route. Tr 14: 2828-2829. Kennecott's own geochemist said that he is "sure" that there is leakage from rail cars and trucks. (Logsdon) Tr 20: 4260.

Dr Alec Lindsay, a professor at Northern Michigan University, testified that increased road use affects breeding birds by direct mortality when cars and trucks hit birds, and by increased dust in the air and increased noise effects. Tr 11: 2317. Dr. Flaspohler, a professor at Michigan Technical University, testified that the heavy truck traffic will have numerous biological impacts resulting from:

- Noise;
- Water runoff;
- Facilitating the spread of exotic species (which are currently largely absent from the Yellow Dog Plains);
- Alteration of snow melt patterns (through deposition of dust); and
- Road kill.

Tr 7: 1339-1341. Illustratively, Dr. Flaspohler explained that the noise of truck traffic is likely to have significant adverse impacts on songbird populations. Studies have shown that nesting success is reduced in areas near consistent road noise. Tr 7: 1342-1344.

Another potential impact of mine-related transportation is the introduction of exotic plants. Truck traffic has been demonstrated to spread exotic plants by transporting seeds on truck tires. Both terrestrial and aquatic exotic plants can have substantial negative impact by crowding out native species and substantially reducing plant biodiversity. (Flaspohler) Tr 7:

1368-1369. Reduction of plant diversity will often, in turn, reduce animal diversity: "[O]ne of the . . . central tenants (sic) in wildlife habitat relationship[s]" is the fact that "greater plant diversity is usually associated with greater animal diversity in that same community." *Id.*

Failure to assess impacts of transportation on aquatic species and habitat is especially glaring in light of the following text, from Section 3.3.2 of Kennecott's Hydrogeology Study:

> Surface erosion, primarily from road runoff, is a well known existing condition potentially effecting stream quality on the Plains and downstream of the Plains. In order to roughly quantify sediment inputs from roads, sediment traps were established in the EBS that represent the range of traffic use, parent road material and road gradients that exist within the Study Area (Figure 18, Table 10).
>
> Traffic appears to be the strongest factor influencing erosion rates, which is consistent with other studies of road surface erosion associated with heavily logged watersheds (e.g., Reid and Dunne 1984). Two high-traffic monitoring locations (SED03 and SED08) on the Triple A Road yielded estimates of 256 and 515 tons per mile of road (tons/mi), respectively. Monitoring locations on the less frequently traveled Northwestern Road and secondary roads yielded estimates that were 1 to 2 orders of magnitude less (0.9-55 tons/mi) than the Triple A Road.

In his review of the permit application's proposed haul route, Dr. Coleman counted nineteen significant stream crossings. Tr 14: 2857. Mr. Taylor, who testified on behalf of Kennecott, admitted that during its mineral exploration activities, Kennecott engineered and rebuilt a crossing of the Salmon Trout River that failed, washing 91 tons of sediment into the river. (Taylor) Tr 36: 7413. Mr. Taylor agreed that this amount of additional sediment into the river would have a significant impact on aquatic habitat. *Id.* at 7413-14. And particularly telling is the testimony of Michael Koss, a wildlife ecologist for the Michigan Department of Natural Resources, that the DNR is concerned about the route and traffic from this mine. (Koss) Tr 34: 6955. As explained below in the section on endangered species, the U.S. Fish & Wildlife Service is particularly concerned about the impacts of sedimentation in the Salmon Trout River

on Coaster Brook Trout. Yet the EIA says nothing about the potential increase in sedimentation from mine traffic.

In light of the many potential impacts of traffic testified to by several witnesses on both sides of this case, it is completely unacceptable that the EIA provides no information on impacts from mining traffic.

Kennecott has publicized that it is seeking a different haul route that would require new road construction very near to the McCormick Tract Wilderness; the concerns outlined in this section will be even more elevated if Kennecott seeks to permit that haul route.

6. Noise, lights, and seismicity ignored

The Part 632 rules require an assessment of the mining operations on noise, lights, and seismicity. Rule 425.202(2)(ii), (jj), (kk). While the EIA includes sections addressing these natural features, it does not indicate what the impact on these features will be. Instead, it erroneously concludes that there are no receptors to be impacted by noise, lights, and seismicity, and thus concludes that there will be no impact regardless of the increase.

The EIA's contention that "public exposure to the mine is based on general public and recreational users passing through the area, viewing the facility as they drive by" (EIA section 3.18, p. 65) is clearly erroneous. Witnesses testified that they spend time at the mine site and in the surrounding area, for a number of reasons. None testified that their recreational use is limited to driving through the area. Noise, lights, and seismicity from mining operations can be expected to affect human use of the area, and this impact must be addressed in the EIA. In order to address it, Kennecott must provide quantitative information about the increase in noise, light, and seismicity in the area surrounding the mine site.

The EIA's statement, "No local flora or fauna have been identified to be potentially affected by [noise, lights, and seismicity]" (EIA sections 3.18.2, 3.18.3, and 3.18.4, p. 66) is also unsupported by credible evidence. Petitioners' witnesses testified that industrial and truck noise affects songbirds and other wildlife species found on the Yellow Dog Plains, and this evidence was not negated by respondents' witnesses. Mr. Kailing, who performed Kennecott's wildlife surveys, testified that he considered only the direct physical disturbance at the mine site when concluding that there would not be an impact. (Kailing) Tr 26: 5458. Furthermore, this conclusion was reached without any quantitative information on how much noise and lighting will occur, and how far it will extend beyond the mine property. The EIA must provide quantitative information about the increase in noise, light, and seismicity that can be expected from the mine, followed by a legitimate description of the potential impacts about that increase on songbirds and other wildlife.

According to the regulations, it is incumbent upon the permit applicant to show that there will be no impacts from seismicity; Kennecott has provided no testimony indicating that fish will not be impacted by seismicity. Alaska's and Oregon's regulations pertain to blasting in, under or adjacent to waters where fish live. (Parker) Tr 38: 7878 and Tr 3: 421. Exhibit P632-36*[2]. Of course this is relevant to the Eagle site. *Id*. at 7878. Mr. Parker studied the literature related to the effects of blasting in mines on fish in nearby streams. Tr 3:288. Mr. Parker evaluated the effect of blasting on the Eagle Mine and its likely impact on fish living at the surface. *Id*. at 422. The initial damage done to most fish would be to their swim bladder which keeps them right way up and allows them to live. *Id*. at 425. And even more sensitive is the damage which would be done to spawn just before it hatches out in the East Branch of the Salmon Trout River, in the gravel and upwellings at the bottom of the creek. For his analysis, Mr. Parker used a simple

[2] Exhibits designated with an asterisk (*) were admitted for demonstrative purposes only.

explosive, not the most devastating. He used a 4 inch hole containing roughly 4 1/2 pounds of ammonium nitrate per foot of whole. Tr 3:425. He assumed that only one hole at a time was detonated, which is not the most efficient way to blast. *Id.* at 426. Even with only one blast at a time, brook trout in the creek running almost directly over the ore body would be damaged at around 1,000 feet away. *Id*.

7. Rare and endangered species assessment inadequate

The Part 632 regulations require a description of and an assessment of potential impacts on state and federally-listed threatened and endangered species and on U.S. Forest Service-listed "species of special concern." Rule 202(2)(aa), (bb). As Dr. Flaspohler testified, Kennecott's survey of rare, threatened and "special concern" species was grossly inadequate. Tr 7: 1383-1384.

First, the survey methods used by Kennecott's researchers were designed to assess the abundance of common species, rather than methods designed to find rare or threatened species. *Id*. Despite the significant list of rare or threatened species known to occur in Marquette and the surrounding counties, Kennecott identified only the narrow leaf gentian for targeted survey work. Tr 7: 1385. Contrary to DNR protocols, Kennecott did not, with respect to any other rare or threatened species likely to be present, use standard techniques designed to ensure high probability of locating the species. Tr 7: 1385-1386. In addition, and also contrary to DNR protocols, Kennecott sampling was not performed at appropriate times during the year with respect to several rare or threatened species that are likely to be present. *Id*. at 1386-1387. In short, Kennecott made no effort whatsoever to determine the presence of numerous threatened and endangered species that are known to occur within this area of the Upper Peninsula. *Id.* at 1387-1391; Exhibit P632-143 Slides 7-8.

Special mention should be made of three species known to exist on or downstream from the Yellow Dog Plains. First, the Kirtland's warbler is a federally-listed endangered species, and the young jack pine forest of the Yellow Dog Plains is known to be the type of forest used by Kirtland's warblers for nesting. (Lindsay) Tr: 2310-11. While Kennecott's surveys found no Kirtland's warblers, at least one male warbler has been seen and heard in the mine vicinity, singing to attract a mate. Lindsay at 2308-09. Experts from both sides in this case testified that this indicates an attempt to nest and breed in the area. (Koss) Tr 34: 6957, (Lindsay) Tr 11: 2311-12.

Mr. Koss of the DNR testified that if nests were present, they would be found at ground level, hidden in thick jack pine branches, yet no effort was made to look for nests in such areas near the mine site. (Koss) Tr 34: 6958. Kennecott's conclusion that Kirtland's warblers do not breed near the mine site is thus unsupported by the evidence.

Second, gray wolves are known to traverse the Yellow Dog Plains. (Koss) Tr 34: 6959. In the state of Michigan, the gray wolf has been listed as "endangered" on the federal endangered species list since 1978. Although the U.S. Fish & Wildlife Service delisted the wolf in 2007, 72 FR 6052 (Feb. 8, 2007), a federal court has recently ruled that delisting was inappropriate, and the wolf is once again listed as endangered in Michigan. *Humane Society v Kempthorne*, 2008 U.S. Dist. LEXIS 74495 (D.C. Dist., Sept. 29, 2008).

Evidence indicates that the Yellow Dog Plains form an important wildlife corridor for species moving between the Huron Mountain Club and the McCormick Wilderness. (Flaspohler) Tr 7:1326-27. A wolf pack is known to inhabit the Huron Mountain Club, and that pack is very likely to traverse the Yellow Dog Plains. (Koss) Tr 34: 6959. Wolves tend to avoid areas with significant traffic, (Flaspohler) Tr 41: 8434-8436, and thus their use of the Yellow Dog Plains is

likely to decrease due to mining-related transportation. And yet the EIA says nothing about the potential impact of the disruption of this wildlife corridor on the gray wolf.

Finally, Coaster Brook Trout inhabit the downstream reaches of the Salmon Trout River. (Woods) Tr 2: 227. Coaster Brook Trout are very rare organisms that used to be considerably more widely distributed. Coaster Brook Trout spend most of their lives in Lake Superior, but they spawn in the Salmon Trout River. *Id.* at 227. Coaster Brook Trout used to spawn in dozens of Michigan rivers, but the Salmon Trout River is the only place they still spawn on the south shore of Lake Superior. *Id.* at 229. The U.S. Fish & Wildlife Service considers the coaster to be a species of concern. (Flaspohler) Tr 7: 1331.

The Huron Mountain Club and Sierra Club petitioned the Fish & Wildlife Service for endangered species listing on February 22, 2006. 73 Federal Register 14950, 14951 (March 20, 2008). On March 20, 2008 the Service found that the petition presented sufficient evidence to warrant consideration for listing. *Id.* at 14950. The Service is currently undergoing that consideration, and will make a preliminary listing decision within twelve months. *Id.*

In its March 2008 finding, the Fish & Wildlife Service indicated that a primary threat to Coaster Brook Trout is the degradation of habitat due to sedimentation from activities such as transportation and road crossings. *Id.* at 14954. This is not a general statement about habitat throughout the Lake Superior region. The *only* river that is home to Coaster Brook Trout and that is not located in a wilderness area without roads is the Salmon Trout River. In other words, the threat to the entire U.S. population of Coaster Brook Trout cited by the U.S. Fish & Wildlife Service is from sedimentation from construction, transportation and road crossings specifically *on the Salmon Trout River.* An example given was the failure of Kennecott's road crossing in 2005, which washed 91 tons of sediment into the river. *Id.* To quote the Fish & Wildlife Service:

> Future road washouts in the Salmon Trout River could result in impacts to the coaster brook trout downstream. Therefore, based principally on information related to siltation, we find that the petition presents substantial information indicating that the petitioned action may be warranted due to the present or threatened destruction, modification or curtailment of the habitat or range of the U.S. coaster brook trout.

Id. Dr. Taylor, a fisheries and landscape ecology specialist, was also aware that in April 2005, 91 tons of sediment ran into the Salmon Trout River from a road crossing Kennecott had re-engineered and rebuilt at the AAA crossing of the Salmon Trout River. (Taylor) Tr 36: 7413. Dr. Taylor believes that 91 tons of sediment dumped into the river at one time would certainly impact the quality of the river. *Id.* at 7413-14. It would certainly have an impact in the local area. *Id*. at 7414.

There is a real possibility that this species will be listed specifically due to concern that the traffic from this very mine will degrade its habitat. And yet the EIA is completely silent on this issue.

8. Two year's of baseline data not provided

The EIA rule includes several requirements for background studies sufficient to predict seasonal and long-term variation in certain features and parameters. These include seasonal variation for groundwater depth and flow, Rule 425.202(2)(d)(iii); seasonal and long-term variation for surface water levels or discharge rates, Rule 425.202(2)(e)(ii); seasonal variation for groundwater and surface water quality, Rule 425.202(2)(g)(vi); "predicted variations" for species and abundance of aquatic and terrestrial flora and fauna, Rule 425.202(2)(y), and seasonal and long-term variations for meteorology, Rule 202(2)(gg). Rule 425.202(3).

The rules also provide direction on what information will be deemed sufficient for these requirements. For species and abundance of flora and fauna, a permit applicant must use "at least 2 years of relevant information. Relevant information may include records of pertinent data at

other sites having documented similar conditions of credible regional studies from acknowledged sources, but shall include at lest 1 year of site-specific data." Rule 425.202(2)(y). For the other features,

> the required characterization . . . shall be satisfied by a combination of documented observations of pertinent data over a period of at least 2 years at the monitoring site and records of pertinent data at other sites having documented similar conditions or credible regional studies from acknowledged sources. Seasonal and long-term variations at the monitoring site shall be predicted, where feasible, using statistical analysis demonstrating a confidence interval. The statistical analysis shall include an explanation of how the use of any data from other sites affects the confidence interval. Analysis of potential impacts shall incorporate credible extremes in the condition or feature based on the statistical analysis.

Rule 425.202(3).

a. A full year's wildlife study has not been done

Peter Kailing headed up the baseline ecological studies prepared for the EIA, (Kailing) Tr 26: 5410, and he acknowledged the statutory requirement that the assessment include flora and fauna studies over two 12-month periods. *Id.* at 5411. Nonetheless, the only survey submitted in connection with the mining application was a single seven-to-eight month survey conducted in 2004. *Id.* at 5411-12. Although Kailing also conducted two post-application surveys, these surveys were also limited to approximately eight month periods, and included no winter studies. *Id.* at 5412-13.

Kailing limited his studies despite recognizing that there are animals inhabiting the Yellow Dog Plains in the winter that are not there in the summer. *Id.* at 5413. The bottom line is that no one involved with the permit application has gone out to the Yellow Dog Plains between the months of November and April to conduct studies of animal life. *Id.* at 5414. To this day, winter wildlife in the mine area has not been studied. Mr. Koss of the Michigan DNR agreed that

winter species in the area include marten, fisher, and bobcat, and that these species were not inventoried. (Koss) Tr 34: 6947-48.

Perhaps as a result of Kennecott's truncated timeframe for wildlife studies, they found far fewer birds utilizing the Plains than did Prof. Lindsay of Northern Michigan University, who surveyed the same area. Prof. Lindsay testified that a total of 118 species have been seen utilizing the Plains, (Lindsay) Tr 11: 2296-97 and 2300, compared to the 53 species found in Kennecott surveys, *Id.* at 2313. Prof. Lindsay pointed out that a standard survey should include both summer and winter examinations due to migration. *Id.* at 2303-04. An adequate survey would cover two years, twelve months per year. *Id.* at 2314.

Furthermore, at the time the EIA was submitted Kennecott had obtained survey data from only one 8-month period. (Kailing) Tr 26: 5411-12. While the regulations do allow a permit applicant to use non-site specific information in describing wildlife that inhabit an area, if the applicant uses this method it surely must assume that wildlife found in a similar area is likely to be present in the subject area as well. Kennecott's approach to the use of non-site specific information was to list the species that might be in the area, and then to dismiss them as not present because they were not seen during one 8-month survey. This turns the two-year study requirement on its head.

9. Cumulative impacts not assessed

The Part 632 rules require that for each of the listed features, the EIA must include an assessment of the cumulative impact of mining activities on that feature. The assessment must include:

> An analysis of the potential cumulative impacts on each of the conditions or features . . . within the mining area and the affected area from all proposed mining activities and through all processes or mechanisms. The analysis shall consider additive effects, and the assessment of significant interactions between

> chemical and physical properties of any discharges, with reference to the physical and chemical characteristics of the environment into which the discharge may be released.

Rule 425.202(1)(b). "'Cumulative impact' means the environmental impact that results from the proposed mining activities when added to other past, present, and reasonably foreseeable future activities." Rule 425.102(1)(h).

> 'Mining activity' means any of the following activities for the purpose of, or associated with, mining: (i) Clearing of land; (ii) Drilling and blasting; (iii) Excavation of earth materials to access or remove ore; (iv) Beneficiation; (v) Reclamation; (vi) Transportation of overburden, waste rock, ore, and tailings; (vii) Storage, relocation, and disposal or overburden, waste rock, ore, and tailings within a mining area, including backfilling of mined areas; (viii) Storage and transportation of chemical reagents; (ix) Construction of water impoundment and drainage features; (x) Construction of haul roads; (xi) Construction of utilities or extension of existing utilities; (xii) Withdrawal, transportation, and discharge of water.

Rule 103(1)(a).

The testimony in this case indicates that there are potential cumulative impacts on several listed features, none of which are described in the EIA. Terrestrial wildlife may be impacted by multiple stressors, including lights, noise, seismicity, human presence, displacement, road kill, increased consumption of pollutants that have accumulated in food sources, an increase in commensals, and fragmentation of habitat. Water resources and aquatic wildlife may be impacted by changes in hydrology (including drawdown in the water table, increased flow at the seeps, and/or changes due to subsidence), increased acidification, heavy metals, and/or sedimentation in water due to direct releases and/or air deposition, change in water chemistry at the seeps, increases in stream sedimentation from transportation, and seismicity. Terrestrial ecosystems, including flora richness and diversity, may be impacted by deposition of air pollutants, an increase in invasive species, water table drawdown, and fragmentation. The EIA

must assess the amount of degradation that could occur to these resources if they are impacted by all of these factors.

Finally, as described above the land at and surrounding the proposed mine site is currently used for religious purposes, for hunting and fishing, for gathering medicine and food, and for recreation. These uses will be disturbed by a number of factors stemming from mining activities, including the fencing of land, the light, noise and disruption of mining activities, increased traffic, and changes in species and abundance of flora and fauna. The potential impacts of all of these factors must be considered together when assessing the potential cumulative impact on land use.

As described below, Kennecott is now considering several changes to its mining plan that could increase some of the impacts from the mine, and decrease others. Kennecott is considering the use of the Humboldt mine site for ore beneficiation, the extension of power lines to the site, and a new transportation route for hauling ore. None of the potential impacts from these activities have been considered in the permit proceeding, either individually or cumulatively. These activities must all be incorporated into a cumulative impacts assessment.

10. Feasible and prudent alternatives not assessed

Part 632 requires that the EIA "address feasible and prudent alternatives." MCL 324.63205(2)(b). Alternatives analysis is a common feature of environmental review statutes, because one of the purposes of such statutes is to ensure that a project is as protective of the environment as possible. An alternatives analysis should provide the project proponent and the regulatory agency with enough information to compare the environmental impacts between one alternative and another. *C.f., e.g., Dubois v. US Dept of Agriculture*, 102 F3d 1273, 1287 (1st Cir

1996) (analysis of the relative environmental merits and demerits of alternatives is "the linchpin" of federal environmental impact process).

Although Kennecott included a "feasible and prudent alternatives" section in its EIA, the discussion was so lacking in detail and analysis that it provided no practical benefit to the review process. As described immediately below in the section on changes to the mine plan, practical alternatives have emerged for several mining activities, including beneficiation, power supply, and transportation. Kennecott still seems to be in the process of determining which alternative it prefers for some of these activities. Yet no comparison of the impacts of different alternatives has been presented, and it appears that none is planned. In light of the very real alternatives that exist in this case, the EIA must contain an analysis that will allow MDEQ to determine whether the most environmentally sound alternative has been chosen.

11. Potential changes to the mining plan unassessed

The testimony revealed that Kennecott is considering several significant changes to its mining plan. These include extending power lines to the site rather than using diesel generators, (Maki) Tr 31: 6325, processing the ore locally at the old Humboldt plant rather than shipping it to Canada, *Id.* at 6339, and building a new haul road rather than using existing roads. The impacts of these activities are not discussed in the EIA, nor does there appear to be any plan to update the EIA to include these activities.

As explained above, Kennecott apparently believes these are all "feasible and prudent alternatives" so they should have been thoroughly discussed in that section of the EIA. This would have (and should have) provided the mechanism for assessing potential impacts even in light of the uncertainty that these activities would occur. By failing to address them and raising

the issues after the EIA was submitted, Kennecott is circumventing the requirement that the EIA address all of the impacts of the mining operation.

It has been more than a year now since Kennecott began to consider at least some of these options. For instance, Mr. Eykholt testified that consideration of the Humboldt site was in process in spring of 2007. (Eykholt) Tr 23: 4797. There has been plenty of time to update the EIA without delaying the permitting process, and yet Mr. Maki of MDEQ testified that no update is planned. (Maki) Tr 31: 6340. It is simply unacceptable to allow this permit to go forward without an assessment of the impacts of proposed changes when Kennecott has been sitting on its hands for so many months.

B. Kennecott has not Demonstrated the Efficacy of its Proposed Plans, Nor Even Merely Described Them Adequately

Part 632 requires that the mining plan first describe the methods, materials and techniques" proposed and then demonstrate that they are "capable of accomplishing their stated objectives in protecting the environment and public health." MCL 324.63205(2)(c)(i-ii)). The second requirement includes two components. First, the planned methods, materials and techniques must in fact *be* capable of protecting the environment and public health. Second, the application must include information that demonstrates this capability.

