Summary of public comments and questions from the April 9, 1997 public meeting at New London, Wisconsin, with DNR responses.

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Public Concerns Regarding the Proposed Crandon Mine

A Summary of Public Comments and Questions
from the April 9, 1997
Public Meeting at New London, Wisconsin,
with DNR Responses

Wisconsin Department of Natural Resources
Bureau of Integrated Science Services
P.O. Box 7921
Madison, WI 53707

May 19, 1997

LIST OF ACRONYMS AND ABBREVIATIONS ASSOCIATED WITH THE CRANDON PROJECT

BOD:	Biochemical Oxygen Demand
CMC:	Crandon Mining Company
COD:	Chemical Oxygen Demand
CTH:	County Trunk Highway
DEIS:	Draft Environmental Impact Statement
DNR:	Department of Natural Resources
EIS:	Environmental Impact Statement
GCL:	Geosynthetic Clay Liner
Mg/L:	milligrams per liter (1 milligram = 1/1000 gram), 1 gram = .0022 pound
µg/L:	micrograms per liter (1 microgram = 1/1,000,000 gram), 1 gram = .0022 pound, 1 liter = 61.02 cubic inches or 1.05 liquid quarts
MMRA:	Metallic Mining Reclamation Act
MODFLOW:	Computerized groundwater flow model
STH:	State Highway
s.u.:	standard units, units used to measure pH
TMA:	Tailings Management Area
USR:	U.S. Route
USGS:	U.S. Geological Survey
WPDES:	Wisconsin Pollution Discharge Elimination System

TABLE OF CONTENTS

Introduction

The Department of Natural Resources (DNR) wishes to thank all of the citizens who attended the April 9 public meeting at New London. As was intended, the Department received many comments and questions during the meeting. Many of these questions raised issues that the DNR intends to analyze before publication of the Draft Environmental Impact Statement (DEIS).

Additional information is available in a number of recently updated mining information sheets available from the Department's Rhinelander (call Cathy Cleland at 715-365-8997) or Madison (call Shannon Fenner at 608-267-2770) offices. These are: *Potential Mining Development in Northern Wisconsin, The Cumulative Impacts of Mining Development in Northern Wisconsin, How a Mine is Permitted, Local Decisions in Mining Projects, Protecting Groundwater at Mining Sites, Reclamation and Long-term Care Requirements for Mine Sites in Wisconsin, How the Department of Natural Resources Regulates Mining, Addressing Public Concerns with Wisconsin's Laws Governing Mining,* and *Wisconsin's Net Proceeds Tax on Mining and Distribution of Funds to Municipalities.*

For a comprehensive description of how mining is regulated, refer to: An Overview of Metallic Mineral Regulation in Wisconsin, by Thomas J. Evans, published by the Wisconsin Geological and Natural History Survey (WGNHS) as Special Report 13, 1996 (revised edition). The document is available from the WGNHS office in Madison (phone: 608-263-7389).

The following pages contain DNR responses to the questions and comments that arose at the public meeting on April 9 in New London. The Department has made an effort to include each comment that was raised by reviewing the questions submitted on cards and the videotape of the meeting. Unfortunately, not all verbal questions from the audience were audible on the tape. In the many instances that several individuals asked similar questions, an attempt was made to accurately paraphrase the general question while capturing the essential meaning. Of course, with the magnitude of comments received, it is possible that one or more questions have been accidentally overlooked. This is not the Department's intent, and any questions not answered within this document should be sent to Bill Tans at the following address: Bill Tans (SS/6), Department of Natural Resources, P.O. Box 7921, Madison, WI 53707. The questions and comments are written in bold type, and the Department responses follow each question in regular type. Where Wisconsin Statutes are paraphrased, the reader is advised to check the original language if more complete information is desired.

The DNR's Authority & Review Process

1.

Q: With the large amount of staff and special consultants being used in this project and a time span of six years or more being spent, does this project even stand a chance of not being approved? Does the DNR believe the figures that Exxon submits to you or can you prove them wrong?

A: The mine permitting process, similar to other regulatory reviews conducted by the DNR, is a process through which the agency identifies whether a proposal meets or fails to meet regulatory requirements, and the applicant responds by amending the project accordingly. The practical outcome of this approach is that the areas of disagreement between the agency and an applicant, and thus the grounds for the agency to deny the requested permits, tend to be minimized. However, it is likely that not all areas of conflict will be resolved to the total satisfaction of DNR, and the agency will then recommend specific conditions to be included in the permits. Alternatively, if the agency finds that the project will not meet the criteria specified in the applicable laws and regulations, regardless of the imposition of specific conditions, the permits would be denied. In the case of the Crandon Project, there are still significant areas of disagreement between the DNR and the company, some of which could lead to a recommendation for denial of the necessary permits.