The statute also provides that the presentation of information is not required "for methods, materials, and techniques that are widely used in mining or other industries and *are generally accepted as effective*." Because the burden is on the applicant to show that the mining operation will be safe, the applicant must provide evidence that methods, materials and techniques are in fact widely used and generally accepted. Furthermore, this clause cannot be used to bring widely-used methods into an unproven application. For instance, widespread use of

low-grade cemented backfill in mines that leave significant support pillars of native rock does not indicate a method or technique that is widely used in alternating stopes-type mines.

Finally, "widely-used" methods, materials, and techniques must be generally accepted as effective *in protecting the environment and public health.* Dr. Ann Maest testified that the mining of sulfide ores has uniformly resulted in the release of acid mine drainage whenever groundwater or surface water is within close proximity of the mine, as it would be here. Under this provision of Part 632, a permit applicant may not simply adopt mining techniques that have previously failed to protect water resources. It is not enough to say "this is how the mining industry does it." Kennecott must also be able to say "and it has proven adequate to protect the environment and public health." Kennecott has not borne this burden of proof.

1. **The application does not describe nor demonstrate techniques to prevent subsidence**

The permit application is completely deficient in regards to prevention of subsidence. First, Kennecott has not provided critical information about the backfill nor shown that the backfill will prevent subsidence, especially over the long term. No evidence was presented either in the application or in the contested case hearing that the backfill is capabe of standing up over time. Quite the opposite, Mr. Parker testified that "I believe the backfill will settle and leave the crown pillar unsupported." Tr 38: 7908.

Dr. Carter, a Kennecott witness, admitted that he could not predict the length of time to go along with his conclusion that the rock mass would remain stable other than to say that a blocky rock mass does not fail within hours assuming the RMR is high enough. (Carter) Tr 17:3628. He went on to admit, however, that if the RMRs drop and there is a void space, failure could occur within hours. *Id*. Performance aside, Kennecott has not even described basic elements of the mining and backfill plan. (Stone) Tr 22: 4610-11 and Tr 15: 4557-58.

Dr. Vitton testified that Kennecott's backfill plan will not provide the necessary support to prevent subsidence. As Dr. Vitton explained, the mine plan calls for backfilling using primary and secondary stopes. Tr 4:670. The primary stopes would be filled with cemented rock fill and the secondary stopes would be filled with sand or gravels. *Id.* at 670-671. Kennecott admitted that the backfill would need to last indefinitely because Kennecott would be relying on it to hold up the roof of the mine. *Id.* at 670. However, *Dr. Stone, Kennecott's backfill witness, admitted that he does not know how long the backfill will last.* (Stone) Tr 22: 4582-83.

The backfill will not last indefinitely. In the long-term, the backfill will decompose, deteriorate and settle. (Vitton) Tr 38:7937. First, the entire mining area, primary and secondary stopes, will settle. Settlement occurs over 20 to 50 years and backfill is continually settling, even when it is compacted. Tr 4: 681. Studies show that in 100 days, mine rock settles about 7 1/2%. Tr 38: 7933. Exhibit P632-168*, Slides 17-19. Settlement over 50 years is of course much greater. In one example of a mine using similar backfill material, the mine had a 34% void in the cemented aggregate; leaving roughly 34% of the backfilled space for the backfill to settle into. Tr 38: 7946.

This settlement will be exacerbated by the breakdown of the concrete in the primary stopes from acidic water and sulfate. (Vitton) Tr 5: 744. Salts and brine salt water are also known to deteriorate cemented rock fill. *Id*. at 745. Dr. Vitton testified that a condition known as Thaumasite attack is particularly prevalent in buried concrete, and it completely destroys the cementatious binding ability of the concrete, transforming it into mush. This occurs particularly in the presence of acidic groundwater. (Vitton) Tr 38: 7942. All of the conditions for Thaumasite would exist at the Eagle project, and it is a very serious concern for the cemented aggregate backfill. *Id*. at 7943. This issue has not been addressed in the application or any

subsequent materials. *Id*. Massive and semi-massive sulfide units cannot be 100% extracted. (Maest) Tr 9:1876. There will be some ore left in the walls and in the underground workings. *Id.* at 1877. Near the cemented aggregate, the pH would be closer to neutral, because of reactions with this cement. (Maest) Tr 39:8241. It is the dissolving of some of the cemented aggregate, and some of the limestone that allows the pH to become more neutral. *Id*.

Blasting is also likely to contribute to the breakdown of the backfill. The planned backfill strength of 218 psi for the primary stopes is very low for cemented rock fill that will be subjected to blast vibrations. (Vitton) Tr 4:674. In contrast, the strength of the intact rock is 10,000 to 20,000 psi. *Id.* at 675. Kennecott claims that backfill with a very low strength of 218 psi will endure blasting right next to it intended for rock with 10,000 to 20,000 psi strength. If there is not a good bond between the cemented rock fill in the host rock rebounding will occur, causing fracturing in the cemented backfill. This seems very problematic and is not comparable to what is being used in the industry. *Id.*

Finally, the strength of the cemented rock is likely to be negatively influenced by the backfill methods. Under the mine plan, the cemented rock fill would be end dumped 400 feet, causing segregation of the materials, leading to the bottom being strong and the top being very weak. (Vitton) Tr 4: 677. Liquefaction is another problem that is well described in many industry papers resulting from dumping the material down the open stopes. *Id.* Kanowna Belle Mine is a currently operating mine that attempted to use similar backfill. (Vitton) Tr 38: 7916. Segregation was an extreme problem with variations in strength throughout the backfill, causing that company to switch to cemented paste backfill. *Id.*

All of these issues of deterioration and settlement will result in a void below the crown pillar across the entire span of the mine. As explained below, the crown pillar will not be stable if

such a void develops, and yet this void is virtually certain to occur. *Infra* pp. 91-96. As Mr. Parker and Drs. Vitton and Bjornerud testified, the crown pillar is very likely to collapse. Tr 5:744; Tr 38:7937, 7991. Tr 3:466.

Mr. Stone, who was the only witness testifying for Kennecott regarding the backfill plan, admitted that the backfill was designed for safety during mining, and not for long term environmental protection. (Stone) Tr 22:4610. The backfill strength is designed only to support itself to a height of 30 meters, yet the stopes are planned to be 100m high. *Id*. at 4572 Mr. Stone was unaware of any analysis regarding the ability of the backfill to support the weight of the stopes sitting on top of them at the end of mining. *Id.* There is also no evidence that the backfill will hold up to blasting; Mr Stone testified that he did not know that anyone has yet considered a blasting plan or thought about the safety of blasting against the backfill in a disciplined way. *Id.* at 4566-68. Furthermore, Mr. Stone admitted that acid mine conditions are a problem for cemented rock fill. *Id.* at 3248. In sum, Kennecott simply has not presented evidence that the backfill is capable of accomplishing its stated objective in protecting the environment.

Kennecott has provided no evidence that thickening the crown pillar will prevent a catastrophic plug failure of the type that occurred at the nearby Athens Mine, and more recently at Rio Tinto's Palabora Mine in South Africa. (Vitton) Tr 4: 600-03; Tr 38: 7989. MDEQ's own experts very clearly believed that such a failure was a distinct possibility at this mine. However, Kennecott has presented no "actual testing, modeling, documentation by credible independent testing and certification organizations, or documented applications in similar uses and settings" to indicate that this crown pillar thickness will prevent a plug failure. In fact, the testimony indicated that the crown pillar that failed at the Athens Mine was 1,800 meters thick. Vitton Tr 4: 601. Dr. Vitton and Mr. Parker testified that thickening the crown pillar does not alleviate the

risk of plug failure. Tr 4: 707 and Tr 38: 7851. In fact, neither Kennecott nor MDEQ has offered an ounce of explanation for why the permitted 87.5m crown pillar might be any safer than Kennecott's original proposal, which Sainsbury and others agreed was unstable. From the combined testimony of Messrs. Maki, Sainsbury and Blake, we know that none of them ever conducted or reviewed any calculation that would justify the 87.5 meter final thickness of the crown pillar and that proposed crown pillar dimension remains scientifically unsupported in the record of this case.

The fact is that the crown pillar was thickened in the late stages of the permit proceedings like a bone thrown to the many experts who had weighed in on this issue, but without any supporting analysis. The attitude was "let's just thicken the pillar and call it good," without any real assessment of whether thickening the pillar would actually address the identified problem. The Part 632 statutes and regulations were designed to prevent just this sort of recklessness in the permitting process.

2. Kennecott has not demonstrated that it can segregate contaminated water and snow—and failed at the Flambeau Mine in Wisconsin

The segregation of water and snow from contact and non-contact areas for preventing releases of metals and acid mine drainage has not worked at other mines, including Kennecott's mines. (Coleman) Tr 14: 2820 and 2835. Kennecott's application does not contain any of the acceptable methods of showing that they can prevent reactive materials from blowing, spilling, or physically moving into non-contact areas. In fact, the storm water management plan is not adequate to protect natural resources. Tr 14:2819. Kennecott's witness, Mr. Liebman, revealed that "grading will be the means to separate the contact areas from the non-contact areas." (Liebman) Tr 23:4624.

The segregation of contact and non-contact waters is very difficult to implement. (Coleman) Tr 14:2820. Frequently, mine materials, particularly fine dust particles of either ore or development rock, move from contact areas into non-contact areas simply being carried as dust in the wind. *Id.* Dr. Coleman has observed contamination from non-contact water at other sites, particularly at the Flambeau Mine (Kennecott mine at Ladysmith, WI). *Id.* at 2835. Purportedly non-contact areas were contaminated by wind-born fine materials, primarily from ores that escaped onto the rail spur which was designated as part of the "non-contact" storm water area. *Id.*

At the Flambeau Mine, spillage of very fine materials along the rail spur, and tracking and spilling of fine ore materials in the parking lot occurred. (Coleman) Tr 14:2835. Contaminated runoff is present at that site. These problems caused exceedances of water quality standards at the Flambeau site. *Id.* A number of pathways created the exposure of "non-contact" areas to the transfer of mine materials. *Id.* at 2827. Contamination along the rail spur caused the contamination of "non-contact" storm water that flowed into Stream-C. *Id.* at 2826. Exhibit P632-75, slide 321. The copper standards for this receiving water are 9 and 7 micrograms per liter. *Id.* at 2836. The copper discharged into the stream exceeded those standards. *Id.* at 2837. Zinc occasionally exceeded the standard also. *Id.* at 2838.

Due to the elevation of copper at the site, the Wisconsin DNR determined that remediative action was necessary. This initiated the remediation of the rail spur, the removal of the rail spur and the ballast from that rail spur because it was contaminated.

The remediation of the rail spur has not brought Stream C into compliance with water quality standards. *Id.* Even today, the levels in Stream C are still above the applicable water quality standards. *Id.* at 2839. Exhibit P632-75, Stream C Table. The copper levels in Stream C

are above levels frequently toxic to some species of fish. *Id.* at 2842. A biological survey of that stream by the company concluded there was virtually no biota in that stream. *Id.* at 2845.

Another avenue for contaminant escape is through snow. There is virtually no information in the permit materials about snow management at the site. *Id.* at 2859. There is clear potential for movement of snow being plowed from one area to the other and contaminated snow being deposited in the non-contact area. *Id.* at 2860.

And, Kennecott has completely ignored contaminant escape via transportation, even when their own expert conceded that contaminants surely escape from trucks and rail cars. (Logsdon) Tr 20: 4260. Fine dust can be tracked by vehicles or sift out of trucks. (Coleman) Tr 14: 2820-21. "Spillage" from trucks occurs when materials fall through the bottom of trucks or cling to the outside of the truck. *Id.* There is very little information in either the mine permit application or the EIA about the transportation route and potential impacts to the natural resources along it. *Id.* at 2828. Hauling of ore can cause contamination of haul routes through the loss of fine materials along the route. The proposed haul route between the mine site and the rail loading area is 65 miles. The ore is high in sulfur and minerals. *Id.* If these materials escape onto the haul road, particularly the fine materials which have a large surface area compared to their volume, they would readily react with air and water to leach materials along the route. *Id.* at 2828-29.

3. Kennecott has not demonstrated that the TDRSA will prevent the release of Acid Mine Drainage

Instead of demonstrating the Temporary Development Rock Storage Area (TDRSA) would not leak, Kennecott's application admitted its potential leakage rate; the application states "the theoretical leakage through the liner design is .000511 inches per acre per day." (Starke) Tr 23: 4709. In fact, Starke, Kennecott's TDRSA engineer, said "I can't guarantee the performance

of a facility or an operation." *Id.* at 4710. Mr. Starke is not 100% sure that there will not be leachate escaping from the system. *Id.* at 4709. Likewise, Ms. Ring is not 100% sure that the system will not leak. (Ring) Tr 31:6564. The permitted actionable flow rate through the TDRSA of 25 gallons per acre per day is based upon municipal landfill requirements. *Id.* at 6541. 25 gallons per acre per day is a trigger for specified response. *Id.* at 6542. As permitted, nothing happens if the leakage rate of the liner is 24 gallons per day per acre. *Id.*

Dr. Coleman testified that the TDRSA which has been identified as an area to store contact snow (snow that has been exposed to contaminants from the mining process), is not sized to handle the volume of snow that falls on the Yellow Dog Plains, and that there seems to be no accounting for the volume of snow in the sizing of the TDRSA. Tr 14:2862. Kennecott's Mr. Starke admitted that the TDRSA will not be able to be used for snow storage once it is covered. (Starke) Tr 23: 4689. In fact, Kennecott has no particular plan for snow storage once the TDRSA is full of development rock. No calculations have been performed to assess whether or not the drain system could handle the volume of water. (Coleman) Tr 14:2864. Ms. Ring is concerned about the TDRSA being used as an overflow for contact water basins because the TDRSA would not have that much storage capacity due to the head limits. (Ring) Tr 31: 6558.

In a similar vein, Ms. Ring of MDEQ admitted that she did not know whether the TDRSA might fail to contain acid mine drainage in a 50 or 100-year storm event, and that she did not think such an event had been modeled. (Ring) Tr 31: 6569. As to the HELP model that was used to assess the adequacy of the TDRSA, Ms. Ring admitted that the HELP model was designed to assess landfills, and that significant differences between the TDRSA and landfills brought the value of that model into question. *Id.* at 6561.

Starke admitted that the foundation load on the TDRSA would be significant and large, but that he had assumed minimal settlement; he could not recall any calculation providing a basis for that opinion. (Starke) Tr 23: 4703.

Kennecott has not met its burden for showing that the TDRSA is capable of segregating contact water, nor does the application include information that demonstrates that water and snow storage methods are capable of accomplishing their stated objectives in protecting the environment and public health.

4. The permit application does not show that the air raise vent filter will be effective

Petitioners have presented extensive testimony that the deposition of air pollutants in the area surrounding the mine and downwind on the Huron Mountain Club will impair natural resources through an increase in heavy metals and sulfur. *See infra* at 120-122. Kennecott has not countered the evidence that at the level at which pollutants would be emitted from the air raise vent (which will vent dust-laden air from the mine workings) without controls, these pollutants would significantly impact the Salmon Trout River and the pristine condition of the Huron Mountain Club. Instead, the company argues that with the addition of a fabric filter, pollutants will be controlled to the extent that the pollution will no longer be significant.[3]

The company has presented no evidence that a fabric filter has ever been used in this type of application before, or that it will perform effectively here. Once again, this control equipment was added late in the game to meet public objections, without any real analysis of whether the fix would work. Kennecott has yet to provide any specifications for its proposed control equipment. In regards to the filter itself, not only does the permit application lack a demonstration that the material is capable of protecting the environment, *we do not even know what the material is.*

[3] Petitioners do not in any way concede that if the controls operate as planned, the amount of deposition of pollutants will be insignificant.

Mr. Maki of MDEQ admitted that there is no information available concerning the air raise vent filter. (Maki) Tr 31: 6370. He admitted that he has no information about a fabric filter ever being used on a mine vent raise before, and that he has not seen a description or assessment of whether or how the filter would work. *Id.* at 6369-70. Mr. Maki nonetheless agreed that MCL 324.63205(2)(c) requires that the application include a description of materials, methods and techniques that will be utilized in connection with designing the mine. (Maki) Tr 30: 6301. It could not be more clear that this statutory requirement has not been met.

5. Kennecott has not demonstrated that its wastewater treatment plant will be effective, nor even decided what it would entail

Part 632's demonstration requirement applies to the wastewater treatment plant (WWTP), a component of the mine plan that Kennecott claims is designed to prevent impacts to ground and surface water. Kennecott has not demonstrated that the WWTP will be effective. In fact, Kennecott's WWTP designer admitted that he has no knowledge of a comparable system at any mine anywhere in the world. (Fassbender) Tr 21: 4476 and 4496.

According to Dr. Glenn Miller, an environmental chemist and professor at the University of Nevada-Reno with special expertise in wastewater treatment of acid mine drainage, the proposed wastewater treatment plant (WWTP) is "unprecedently complicated." Tr 11:2161. Dr. Miller has never seen another mine treatment system that had used all of the components proposed by Kennecott in that configuration anywhere in the world. *Id.* at 2168, 2201, 2203, 2265. Although the individual processes have been used elsewhere, putting them together in a single, sequenced system is not a simple matter of adding together their removal efficiencies. *Id.*

Ms. Kristin Mariuzza, who was responsible for reviewing the proposed system for MDEQ, testified that she had never seen or analyzed a system like this one before, and that its

configuration is "unique." Tr 32:6665-6666, 6684. She had no knowledge of any other system in the world configured in this way. *Id.* at 6680. Ms. Mariuzza agreed that the treatment system is a sequence of processes, and that the failure of pretreatment processes can impact the effectiveness of the reverse osmosis process. Tr 32:6678. In her review of the system, she did not consider whether the integration of individual processes into a connected system has any treatment implications; she merely "look[ed] at each unit processes separately and look[ed] at the effluent from one process and assume[d] that's the influent to the next process and down the line." *Id.* at 6681.

Despite its uniqueness and complexity, no pilot or bench scale testing of the WWTP was submitted to MDEQ to demonstrate its effectiveness. Kennecott's projections of treatment efficacy were based on manufacturer data rather than testing. (Miller) Tr 11: 2167; see also (Fassbender) Tr 21:4447, 4501-4503; Ex R-151 Appendix G-1. At the hearing, Mr. Fassbender testified that a treatability study had been performed on the WWTP. Tr 21:4468. *That study was not submitted to MDEQ or the public, nor was it described in the application materials*. (Mariuzza) Tr 32: 6684-6685. As such, it cannot meet the requirement that the mining plan include information that demonstrates that all methods proposed to be utilized are capable of protecting the environment. In addition, the treatability study did not involve the volume of inflow predicted at the mine, and it only addressed Kennecott's estimated influent quality, not quantity. (Fassbender) Tr 21:4503. Additionally, the study did not evaluate the ability of the system to treat higher concentrations than estimated by Kennecott, such as those predicted by Dr. Maest. *Id*. at 4504.

Critical components of the WWTP are not finalized, further underscoring the untested and unknown nature of the system. The application states that Kennecott may use an ion

exchange system in lieu of the second pass reverse osmosis system for purposes of treating boron. Dr. Miller testified that this is a major change in configuration and process, not a minor substitution. Tr 11: 2169-2170, 2209, 2212. Furthermore, at the hearing Mr. Fassbender revealed that Kennecott will "most likely" forward reverse osmosis reject water directly to the evaporator and eliminate the CRP process described in the application – but that he is still evaluating the alternatives. Tr 21: 4450-4451. First Kennecott would have to finalize its plans, and then significant engineering design and testing will be necessary before Kennecott could even claim to have demonstrated anything about the WWTP's ability to effectively treat the expected influent. (Miller) Tr 11: 2214.

On the other hand, the evidence in this case indicates that the treatment system is not likely to be effective. The reverse osmosis process, which is very important to the WWTP, presents unique treatment problems. Reverse osmosis is commonly used in situations with constant quality of water, such as desalinization of ocean water, but here the water quality will be variable, impacting its effectiveness. (Miller) Tr 11: 2189. Mr. Fassbender admitted that variability is a problem with reverse osmosis systems. Tr 21: 4524. In addition, Dr. Glen Miller has never seen it used on a continuous basis without "down time" to allow for maintenance, repair, cleaning, and membrane replacement. At most, those systems are operated for four to five days per week to allow for necessary management. Here, if the influent volume is at or near the design capacity, the system will be operating on a constant basis 24 hours per day, seven days per week, which, to Dr. Miller's knowledge, has never occurred at a mine. Tr 11: 2206-2207, 2265. Mr. Fassbender, who designed the WWTP, also did not know of any other examples of continual operation at a mine. Tr 21: 4497. Ms. Mariuzza did not know, nor did

she investigate, whether any other mine treatment system utilizes reverse osmosis on a continuous 24 hour per day, 7 day per week basis. *Id.* at 6680-6681, 6682.

The WWTP is also sensitive to the quality of the influent, especially for boron and copper. (Miller) Tr 11:2173-2174. For those parameters, the expected effluent levels are very close to the discharge limits, and slight variations in treatment effectiveness can cause exceedances. *Id.* Higher concentrations in the influent can also foul the reverse osmosis membranes, negatively impacting the system's effectiveness. *Id.* Fouling will put the treatment system under stress, and significantly undermine its effectiveness. *Id*. at 2175 and 2207. If the water quality is worse than predicted, the WWTP will require redesign. *Id*. at 2175, 2182, 2210.

As illustration of this point, Dr. Miller compared the influent levels predicted by Dr. Maest to those predicted by Kennecott. The levels of calcium and sulfate predicted by Dr. Maest would create large volumes of gypsum crystals that would foul the system. *Id.* at 2173-2175. Other parameters, such as metals, would exceed permit discharge limits even under the treatment efficacy assumptions used by Kennecott. The copper discharge would exceed limits if treatment was slightly less effective than predicted by Kennecott, even if concentrations are lower than Dr. Maest's estimate. *Id*. at 2181-2182. If concentrations of copper are near Dr. Maest's estimate, the copper discharge will exceed the limit by a factor of 70. *Id*. at 2220.

Boron is also a critical parameter at the mine. *Id.* at 2202-03. Boron is harmful because it prevents plant growth and is sometimes used as a soil sterilant. *Id.* Based on Kennecott's data, the level of boron in the expected influent is an order of magnitude higher than the discharge limit. Thus approximately 90 percent of the boron must be removed by treatment. Because the discharge limit is so close to the expected effluent level, any drop in treatment performance will quickly cause an exceedance. *Id.*

In sum, Kennecott has not submitted "actual testing, modeling, documentation by credible independent testing and certification organizations, or documented applications in similar uses and settings" indicating that the WWTP will be effective in protecting the environment, as required by MCL 324.63205(2)(c)(ii).

It is clear that the requirements of Part 632 apply to processes that are also covered by other permits when they are less protective. Part 632 states that in determining whether the mining operation will pollute, impair or destroy natural resources MDEQ must consider protection provided by other permits, and the extent that such permits do not afford the degree of protection provided by Part 632, Part 632 adds an additional layer of analysis and protection. MCL 324.63205(11)(b). In this instance, there is no credible argument that Part 632's standards do not apply the Wastewater Treatment Plant because it is included in Kennecott's own Part 632 application.

C. Contingency Plans are Nonexistent or Completely Inadequate

Part 632 requires that a contingency plan be included in a permit application. The contingency plan must include "an assessment of the risk to the environment or public health and safety associated with potential significant incidents or failures and describes the operator's notification and response plans." MCL 324.62305(2)(d). Potential significant incidents or failures that must be addressed include the release or threat of release of toxic or acid-forming materials, failure of the wastewater collection and treatment system, failure of tailings disposal embankments, air emission control failures, unplanned subsidence, and leaks from containment systems for stockpiles or storage facilities. Rule 205(1)(a). Kennecott's purported, but inadequate, contingency plan is found at page 96 of the mine permit application.

Mirroring the EIA, the contingency plan completely fails to assess risk to the environment and/or response plans for any of the types of significant incidents or failures mentioned above. Incredibly, Kennecott simply asserts that the mine is designed to prevent failures from occurring, and thus concludes that they will not occur. The thinking here is somewhat tautological. If the mine were not designed so that failures would not occur, the mine could not be permitted. It is difficult to imagine what the requirement for a contingency plan means, and in what circumstance an actual plan would be necessary applying Kennecott's twisted logic.

The intention of the statute and regulation is that the contingency plan must describe the impact on the environment and the response if each particular failure were to occur, regardless of the applicant's plans and intentions. Surely, we do not need the level of expertise that has been present in this Tribunal to know that accidents sometimes happen and things sometimes go wrong. In fact, Kennecott's Dr. Carter admitted that "accidents do happen." (Carter) Tr 17: 3649. Jack Parker agreed that in sulfide mining, accidents do happen and things do go wrong. (Parker) Tr 38: 7884. Michigan's new law requires that mining companies reveal the potential impacts of accidents before it obtains a permit.

Specific examples from the contingency plan are illustrative. The entire discussion of berm failure reads,

> Embankment failure of the CWBs or the TDRSA is not likely due to the very small height of the embankments, and the flat slopes and the stable nature of the onsite foundation soils at the site. Due to the short embankment height and excellent foundation soils on-site, berm failure is a very nominal risk. In addition, all construction will be under strict QA/QC procedures to verify good construction of the embankments.
>
> Overtopping of the CWBs is also very unlikely due to 2 ft freeboard above an already very conservative design. In addition, in the event of a catastrophic flood

> event, the TDRSA will be used for excess water storage.[4] Erosion on the external berm slopes could be caused by unusually high precipitation. Erosion control contingency measures will be to quickly repair potential rutting or other soil instability with conventional earth moving equipment.

Application, p.94. Not one word is said about the impact to the environment or the operator response if a berm does fail.

Discussion of air emissions is lengthier, but not a word is said about emissions from the primary emissions source, the air raise vent. The text regarding accidental emissions from the surface backfill facility reads in its entirety,

> Portland cement and fly ash[5] will be incorporated as a binder for aggregate material used in backfilling primary stope areas underground. The cement and fly ash will be unloaded at the surface and stored in silos at the surface backfill facilities. Controls will be incorporated to minimize fugitive dust emissions during this process. Controls will include use of a truck mounted pneumatic conveying system, vent fabric collectors and enclosed screw conveyors. While it is anticipated the risk of accidental emissions from these operations is moderate, KEMC will be prepared to take appropriate corrective action if an upset condition should occur.

Application, p. 96. Despite the admission of a moderate risk of accidental emissions, no mention is made of the environmental impact and no detail beyond "appropriate corrective action" is given for a response plan.

The discussion of unplanned subsidence reads,

> The contingency measures to be taken in the event unanticipated surface subsidence occurs will be initiated based on subsidence monitoring. Subsidence monitoring will be performed at two locations above the ore body, adjacent to the overlying wetland. In the event of unanticipated subsidence, the mining sequence and backfill methods as described above and in Section 4, will be evaluated and adjusted to reduce the subsidence. Adjustments to the stope sequence, backfill methods, crown pillar thickness, and backfill mix would be adjusted as needed to minimize subsidence.

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[4] Note permit conditions preclude use of the TDRSA for excess water storage.

[5] Note that Ms. Ring of MDEQ is uncertain as to whether Kennecott is still planning to use fly ash in its backfill (Tr 31:6560); fly ash inclusion is a significant issue in considering backfill composition and strength capacities as well as carrying geochemical concerns.

Application, p. 99. Once again, impacts on the environment go completely unmentioned. As for the "response plan," here again the level of detail is so low as to be meaningless. Kennecott has provided no indication that any of these types of adjustments would be successful at arresting subsidence once it has begun. This so-called contingency plan is particularly puzzling and offensive because of Kennecott's Dr. Carter's assessment that *"[f]or crown pillar collapses and hard rock mines, you don't see subsidence; you just have a collapse."* Tr 17: 3647. *Dr. Carter would not say that the crown pillar will be 100% sure not to collapse.* Tr 17: 3648. *Dr. Carter conceded that in mining, like any other industry, "accidents do happen."* (Carter) Tr 17: 3649.

Permit requirements intended to address contingency situations do very little to remedy this critical deficiency in Kennecott's case. See Exhibit R-117, Mining permit p. 28, subsection (M) ("Contingency section"). The section includes no discussion of subsidence or crown pillar failure. (Maki) Tr 30: 6173. Indeed, Mr. Maki admitted that MDEQ had set no standard that would indicate that crown pillar stability had become an issue and that Kennecott needed to begin contingency measures, whatever they might be. (Maki) Tr 31: 6494. The permit is equally silent on other potential catastrophic failures. (Maki) Tr 30: 6173. There are no contingency requirements in the event that the wastewater treatment plant must close for period of time, in the event of a greater inflow of groundwater to the mine than predicted by Kennecott, in the event of a failure of the vent raise filtering system, or in the event that contaminated water leaks into aquifers from the underground mine. (Maki) Tr 30: 6175.

Initially, Mr. Maki stated that permit section L served as a contingency plan for a mine inflow of over 60 gallons per minute because "it identifies a threshold and if that threshold is met, the contingency is that they must stop pumping." (Maki) Tr 31:6505. When asked to read the permit, however, Mr. Maki admitted that the permit includes no requirement that the

company stop pumping at any time. Mr. Maki admitted that the "contingency plan" requires only additional monitoring, and backtracked saying, "I wouldn't call monitoring a contingency plan." *Id.* at 6506. Special condition L10(d) requires that a remedy proposal be submitted to MDEQ within 30 days if mine dewatering exceeds 300,000 gallons per day, but contrary to Mr. Maki's prior understanding, the permit allows dewatering to continue during those 30 days and beyond. Exhibit R-117, *Id.* at 6509. The permit requires that a remedy proposal be prepared once it appears certain that wetlands will be impacted by the mine inflow rate, but at that point the horse will already be out of the barn.

Nothing has been submitted by Kennecott during the permitting proceeding or before this Tribunal that indicates that if the inflow is greater than expected, it will at that point be possible to reduce inflow into the mine to the point that wetlands and the Salmon Trout River are not affected.

In summary, the permit application includes no contingency plan, and the permit's contingency measures do not address the greatest threats to the environment from "potential significant incidents or failures." This alone is grounds for denying this permit.

D. Worker Safety Not Adequately Addressed

In addition to disregard for the environment, Kennecott has shown disregard for the safety of its potential workers at the mine site, most obviously by the application's lack of addressing the danger of a mine fire. (Parker) Tr 38: 7881. Fire is a concern in underground mines, although the application makes light of fire danger. (Parker) Tr 3:411-12. Common occurrences leading to underground mine fires were not addressed in the application. *Id*. The application's conclusion that fire risk at this mine is negligible is ridiculous. *Id*. This is just one more example of how Kennecott's application is wholly unrealistic.

IV. MDEQ FAILED TO APPLY THE LAW

It should go without saying that MDEQ must follow the applicable statute and regulations when making a decision to issue or deny a permit. *See, e.g., Consumers Power v PSC*, 596 NW2d 126, 131-32 n.8; 460 Mich 148 (1999) ("An agency interpretation cannot overcome the plain meaning of a statute."); *City of Romulus v Dep't of Environmental Quality*, 678 NW2d 444, 452-53; 260 Mich App 54 (2003) (court "will not defer to the administrative agency's interpretation of a rule where the language of the rule is unambiguous"); *De Beaussaert v Shelby Tp*, 333 NW2d 22, 23; 122 Mich App 128 (1982) ("Once an agency has issued rules and regulations to govern its activity, it may not violate them.").

Unfortunately, this point seems to have been lost on the agency. Mr. Maki, who was head of the mining team and responsible for the recommendation to issue the permit, admitted in his testimony that many of the regulatory requirements were not met. Particularly troubling is Maki's admission that neither he nor the mining team applied the statute's keystone provision. *When asked whether he applied the standard of the applicant having to demonstrate that they would not pollute, impair or destroy the air, water or other natural resources, Mr. Maki stated that he did not apply this section of the statute to his analysis. (Maki) Tr 30:6310-12. Additionally, the Mining Team did not apply this section of the statute to its analysis. Id. at 6312. Mr. Maki headed the Mining Team that was responsible for recommending approval or denial of the permit. Id. at 6311.* In light of this admission, the decision to grant the permit must be overturned.

A. MDEQ Improperly Found the Application to be Complete.

Many required items were completely missing from the Mining Permit Application and Environmental Impact Assessment that Kennecott originally submitted to MDEQ; the evidence

in this proceeding has not patched the gaping holes. The application was missing most of the requisite two years of data for flora and fauna; Mr. Maki testified that the EIA contained only one 7-month set of data on flora and fauna. (Maki) Tr 31:6383. Mr. Maki also testified that the requisite discussion of the impacts of transportation was not included in the EIA. *Id.* at 6336 and 6338. In addition, there was no delineation of the affected area, no quantitative information about noise and lights, and virtually no information about hydrology of the bedrock. But despite these clear deficiencies, MDEQ first found the application to be "administratively complete"[6] and then granted the permit. *See* MCL 324.63205(4). This determination begins a very tight statutory timeframe for processing the application. *See* MCL 324.63205(6)-(9).

The information that must be included in the permit application and EIA is not subject to MDEQ's discretion. Certain information is necessary in order to fully inform the public and MDEQ of the resources at risk and the potential impact on those resources if a mine is permitted and to facilitate a meaningful technical review. The whole rationale behind environmental impact assessments is to have complete information about the potential environmental impacts in front of the agency *before* it undertakes the decision-making process. *Cf. Pennaco Energy v US Dep't of Interior*, 377 F3d 1147, 1159 (10th Cir. 2004) (federal agencies must satisfy environmental review requirements "before committing themselves irretrievably to a given course of action, so that the action can be shaped to account for environmental values,"); *Idaho Sporting Congress v Alexander*, 222 F3d 562, 567 (9th Cir 2000) (federal environmental assessments "must be prepared early enough so that they can serve practically as an important contribution to the decision-making process and will not be used to rationalize or justify decisions already made").

[6] Some Petitioners in this case previously challenged the MDEQ determination that the application was "administratively complete."

In this case, MDEQ's failure to require the submission of all required information before the application was deemed complete and the permit approved fatally compromised its own decision-making process, as well as the public's right to participate on a fully informed basis. The permit should thus be denied.

B. MDEQ Ignored the Criticism of its Own Expert

Dr. David Sainsbury of Itasca Consulting in Minneapolis, Minnesota was hired to conduct the rock mechanics evaluation. (Maki) Tr 30:6171. Dr. Sainsbury's charge was to review Kennecott's application, determine if there was enough information to do a thorough review and, if not, to provide comments on what information was necessary. (Maki) Tr 31:6385. Dr. David Sainsbury was the only person on the MDEQ Mining Team capable of reviewing, understanding or analyzing the rock mechanics. (Maki) Tr 30:6251-52. No one at MDEQ had rock mechanics expertise. (Maki) Tr 31:6387. Mr. Maki did not retain any of Sainsbury's reports and admitted to deleting at least one of them. (Maki) Tr 30:6238 and 6250.

Mr. Maki admitted to deleting Sainsbury's May 5 report from his e-mail. Tr 30:6238. Mr. Maki admitted that Dr. Sainsbury was highly critical of Golder and Associates. Tr 31:6381 However, Golder continued to be the principal supplier of data to the MDEQ in connection with the rock mechanics analysis in the application, and MDEQ continued to rely on the Golder data, even after learning that the Golder data was the subject of heavy criticism from MDEQ's experts. Tr 31:6381-82.

Mr. Maki indicated that in fact, none of the deleted sections of Sainsbury's earlier reports were overly technical. (Maki) Tr 30:6247. However, Mr. Maki still felt that this information was not useful to him in reviewing the Eagle Project. *Id.* at 6249. Mr. Maki admits that he never considered the FOIA implications of deleting the file. (Maki) Tr 31:638.

Dr. Sainsbury wrote in his memo to Mr. Maki, "*the long term time-dependent behavior of the Eagle crown pillar was not considered in any of the analyses*." Tr 31:6398. To Mr. Maki's knowledge, Sainsbury's concern about the long-term time-dependent behavior of the crown pillar still *has not been considered. Id.* at 6401. Mr. Maki admitted that he understands Sainsbury point, but did not ask about it. *Id.* at 6399.

Nothing in the record reflects that Dr. Sainsbury actually ever reconsidered the issues he raised including time-dependent behavior of the crown pillar, effects of the mine on the Salmon Trout River, and relevance of the Athens mine to this mine site or that he was ever actually satisfied with the response on all of the issues that he raised. (Maki) Tr 31:6492.

Despite Dr. Sainsbury's concerns, Mr. Maki has never asked Kennecott how the Salmon Trout River would be affected by the underground mining. (Maki) Tr 30:6393. Mr. Maki, couldn't think of any reason why he never asked about the effects on the Salmon Trout River, even though he admitted the river is at the very heart of the public concerns about the project. Tr 31:6394-95.

Mr. Maki admitted that "*nothing has been done*" about the information he learned regarding Dr. Sainsbury's continued criticism of the rock mechanics work in Kennecott's application. Tr 31:6356. Yet, the permit was signed on December 14, 2007. Exhibit R-117.

On November 9, 2006, Sainsbury sent a memo to Mr. Maki among others stating proposed limitations for the project. (Maki) Tr 30:6228. On that same day, Dr. Sainsbury sent an e-mail message to Andre van As at Rio Tinto stating:

> In my, and the states [sic] opinion, the rock mechanics issues at Eagle are going to be a potential stumbling block for the project. The rock mechanics work conducted thus far, which forms the basis of the mine permit application, is not defensible. Some of the analyses conducted actually indicate that crown pillar stability should be a serious concern. The main difficulty with the review process thus far has been the lack of Kennecott/Rio Tinto [] associated with the project

> that have an understanding of the rock mechanics issues. I would like to keep Rio Tinto in the loop on the rock mechanics review process. Can you advise if there is anyone from Kennecott/Rio Tinto with rock mechanics input on this project? P632-174**[7].

Mr. Maki has not, nor is he aware that anyone at MDEQ has followed up with Dr. Sainsbury regarding his e-mail of November 9, 2006 to Andre van As of Rio Tinto. Tr 31:6356-57.

Mr. Maki attended Dr. Sainsbury's deposition held on June 7, 2007, in which Dr. Sainsbury discussed this message. Tr 31: 6498. Exhibit I-626, p. 47. Mr. Maki learned of this e-mail in June of 2007, approximately six months before the proposed decision to grant the permit was announced, yet did nothing. *Id.* at 6500.

Mr. Maki and other department staff relied on Dr. Sainsbury's November 9, 2006 and March 2, 2007 documents to support the issuance of the permit with limitations. Tr 31:6469-70. Exhibits R-75 and R-92. However, *there is nothing in the record to reflect that Dr. Sainsbury actually ever reconsidered the issues he raised including time-dependent behavior of the crown pillar, effects of the mine on the Salmon Trout River, and relevance of the Athens mine to this mine site or that Sainsbury was actually satisfied about the issues that he raised. (Maki) Tr 31:6492.*

In his position as head of the mining team, Mr. Maki immediately shared Dr. Sainsbury's concerns with Kennecott, but did not require Kennecott to actually address them, and thus the recommendation to issue the permit was made without any response to these objections. As testified by Mr. Maki:

- Mr. Maki did not ask about Kennecott's use of a rating of ten for the rock mass rating factor indicating dry conditions, despite the fact that the rock was saturated. (Maki, p. 6396, lines 3-22).

- Mr. Maki did not ask Kennecott about horizontal stress figures at the White Pine Mine and their implications for the Eagle Mine. (Maki, p. 6397, lines 8-11).

[7] Exhibits marked with two asterisks (**) indicate that they were offered, but not admitted; Petitioners maintain that they should have been.

- Mr. Maki did not ask Kennecott about the long-term time-dependent behavior of the Eagle crown pillar. (Maki, p. 6399, lines 3-7). To Mr. Maki's knowledge, the long-term time-dependent behavior of the crown pillar has never been considered to date. (Maki, p. 6401, lines 1-6).

- Kennecott was never asked to do an analysis of the Athens Mine collapse relative the design of the Eagle Mine. (Maki, p. 6401, lines 19-23). In fact, Mr. Maki excluded all questions to Kennecott about other mines that Sainsbury considered relevant. (Maki, p. 6402, 5-8).

- Mr. Maki did not ask Kennecott about induced horizontal strain in relationship to the fact that the mine would be underneath a water body. (Maki, p. 6404, lines 3-7).

- Mr. Maki did not request drillers' logs indicating water loss during drilling, which provides important indications of hydrogeologic conditions.

Dr. Sainsbury believed that all of these issues were important to an assessment of the stability of the crown pillar, and yet MDEQ ignored them. During the public comment period, Petitioners submitted comments containing very similar questions and concerns.

Mr. Maki admitted that to this day "*nothing has been done*" about the information he learned regarding Dr. Sainsbury's continued criticism of the rock mechanics work in Kennecott's application. Tr 31:6356.

C. MDEQ did not Apply the Relevant Environmental Standards

Part 632 makes clear that MDEQ may not issue a permit unless it makes a determination that "the proposed mining operation will not pollute, impair, or destroy the air, water, or other natural resources, or the public trust in those resources, in accordance with Part 17 of this act." MCL 324.63205(11)(b). Mr. Maki was equally clear in his admission that he and the mining team did not consider this standard when making the recommendation to approve the permit. (Maki) Tr 30: 6309-12. It is also clear from Mr. Maki's testimony that he did not understand the meaning of Kennecott having the burden of proving that its mining operation would not harm the environment. *Id*. When an agency has so completely failed to consider the applicable law in its

decision making, its decision cannot stand. *Cf. Florida Dept of Labor v US Dept of Labor*, 893 F.2d 1319, 1322 (11th Cir 1990) ("If the agency has misapplied the law, its order cannot stand."); *Getty v Federal Savings and Loan Ins Corp*, 805 F.2d 1050, 1056 (DC Cir. 1986) (overturning agency decision where decision-making record contained no evidence that agency considered factors it was mandated to consider by statute).

V. KENNECOTT HAS NOT MET ITS BURDEN OF SHOWING THAT THE PROPOSED MINE WILL NOT HARM THE ENVIRONMENT

Part 632 includes several substantive standards that a permit applicant must meet. These standards are addressed separately below.

A. Kennecott has not Shown that the Proposed Mine will not Pollute, Impair or Destroy Natural Resources

Part 632 prohibits the approval of a mining permit unless the applicant has shown that "the proposed mining operation will not pollute, impair, or destroy the air, water, or other natural resources or the public trust in those resources, in accordance with part 17 of this act." MCL 324.63205(11)(b). To reiterate, *the burden is on the permit applicant* to present a plan that assures that the mine will not, despite all good intentions, end in the pollution, impairment, or destruction of natural resources.

MEPA expressly applies to administrative proceedings and contested case hearings. Section 1705(2) of MEPA says:

> (2) In administrative, licensing, or other proceedings, and in any judicial review of such a proceeding, the alleged pollution, impairment, or destruction of the air, water, or other natural resources, or the public trust in these resources, shall be determined, and conduct shall not be authorized or approved that has or is likely to have such an effect if there is a feasible and prudent alternative consistent with the reasonable requirements of the public health, safety, and welfare.

MCL 324.1705(2). Section 1705(2) expressly prohibits an administrative agency from authorizing or approving conduct that will have the effect of polluting, impairing or destroying the air, water or other natural resources.

B. Part 632 Places the Burden on the Applicant to Prove no Pollution, Impairment or Destruction of the Air, Water or Other Natural Resources

Section 63205(12) requires MDEQ to deny a proposed mining permit if MDEQ determines that the applicant has failed to show that the proposed mining operation will not pollute, impair or destroy the air, water, or other natural resources pursuant to MEPA and case law interpreting MEPA. The phrasing of Section 63205(12) importantly places the burden of proving no pollution, impairment or destruction under MEPA on the applicant.

The phrasing of Section 63205(12) is plain and unambiguous. Section 63205(12) does not say that the MDEQ shall deny a mining permit if the MDEQ finds that the proposed mining will pollute, impair or destroy the environment pursuant to MEPA. Section 63205(12) points back to Section 63205(11), which requires MDEQ to approve a mining permit if the applicant demonstrates that the proposed mining operation will *not* pollute, impair or destroy the environment pursuant to MEPA.

Put another way, Petitioners' burden in this contested case is not to show that the proposed mining operation will pollute, impair, or destroy the environment, but to show that Kennecott has failed to establish that its proposed mining operation will not pollute, impair or destroy the environment. Thus, Part 632 instructs this Tribunal to employ every presumption in favor of protecting the environment.