The DNR reviews, evaluates, and must verify the data gathered by the Crandon Mining Company (CMC) to be certain it is accurate and comprehensive.

2.

Q: A comment for the record: "The reorganization of the DNR making the Secretary of the DNR an appointed position, politicizes the approval process - because the Secretary decides the position making the final approval - judge or Secretary." By whom and how is the decision made whether the final approval is made by a law judge or the Secretary of the DNR?

A: It is true that the Secretary of the DNR will decide how the decision is made. Under Chapter 227 of the Wisconsin Statutes, the head of the Department can choose from three alternatives for making the final decision. Either the decision is made by the Department, the decision is made by the Hearing Examiner, or a recommendation is made by the Hearing Examiner and either approved or modified by the Department. After our Environmental Impact Statement (EIS) is released, we will indicate how the decision will be made.

3.

Q: We know that recently the DNR has become nothing more than a puppet of the governor. Why should we trust or believe any findings your agency may arrive at?

A: As in all projects, the Secretary has directed staff to review the Crandon project in a thorough and professional manner. The DNR has also hired knowledgeable, independent consultants to review the information provided by the company. The DNR consultants and staff have developed an extensive record of their review activities of the proposal. DNR files are public records open to anyone who wishes to examine them.

The above opinion needs to be examined in view of how the final decisions are made. At the Master Hearing on the proposals and on the adequacy of the EIS, the trial-like format enables all interested persons, groups, agencies, tribes and municipalities to question any aspect of mine development, waste storage, permit review, data acquisition, data analysis, and any other related topic. It also enables other parties to enter information or testimony into the record. The final written decisions on the permits are based on the entire record, not just on the DNR's position. Department staff who worked on this project will be made available, under oath, for testimony and cross-examination. They will be asked if their supervisors or any others have influenced their decisions and if so, how. Finally, the conclusions of the decision-maker must be consistent with the criteria in the law on whether to deny or grant the permits and approvals. Should anyone believe that the process or resultant decisions were not made appropriately, the decisions can be appealed to a court of law.

The Department is fully aware of public concerns regarding political influence in this process. We want you to understand that our review has been, and - through the end of this process - will always be, based solely on the best scientific review possible. There will be no other influences allowed to affect the permit review and development of the EIS.

4.

Q: Why is the DNR here tonight? To defend the mining operation? Who does the Department of Natural Resources work for? What is the DNR's stand on the mine?

A: The DNR was invited to this meeting by the Wolf River Preservation Alliance and the Tri-County Power Boat Association to provide a status report on the review process and to respond to public concerns about the proposed mine. As stated previously, the DNR has not taken a "stand" on the mine, but instead is a regulatory agency having the responsibility to review the proposed plans and determine if the project could comply with environmental laws and regulations. The applicable laws were developed by elected representatives in the Legislature.

The DNR works for the State of Wisconsin, and its regulatory responsibilities have been developed by the Legislature.

5.

Q: How many people who actually live along the Wolf or Wisconsin Rivers are an integral part of making a decision of such far reaching ecological consequences that may affect them directly, or do bureaucrats in Madison alone decide?

A: The DNR is given the authority by the Legislature to review mining proposals in the state. The most far-reaching role of any interested private citizen is to elect like-minded representatives to establish and revise the laws that regulate mining, as well as participating in the public hearing process prescribed by law. Participation in meetings and hearings ensures that all relevant public concerns will be addressed during the decision-making process.

6.

Q: Why has the Governor eliminated the Public Intervenor from this project?

A: The office of the Public Intervenor was eliminated by the Legislature with the consent of the Governor during the 1995-1997 budget deliberations. The Legislature and the

Governor have decision-making power over the budget. Since the Department of Natural Resources was not involved in this decision, these concerns may be best directed to the Governor's office or to your State Senator or Representative.

The Regulatory Framework

7.

Q: How old are the existing mining regulations?

A: The bulk of the existing mining laws have been in effect since 1978 and the major portion of the mining regulations have been in place since 1982. There have been specific additions and revisions of each, but the basic framework and requirements have not significantly changed since originally developed. More recently, two mining-related laws were passed in 1991. The first requires a mining applicant to deposit money in the Mining Impact Fund at the same time that their permits are filed. This money is then distributed to affected communities to cover negotiations with the mining company. The second law passed in 1991 addresses the prior record of a mining applicant (see response #24). Another law, passed in 1995, requires a mining company to maintain proof of financial responsibility even after the 40 year closure period is over.