Second, Section 63205(11)(b) and Section 63205(3), by placing the burden on Kennecott to prove that its proposed mining operation will not pollute, impair or destroy the environment, are consistent with Part 632's legislative findings, which include:

> Sec. 63202. The legislature finds that:
>
> (a) It is the policy of this state to foster the conservation and development of the state's natural resources.
>
> * * *
>
> (e) Nonferrous metallic mineral mining may be an important contributor to Michigan's economic vitality. The economic benefits of nonferrous metallic mineral mining shall occur *only* under conditions that assure that the environment, natural resources and public health and welfare are adequately protected.

MCL 324.63202 (emphasis added). This provision subordinates development of nonferrous metallic mining by applicants to the protection of the air, water and other natural resources from pollution, impairment or destruction, as set forth in Section 63202(e).

This state's policy to foster the conservation and development of the state's natural resources, as stated in Section 63202(a), is derived from the Michigan Constitution. Article 4, §52 of the Michigan Constitution declares:

> The conservation and development of the natural resources of the state are hereby declared to be a paramount public concern in the interest of the health, safety and general welfare of the people. The legislature shall provide for the protection of the air, water and other natural resources of the state from pollution, impairment and destruction.

Const 1963, art 4, §52. Although it might be argued that "conservation" and "development" of natural resources are equal, they are not. In *Whitaker & Gooding Co v Scio Twp*, 117 Mich App 18, 21-22 (1982), the court said:

> Although the constitution initially declares that both conservation and development are of paramount public concern, the constitution does not state that the public concern is to promote the development of natural resources.

C. MEPA Section 1705(2) Requires MDEQ to Deny a Permit That Will Have the Effect of Pollution, Impairment or Destruction of the Air, Water or Other Natural Resources.

Section 1705(2) constitutes a power delegated to MDEQ by statute. Agencies have only those powers delegated to them by statute. *In re Quality of Service Standards for Regulated Telecommunications Services*, 205 Mich App 607, 613 (1994), quoting *Coffman v State Bd of Examiners in Optometry*, 331 Mich 582, 588-90 (1951). Thus, MDEQ has the authority under Section 1705(2), and, by the plain language of the statute, the duty to not approve conduct that likely will pollute, impair or destroy the air, water or other natural resources.

The only Michigan appellate court that has interpreted MEPA Section 1705(2) is the seminal *West Michigan Environmental Action Council v Natural Resources Commission*, 405 Mich 741 (1979). In *WMEAC*, the Supreme Court cited the predecessor of Section 1705(2), former MCL 691.1205(2),[8] as support for its statement:

> The environmental protection act would not accomplish its purpose if the courts were to exempt administrative agencies from the *strict scrutiny* which the protection of the environment demands.

405 Mich at 754 (emphasis added). Thus, *WMEAC* holds that both courts and administrative agencies must employ the stringent strict scrutiny standard when applying Section 1705(2) to protect the environment.

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[8] (2) In any such administrative, licensing, or other proceedings, and in any judicial review thereof, any alleged pollution, impairment or destruction of the air, water or other natural resources or the public trust therein, shall be determined, and no conduct shall be authorized or approved which does, or is likely to have such effect so long as there is a feasible and prudent alternative consistent with the reasonable requirements of the public health, safety and welfare.
Former MCL 691.1205(2).

Even though the strict scrutiny test ordinarily applies to state action in constitutional jurisprudence,[9] the concept of strict scrutiny is inherent in MEPA. The test of "pollution, impairment or destruction" under Section 1705(2) requires an agency to strictly scrutinize conduct of a party that will likely have the effect of polluting, impairing or destroying the air, water or other natural resources in the absence of a feasible or prudent alternative. That is why Section 1705(2) prohibits an agency from authorizing or approving conduct that will have such an effect.

SOAHR has held that Section 1705(2) must be considered in administrative hearings. *In re Petitions of Anglers of the Au Sable*, Order dated February 22, 2006. In *Anglers*, however, SOAHR determined that compliance with Part 31 of NREPA constituted compliance with MEPA. This latter ruling in *Anglers* is distinguishable, however, because Part 632 expressly incorporates MEPA, and therefore incorporates Section 1705(2). Thus, the rule required in this case is that the MDEQ must employ the prohibition contained in Section 1705(2) at every step of the permit process.

D. The Meaning of "Pollution," "Impairment" and "Destruction" in MEPA and Part 632

Neither Section 1705(2) nor the other sections of MEPA define the words "pollution," "impairment" and "destruction". The Supreme Court has held that these terms, while broad, nevertheless have acquired meaning in Michigan jurisprudence:

> While the language of the statute paints the standard for environmental quality with a rather broad stroke of the brush, the language used is neither illusive nor vague. "Pollution," "impairment" and "destruction" are taken directly from the

[9] "Strict scrutiny" is a test developed under federal jurisprudence when a claimant challenges a regulation restricting rights protected under the First and Fourteenth Amendments to the United States Constitution. Under strict scrutiny, the state must show a "compelling state interest . . . that . . . is narrowly drawn to achieve that end." *In re Request for Advisory Opinion Regarding Constitutionality of 2005 PA 71*, 479 Mich 1, 22 n 45, citing *Burson v Freeman*, 504 US 191, 198 (1992).

> constitutional provision which sets forth this state's commitment to preserve the quality of our environment. In addition these and other terms used in establishing the standard have acquired meaning in Michigan jurisprudence.

Ray v Mason County Drain Comm'r, 393 Mich 294, 307 n 10 (1975).

Although not expressly defined in MEPA cases, the term "air pollution" is defined in Part 55 of NREPA as follows:

> "Air pollution" means the presence in the outdoor atmosphere of air contaminants in quantities, of characteristics, under conditions and circumstances, and of a duration that are or can become injurious to human health or welfare, to animal life, to plant life, or to property, or that interfere with the enjoyment of life and property in this state . . . .

MCL 324.5501(b).[10] Air pollution is thus, at a minimum, the presence of air contaminants in quantities and duration that are or may become injurious to human health, property, or the environment.

Similarly, while not defined in MEPA cases, a concept of "water pollution" is embodied in Part 31 of NREPA:

> A person shall not directly or indirectly discharge into the waters of this state a substance that is or may become injurious to any of the following:
>
> (a) To the public health, safety, or welfare;
> (b) To domestic, commercial, industrial, agricultural, recreational or other uses that are being made or may be made of such waters.
> (c) To the value or utility of riparian lands.
> (d) To livestock, wild animals, birds, fish, aquatic life, or plants or to their growth or propagation.
> (e) To the value of fish and game.

MCL 324.3109(1).[11] Water pollution is thus, at a minimum, a discharge into waters of the state that is or may become injurious to human uses, property or the environment.

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[10] The definition of "air pollution" found in MCL 324.5501(b) is a maximum threshold. "Air pollution" in MEPA actions may be found at thresholds less than those described in MCL 324.5501(b).

[11] The concept of "water pollution" found in MCL 324.3109(1) is a maximum threshold. "Water pollution" in MEPA actions may be found at thresholds less than those described in MCL 324.3109(1).

The term "impair" was defined in *Michigan United Conservation Clubs v Anthony*, 90 Mich App 99, 105-06 (1979), quoting *Black's Law Dictionary*, as:

> To weaken, to make worse, to lessen in power, diminish, relax, or *otherwise affect in an injurious manner*.

(emphasis by the court).

The only MEPA cases that have considered the term "destruction" of natural resources have held that removal of trees constitutes destruction of natural resources. See, *e.g.*, *Eyde v Michigan*, 82 Mich App 531, 540 (1978). "Destruction" is defined in *Black's Law Dictionary* 479 (8th ed) as: "the act of destroying or demolishing; the ruining of something."

E. Application to this Contested Case

The evidence demonstrating that Kennecott did not, in its application for a mining permit or at this hearing, carry its burden of demonstrating no pollution, impairment or destruction of the air, water or other natural resources is set forth in detail in Petitioners' proposed findings of fact and conclusions of law. In addition, the evidence affirmatively shows that Kennecott's proposed mine, if developed and mined, will pollute, impair or destroy the air, water or other natural resources in violation of MEPA. Accordingly, MDEQ had a duty under MEPA Section 1705(2) and Part 632 Section 63205(12) to deny Kennecott's permit application. MDEQ witnesses agreed that the MEPA standard applies to Kennecott's application to mine, but that the MDEQ did not apply that standard. Nevertheless, that standard is binding on MDEQ.

The evidence that Kennecott has not met its burden is summarized here:

1. Kennecott has not met its burden of showing that the crown pillar will not fail

One of the greatest unallayed concerns about Kennecott's proposed mine is that the crown pillar failure will fail. The crown pillar is the bedrock roof above the mine cavity in an

underground mine. Crown pillar failure would most likely occur through what is known as a "plug failure," where the entire crown pillar collapses as a single chunk of rock; it may occur through a slower process called subsidence. At least four of the highest caliber mining experts have expressed concern that if a void develops below the crown pillar, the pillar will not be strong enough to withstand gravity, and will collapse into the opening. Kennecott's own Dr. Carter admitted that he could not predict the length of time to go along with his conclusion that the rock mass would remain stable other than to say that a blocky rock mass does not fail within hours assuming the RMR is high enough. (Carter) Tr 17:3628. He went on to admit however that if the RMRs drop and there is a void space, failure could occur within hours. *Id.* And unchallenged evidence in this case indicates that such a void will develop.

The mine plan calls for the excavation of long corridors called "stopes." The entire volume of the mine will be divided into stopes, with all stopes slated for eventual removal. At each level, the rock in alternating stopes referred to as the primary stopes would be removed first. These stopes would then be backfilled with cemented rockfill. Next, the rock that was left in place while the primary stopes were mined would be removed; these stopes are called the secondary stopes. Once the native rock is removed from these stopes, they will be backfilled with loose, uncemented rock or sand. The mining operation would then move up to the next level and begin the process again. At the end of mining, the backfill in the stopes would stand 100 meters, from the bottom to the roof of the mine.

There is no indication from any witness or exhibit in this proceeding or in the permitting record that the backfill will hold up over time in this situation. The evidence that it will not has been described earlier in this brief. *Supra* at 45-50. The result of the inevitable settling and breakdown of the backfill will be a void immediately below the crown pillar, extending across

the entire width and length of the mine. It was just such an opening that the many experts who have weighed in about this case have warned will lead to the collapse of the crown pillar.

MDEQ and Kennecott's response to this concern has been to increase the thickness of the crown pillar. But a thicker crown pillar does not eliminate the likelihood that the disintegration and subsidence will occur in the future. Furthermore, it does not address plug failure at all. The nearby Athens Mine experience plug failure with a crown pillar 1,800 thick.

a. Kennecott Ignored Evidence About Rock Structure

There are two veins of testimony regarding an assessment of geology at this and other sites to determine the strength of the rock. The first is that too little is known about the geology of this site to make any informed judgments. As explained below in the section on mine water inflow, *infra* pp. 109-115, very, very little work was done to characterize the faults, dikes, and fracturing at this site. Cores were drilled to locate and characterize the ore body, *not* to identify features that might contribute to subsidence. Methods such as extended pump tests that could provide information on the extent of fracturing of the bedrock were not done by Kennecott nor MDEQ. Existing information such as water loss during the drilling of cores that could also shed light on the degree of fracturing was not used, nor made available to MDEQ, Petitioners, or this Tribunal.

Dr. Marcia Bjornerud, a structural geologist at Lawrence University, testified that the bedrock outcropping known as Eagle Rock provides the best available evidence of the quality of the bedrock, because it is after all a large sample of the bedrock that is available to be looked at and touched. Tr 3:472. However, Kennecott's geologists and other mining experts ignored this evidence in assessing the probable stability of the mine.

What little evidence there is indicates that significant faults and fracturing very likely exist and would impact the mine's safety. The evidence discussed below regarding inflow to the mine is also relevant in assessing rock stability, because faults, fracturing, and dikes are all features that contribute to instability as well as conduct water. The scant evidence that does exist reveals a significant numbers of these features, such that Kennecott's and MDEQ's conclusion that the crown pillar will be stable is completely unfounded.

Dr. Bjornerud testified that the known dikes and faults in the area of the proposed mine constitute discontinuities in the rock that should be investigated because they can be zones of weakness. Tr 3:476-477; Exhibit R26, Appendix C1, page 13. One of the most dramatic features of Eagle Rock are fractures or "joints" breaking the rock into columns that are quite uniform in thickness. This is an example of "columnar jointing," which forms when a hot magma body cools quickly. *Id.* When the magma cools it contracts and the rock is completely broken into rod-like cylinders. *Id.* at 478. Petitioners' Exhibit 3A is a photograph that Dr. Bjornerud took of the East Eagle outcrop showing how the rock mass is broken into polygonal shapes that continue into the side of the outcrop. "When you see something like this, usually it continues right across the entire thickness of the magma body and it means that *the rock is completely broken into these rod-like cylinders.*" *Id.* (emphasis added).

Dr. Bjornerud also discussed information culled from the drill core photos that she inspected. The drill cores show a zone of sheared and almost rubblized rock that has mineralization along it, including a mineral called serpentine, which is an extremely slippery rock and known for very low friction. *Id.* at 481-482. Kennecott's Appendix C1 noted that much of the peridotite has been changed to serpentine. Serpentine is notorious for having a lower core friction than other silicate minerals, and therefore needs more confining pressure, or lateral

stress, to keep it from slipping. *Id.* at 482-483; Exhibit P632-3, Appendix 8, Figure 3A. Dr. Bjornerud also identified "brecciated (broken-up, sheared) contacts between dike and country rock at the outcrop; this demonstrates that there has been a lot of deformation of the rock at the time the dike was in place. Tr 3:483; Exhibit 3B. Dr. Bjornerud spent approximately 30 hours reviewing core photos, Exhibit 632-116, and arrived at a general impression that "much of the core was very poor quality rock" and in "all of the cores at least some zones are very poor quality rock." (Bjornerud) Tr 4:508.

b. Kennecott Ignored Regional Data Despite MDEQ Expert's Recommendation to Study It

The second vein of testimony regarding an assessment of geology advises studying other mines in the region, especially those that have failed. Kennecott offered no evidence that it performed this type of assessment. Dr. Sainsbury, Mr. Parker, and Dr. Vitton were all of the opinion that based on the little that is known about the geology at this site, a catastrophic plug failure of the type that occurred at the nearby Athens Mine is entirely possible. Dr. Vitton testified that the proposed Kennecott mine site is similar to the Athens mine site because both deposits are vertically oriented, and both have dike structures on both sides that form planes of weakness. Tr 4:604.

Dr. Vitton also referenced a similar collapse at Rio Tinto's Palabora Mine in South Africa. Tr 4:600-03; Tr 38:7989. Dr. Vitton testified that there are many similarities in the work done to characterize the sites at Palabora and Eagle; at Palabora, hydrology and the fracturing of the crown pillar were incorrectly analyzed, resulting in crown pillar failure. *Id.* The ore at Palabora is vertically dipping, just like at Eagle, and the compressive rock strengths at Palabora are roughly the same as Eagle. *Id.* at 7990-92. Modeling performed at Palabora by external consultants indicated that the walls would be stable; however, the crown pillar failed. Tr

38:7991. History has shown that these models were not accurate. *Id.* Yet, Kennecott and MDEQ are repeating those same mistakes here in Michigan. The crown pillar had very high hydraulic conductivity, several orders of magnitude greater than was originally estimated. *Id.* at 7990. As a reminder, Kennecott is the U.S. wholly-owned subsidiary of Rio Tinto; this is the same company that is asking MDEQ and the people of Michigan to trust its predictions.

This Tribunal should not countenance Kennecott's argument that regional mine failures should not be considered. This proposition flies in the face of common sense and humans' capacity and necessity for learning from past failures. Several very competent experts believe that the geology shows enough similarity that the events are highly relevant to the situation at Eagle. MDEQ and Kennecott should not don self-imposed blindfolds to past events from which they could learn and possibly avoid future problems; but that is precisely what Kennecott and MDEQ have tried to do in this case even in contradiction to MDEQ's own experts, Dr. Sainsbury and Dr. Blake. Dr. Sainsbury's reports included references to the failed Athens Mine, among others in the Upper Peninsula.

c. The Rock Mass Rating (RMR) Riddle

Under the second approach taken to assessing the rock mass stability, numbers are assigned to the various factors having a bearing on rock stability, plugged into a formula which generates a number by which to judge the quality of the rock and ultimately the stability of the mine. In this case, Kennecott used the scaled span and CPillar methods to assess crown pillar stability. To the extent that it has been revealed, Kennecott's work was riddled with errors, inconsistencies, and failures to follow industry standards. Added to that is Kennecott's refusal to allow Petitioners access to most of the underlying physical evidence, documentation and even raw data.

The analysis begins by calculating a Rock Mass Rating (RMR). RMRs should be based on an examination of rock obtained from drill cores and on-site observed conditions. However, MDEQ's rock mechanics expert testified he tried to find out why there were "missing core zones" and "who really did the RMR calculations for Kennecott and how it was done." (Blake) Tr 5: 807-08. Ultimately, as Dr. Blake testified on direct examination: "I don't think the issue was really resolved. It certainly wasn't resolved to my satisfaction." *Id.*

The analysis includes five parameters and one adjustment factor that attempts to provide a sense of how the rock will perform under various types of stresses. (Vitton) Tr 4: 641-42. Kennecott's entire crown pillar stability analysis is based on Rock Mass Ratings (RMRs). *Id.* at 624, 627.

RMR76 (the version used by Kennecott) consists of six parameters:

A1 = rock strength

A2 = Rock Quality Designation (RQD)

A3 = spacing [of joints]

A4 = condition of joints

A5 = level of groundwater present, and

AB = adjustment for joint orientation.

Id.

The first error discovered by Petitioners' experts was that Kennecott did not include "discrete features" such as fractures found in the drill cores in its calculation of the A2 RQD values. (Vitton) Tr 4: 645. Dr. Vitton pointed to the application text, which states: "*the structural features identified during the logging have not been incorporated into the GoCAD model*." Exhibit R-26, Appendix C2 (Eagle Project Geotechnical Study), page 13. Kennecott's application

identifies at least 143 discrete features in the crown pillar. *Id.* at 657; Exhibit R-26, App. C3 (Subsidence Analysis Report), Fig. 20. Kennecott's application revealed:

> Based on the information in the two Microsoft access to databases, there have been other discrete structural features identified in the Eagle project. These discrete features have been stored in a separate table of the database instead of being included in the main database. A review of these discrete features indicate there are three types of structural features: broken core zones, shear zones and fault gouge zones.

Exhibit R-26, appendix C2, page 13. And:

> Additional discrete structure may be present in the crown pillar, which could have a significant effect on the behavior of the crown. Current contours of RQD and RMR show low value zones (one such zone extends approximately east/west across the northern contact of the intrusion) that may indicate the location of discrete structure.

Exhibit R-26, appendix C3, page 9.

Dr. Vitton testified that discrete features are very significant and relevant to the analysis of crown pillar stability, Tr 4: 706-07, and that it is unacceptable to ignore them when assessing crown pillar strength. Tr 4: 642. According to Dr. Vitton, any question about additional significant discrete features should be investigated before mining begins. *Id.* at 656.

Dr. Bjornerud noted that Table 4 of Appendix C3 makes reference to 40 individual "major structural zones," anything that had shown evidence of intense shearing or breaking of the rock that was longer than a meter in core length. Tr 4: 520. The significance of these zones from a structural geology standpoint is that failure can happen in such zones and in zones that are much narrower. *Id.* at 521. As an example, Hole 62 contains a structural zone that is 55 meters in length. *Id.* That means there is a shear zone or fracture that is 55 meters long reflected in the core for Hole 62. In Dr. Bjornerud's words, "[t]hat's a major potential zone of weakness." *Id.* at 522.

Dr. Bjornerud supplemented Golder's table of major structural discontinuities by looking at areas that Golder itself had already identified as major structural discontinuities and noting areas of comparably sheared and broken rock. Most of the zones shown on Table 4 have RMR values of 40 or less. Tr 4: 523. Exhibit P632-3, Appendix 8, Appendix 1. At the end of the process, Dr. Bjornerud had added a total of 157 meters of major structural discontinuities from the same cores where Golder had found only 80 meters of major structural discontinuities. *Id.* She performed this process "because the weakest part of the rock is the part that will fail potentially, so that is the part that should be focused on in a stability analysis." *Id.* at 524. In sum, Dr. Bjornerud prepared an overall comparison and assigned figures in columns A3, A4 and A5 to the cores she studied. Table 1, Bjornerud Report, Exhibit P632-3.

Dr. Bjornerud found a great deal of poor quality rock, much of which had an RMR quality of below 60, which she deemed unacceptably weak. Tr 4: 528-34; Exhibit P632-3-8. Dr. Bjornerud testified that these values require, at a minimum, further study to understand the nature of the discontinuities and to understand how they are connected. Tr 4: 533-534.

The second problem identified by Petitioners' experts was that Kennecott used the outdated 1976 RMR (RMR76) system, (Vitton) Tr 4:627, rather than the updated 1989 version (RMR89), which is more commonly used today. (Bjornerud) Tr 3:491. According to Dr. Vitton, the RMR 89 system is clearly superior to the RMR 76. Tr 38:7954. The RMR 89 system uses an increased database of civil engineering projects *and mining case histories*, and increases the weighting of factors for the spacing of fractures and the influence of water. (Vitton) Tr 38: 7953.