Many other environmental laws and rules also apply to mining projects.

8.

Q: You stated that the mine must comply with existing standards for protecting the environment - At what point in time do you define compliance? Start-up? End of mining? 100 years? Infinity?

A: Mining involves many activities, some with a definite ending, and others that continue indefinitely. The required compliance would vary depending on the regulated activity and the type of impact. For example, the surface water discharge permit for a mining facility, assuming it would be granted, would contain the effluent limits that would have to met as long as the surface water discharge was occurring. The air quality standards would have to be met during construction, operations and reclamation. When the site had met reclamation requirements and it was environmentally stable, the air quality permit would expire because there would no longer be pollutants emitted to the atmosphere. Relating to groundwater, the groundwater standards would be established prior to permitting and would have to be met at the compliance boundary <u>forever</u> because the TMA (Tailings Management Area) would be a potential source of pollutants for hundreds or thousands of years.

9.

Q: Please define the word 'mitigation' as it relates to the project.

A: The terms "mitigate" or "mitigation" do not have specific meaning in terms of the proposed Crandon project. They are commonly used environmental terms and generally refer to efforts aimed at lessening or compensating for project related impacts. We may use the phrase "wetland mitigation" to refer to the federal process which requires permittees to compensate for loss of wetlands by recreating wetlands in another location, as is proposed for

the Crandon project. In addition, the term "surface water mitigation" may be used in reference to a plan for ensuring that surface waters in the vicinity of the proposed mine do not experience losses of public rights (for example: loss of navigability, fish and wildlife habitat, or recreation opportunities). This would likely be accomplished by adding supplemental water to the lake or stream to make up for losses of water due to mine de-watering.

10.

Q: You mentioned that there is a comprehensive set of laws in place for groundwater protection - or did you mean surface water? If the list includes groundwater protection how do you reconcile it with the 1200 foot exemption on the tailing site boundary that would allow groundwater pollution that could migrate off site?

A: There are comprehensive regulations in place for both groundwater and surface water protection. There are also new proposed rules relating to the compliance boundary. Under the new rules, the compliance boundary is called the design management zone. Under both the current rules (Ch. NR 182, Wis. Adm. Code) and the proposed changes, the design management zone or compliance boundary is 1,200 feet. This zone is not an area within which unlimited contamination is allowed to take place. Rather it is an area within which groundwater would be monitored.

The results of the monitoring would be evaluated to determine if groundwater quality at the compliance boundary or design management zone would comply with the appropriate standards. An extensive groundwater monitoring network would be established to monitor changes in water quality. For mining waste sites, any statistically significant deviation in background water quality triggers an evaluation of the situation and possibly implementation of contingency measures. This is true of monitoring wells located very close to the facility, in addition to those situated within and along either the compliance boundary or the design management zone.

If it is determined that the standards would be violated without intervention, then the operator must take appropriate actions to prevent such occurrence. Further, since neither the compliance boundary nor the design management zone may extend beyond the property line, off-site migration of groundwater which does not meet the standards is also prohibited. This is the same approach and philosophy applied to other regulated facilities in the state.

11.

Q: If laws such as the Clean Water Act (or any certain laws or acts that the company must comply with) change, will the company's requirements change with the law?

A: Statutory changes sometimes contain provisions that clarify which projects are affected by the changes, but in other cases, changes to the laws apply to all projects already permitted - so it depends on the wording. Some permits that would apply to mining projects, such as the air quality permit and the wastewater discharge permit, are issued for a specific durations (for example, five years), and must be renewed periodically. If there was reason to change these permits, and tighten some restrictions or add new restrictions, the Department could do it then. However, at any time after permits had been issued, if the Department had information that significant, unexpected impacts were occurring to aquatic life, to groundwater resources, or to air quality, for example, it could initiate changes to permit conditions or alter the company's actions to minimize or eliminate the environmental problem.

Legislation

12.

Q: What effect did the recently passed bill in the Wisconsin legislature have on the mining project? What is the status of the bill? What steps must it take yet? Is it fully approved - is it law? Can the governor veto this bill somehow?