Third, Kennecott omitted data and used flawed data in its analysis. Based on Kennecott's RQD and RMR tables and core photographs, not all sections of core were assigned RMR values; some are simply missing. (Bjornerud) Tr 4: 659. Exhibit P632-116 (Core photographs) and

P632-41 and 42 (Kennecott's RMR and RDQ tables with notations by Parker). For the eight cores represented in Exhibit P632-116, the following table shows the percentage of cores without RMRs. (Bjornerud) Tr 4:516.

d. Cores without RMRs erode confidence in Kennecott's crown pillar stability analysis

Hole ID	**55**	**60**	**62**	**64**	**67**	**69**	**99**	**101**
Total Run (meters)	137	85	300	280	280	271	142	121
Not reported (meters)	12	11	59	51	15	33	49	26
% not reported	9	13	20	18	5	12	34	21

One cannot be confident in the results of predicting crown pillar stability when these kinds of percentages from core runs are missing. (Bjornerud) Tr 4:516. Since the point is to assess the overall quality of the rock, leaving some rock out of the equation brings the whole exercise into question. In fact, Kennecott's own Dr. Carter has written that "furthermore, most crown pillars are characterized by different zones of competent rock, usually in margins to the poor and weak vaulted ground, often the ore zone. In recognition of this, the approach that is developed in the present contribution is based on treating the quality of the weakest zone of rock and a particular crown pillar as a random variable and evaluating the likelihood that this zone of the crown is sufficiently poor or extensive to result in a collapse." Exhibit P632-50. MDEQ's rock mechanics expert, Dr. Blake agreed with Dr. Bjornerud that the 55 meters of missing data had to be interpreted as "bad rock" in that it suggests a significant fault, a broken rock zone. (Blake) Tr 5: 894-895. In other words, that is "certainly something you take into account" when you're predicting the collapse of a mine. *Id*. Mr. Parker agreed that this practice of not using

poor quality rock in the RMR calculations is misleading, deceptive, or worse. It is intentional. No geologist or mining engineer in his right mind would have done that by accident; reviewers should have caught it and corrected it. (Parker) Tr 38: 7846. Wilson Blake was asked if this was an acceptable practice; he replied, "It's certainly not." (Blake) Tr 38: 7846.

Fourth, Rock Quality Designations (RQDs) were improperly assigned. For the core where RQD was assigned, Kennecott's method of assigning the numbers for parameter A2 of the RMR analysis is incorrect. (Vitton) Tr 4: 636-37. Exhibit I-303, p. 17. Kennecott's own description of how the A2 parameter was developed is: "Rock quality was recorded as the link of all solid core greater than 10 cm long." *Id.* Exhibit I-303, p. 17. The additional missing step in the proper method is to divide that total by the length of the entire run of core. *Id*. at 638. Otherwise, you have completely eliminated the worst quality rock from the assessment – which is what Kennecott did here. Kennecott's method results in incorrect RQDs for the A2 parameter. *Id.*

Fifth, Kennecott erroneously assigned an A5 factor representing that the rock would be completely dry. In fact, this is one place where Kennecott imported a value from RMR 89 into the analysis (it is improper to mix and match the RMR76 and RMR89 systems), using the RMR 89 maximum value of 15 for dryness and RMR 76 values for the other four components. This meant that Kennecott's possible score added up to 105, when the entire system is based on a total score of 100. This means that all of the RMR values probably started out too high. (Bjornerud) Tr 3: 497. Dr. Sainsbury raised specific concerns about the assignment of the number 10 indicating "dry" conditions for the groundwater parameter for the rock mass reading analysis. (Maki) Tr 31: 6396. Mr. Maki or the MDEQ never asked Kennecott why they use 10, or why

they assumed dry conditions. *Id.* Mr. Maki, also never asked Kennecott anything about the horizontal stress at the White Pine Mine and its implications for this mine. *Id.*

Furthermore, it is completely untrue that the rock will be dry. Mark Logsdon testifying on Kennecott's behalf stated that the crown pillar would be saturated. (Logsdon) Tr 20: 4224. The application itself states, "The water depth that was used in the analysis assumes the crown pillar was completely saturated with water." Exhibit R-26, appendix C3 page 14. Yet absolutely dry conditions were assumed for determining RMR values. (Vitton) Tr 38: 7982-83. An assignment of "dry" conditions earns higher scores in the RMR systems.

Sixth, Kennecott did not perform necessary adjustments for the orientation of discontinuities in the rock, the AB parameter. In fact, this parameter was not mentioned at all in the report. (Bjornerud) Tr 3: 497-98. The permit allows tunnels, or vertically oriented rock with a void underneath, which is a very unfavorable condition. (Vitton) Tr 4: 627. With this orientation, Kennecott should have subtracted 12 (-12) from its RMR ratings. (Vitton) Tr 4: 617, 627. Kennecott made no adjustment at all for the AB parameter. *Id.*

To the extent permitted by the limited information Kennecott made available to them, Drs. Vitton and Bjornerud performed their own calculations of RMR values to assess whether Kennecott's work was reasonable and realistic. (Vitton) Tr 4: 659. They used Kennecott values for the A1 and A2 parameters. *Id.* at 661. Dr. Bjornerud calculated the A3 and A4 parameters. Tr 4:661. She also made an assessment for the A5 parameter. *Id*. Dr. Vitton assigned an AB parameter value of (-2) instead of (-12) to be conservative. *Id*.

Dr. Vitton arrived at an average RMR for the crown pillar based on the eight cores for which he and Dr. Bjornerud received and reviewed photographs. (Vitton) Tr 4: 663. Dr. Vitton's average RMR for the crown pillar was *45*. Tr 4: 663. *Kennecott concluded that if the RMR was*

70 or better, the crown pillar would be stable, but if the RMR was 60 or less it would be questionable. (Parker) Tr 3:367.

In summary, *the evidence indicates that Kennecott eliminated the worst portions of the samples (which consisted of rubble) from its RMR analysis*. As a result the number designated to represent the rock quality of these cores was significantly higher (indicating better quality rock) than was actually the case. In addition, Kennecott used a method of averaging rock quality designations over the length of a core sample that also significantly skewed the analysis to indicate a higher rock quality than actually exists. When Petitioners' witnesses performed the same analyses correcting these problems, the RMR ratings were much lower than those obtained by Kennecott. While Petitioners and this Tribunal have no way of knowing whether the same errors were made for the remaining core samples, Kennecott bears the burden of showing that the crown pillar will be stable, and thus must present adequate evidence on which to base such a determination. In light of the mistakes[12] that came to light in the evidence that was presented, this Tribunal cannot assume that no similar errors or omissions were made in regard to the rest of the core samples. This is particularly true since Kennecott has refused to allow access to those samples, and so there are no checks and balances.

e. Plug Failure is Likely

Kennecott used the scale span method of assessing the likelihood of plug failure. (Vitton) Tr 4: 623. This method considers actual data from mines around the world, scales them to a certain value, compares the rock quality in the mines and plots them to determine which indicates stable conditions and which indicate unstable conditions. *Id.* at 624. It separates those that fail from those that have not failed, *Id*.; mines with a factor of safety of below 1.0 have

[12] But note Mr. Parker's contention that no reasonable engineer would have made these "mistakes."

failed, while those above 1.0 have not. *Id.* at 631. Figure 28 of Appendix C2 indicates that some of Kennecott's crown pillar scenarios would fail. *Id.* at 625. Exhibit R-26, appendix C2, Figure 28 (indicating orange dot above the red line). Even with an RMR of 85, which indicates very competent rock, the values are close to the failure line. *Id.* at 626. Drs. Vitton and Bjornerud estimate an RMR of 45 for the crown pillar.

Dr. Vitton used several scenarios in the scale span method to assess crown pillar stability. He looked at the permitted 87.5 m thick crown pillar; Tr 5: 755-56, with an opening of the full crown pillar span, 68 x 50 m., Tr 5: 751. As explained above, this is likely to be the dimension of the void that will eventually develop below the crown pillar. In that scenario and with an RMR of 70, the scale span method gives a factor of safety of 1.12. Tr 5: 751. By Kennecott's own standards 1.12 is not a sufficient factor of safety. Tr 5: 756. Kennecott's target factor of safety was two or greater. Tr 5: 748. With an RMR of 51, the factor of safety is 0.44 and with an *RMR of 45 (representing Dr. Vitton's best judgment of the actual quality of the rock), the factor of safety is 0.17. Id.* at 751. Exhibit P632-139 (Vitton diagram). This illustrates how critical the RMR is in these calculations; a small difference in RMR values causes the factor of safety to drop off dramatically.

Kennecott's application of the scaled span method for assessing plug failure also resulted in values that are right at the failure line. (Vitton) Tr 4: 631. An RMR of 75 and a crown pillar at 365 m results in a factor of safety of 1.03, which is right at the failure line. *Id.* As the proposed crown pillar gets thicker, it gets safer, but not by much. *Id.* Even with a crown pillar at 340m and an RMR of 75, the factor of safety is 1.35. *Id.* Once again, Kennecott's target factor of safety was two or greater. (Vitton) Tr 5:748. Although Kennecott concluded that the mine would be safe with 87.5 m thick crown pillar, that assessment considered only Kennecott's RMR values of

75 and 85. With an RMR of 30 and a 68 m span, the factor of safety is .21, which would have a probability of failure in the 90 to 100% range. (Vitton) Tr 38: 7986. At an RMR of 66 the factor of safety is 1.24 which represents a probability of failure of about 20%. *Id.* at 7987. Even with a RMR of 70 with a 68 m span, the crown pillar would have a standup time of five years and a 10 to 20% probability of failure. *Id*. at 7988.

Even if Kennecott managed to limit the void opening to one stope, an RMR of 51 gives a factor of safety of only 1.49. (Vitton) Tr 5:768. Thus in the final analysis, Kennecott's prediction that the mine will be stable depends both on an unfounded theory that only one stope would ever be open at a time, *and* on abysmally flawed RMR values.

Kennecott also used the CPillar method to analyze the likelihood of plug failure at the Eagle mine. (Vitton) TR 4: 605. CPillar is a very simple method in which the weight of gravity pushing down and the strength of the surrounding rock are analyzed. *Id.* Exhibit R-26, Appendix C2, Fig. 29. The inputs to this program are the rock mass rating values, the uniaxial compressive strength values and the horizontal stress. *Id*. Again, Kennecott's CPillar analysis used only two RMR values, 75 and 85. *Id.* at 613.

The horizontal stress value is a key component of the CPillar method. (Vitton) Tr 4: 607. However, the permit application and its appendices do not discuss the orientation and relative magnitudes of stresses. (Bjornerud) Tr 3:486. *There have been no horizontal stress measurements at the proposed Eagle site.* (Vitton) Tr 4: 607. Kennecott used average stress measurements for the entire Canadian Shield in its analysis. *Id.* Dr. Bjornerud testified that it is not professional best practice to use stress data that is not a local value. Both scaled span and C-pillar use stress magnitude and direction as inputs; one would not, from a best professional practice standpoint use non-local assumptions. (Bjornerud) Tr 3: 488.

In court, Dr. Bjornerud used a simplified block model to demonstrate the stress situation she described. Small wooden rods were held together by the compression of lateral stress represented by the elastic bands on the model. As she continued to remove confining pressure, suddenly there was nothing holding on to the rods and they collapsed. (Bjornerud) Tr 3: 484.

It is possible to estimate stress locally at a place such as the proposed Eagle Mine by hydrofracturing or computing the borehole deformation, which measures the change in bore holes to circular to slightly elliptical; these stress measurements can be obtained before starting to mine, and should have been done by Kennecott. (Bjornerud) Tr 3:490; (Vitton) Tr 4:621. It is possible to perform in situ stress measurements from above ground. (Vitton) Tr 38:7955. Dr. Vitton's Master's thesis project included gathering in situ stress measurements from above ground in the early 1970s. Tr 4:572.

The effects of the original stress field are very important. (Vitton) Tr 38:7957. One of the most important lessons learned from the Athens Mine relates to ground stresses in the area immediately above the stope. *Id.* Dr. Vitton testified that Kennecott made very, very simplistic assumptions about the horizontal stress field at the Eagle Mine site. Tr 4:683.

Dr. Sainsbury's reports paralleled Dr.Vitton's and Mr. Parker's review of the permit application, including his concern about horizontal stresses. Tr 4:682. Dr.Sainsbury utilized Mr. Parker's seminal work on lateral stress fields in the White Pine Mine, which is also in the U.P. *Id.* at 683. Mr. Parker's paper shows that horizontal stresses can go from very high compression to no stresses to tension in very close proximity. *Id.* at 684-85. Exhibit P632-37. Dr. Sainsbury stated that Mr. Parker's paper should have been reviewed in considering this project, given that the application does not include any measurement of in situ horizontal stress at the proposed

mine site. *Id*. Dr. Vitton offered archival horizontal stress data from the White Pine Mine to Mr. Jon Cherry of Kennecott but Cherry declined the offer. *Id*. at 620-21.

As for MDEQ's experts on rock mechanics, their concerns remain unaddressed, too. Mr. Maki admitted that "nothing has been done" about the information he learned regarding Dr. Sainsbury's continued criticism of the rock mechanics work in Kennecott's application. (Maki) Tr 31: 6356. Among a myriad of other concerns, Mr. Blake acknowledged that the 55 meter long structure in Hole No. 62 was "a big structure" and acknowledged that "I certainly had a concern about it." Asked again why he didn't follow up with this concern, he stated, "I don't really have a good explanation why I didn't." (Blake) Tr: 5: 955. Yet, the permit was signed on December 14, 2007. Exhibit R-117.

Kennecott's prediction that the crown pillar will be stable is based on a terribly long list of faulty assumptions, missing information, and unanswered questions. The evidence shows a very real possibility that the backfill inside the mine will deteriorate and settle, opening a void under the crown pillar. Whether through catastrophic collapse or through slow unraveling, the roof of the mine will sink. The impacts on the Salmon Trout River and on other resources in the area have not been assessed due to Kennecott's complete failure to meet the EIA requirements. However, because the river is directly above the mine it is likely to drain into the mine in the event of subsidence, and contaminated mine water is likely to escape into adjacent and nearby groundwater and surface water. Kennecott has not met its burden of showing that natural resources will not be polluted, impaired or destroyed by mine subsidence.

2. Kennecott has not met its burden of demonstrating that wetlands and the Salmon Trout River will not be impaired or destroyed due to groundwater drawdown from its proposed mining

A fundamental issue in this case is the sensitivity and importance of the Salmon Trout River and adjacent wetlands above and downstream from the mine site. All parties agree that some amount of drawdown of the water table above and around the mine will occur. And all parties agree that there is at least a potential that the drawdown will lower water levels in the reach of the river above the mine and in groundwater-supported wetlands. The only question is whether the drawdown will be great enough to impair these resources; Kennecott has not proven that it will not; therefore, Kennecott has not borne the Part 632 burden of proof.

a. Kennecott has not demonstrated that mine inflow will be limited to its upper bound estimate proffered in its application and testimony

The drawdown in the water table will occur because once an opening is made underground, groundwater will begin to flow into it and will be pumped out of the mine and routed to the WWTP. The rate of inflow into the mine is a critical figure for accurately predicting the amount of drawdown of the water table. In assessing the potential impacts of mine dewatering on wetlands and the Salmon Trout River, Kennecott used an "upper bound" (maximum expected) mine inflow of 215 gpm, which was estimated by modeling conducted by Golder Associates, Ltd. ("Golder"). Ex R-141, p. 17.

The evidence in this case indicates that Golder's modeling seriously underestimated the probable mine inflow due to two primary factors. First, Kennecott's characterization of the bedrock groundwater system is wholly adequacy to support the assumptions that were incorporated into the modeling. Second, the modeling itself was faulty and did not comport with industry standards.

b. Kennecott's characterization of hydrology is inadequate and misleading

Dr. Robert H. Prucha, who testified on behalf of Petitioners, is a professional engineer, a hydrogeologist and a hydrologist and is a principal in Integrated Hydro Systems of Denver, Colorado. His primary area of expertise is developing and reviewing modeling of water systems, including both surface water and groundwater systems. Tr 8:1541-1542. He is also experienced in reviewing and preparing hydrogeologic reports of both bedrock and unconsolidated aquifers; characterizing and modeling groundwater flow conditions; designing conceptual hydrogeologic models; and the calibration, validation, and uncertainty analyses that are required of such models. Id. at1542-1547.

At the hearing, Dr. Prucha described the basic initial steps that are required under professional standards, including American Society of Testing and Materials ("ASTM") standards and MDEQ's draft groundwater modeling guidance, in any groundwater investigation and modeling effort. First, sufficient data must be collected. Tr 9:1676. Adequate site-specific data is crucial for limiting the range of uncertainty in modeling. Tr 8:1635. Second, the data is used to prepare a conceptual model. Tr 9:1677. If the conceptual model is flawed, the numerical inflow modeling, which is based on that conceptual model, will also be flawed. Tr 8:1628. Charles Thomas, a geologist for MDEQ, agreed with Dr. Prucha's latter point, stating that conceptualization "is the meat and potatoes of any model." Tr 33:6792.

Kennecott simply does not have sufficient information on which to base a valid conceptual model. In addition, it has mischaracterized and misinterpreted the information it does have in ways that lead to faulty modeling parameters.

i. The conceptual model is based on unwarranted conclusions regarding bedrock fracturing

In conceptualizing and modeling a bedrock system, modelers must account for dikes and faults, as these features can control hydrology. (Prucha) Tr 8:1553. A "dike" is an obtrusive body of material different from the surrounding rock, which extends up vertically through that rock. Id. at 1552. Dikes are usually of low permeability, but are likely to be surrounded by higher permeability "brecciated zones," or fractured zones, which allow water to move freely along the edges of the dike and preferentially route water along the dike. Id. at 1560-1561. A "fault" is an open space between two adjoining bodies of rock; faults can be "significant conductors of water" and can transmit water into bedrock from the overlying unconsolidated (higher permeability) material. *Id*. at 1554. Faults also generally align with rivers and often establish a connection with those rivers, *Id*. at 1561; this effect in the area of the proposed Eagle Mine was noted by Kennecott's geologists. Ex R-26 (App. C-1), p. 12. Faults and dikes intersecting the mine would thus serve as major sources of inflow, and the existence of those water-conductive features must be sufficiently investigated if a prediction of water inflow is to be made with any degree of accuracy.

Kennecott's investigation in this case was entirely insufficient. Golder's 2006 inflow modeling assumed that only a single fault, "limited in extent and poorly connected to other water conductive features," exists in the immediate area of the mine. Ex R-33, p 14. Golder further concluded that the six boreholes forming the basis of the preliminary conceptual model were likely to have intersected any faults, and that testing results from those boreholes supports the conclusion that only one limited fault exists. *Id*., p. 16-17. This conclusion is completely unwarranted due both to the scarcity of the data, and to evidence from the data that does exist that Golder has ignored.

Dr. Prucha detailed numerous faults and dikes that have been identified through various sources, but were not investigated or included in Kennecott's conceptualization of the bedrock groundwater system. Dikes and a fault zone in the immediate area of the ore body and mine access tunnels that were identified in a study by J.S. Klasner. Ex P632-155*. Tr 8: 1550-1553. Another figure depicts the Klasner fault zone and dikes with other faults and dikes identified by Kennecott's own geologists. Ex P632-155. Tr 8: 1561-1563.

Figure 4 of Appendix B-1 to the EIA also details numerous faults and dikes in the area of the mine, some running for several miles in length. Tr 8: 1558-1559. Figure 21 of Appendix B-8 to the EIA shows a dike that is in direct contact with the Salmon Trout River and surrounding wetlands, which could offer a direct conduit between the overlying surface water and the underlying bedrock through brecciated zones surrounding the dike. Tr 8: 1564-1568, 1620-1621. Kennecott's Exhibit 214 also suggests the existence of faults through the mine and ore body at several levels. Tr 8: 1587-88. MDEQ's own expert Dr. David Sainsbury criticized Kennecott for not considering the effect of a "discrete sub-vertical fault plane that intersects the Eagle deposit." Tr 15: 3121; Ex I-626 p. 5. And yet, Kennecott maintains that none of these features conduct significant amounts of water based on no data, and even in the face of data to the contrary.

Mr. Ware, site operation and exploration manager for Kennecott, concluded that the Klasner fault does not exist, based solely on geological logging data for 13 drill holes; any review of his conclusions would require review of the drill cores, *id*. at 3180-3181, which were never submitted to MDEQ or made available to Petitioners or to this Tribunal.

Kevin Beauchamp, professional engineer at Golder, reviewed the geotechnical data collected by Kennecott and prepared reports and modeling concerning the integrity of the mine's crown pillar, including Appendices C-2 and C-3 of the mining permit application. Tr 16: 3265-

3267. Even Mr. Beauchamp acknowledged that more information is needed about the known fault zone: "We are recommending that more drilling be done, so we didn't want this fault to be forgotten or not considered in the planning of the future drilling programs." *Id*. at 3312-3313. Trevor Carter, a professional engineer and principal at Golder, Tr 17:3489, testified that it "would not be impossible" to conduct such an investigation before underground development begins. *Id.* at 3644. Kennecott is waiting to finish the hydgrogeological characterization because it is "easier" to investigate from below ground. *Id.*

However, Dr. Kenzi Karasaki testified that, for purposes of assessing hydraulic connections and estimating inflow, it is not only possible – but *it is standard practice and absolutely essential* – to characterize fractures from aboveground, rather than waiting until underground access is obtained. Tr 39: 8122. In fact, characterization once underground "won't help you much at all." *Id*. at 8131. Dr. Karasaki is a staff scientist, Principal Investigator and Area Team Leader at Lawrence Berkeley National Laboratory, with primary expertise in fractured rock characterization and fractured rock hydrology. Tr 39: 8038-8039. He has characterized and studied fractured rock hydrology in Sweden, Japan, Canada and the United States.

Dr. Prucha presented an exhibit depicting the various faults and dikes believed to exist in the vicinity of the mine, along with surface topography, surface water features and drainage patterns, and groundwater wells. Ex P632-193; Tr 40: 8311-8313. The exhibit demonstrates that the Klasner faults and dikes are consistent with the surface drainage features in the area. These features were largely ignored in Kennecott's hydraulic testing – only one test was performed in the entire Klasner fault zone, and none were performed in a structurally complex area to the southeast. *These "obvious data" should have been investigated and considered in the*

conceptualization. *Id*. In addition, drainage patterns indicate the existence of other inferred faults in the area. Consideration of those inferred features would be an "elementary first level attempt" at characterizing subsurface conditions in the area. *Id*. at 8313-8315, Ex P632-191*, Slide 22.

ii. Scant hydrological data does not support Kennecott's assumptions used to model inflow

To achieve a valid model, it is necessary to adequately assess the hydraulic conductivity of the aquifer matrix, in this case bedrock. The quality of the assessment and corresponding level of uncertainty of modeling results is heavily influenced by the type of test that are utilized. (Prucha) Tr 8: 1611-1612. Another common type of test is a "slug test," where a small volume of water is introduced into the well and the response of only that well is observed. *Id*. In contrast to long-term pump tests, slug tests only reveal information about the localized area around the wells tested, rather than the connections between various areas of an aquifer. Consequently, it is well-documented that slug testing tends to bias results toward low hydraulic conductivity. *Id.* This bias can extend up to an order of magnitude (a factor of ten). *Id*.

Dr. Karasaki explained several factors that are critical to the design of a study of hydrology in fractured bedrock. First, the range of hydraulic permeability in fractured rock is extremely heterogeneous; the difference in permeability can be up to a factor of 10 million. *Id.* at 8048. The essential point is that because of the large range of permeabilities, a single pump test is not adequate to determine the permeability of a given area of rock. Ex P632-188*, Slide 6; Tr 39: 8054-8056. Kennecott's bedrock testing using a single long-term pump test is acutely inadequate in light of this principle.

Second, a fault generally has dual properties; the core, or middle zone that is clogged with rock dust, is generally low permeability, but the fractured zones alongside the core are

higher permeability. Therefore, it is difficult for water to cross a fault, but very easy for it to flow along the fault on both sides of the core. Tr 39: 8048-8049, 8067-8069; Ex P632-188, Slide 10.

Third, fracture hydrology is dominated by the larger features or "killer fractures" in a system. Tr 39: 8049-8051. As the area covered by a study increases and more high permeability features are included, the composite permeability of the area also increases. (Karasaki) Ex P632-188, Slide 7; Tr 39:8056-8058. As discussed below, KEMC's testing of a very localized small set of boreholes is not sufficient to make any conclusions about the hydraulic conductivity of the bedrock. Fourth, during a pump test, a low response in another well does not necessarily mean the area between the pump test and the other well is low permeability. Tr 39: 8051-8052. In fact, the drawdown response in an observation well can be nearly identical regardless of whether the permeability of an intervening fault is low or high. Ex P632-188, Slides 10, 11; Tr 39: 8070-8072.

Fifth, as Dr. Prucha also testified, "quick and dirty" slug tests only test a small radius, tend to underestimate permeability, and are prone to give incorrect readings. *Id*. at 8052-8053, 8064-8067; Ex P632-188, Slide 8. While slug tests in a homogenous medium tend to be more accurate, they *underestimate* permeability in heterogeneous media such as fractured bedrock. Tr 39: 8066-8067; Ex P632-188, Slide 9. Kennecott's testing relied almost exclusively on these tests.

Sixth, long term pump tests at as many locations as one can afford are crucial to understanding a fracture system. *Id*. at 8053-8054. As discussed below, KEMC's investigation included only a single long-term pump test, and even that was of relative short duration (7 days vs. recommended duration of months).

When conducting any groundwater investigation, it is important to have a sufficient number and spacing of testing wells. (Prucha) Tr 8:1569. The number and spacing in this case were wholly inadequate to provide accurate information about groundwater flow, or accurate predictions of groundwater behavior under future conditions. Golder's 2006 model predicted impacts from mine inflows ("drawdown") over a concentric area exceeding one mile in diameter. Ex R-33, Figure 9.5. The Phase I and II bedrock hydraulic testing, however, utilized only eight boreholes in the immediate vicinity of the ore body and one borehole in the area of the mine decline tunnel. Ex I-214, p. 3; Ex R-32, Appendix B-3, Figure 8.1; (Wozniewicz) Tr 24:4832. Dr. Prucha testified that not only more testing in the area of the mine but also testing of the larger surrounding area would be necessary to properly characterize the bedrock system, including investigation along identified dikes and fault zones. Tr 8: 1555-1558, 1569-1571, 1574. The wells utilized in the investigation are not adequate to cover the area immediately around the mine, much less a larger area. *Id*. at 571-1574.

John Wozniewicz, hydrogeologist for Golder, was responsible for collecting and characterizing data, and developing a hydrogeologic conceptual model, for the bedrock around the mine. Tr 24:4810. Short-term pump tests were conducted on five of the six boreholes that were flow logged in the Phase I investigation. *Id*. at 4838. These short-term tests lasted *five to six hours*. *Id*. at 4901.

The Phase II investigation included water quality sampling, one pump test, and evaluation of vertical gradients in the bedrock. Tr 24: 4828. The single, seven-day pump test was conducted in borehole 04EA-084 because that was the zone of highest hydraulic conductivity identified in the Phase I packer testing and showed the greatest "deflection" in flow logging during the Phase I investigation. *Id*. at 4838-4839, 4856-4857.

Dr. Karasaki testified that Golder's single pump test is inadequate to identify the zones of higher hydraulic conductivity in the bedrock. At other sites, he has conducted between 50 and 4,000 tests; there is no set number, but "*the more the better*." (Karasaki) Tr 39: 8074-8075. The single seven-day test is "*acutely inadequate*" given that at the rate of coverage of the test, it would take over 14 months to characterize one mile of bedrock. The existence of a highly conductive fracture network cannot be ruled out based on the testing performed, and more tests are necessary, in more wells, covering a period of months. *Id*. at 8113-8116; Ex P632-188, Slides 36, 37. Moreover, the pump tests should not be limited to existing holes, but should also specifically target areas where faults are suspected. Tr 39: 8120.

Dr. Karasaki also testified that of the other holes that were merely flow logged, some should have been long-term pump tested because they indicated inflows. The flow log for several holes showed similar indications of inflow. Tr 39:8075-8078; Ex P632-188, Slide 15-16. *See also* R-32, App. B-2. Furthermore, the short-term pump testing that apparently was conducted on those holes for heat-pulse flow meter purposes is "nowhere near" equivalent to long-term pump testing, and was not analyzed for time versus pressure or drawdown as a long-term test would be. *Id*. at 8158.

Finally, Kennecott failed to utilize pertinent information that it could easily have obtained. During the drilling in the Klasner fault zone referenced by Mr. Ware, *no flow metering, hydraulic conductivity, or hydraulic reactivity or resistivity testing whatsoever was performed*. (Ware) Tr: 15: 3134. This is in contrast to the testimony of Dr. Karasaki, who repeatedly emphasized that long-term hydraulic pump testing is absolutely necessary to evaluate the existence of major water-conductive features in an area. *See, e.g.,* Tr: 39: 8074-8075, 8113-8116. Dr. Prucha also testified that no conclusions can be made about potential water conductive

features in the Klasner fault zone without hydraulic testing. Tr: 40: 8285-8286; Ex. P-191, Slide 4. Without this information, Kennecott's conclusions as to the existence of conductive faults simply are not scientifically valid.

Mr. Ware also testified that the drilling logs would contain information concerning the loss or gain of water during drilling, which can be used to evaluate hydraulic permeability in the bedrock. This was not done, *id.*, p. 3051-3053, and once again this vital piece of important information has not been made available to MDEQ, Petitioners, or this Tribunal.

iii. Kennecott's conclusions regarding the upper and lower bedrock system are unwarranted

Dr. Karasaki further testified that Golder miscalculated the lower bedrock hydraulic conductivity. And, even using Kennecott's slug test data for Hole 084, the lower bedrock hydraulic conductivity should be one order of magnitude higher than estimated. Tr 39: 8098-8102; Ex P632-188, Slide 29.

Golder's approach to estimate the hydraulic conductivity of the upper bedrock reflects an assumption that it is a homogenous porous medium, when in fact it is a highly heterogeneous medium with a range of hydraulic conductivity of orders of magnitude. (Karasaki) Tr 39: 8096-8097, 8102-8105; Ex P632-188, Slides 27, 30, 31.

Finally, Golder's conclusions about the lack of connection between the upper and lower bedrock are unwarranted. Golder's bedrock conceptual model concludes that an "upper bedrock unit" of higher hydraulic conductivity and a "lower bedrock unit" of lower conductivity exist, and the division between the two occurs at 90 meters total vertical depth ("TVD"). The upper/lower bedrock contact level is an important factor for the inflow modeling. Because the upper bedrock is assigned a much higher hydraulic conductivity for modeling purposes, if the upper bedrock were extended to a greater depth, the modeling would produce a higher inflow

rate on that basis alone. Tr 8:1592-95. Kennecott's Exhibit 214 indicates that several faults extend between the upper and lower bedrock, which would act as a pathway for flows from the higher conductivity lower bedrock. This is inconsistent with the conceptual bedrock model's assumption of a strict division between the upper and lower units. (Prucha) Tr 8: 1597-1598; 40: 8289-8291.

Despite Kennecott's claims, differences in water quality do not rule out a connection between aquifers. In fact, where (as here) a uniform environmental head exists, a connection between those aquifers is indicated. Tr 39 :8107, 8109-8110; Ex P632-188, Slides 32, 33. In reality, the purported division between the upper and lower bedrock likely does not exist at all.

iv. Kennecott mischaracterizes the unconsolidated groundwater and surface water systems.

For purposes of building a conceptual model to estimate mine inflows, it is important to determine the properties of the unconsolidated aquifers and surface waters, and their hydraulic connections between each other and with the underlying bedrock. Tr 8: 1620-1622. This is because the pumping from the bedrock will create a drawdown that induces an increased amount of flow from the overlying water features, in this instance the Salmon Trout River and rare wetlands. *Id*. These hydrogeologic conditions were presented in Appendix B-5 to the EIA, and summarized in Appendix B-1 to the EIA.

Dr. Prucha testified that the number and spatial orientation of testing wells used in the hydrogeologic studies of the unconsolidated aquifer are inadequate. As shown in Figure 23 to Appendix B-1 of the EIA, relatively few wells were located near the "key area of interest," the ore body and proposed mine workings. Tr 8: 1600-1601. More wells are needed in that area, given the "very complex" unconsolidated system with several layers of varying permeability that "are pinching out" in that area, including several areas where bedrock is exposed at the ground

surface. *Id*. at 1601; 1614-1615. Figure 24 from the same study shows the absence of the "D" zone aquifer in areas near the mine, without sufficient wells or boreholes to support that depiction – it "is a complete guess." *Id*. at 1602-1603. Dr. Prucha further emphasized that the areas south and west of the Salmon Trout River would be impacted by mine drawdown, and should have been "a primary interest" for conceptualization purposes, yet there are no wells in that area. *Id*. at 1606, 1616-1617.

Dr. Prucha clarified that it is acceptable to "interpolate" data, meaning to logically assume a measurement for a point between two actual control points. However, the conclusions reached by KEMC are an "extrapolation," meaning that the measurements have been assumed without appropriate outward control points. *Extrapolation creates significant uncertainty*. Id. at 1604.

Dr. Prucha testified that the screened intervals of wells were too short relative to the thicknesses of the aquifer zones involved. Tr 8:1614. In addition, samples from wetland piezometers were taken during the winter and had to be thawed, which "dramatically influences their estimation of the vertical gradients" in that area. Seasonal measurements should have been taken in the wetlands. Id. at 1627.

Dr. Prucha also pointed out significant errors evident in depictions of groundwater flow direction and elevations. Elevation contours cross over the Salmon Trout River "as though it has no influence on groundwater." Tr 8: 1617. Furthermore, the flow directions and elevations are depicted in areas where data is lacking, and are likely incorrect. *Id.* at 1618-1619. This introduces significant uncertainty into any numerical modeling. *Id*.

The assessment of the stream-aquifer interaction around wetlands near the ore body is also insufficient. More wells should have been located in areas along the Salmon Trout River and

screened at a deeper depth. Tr 8: 1622. Moreover, given the complexity of different wetland zones identified, a more detailed concept and cross-section showing those interactions should have been utilized. *Id*. at 1623.

v. KEMC's numeric modeling of mine inflow is flawed

Dr. Prucha testified that it is important to select the proper modeling code to simulate the flow of water through a particular medium. A code called "MODFLOW" can only simulate flow through unconsolidated materials; *it cannot simulate flow through fractured rock*. In contrast, a well-known and established code called "FEFLOW" is capable of simulating both fracture flow and flow through unconsolidated material and is more reliable in the context of this site. Tr 8: 1639-1640. Dr. Prucha also explained the basic steps that must be followed in developing a numerical model before running predictive simulations. If these steps are not followed, the results of any predictive simulation from the model are inherently unreliable and unrealistic. Tr 9: 1680. These steps were not followed in Kennecott's modeling.

Once predictive simulations have been made, it is also standard practice to perform a "sensitivity analysis" to identify the model parameters, such as hydraulic conductivity, that most affect the model results. Tr 8: 1656. The sensitivity analysis is necessary to assess the uncertainty of the predictions based on the range of uncertainty in those parameters. *Id*. at 1656. There are "very clear guidelines" for this process under ASTM standards. *Id*. at 1657. As discussed below, the modeling submitted with Kennecott's application did not include a sensitivity analysis, and Kennecott's later attempt to correct this mistake, aside from being irrelevant to these proceedings, was itself insufficient and inconsistent with standards for sensitivity analyses. No sensitivity analysis was performed on this model; this was admitted by Kennecott's expert witness Gregory Council. Tr 26:5313; Ex I-645, Slide 14. Willy Zawadzki, who performed

Golder's numeric inflow modeling, Tr 24:4952, also admitted that a sensitivity analysis is a standard technique in groundwater modeling. *Id.* at 4983.

Kennecott's reliance on two different and separate models to simulate drawdown in the unconsolidated aquifers is unconscionable. In reality, the mining operations will cause water to be drawn down from the unconsolidated materials through the bedrock as one connected system. The use of separate models (and types of models) for the bedrock and unconsolidated materials makes an accurate translation of the drawdown from one to the other impossible, and forces the modelers to choose inappropriate and unrealistic boundary conditions to simulate the boundary between the two areas in their respective models. Tr 8: 1643. Instead, an integrated FEFLOW model covering both the bedrock and unconsolidated materials should have been used. *Id.*; see also Tr 40: 8296-8298.

Golder's 2006 model is also unreliable because it is not sufficiently calibrated. The model was supposedly "calibrated" to the single bedrock pump test that was conducted in borehole 04EA-084 during the Phase II bedrock investigation. Ex. R-33, p. 18. Dr. Prucha testified that this calibration on a single pump test is not sufficient, given that the model domain covers an 87 square kilometer area, or approximately 33 miles, with significant data gaps and extrapolation of data over that domain, and that Golder's own modeling projects drawdown over a one to two-mile radius around the mine. Tr 8: 1643-1644. See also *id* at 1651-1652, 1658; Tr 40:8299. This single data point, which was shown through other testimony by Dr. Prucha and Dr. Karasaki to be highly unreliable in its own right, is not a sufficient basis upon which to calibrate the model.

Golder's model unrealistically represented water conductive features in the bedrock because when they modeled faults they were artificially confined to the lower bedrock. Dr. Prucha explained that *the model, by design, this does not allow for significant transfer of water*

from the overlying upper bedrock or unconsolidated materials. (Prucha) Tr 8: 1644-1646. The projected inflows are seriously underestimated because of the model's assumptions about the length of faults and the connections of faults with the upper bedrock and overburden. *Id*. at 1659. The model also failed to account for other mapped features in the area and brecciated zones along dikes. *Id*.; *see also* Tr 40: 8297.

In addition, no uncertainty analysis was performed by Kennecott, and MDEQ did not insist that this critical step be performed. Tr 40: 8362. An uncertainty analysis is especially crucial in this instance given the significant uncertainty associated with the limited hydrogeologic data that was collected. Finally, Dr. Prucha further testified that it is standard practice to account for "worst-case" scenarios, under both general modeling standards and MDEQ's own modeling guidelines, which Kennecott did not do. Tr 8: 1632-1633.

vi. Golder's 2008 inflow modeling does not fix these problems

In 2008, Golder produced a revised inflow model that once again predicted inflows of 60 gpm to 210 gpm. Ex I-399. This model was almost identical to the previous model, but altered some parameters to account for stress-induced permeability changes and the revised crown pillar thickness of the mine allowed under the Part 632 mining permit. Id. The model also included a sensitivity analysis. *Id.*

This model did not exist during MDEQ's review of the mining permit and had not yet been prepared when the decision to grant the permit was made. It was never reviewed by MDEQ or the public during the permit review process and did not form any part of the basis of MDEQ's decision to issue the Permit. See Thomas, Tr 33:6866; Mariuzza, Tr 32:6626-6627, 6671. Therefore, the 2008 model is outside the scope of the issues in this proceeding, and cannot have any bearing on the outcome of this proceeding. Even if the model were to be considered,

however, *it does not correct the problems identified with the earlier model.* Zawadzki claimed that he had extended the mine workings 30 meters laterally in all directions to account for these permeability changes, which he asserted was "very conservative." He further asserted that the changes in inflow resulting from this modification were not significant. Tr 24:5032. However, the extended zone was not actually continuous along the mine decline tunnel, which has the effect of limiting inflows. Tr 40: 8300. The 30-foot zone of increased permeability is also inconsistent with an analysis by Dr. David Sainsbury that estimates a 400-foot zone; that scenario should have been tested as well, but was not. *Id.*

Mr. Zawadzki also testified about the sensitivity analysis associated with the 2008 revised model. Tr 24:4982. Dr. Karasaki, however, explained that Golder's sensitivity analysis was not performed properly. The analysis only adjusted the most sensitive inputs relating to permeability by a factor of five; this is far too small an adjustment given the wide range of permeabilities inherent in fractured bedrock systems and the scant baseline data. Tr 39: 8084-8085. Ideally, the analysis should be based on a range developed through more samples and data collection, but based on the existing situation, *the inputs should be adjusted by one hundred times*. *Id*. at 8087. Mr. Zawadzki revealed that he did not consider ASTM standards for sensitivity analyses in performing his sensitivity analysis. (Zawadzki) Tr 24:5013.

In addition, Golder only adjusted one parameter at a time in its sensitivity analysis. Dr. Karasaki explained that this is acceptable to determine which parameters are sensitive, or affect model results, but is not sufficient to assess the uncertainty of the model. To assess uncertainty, it is necessary to adjust combinations of those sensitive parameters. Tr 39: 8088-8089, 8091; Ex P-188, Slides 21, 23. This approach biases the analysis to show limited impacts. (Prucha) Tr 40: 8202-8203.

Dr. Prucha further testified that Golder's sensitivity analysis was only run on the base-case (lower) inflow model of 60 gpm, not the higher 210 gpm scenario that included water-conductive features. If Golder had run the analysis using its own higher value, it would have produced more significant changes. Tr 40: 8303. In addition, it is standard modeling procedure to run a sensitivity analysis on the upper-bound case. *Id.*

The individual scenarios run during the sensitivity analysis were also defective. Mr. Zawadzki asserted that his sensitivity analysis assumed the existence of a large water-conductive feature located within 100 meters of the mine workings, but that it showed no significant impact on mine inflows. Tr 24:4987. However, the analysis assumed that the fault did not intersect the mine itself, and *the model by design assumed that the rock between the fault and mine workings would allow very low flow*. (Karasaki) Tr 39: 8090; Ex P632-188, Slide 22. Because Golder did not connect the fault to the mine the model would not allow much flow regardless of the size or permeability of the feature. Instead, Golder should have "hooked up the pipes" to assess the impact of this feature on the inflows and drawdown. (Prucha) Tr 40:8304-8305.

An additional flaw in Golder's 2008 modeling is that an uncertainty analysis was not performed. To do "anything that even approaches a more standard uncertainty analysis," Dr. Prucha testified, it would be necessary to adjust combinations of parameters to evaluate the full possible set of outcomes. *Id.*

vii. Kennecott's inflow predictions are vastly understated

To gain understanding about the system and the impact of Golders errors in the inflow modeling effort, Dr. Prucha performed his own inflow modeling. He utilized the model as prepared by Golder to predict upper bound inflows. Tr 8: 1658-1660; 9: 1792. Dr. Prucha adjusted certain parameters in the model to reflect more realistic conditions. Tr 8:1658-1660.

Dr. Prucha testified that it is standard practice to consider "worst case" scenarios in modeling, and that this is also outlined in MDEQ's own modeling guidance. Tr 8: 1633. Dr. Prucha's modeling, which is based on reasonable assumptions given the lack of site-specific data, indicates that *inflows to the mine could range from 280 gpm to 3,000 gpm*. Tr 8: 1650; 9: 1698, 1700-1701. Prucha's modeling is somewhat conservative, because his model did not include the dikes in the area, which would create greater inflows if considered. *Id*. at 1701.

Any prudent modeler would take information about other similar mines into account. (Prucha) Tr 8:1576-1577. Kennecott's application materials did not discuss those mines at all, much less why they are or are not relevant to predicting inflows at the mine. *Id*. at 1579. Mines in the nearby Marquette Iron Range exhibit very similar hydrogeologic conditions to the proposed mine area.

Dr. Prucha highlighted specific examples from those mines that are of particular relevance to predicting inflows at Kenneott's Mine:

- The Morris Mine, which is approximately 15 miles from the Kennecott Mine area, caused drawdown of over 400 gpm in a river located 1,000 feet from the mine. The affected area extended nearly 2 miles downstream. Tr 8: 1583-1584; Ex P632-61.
- The Morris Mine had inflow rates of 1650 to 2,000 gpm. Tr 9: 1702; Ex P632-61.
- The Mather B Mine had 4,000 gpm of inflows when a water conductive feature was intercepted. *Id.*
- The Maas Negaunee Mine had 3,000 gpm of inflow. *Id*.
- The Athens Mine had inflows of up to 600 gpm. *Id.*

If there is a direct connection between the Mine and the Salmon Trout River, the river will act as a direct source of water flowing into the mine, and inflows will increase exponentially. *Id*. at 1703.

In sum, Kennecott's prediction that the inflow of groundwater into the mine will be below 215 gpm is based on a characterization of the bedrock around the mine that is in turn based on

too few data points to be valid. In addition, Kennecott drew faulty conclusions from the data it does have. Similarly, Kennecott did far too little hydrological testing to support its conclusions, and drew faulty conclusions from the testing it did do. Modeling using more realistic conclusions shows a much greater predicted inflow. These greater predictions must be considered when assessing the potential for drawdown of the Salmon Trout River and wetlands above the mine.

c. More realistic modeling indicates a much greater drawdown of the water table

Much debate has been had about the amount of drawdown that would result from water flowing into the mine from above. One thing is certain; there will be drawdown. The question is how much. Kennecott has not demonstrated that drawdown will not harm the Salmon Trout River and adjacent wetlands and its inhabitants.

Kennecott's Environmental Impact Assessment, Appendix B-4, Figure 9.5 depicts an upper bound case was depicted for the predicted drawdown at the end of mining. *Figure 9.5 is estimated to reflect a drawdown of about a mile in diameter*. Tr 8:1555-57.

Water levels in the aquifers above the bedrock would actually start to decline as water flowed out of the aquifer into the mine. Kennecott's Figure 25 of Exhibit I-591, Kennecott's own, newest modeling shows an 8-foot drop in water level in the area of the ore body where the Salmon Trout River is located. (Prucha) Tr 8: 1666. In other words, the April 1, 2008 *Geotrans model done for Kennecott showed a drawdown of eight feet in the water levels above the ore body* – "and this is for the case where they only simulate 60 gallons per minute." So for the more realistic range calculated by Dr. Prucha of 280 to 3000 per minute, the drawdown of the Salmon Trout River would be "substantially more." Thus Dr. Prucha stated unequivocally: "I believe that models [Kennecott] developed are inadequate to predict mine inflows because … the underlying conceptualization and characterization was inadequate. I believe that they

substantially underestimated the amount of mine flow, and I believe that they substantially *underestimated the impacts to the unconsolidated aquifer zones and the stream flow in the Salmon Trout River*." Tr 8: 1666-67. (Emphasis added)

Geomatrix, a national consulting firm, issued a report during Part 632's public comment period that stated drawdown of the water table near the mine site of between three and twelve feet. (Adamus) Tr 6:1051-52; Exhibit P632-3, App. 6, table 4.

d. The drawdown of the water table is likely to impair or destroy wetlands

According to Dr. Adamus, the wetlands at the mine site and those close to the mine site are exceptionally sensitive and important. (Adamus) Tr 6: 1013. Some of these wetlands are groundwater driven fens, which are rare in the United States as a whole, and which generally high plant species diversity in comparison to other types of wetlands. *Id*. at 1035. Some of the wetlands identified in the EIA are of exceptional quality and are extremely rare. *Id*. at 1038. One of the mine's greatest threats to these wetlands is from the potential lowering of the water table due to inflow of water into the mine. *Id.*

As explained above, the parties differed in their predictions of the degree to which the water table will be lowered in the area above the mine. Kennecott's experts predict up to a six inch drop, while petitioners' experts predict a three-to-twelve foot drop. According to Dr. Adamus, even a six-inch drawdown can have a major impact on groundwater-supported wetlands, including changes in species composition and chemical function. Tr 6: 1044, Ex P632-42, Slide 14. A three foot drop in the water table would mean a total loss of the wetlands in the vicinity of the mine site and would affect wetlands for a one mile radius. Tr 6: 1052-53, Ex P632-42, Slide 14. If wetlands in the Yellow Dog Plains do dry up, it is unlikely that they could be restored to pre-mining status, even after mining ends. *Id*. at 1062-63.

e. The drawdown of the water table is likely to impair or destroy the Salmon Trout River

The headwaters and upper reach of the main branch of the Salmon Trout River flows directly above the proposed mine site. From there, it flows north through the Huron Mountain Club property and ultimately into Lake Superior. The Salmon Trout is a river of extraordinary environmental quality. (Strand) Tr 7: 2046. The only naturally reproducing population of coaster brook trout on the south shore of Lake Superior spawns in the lower reaches of the Salmon Trout River. *Id*. at 2054-2055. Coaster Brook Trout are very rare, and are currently a candidate for listing on the federal endangered species list. Furthermore, the stretch of river above the proposed mine supports stream-dwelling brook trout.

Dr. Strand, a fisheries biologist from Northern Michigan University who is very familiar with the Salmon Trout River, described the importance of groundwater to the Salmon Trout River and the impacts that would ensue if groundwater inflow was lost. According to Dr. Strand, groundwater drawdown is likely to have a negative thermal impact on area streams, because cold water streams depend on groundwater supplies to maintain their summer coolness. (Strand) Tr 7:2057. Warmer water, in turn, has a double impact on the cold water organisms in the streams: higher water temperatures increase metabolic rates and oxygen demand; at the same time, however, dissolved oxygen concentration goes down as water temperature increases. *Id*. In Dr. Strand's opinion, cold groundwater is an important source of water for the Salmon Trout River. *Id*. at 2058.

If groundwater supplies to a stream are reduced, the stream can become a net exporter of water. *Id*. at 2059. In addition, the thermal regime of the stream can be altered both in summer (becoming warmer) and winter (becoming colder) in the absence of the moderating thermal impact of groundwater supplies. *Id*. at 2061 and 2064-66; Ex P632-146, Slide 13. One result of

the substantial groundwater contribution to the upper Salmon Trout is that brook trout, which commonly move upstream and downstream in a river, will be able to find optimal thermal conditions at almost all times even in the hottest month (August). *Id*. at 2071-2073.

Dr. Strand's own research has shown that invertebrate abundance, invertebrate richness, and periphyton abundance are greatest in streams with strong groundwater supplies. Tr 7: 2061-2064; Ex P632-146, Slides 11-12. Invertebrate abundance, of course, is a habitat requirement of trout. *Id*.

Dr. Strand testified that the substantial drawdown of groundwater in the area of the upper Salmon Trout (hypothesized to be 8 ft. by Council of GeoTrans [Kennecott]; see previous section) would cause a substantial reduction in the groundwater supply to the river. *Id*. at 2075-2076. Dr. Strand further testified that with a reasonable degree of scientific certainty, he believes that the ecosystem of the Salmon Trout River would, as a result, be impaired or destroyed. *Id*.

Furthermore, the river would very likely be impaired as trout habitat at a much smaller drawdown level. Dr. Ejnik's stream monitoring indicates that in July 2007 at the closest monitoring station downstream from the mine (designated as STRM006), the depth of the stream in September 2007 was .36 feet, with a flow of 2.08 cfs. Ex P632-92, Table 3. These measurements are consistent with flow measurements taken by Kennecott. See Ex. R-71, Attachment 6, Table 4. Based on the depth of the stream, a drop in the groundwater of greater than four inches would mean that the groundwater level would drop below the level of the bottom of the stream, and would thus no longer flow into the stream. Thus *a water table drawdown of only four inches could impair the stream as habitat for trout.*

In summary, Kennecott has not met its burden of showing that the inflow into the mine and drawdown of the water table above it will not be great enough to impair or destroy the trout

habitat of the Salmon Trout River above the mine. Its conclusions regarding the potential inflow level are unfounded and its conclusions regarding the impact of the inflow level on groundwater drawdown are equally unfounded. Finally, even a small drop in the water table could significantly impact trout habitat.

f. Kennecott has not met its burden of showing that air deposition and/or the direct release of pollutants into water will not impair species and ecological systems

Kennecott has also failed to prove that the proposed mine will not pollute or impair important aquatic and terrestrial species and ecosystems due to air deposition and/or direct discharge of pollutants. The ecosystems that may be impacted include the pristine aquatic and terrestrial systems downwind and downstream within the Huron Mountain Club, and the wetlands and river ecosystems of the Salmon Trout and Yellow Dog River near the mine.

After the application was filed, Kennecott proposed to add air pollution control measures. However, the proposed controls are completely unproven in this application. Without more evidence that the controls will perform as hoped, it cannot be assumed that deposition levels will be as low as Kennecott predicts. The original uncontrolled emission levels must therefore be used to predict the possible impacts of pollution on area ecosystems.

Andrea Martin developed Kennecott's air permit application which is implicated by the affected area and cumulative analysis requirements for Part 632. Kennecott's air application provided for *uncontrolled* heavy metal emissions from the MVAR stack of approximately 20 tons of particulate matter per year. (Martin) Tr 18: 3855-3856. Martin admitted that with no emission limits, the mine would dump hundreds of tons of contaminated particulate matter into the Salmon Trout and Yellow Dog Rivers and across the lands of the Huron Mountain and Yellow Dog Plains. *Id*. at 18: 3865-3866. She also admitted that Kennecott had done absolutely

no analysis to evaluate the impact of heavy metal and sulfide deposits on the wilderness areas around the mine. Tr 18: 3865-3866. Although Kennecott has since proposed a fabric filter for the MVAR stack, Ms. Martin admitted having never seen a fabric filter of this size installed in a mine and acknowledged that she has never been contacted by Kennecott with regard to specifications for the filter. *Id*. at 3871-3872. It was also clear from Ms. Martin's testimony that Kennecott underestimated the PM emissions from the mine by thousands of pounds per year. (Vel) Tr 6: 1177-78. The underestimation occurred as a result of Ms. Martin making optimistic assumptions in the emission calculations which directly contradicted data contained in the application itself. Tr 18:3825-3827. Predicted impacts from Kennecott's emissions include:

- Road dust generated by heavy traffic on an unpaved road will settle into snow, and affect area wildlife after snow melt. (Vel) Tr 7:1340.

- The deposition of heavy metals will be spread over *tens of kilometers* and enter both land and water. *Id*. at 1345.

- Water running off the roads and off the facility itself will introduce heavy metals and sulfuric acid into surrounding habitats. *Id*. at 1349.

- Pulses of copper, nickel and sulfur in the spring snow melt will enter the Salmon Trout River and be carried *all the way "out into Lake Superior*." *Id*. at 1392-1393. (Emphasis added)

- As to heavy metal bearing particulates deposited on the lands and forests of the Huron Mountain Club, there is a realistic concern that there would be effects on patterns of growth and population dynamics for organisms. (Woods) Tr 2: 244.

In addition to landscape scale impacts, the Salmon Trout River may also be impacted by acidification and an increase in heavy metals. Acid and/or heavy metals could reach the river either through water-borne releases or through deposition from air emissions. Acidification of the Salmon Trout and other area waters could result in a lowering of the abundance and diversity of aquatic invertebrates, adverse behavioral responses by fish, and a reduced rate of

decomposition of important nutrient sources such a leaf litter. (Strand) Tr 10: 2078. Copper is a heavy metal that is toxic both to invertebrates and fish. *Id.* at 2079. The effects of heavy metal pollution on stream and vertebrates would include mortality and resulting loss of biodiversity; sublethal effects would include increased drifting and increased vulnerability to predation. (Strand) Tr 10: 2087-88; Exhibit P632-146, Slide 19.

3. Kennecott has not proven that it will prevent Acid Mine Drainage or its escape into the environment

Like Eagle, mines with a moderate to high abilities for acid generation; moderate to high abilities to generate other kind of contaminants, especially metals; and mines close to either groundwater or surface water; between 85 and 90% of the time, those mines exceeded water quality standards. (Maest) Tr 9:1858. For the mines that exceeded standards, 64% of the time, it was because of a failed mitigation; in other words, something that was designed to prevent contamination from reaching the environment did not work. *Id*. at 1859.

The Eagle deposit is unique. It has extremely high sulfide content. *Id*. at 1862. There aren't that many other deposits in the world that have such a high sulfide content. *Id*. at 1863.

Dr. Maest earned an undergraduate degree in geology, particularly mineralogy and petrology, from Boston University in 1979. *Id*. at 1838. She earned a Master's degree in sedimentology and geochemistry or in Princeton in 1981. *Id*. She also earned a Ph.D. in geochemistry and water resources from Princeton in 1983. *Id.* In the field of geochemistry, she specializes in the interaction of the earth materials with water. *Id*. at 1839. Her dissertation included the study of fate and transport of chemicals and geochemical modeling. *Id*. at 1840. Dr. Maest had a post doctoral fellowship at the National Research Council with the United States Geological Survey's (USGS) national research program; Dr. Maest was a project chief at the USGS where she worked for six years. *Id*. at 1841. Dr. Maest has been elected to four National

Academy of Science committee study groups which included Committees on the Bureau of Mines Research, Hard Rock Mining on Federal Lands and Technologies for the Mining Industries. *Id*. at 1843-45. After reviewing Kennecott's application and contested case materials and testimony, Dr. Maest concluded that:

- Rock at the proposed mine is inherently the type that is going to generate acid and produce high concentration of metals and other contaminants.
- Kennecott's estimates of water quality severely underestimate the concentrations of contaminants that will be present in water related to the mine.
- The permit limits are not designed to be protective of groundwater or surface water resources.
- Under post-closure conditions, water in the mine will be contaminated and exceed the standards even if it is diluted many times in downgradient groundwater. Tr 10: 2012.

a. Water in the re-flooded mine will be orders of magnitude worse than Kennecott predicts and it could escape into surface and groundwater

Dr. Maest modeled Kennecott's predicted water quality in the mine at the end of mining. Tr 10:1932. Dr. Maest's results are uniformly higher than Kennecott's results. Tr 10:1932. Reasons include that Kennecott did not account for enough surface area and assumed a particle size that was too high. They didn't account for enough leaching, or the amount of ore that would be left in the mine and in the development rock. Tr 10:1932-33. Exhibit P632-154, slide 16. For aluminum, Dr. Maest's predictions indicate three orders of magnitude higher than Kennecott. Tr 10:1933. Copper, which is present in high concentrations in the country rock, was predicted by Kennecott at 2.1 micrograms per liter, with Dr. Maest predictions indicating 11 micrograms per liter. Even Kennecott's predictions for nickel in the underground mine exceed any of Michigan's standards. Tr 10:1933. Kennecott's sulfate prediction is very low, even as low as a background sulfate concentrations are in much of the groundwater in the United States. Tr 10:1933. Dr.

Maest predicts sulfate concentrations of almost 400 milligrams per liter, which exceeds both Michigan standards. Tr 10:1934.

Kennecott did not take the influence of the crown pillar on water quality into account, but it should have. (Maest) Tr 39:8171. Previously, very little of ore would be underground, but as now permitted, there will be quite a lot of or remaining in the crown pillar. Tr 10:1918 and 38. When the crown pillar is thicker, more ore will be left underground. Tr 10:1918. Every sample of that rock consistently showed that the rock is acid generating. *Id*. When snow melts and when it rains, water would infiltrate the crown pillar and allow leaching of that material to bring contaminated water into the underground mine. *Id*. at 1919. It is a well documented fact that water goes through the mine, especially when it is pumped from the bottom for years on end, which is what is proposed at the site. (Maest) Tr 39: 8172.

Dr. Maest developed an estimate of the input through the crown pillar that would be entering the underground mined during operations. Tr 10:1941. The results indicate a pH of 5.75, aluminum of .6 mg per liter, copper at 1.3 mg per liter, nickel 57 mg per liter and sulfate at 337 mg per liter. *Id.*

Because the disseminated ore has such a high sulfur content, it is very important to know whether or not it will be mined. Tr 39:8167. Mark Logsdon, on behalf of Kennecott, testified that the disseminated ore may or may not be mined, that Kennecott was uncertain at this point. (Logsdon) Tr 39:8163. If it is not going to be mined, there will be a halo of this high sulfur material left in the mine, and quite a bit of it would end up in the development rock stockpile as well. If it is not mined, the mine wall rock will be more highly mineralized than Dr. Maest has taken into account in her modeling and the water quality could be even worse than predicted by Kennecott or Dr. Maest. Tr 39:8168. If the disseminated ore is removed as waste, it would

increase the sulfur content of rock on the TDRSA. Tr 39: 8168-69. If it is not mined, it will increase the potential for acid mine drainage in the re-flooded mine. Tr 39: 8169.

Dr. John Coleman earned an undergraduate degree in Wildlife and Forestry at the University of Maine, a Master's degree from Virginia Polytechnic Institute and State University in Wildlife Science and Fisheries in 1985 and then a Ph.D. from the University of Wisconsin, Madison in Wildlife Ecology and Statistics. His research for the Master's degree and Ph.D. focused on resource distribution and modeling using existing software and developing programs in Fortran, Pascal and Basic. Tr 13:2743. Dr. Coleman has developed 15 to 20 models throughout his years of experience. *Id*. at 2754. Dr. Coleman's background emphasizes statistics and data analysis. Id. at 2770.

Dr. Coleman discovered that the application contains conflicting data used in modeling to calculate the water quality in the re-flooded mine. Tr 13: 2770. *It is highly likely that the groundwater quality standards in Part 632 would be easily exceeded by several-fold*. Tr 13: 2798-99.

Kennecott's input data used for modeling do not match the inputs stated in the application's text; they are significantly different. *Id*. at 1770. This occurred in four main areas related to calculating the water quality in the backfilled mine: volume of development rock, amount of groundwater to dilute constituents (inflow into mine), particle size of the development rock and leaching data. *Id*. at 1770-71.

First, the volume of rock (rock balance) used to calculate water quality in the reflooded mine is 5.2 to 5.3 times different between the actual input data and the application text. Tr 13: 2773. Calculating the amount of development rock is one step in calculating water quality. *Id*. at 2774. The volume of development rock available and that would be backfilled into the mine is

663,000 tonnes. *Id*. at 2773. Exhibit R-25, Table 4.4. The amount of development rock actually used in the model for calculating the final water quality was only 125,600 tonnes. *Id*. at 2772-73. Exhibit R-68, Appendix D-2, p. 39. Having over five times more development rock backfilled into the mine than was used in the model suggests that there would be a real difference in the amount of constituents available for dissolving in the water. Tr 13:2774.

Second, the application indicates that the "best guess" for mine inflow is 75 gallons per minute (gpm). Tr 13:2775. Exhibit R-25, p. 30. The input used for the model is 180 gpm. *Id*. Exhibit R-68, Appendix D-2. This discrepancy is important because more water (180 gpm inflow) flowing into the mine, the greater the dilution and the lower the concentrations of constituents in the reflooded mine water and vice versa. (Coleman) Tr 13: 2776. The volume of water is which to dissolve constituents is a primary component in calculating water quality. *Id*. at 2775.

Third, the application states that a variety of particle sizes of development rock in the backfilled and reflooded mine were used in calculating water quality. *Id*. at 2777. Exhibit R-29, Appendix D-3, p. 3. However, the input data files for the model indicate that only one size, ten centimeters, was actually used. *Id*. Exhibit R-68, Appendix D-2. Particle size is important in calculating the surface area of rock compared to the mass. *Id*. The smallest pieces of rock (down to powder size) contribute the greatest surface area for reactions. *Id*. Dr. Coleman illustrated this point through a series of slides showing first a sphere of rock, approximately the size of a softball. Tr 13:2799. Exhibits P632-73-B and 73-D. The literature indicates particle size distributions ranging from a little above ten centimeters down to one times ten to the negative six meters, almost dust. Tr 13:2780. Exhibit P632-3, Appendix 10, p. 4. Dr. Coleman

submitted comments to the MDEQ at least as early as October 2007 raising these concerns and sent follow up e-mails asking if MDEQ had any questions about these comments. Tr 13:2782.

Fourth, Appendix D-5, Table 1 states that it contains the data inputs that were used for the model to calculate water quality in the reflooded mine. Tr 13: 2783. Exhibit R-68, Appendix. D-5. However, it is not the data used in the model. *Id*. Appendix D-5 states that data from weeks 40-70 were used in the model; the spreadsheet shows that data from weeks 20-25 were used. Tr 13:2784. Exhibit R-29, Appendix D-5, p. 4-5. The levels of nickel and sulfate claimed in the application's text to be used in the model are much higher than the values that were actually used in the spread sheet. Tr 13: 2784. Exhibits P632-75-A and 75-C.

Dr. Coleman received KEMC's model from MDEQ. Tr 13: 2785. Using the same Kennecott model, with the Kennecott input data indicated *in the text of the application for the four parameters above, Dr. Coleman ran the model.* Tr 13: 788 and P632-3, App. 10, pgs. 5-6. Concentrations of sulfate went from Kennecott's prediction of 29 milligrams per liter to 9,307 milligrams per liter. Tr 13: 2787. Exhibit P632-3, Appendix 10, pgs. 5-6. Copper concentrations jumped from Kennecott's prediction of .002 milligrams per liter, to 93.9 milligrams per liter. Tr 13:2788. *Using the values from Kennecott's application text in Kennecott's own model, most parameters exceed Part 201 standards*. Tr 13: 788. Exhibit P632-3, Appendix 10, p. 5-6. (See red highlighted areas indicating parameters above the Part 201 standards). The corrected values are at least one to two orders of magnitude higher when the inputs were corrected to reflect the application text input data. *Id*. at 2789. *It is highly likely that the groundwater quality standards in Part 632 would be easily exceeded by several-fold. Id.*

i. Kennecott has underestimated contamination in re-flooded mines before

The Flambeau Mine used a similar backfill system using development rock and reflooding. In the Flambeau Mine, sulfate levels range between 300 and 1600 milligrams per liter of sulfate in the backfilled mine pit. Tr 13: 2790. Exhibit P632-70, p. 4. KEMC's prediction of sulfates in the Eagle mine pit was much lower at 29 milligrams per liter. Tr 13:2790. KEMC predicts a copper level in the Eagle Mine reflooded mine water to be .002 milligrams per liter; at the Flambeau Mine, copper levels have stabilized around 500 micrograms (0.5 milligrams) per liter of copper. Tr 13: 2788 and 2793. Exhibit P632-70, p. 4. The manganese level recorded was approximately 11,000 micrograms per liter; the drinking water standard is in the single digits. The sulfate level was around 1500 to 1600 milligrams per liter which does not meet drinking water standards. Tr 13: 2791-92. Exhibit P632-70, p. 4. *A number of the parameters monitored at the Flambeau Mine are well above drinking water standards*. Tr 13: 2792. Exhibit P632-70, p. 4.

ii. Kennecott's groundwater monitoring is not designed to detect contaminants

Monitoring groundwater quality is critical, but at the reflooded mine there are only three compliance wells for the surficial aquifer and even those are not placed downgradient and are not as close to the mine as they should be. Tr 13: 2800-02. There are no compliance wells for the bedrock aquifer determining water quality post-mining. *Id*. at 2803. Exhibit R-25, Fig. 7-3. (Map of monitoring and compliance well in Mining Permit Application).

b. Kennecott has underestimated contamination in water reporting to the WWTP and overestimated the WWTP's ability to treat it

i. Kennecott's Acid Mine Drainage and metal leaching characterization of rock was inadequate

The groundwater quality model predicts water quality by determining how much leachate will be produced by the leaching off the walls and the development rock in the mine, and then accounts for dilution by inflowing groundwater. The infiltration to the mine was based on Kennecott's water balance; Kennecott's expected case is 75 gallons per minute. (Maest) Tr 10: 1927. However, in this model Kennecott used an expected in-flow rate of 180 gallons per minute. *Id*. The higher flow rate will cause more dilution, but it is not the expected case or the highest case according to Kennecott's own water balance. *Id.*

Additional flaws in Kennecott's model include that total rock and particle size were underestimated. Surface area is what controls the leaching rate, and how much contaminants are produced. Tr 10: 1920. The more surface area, the worst the water is with acid generating rock. Tr 10: 1920. Kennecott assumed that every rock in the waste rock pile would be 10 cm in diameter. Tr 10: 1922. Dr. Maest corrected Kennecott's assumptions determining that 90% of the rocks would be 10cm in diameter and 10% would be 1cm in diameter. Tr 10: 1923. This assumption is more valid than Kennecott's. Tr 10: 1923.

Kennecott only conducted *one* kinetic test on the semi-massive sulfide unit. Tr 9: 1881. Similarly, Kennecott only conducted *two* kinetic tests on the massive sulfide unit. Tr 9: 1881. More tests are needed to adequately characterize this rock. Tr 9: 1881. There are not enough samples compared to the value of rock.

MDEQ consultant, Ted Eary used a total of 675,000 metric tons of development rock. (Maest) Tr 10: 1910. This is not an appropriate amount of rock, because it does not include the

ore, which is 4.05 million tons. Tr 9: 1911. That sampling amount is simply too low; it is not enough samples, per the amount of rock. Tr 10: 1911. This is not sufficient to determine how acid generating the rock is or what the whole rock composition would be. Tr 10:1911. Based on recommendations by regulators in Canada and British Columbia, there should've been a minimum number of samples of between 26 and 80. Tr 10: 1913. Complete tonnage of development rock used as backfill overall throughout the life of the mine is 647,000 tons according to Kennecott's application; Kennecott used 379,000 tons in its water quality modeling, representing the amount of development rock in the mine during year three instead of at the end of mining. Tr 10: 1925. 647,000 tons is Kennecott's own figure and should have been used in the modeling because it is the amount of rock that will end up in the backfilled mine. (Maest) Tr 10: 1925.

ii. Even Kennecott's tests show high levels of contaminants and very acidic water

The massive sulfide unit testing showed that it started making a sulfate rich water right away. Tr 9: 1885. Kennecott stopped measuring sulfate in these water samples at week 20. Tr 9: 1885. Exhibit P632-154, slide 8. In the massive sulfide unit, the pH immediately dropped down to 4.0 and remained there throughout the duration of the test. Tr 9:187. Exhibit P632-154, slide 8.

Kennecott's kinetic test on this set on the massive sulfide unit showed very high nickel concentrations that would exceed standards by 1000 times. Tr 9: 1887. Exhibit P632-154, slide 8.

In the semi-massive sulfide unit, high sulfate concentrations developed right away and continued to rise. Tr 9: 1888. Exhibit P632-154, slide 9. The pH continued to drop to between 4.0 and 5.0, and remained even lower throughout the test. This is another acid producing unit of

rock. Tr 9:1889. Exhibit P632-154, slide 9. This is another high nickel leachate generating rock. *Id*. Exhibit P6 32-154, slide 9.

In peridotite, sulfate concentrations continued to increase throughout the life of this test of 50 weeks. Tr 9: 1890. The nickel concentrations climbed to 800 micrograms per liter, quite high. *Id*. Exhibit P632-154, slide 10.

In testing the country rock the sulfates spiked right away, and trended upward. Tr 9: 1891. Exhibit P632-154, slide 11. The pH is down to 4.0 after about 30 weeks of testing. *Id*. Exhibit P632-154, slide 11. Copper is three orders of magnitude higher than the standard for protection of aquatic life. Tr 9: 1892. And, these concentrations are all from filtered samples, so the total concentrations for copper and nickel are probably actually quite a bit higher. Tr 9: 1892-93.

iii. Kennecott's model used unrealistic inputs; Dr. Maest's corrected model shows much higher levels of contaminants

In assessing the water quality for water going into the Treatment Plant, Dr. Maest studied sulfate, aluminum, cadmium, cobalt, copper, iron, lead, nickel and zinc, because they are known to present problems either for human health or aquatic health. Tr 9: 1895. Dr. Maest considered all four rock units. Kennecott did not take into account the country rock. Tr 9: 1896. Kennecott chose certain data from the humidity self testing to use as inputs for their water quality modeling. *Id*.

Kennecott's model contained assumptions that needed adjusting. Tr 10: 1921. Corrected predictions show higher levels of sulfates, cobalt, copper, iron, and nickel. Tr 9: 1898. Exhibit P632-154, slide 7. These rocks are going to produce acid rapidly, metals rapidly, sulfate rapidly and stay that way for a long period of time. *Id*. at 1901. Dr. Maest's results indicate contaminant

levels uniformly higher than Kennecott's; some are orders of magnitude higher. Reasons for that are because Kennecott underestimated the amount of development rock on the pile and didn't include enough ore. Tr 10: 1928. Additionally, Dr. Maest did not account for the limestone and because a number of these constituents including sulfate, nickel, arsenic and antimony are not affected by pH. Tr 10: 1929.

Kennecott's under-predictions would affect the operation of the wastewater treatment plant, because if the concentrations of metals and other contaminants are three orders of magnitude higher, that needs to be taken into account in designing the operation of the treatment plant. Tr 10: 1946. These higher amounts have not been taken into account in the design of the wastewater treatment plant. *Id.*

4. Kennecott has not proven that the materials, methods and techniques it proffers are capable of protecting the environment and public health

As discussed above, Part 632 requires that the mining plan include "information that demonstrates that all methods, materials, and techniques proposed to be utilized are capable of accomplishing their stated objectives in protecting the environment and public health." MCL 324.63205(2)(c)(ii)). Implicit in this language is the requirement that the planned methods, materials and techniques must actually *be* capable of protecting the environment and public health. As shown above in the section addressing the requirement that this information be included in the permit application, *supra* pp. 45-65, Kennecott has not met its burden of proof that its methods, materials, and techniques are capable of protecting the environment.

5. Kennecott has not proven that it will prevent leaching and runoff

The mine plan must include "provisions for the prevention, control, and monitoring of acid-forming waste products and other waste products from the mining process so as to prevent

leaching into groundwater or runoff into surface water." MCL 324.63205(2)(c)(v). In other words, the applicant must plan a mine that will not result in leaching or runoff of acid-forming or other waste. The mine plans fails to do so in several respects.

Kennecott plans to segregate water that comes into contact with reactive materials ("contact water") from water that does not ("noncontact water"). As explained above, this segregation has proven extremely difficult if not impossible at other mines, and Kennecott has not explained what it plans to do differently so that the experience at other mines will not be repeated. Despite the very real possibility that contact water and/or reactive material will end up outside the contact area, neither the plan nor the permit calls for monitoring of water in the non-contact area before it is allowed to leach into groundwater or run off into surface water. (Coleman) Tr 14: 2686. Ex P632-159*. Thus we simply will not know whether waste products are leaching or running off with that water, in violation of the statute. In addition, no monitoring is planned along the transportation route, despite the distinct possibility of the release of ore dust into water along that route. *Id.*

There is also a real concern that the TDRSA will be required to accommodate more than the one-foot head of water that it is designed for. Mr. Starke was unsure whether the limitation would be exceeded if the TDRSA is needed to store overflow water from the contact water basin. (Starke) 23: 4706-07. In light of Mr. Starke's testimony that it is unclear whether this event will exceed the design limitations of the storage system, Kennecott has not met its burden of showing that this control provision will prevent the leaching or runoff of mining waste.

In addition, the testimony of Dr. Coleman and Mr. Liebman indicates that the contact water control system may not be large enough to accommodate the amount of snow that falls on the Yellow Dog Plains. Mr. Liebman testified that site-specific snowfall measurements were not

used in designing the runoff system. (Liebman) Tr 23: 4651. The area gets significantly more snowfall than was used in calculations to size the system. (Coleman) Tr 14: 2861.

This permit is being considered against a backdrop of a long industry record of unintended and unforeseen releases of acid mine drainage into ground and surface water. Studies indicate that mining companies virtually always predict that their operations will not release acid mine drainage, and that mine operations virtually always do release acid mine drainage. (Maest) Some release is thus always predictable; it is merely the mechanism for release that cannot be predicted. In light of this history, plans and monitoring for the prevention of leaching and runoff must be thorough, certain, and foolproof. Kennecott's are not.

6. Part 632's prohibition on reclamation schemes requiring perpetual care not met

Part 632's reclamation requirements prohibit a reclamation scheme that requires perpetual care. MCL 324.63209(8). Michigan does not allow a mining company to rely on open-ended water treatment at the end of the mine's life to protect water resources. The MDEQ rules require that the mining, reclamation, and environmental protection plan include "evidence satisfactory to the department that . . . [b]oth the mining area and the affected area shall be reclaimed to achieve a self-sustaining ecosystem appropriate for the region that does not require perpetual care following closure." Rule 425.204(b)(vi).

Kennecott's plan fails to meet this requirement for at least two reasons. First, the mine plan calls for the accumulation of contaminated water in the mine workings after mining ends. Kennecott plans to continue running its water treatment plant to pump this water out, treat it, and inject it back into the mine until the water in the upper levels of the mine remains pure enough to prevent impact on the alluvial aquifer. However, Kennecott does not know how long this will take, and has not shown with any degree of certainty that the need will not be "perpetual."

In fact, so many uncertainties remain in Kennecott's underlying knowledge of hydrological and geochemical conditions at the mine site that a calculation of the length of time it would take to stabilize conditions in the mine is not possible.

Furthermore, in predicting the quality of water in the mine after the mine closes, Kennecott consistently used values that would result in predictions of cleaner water, even though it rejected those same values within this same application. (Coleman) Tr 13: 2783. .

Between the uncertainty of the bedrock conditions and the huge under-calculation of the likely water quality after mining ends, any predictions regarding the length of time that the water treatment plant will need to operate are suspect. As a result, a reasoned determination that the mine will not require perpetual care is impossible.

Second, surface subsidence at this site could create a situation wherein water treatment must be undertaken for an unforeseeable time into the future. We do not know at this point the full extent of the potential impacts of subsidence, because Kennecott has never submitted the required information. Once again, without this information MDEQ could not have made a reasoned determination that the mine would not require perpetual care.

VI. PERMITTING THE MINE WOULD VIOLATE THE WATER LEGACY ACT

The 2006 Michigan Water Legacy Act includes a flat prohibition on water withdrawals that would decrease the flow of a stream to the point where its value as fish habitat is impaired. The drawdown of the Salmon Trout River immediately above the mine has the potential to be great enough to destroy that portion of the stream as trout habitat, and the permit to mine should be denied on that basis.

Under the Water Legacy Act,

(1) A person shall not make a new or increased large quantity withdrawal from the waters of the state that causes an adverse resource impact to a designated trout stream.

(2) Beginning 2 years after the effective date of the amendatory act that added this section, a person shall not make a new or increased large quantity withdrawal from the waters of the state that causes an adverse resource impact.

MCL 324.32721. The Act became effective on February 28, 2006, and thus both prohibitions apply.

A "large quantity withdrawal" is defined as "1 or more cumulative total withdrawals of over 100,000 gallons of water per day average in any consecutive 30-day period." MCL 324.32701(p). "Withdrawal' means the removal of water from its source for any purpose," MCL 324.32701(w), including the withdrawal of groundwater. *See* MCL 324.32701(v) ("waters of the state" include groundwater); 324.32707(e) (specifying reporting requirements for groundwater withdrawals). The permit in this case allows a withdrawal of 200,000 gallons per day or more. Ex R-117, condition L(9). Thus the permit to mine cannot be granted if it is likely to result in an adverse resource impact.

An "adverse resource impact" is defined as

(i) Decreasing the flow of a stream by part of the index flow such that the stream's ability to support characteristic fish populations is functionally impaired.

(ii) Decreasing the level of a body of surface water such that the body of surface water's ability to support characteristic fish populations is functionally impaired.

MCL 324.32701(a). "Index flow" means the 50% exceedance flow for the lowest flow month of the flow regime, for the applicable stream reach, as determined over the period of record or extrapolated from analyses of the United States geological survey stream flow gauges in Michigan. MCL 324.32701(o).

While the statute currently provides a rebuttable presumption that there will be no adverse resource impact if a withdrawal well is more than 150 feet deep or more than 1320 feet from the banks of the nearest designated trout stream, the presumption "may be rebutted by a

preponderance of evidence." MCL 324.32722. Furthermore, it is not appropriate to apply the rebuttable presumption in this case. The mine plan calls for several large openings to the surface, including the air shaft and the mine entry ramp. This is not the case of a driven well, encased to the surface to prevent the infiltration of groundwater from above the well depth. An undetermined amount of the inflow to (and thus the withdrawal from) the mine will come from within 150 feet of the ground surface. That inflow will occur well within 1320 feet of the Salmon Trout River, a designated trout stream.

Whether or not the rebuttable presumption applies, as described above the preponderance of the evidence in this case indicates that there will be an adverse impact on the Salmon Trout River directly above the mine. See *supra* pp. 18-21.

VII. KENNECOTT NEEDS ADDITIONAL PERMITS

Under Part 632, a permit to mine is not effective until all other required permits have also been obtained. MCL 324.63206(14). Kennecott has not applied for, and MDEQ has not required, at least three permits that are required by state and federal law. MDEQ cannot issue an effective mining permit unless and until these permits are obtained.

A. A Wetlands Permit is Needed.

The Michigan Wetlands Protection Act prohibits several activities affecting wetlands unless they are authorized by permit. One of those activities is draining surface water from a wetland. MCL 324.30304(d). The proposed mining operation will drain surface water from wetlands above the mine. Wetland areas that are currently saturated to the ground surface through much of the year will lose their surface water. The activity therefore requires a wetlands permit.

B. A NPDES Permit is Needed.

Section 402 of the federal Clean Water Act requires a National Pollution Discharge Elimination System ("NPDES") permit for any facility that discharges pollutants to surface waters of the United States. 33 U.S.C.A. § 1342. The NPDES requirement applies to discharges that are hydraulogically connected to surface water, as is proposed Eagle. (LeSage) Tr 37: 7717. MDEQ has maintained throughout the permitting process that Kennecott's discharge through the Treated Water Infiltration System ("TWIS") will discharge to the Salmon Trout River at the seeps from the escarpment at the northern edge of the Yellow Dog Plains. *Id*. Thus the mining operation as it is currently planned cannot go forward without a NPDES permit.

The U.S. Environmental Protection Agency, which has ultimate authority over NPDES permitting, maintains that groundwater with a hydrologic connection to surface waters is subject to NPDES permitting requirements. For example, in discussing a proposed rule regarding permitting requirements for concentrated animal feeding operations, the EPA stressed "that the Agency interprets the Clean Water Act to apply to discharges of pollutants from a point source via groundwater that has a direct hydrologic connection to surface water." 66 FR 2960, 3015 (January 12, 2001). In a final rule regarding permitting for storm water runoff, the agency stated that "this rulemaking only addresses discharges to waters of United States, consequently discharges to groundwaters are not covered by this rulemaking (*unless there is a hydrological connection between the ground water and a nearby surface water body*.)." 55 FR 47990 (November 16, 1990) (italics added).

The bulk of federal case law affirms that groundwater discharges necessitate a NPDES permit when it is clear that such discharges will reach surface waters. While the CWA does not encompass groundwater discharges with no substantial connection to surface water, most courts

that have addressed the issue have concluded that a discharge to groundwater that is hydrologically connected to surface waters of the United States, and has the potential to adversely affect that surface water, is governed by the CWA. *See United States v Earth Sciences,* 599 F2d 368, 373 (10th Cir 1979) (mining waste escaping into creek through groundwater seeps requires NPDES permit); *Quivira Mining Co v EPA*, 765 F2d 126 (10th Cir 1985), (EPA has authority to require NPDES permit for discharge to dry arroyo that makes its way to navigable waters through the ground); *McClellan,* 707 F Supp 1182, 1196 (ED Cal 1988); *Sierra Club v Colorado Refining Co,* 838 F Supp 1428 (D Colo 1993) ("discharge of any pollutant into 'navigable waters' includes such discharge which reaches 'navigable waters' through groundwater"); *Washington Wilderness Coalition v Hecla Min Co,* 870 F Supp at 990 ("since the goal of the CWA is to protect the quality of surface waters, any pollutant which enters such waters, whether directly or through groundwater, is subject to regulation by NPDES permit"); *Idaho Rural Council v Bosma*, 143 F Supp 2d 1169, 1180 (D Idaho 2001). The Court of Appeals for the Sixth Circuit has not addressed this issue, while the state's federal district courts are split, with the Eastern District Court ruling that the CWA applies to such a situation, *Kelley v United States,* 1980 US Dist LEXIS 17772 (ED Mich 1980), and the Western District Court ruling that it does not, *Kelley v United States*, 618 F Supp 1103, 1107 (WD Mich 1985).

In sum, the majority of courts recognize the goal of the Clean Water Act as a broad mandate to protect surface waters, focusing on the effect of pollutants reaching the surface waters rather than on the mechanism by which pollutants are transported to those surface waters.

Based on these same laws, an additional NPDES permit is required. In the application and in testimony, overflow from the non-contact water basins is contemplated, but no receiving waters are discussed. (Liebman) Tr 23:4650. From the various water basins, overflowage would

logically be discharged into the Yellow Dog River watershed and into the Salmon Trout River directly. Kennecott admitted that "*Once the water goes over the spillway and down the berm, it would follow whatever grades or contours and natural lay of the land -- you know, it would move downhill." Id.* The discharge points from these overflows must be revealed and permitted accordingly.

MDEQ must require that Kennecott obtain a NPDES permit.

1. Anti-degradation Standards Should Apply to Kennecott's Discharge

In a letter dated September 14, 2005, from the MDEQ Water Bureau's Permit Section Chief (Creal) to Kennecott officials, the Agency made a preliminary determination that Applicant's proposed groundwater discharge "is anticipated to result in a new loading of pollutants, specifically mercury, to the surface waters of the state" and "requires compliance with Water Quality Standards." Ex R-138. The letter goes on to state that "we believe that Rule 323.1098 applies to this activity." *Id*. Rule 323.1098, the "anti-degradation" rule, addresses any activity "that is anticipated to result in a new or increased loading of pollutants by any source to surface waters of the state and for which independent regulatory authority exists requiring compliance with water quality standards." Mich. Admin. Code. R 323.1098. By invoking this particular rule, the MDEQ acknowledged that Kennecott's activity would result in a discharge to surface waters, that Rule 1098 applies and that the Agency has regulatory authority over this discharge. As a result, *DEQ must require Kennecott to seek a NPDES permit for its proposed discharge and comply with the anti-degradation rule*.

In purporting to apply the anti-degradation rule to the discharge at the seeps, DEQ waived the requirement because of its determination that the project met the "economic" exemption. However, the public was not even aware of the anti-degradation determination nor

that it had an opportunity for input. Creal admitted that "*by reading the public notice, the public would not have known that the DEQ was accepting comments on anti-degradation analysis, because it was not part of the public notice*." (Creal) Tr 37: 7777. Plus, Kennecott's own witness espoused the economic value of fisheries in the U.P.; certainly MDEQ did not conduct a rigorous analysis of this Rule that, if nowhere else in Michigan, should apply to the pristine Salmon Trout River.

And, in internal discussions, MDEQ staff agreed that the most protective of discharge standards (groundwater or surface water standards) should apply to Kennecott's discharge at the seeps. (LeSage) Tr 37: 7711. However, when the groundwater discharge permit was released, it did not include the more protective standards at all. *Id*. at 7714. In many instances, it does not even have numeric limits, even on key contaminants like. *Id*. at 7713-14.

C. A Groundwater Discharge Permit is Needed for Discharges into the Mine; the Groundwater Discharge Permit at Issue in this Case Was Illegally Granted

In addition to the groundwater discharge permit for the TWIS, Kennecott must obtain a permit for its discharges into the mine. This issue is briefed in Petitioners' Proposed Findings of Fact and Conclusions of Law Concerning Groundwater Discharge Permit No. GW1810162. Under MCL 324.63206(14), a mining permit would not be effective unless and until the additional groundwater discharge permit has been granted. Further, Bill Creal and Eric Chatterson admitted that they did not apply Part 632's "pollute, impair or destroy" standard. Because the activities permitted by the Part 31 permit are part and parcel to the Part 632 permit (and are even discussed in the Part 632 permit), the MDEQ Water Bureau should have applied Part 632's standard. At the very least, the mining permit should not have been issued without

Kennecott demonstrating that the Part 31 permit could meet the Part 632 bar since the regulated activities are interconnected and dependent upon each other.

VIII. JACK PARKER, INDUSTRY "ICON," BELIEVES KENNECOTT AND MDEQ DISREGARDED APPLICABLE STANDARDS OF CARE

> *A group of responsible mining engineers, geologists, rock mechanics experts and reviewers would not have made a lot of those statements by accident, which means they made them intentionally. Tr 38:7886.*

Many of Kennecott's omissions would lead to the substantial endangerment of the public health, safety and welfare like the risk of a mine fire and a plug type failure of the crown pillar. (Parker) Tr 38:7886. By ignoring those things, death or serious bodily injury could occur to people, particularly workers. *Id*. If people are in the mine when a plug type failure occurs, they would be killed. *Id*. at 7887. There are two possibilities: one, the people who developed the application were not competent; or two, they were deceptive. Tr 38:7889. The problem is systemic. *Id*. at 7890. The mining proposed by Kennecott, which the MDEQ has approved, disregards the standard of care that a reasonable mining company or a reasonable regulator should observe and this circumstance. Tr 38:7892. The bond required for this mining project is "peanuts as compared to the value of the project" and serves as no deterrent whatsoever. (Parker) Tr 3:453. If operated as planned, this mine would endanger the public health, safety and welfare. (Parker) Tr 38:7896. Anyone reviewing the application ought to have noticed these problems. *Id.* at 7897.

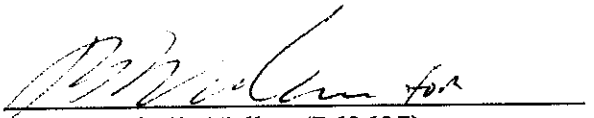
CONCLUSION

Given the evidence that the proposed mine would in fact "pollute, impair or destroy" Michigan's natural resources and that *Kennecott has not borne its burden to demonstrate that it will not* and that the MDEQ's review of the application was woefully insufficient, this Tribunal

must find that MDEQ wrongfully granted Kennecott's Part 632 permit. Therefore, Petitioners request that this Tribunal recommend to Director Chester that the permit be revoked.

Respectfully submitted,

NATIONAL WILDLIFE FEDERATION AND
YELLOW DOG WATERSHED PRESERVE

Dated: October 15, 2008 BY: 

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