A: SB3 (the "Mining Moratorium Bill") which recently passed in the Senate, is now in the Assembly Environment Committee awaiting action. The Assembly Environment Committee, chaired by Representative Mark Duff, will be holding two public hearings on the bill later this spring. In order to become law, it must be passed by majority vote out of the Environment Committee, passed by the Assembly, and signed by the Governor. If it passes these steps without further amendments, as currently worded the law would impose specific conditions on sulfide mining in the state. A sulfide mine could not open unless another mine in similar geologic conditions had operated for ten years without breaking any environmental laws, *and* a mine in similar geologic conditions had been closed for ten years without violating any environmental laws.

Both houses must agree on the exact language of the bill before it gets sent on to the Governor. Sometimes this involves appointing a committee, made up of representatives from each house, to reach a compromise. Because the bill could be significantly changed during this process, it is currently impossible to predict its effect on the Crandon mining project. Up-to-date information on the bill's status can be found by calling the Legislative Hotline at 1-800-362-9472. Just as with all other legislation, if the bill is passed by both houses, the Governor has the power to veto all or part of it. However, a 2/3 majority in both the Senate and the Assembly could override his veto.

13.

Q: Why can't this project be put to a referendum? The public has no say in whether this happens or not!

A: Some states like California have constitutions which allow for statewide, citizen-sponsored initiatives or referenda. Wisconsin's Constitution does not provide for such citizen-initiated referenda. Statewide referenda can occur in Wisconsin, but only when the Legislature has decided to place such a referendum on the ballot. While the Legislature has previously put issues out before the public in this way, in the last several decades it has tended to do so principally for constitutional amendments. The Legislature could authorize a mining-related referendum, but has not chosen to do so. As with other legislation, an initiative for a referendum would need to be introduced by a senator or representative, passed by the Senate and the Assembly, and signed by the Governor. In Wisconsin such a referendum can be either of an advisory nature (meaning it simply advises the Legislature without giving them a mandate) or it can be based on legislation which is designed to become effective only after ratification by voters.

The Department of Natural Resources has been given the responsibility in Wisconsin for regulating mining. It does this by ensuring that mining permitted in Wisconsin would not break any of the State's many environmental laws. By following the guidelines in the Wisconsin Environmental Policy Act and the Metallic Mining Reclamation Act (MMRA), the Department offers the public several opportunities to influence the review process. Mandatory

public hearings occur at three stages - after submission of the Notice of Intent to pursue mining permits, after publication of the DEIS, and at the Master Hearing. These sessions offer the public a chance to direct the course of investigations, and to critically assess the Department's work. In addition, the Department is holding a series of voluntary public meetings, such as this one, to listen to and address public concerns. Another opportunity for involvement occurs at a local level - the MMRA authorizes communities to establish mining-impact committees and the power to negotiate local agreements with the mining company.

Many consider Wisconsin's mining-related regulations to be among the toughest in the world, although there are several features of the laws which are apparently poorly understood. For example, if a proposed mine is found to meet all environmental protection standards, comply with all applicable laws, receives local zoning approval and minimizes impacts to wetlands, the Department must issue a mining permit. The statutes do not allow the Department the option to deny a mining permit under such circumstances. Public acceptance of a proposed mine cannot be considered by the Department in reviewing a mining proposal. There is no "popular vote" on the acceptance of a proposed mine. Similarly, the Department cannot choose the "no project" alternative as long as the proposal conforms with all laws and standards. Basically, the law says that mining is acceptable if the environment will be protected during and after the project to the same degree required for any other industrial activity.

Variances

14.

Q: **What sort of variances do you expect CMC to apply for?**

A: In its mining permit application, the Crandon Mining Company has requested several exemptions from our mining code requirements. These include exemptions for: locating the railroad spur within 1000 feet of a lake and within 300 feet of a stream (it would have to cross Swamp Creek), locating the access road within 300 feet of a stream (it would also cross Swamp Creek), locating the tailings management area within 1,200 feet of a non-potable well, and for deleting several primary drinking water parameters (organic substances, turbidity, radioactivity, asbestos, fluoride and bacteria) and secondary drinking water standard parameters (color, corrosivity, foaming agents and odor) from the baseline monitoring requirements. (The possible rationale for these exemptions is discussed in the next paragraph.) In addition, there may be a number of exemptions needed for constructing surface water mitigation facilities, such as water pipelines and discharge structures, in floodplain or shoreland wetlands.

Evidence for the need for the requested exemptions will be provided during the Master Hearing and will be part of the record. For example, the company will have to show that the access road and rail spur bridges crossing Swamp Creek would not significantly affect flood flows and thus not violate floodplain protection provisions. The rationale for requesting exemptions from certain drinking water standards when sampling baseline groundwater are that some of those measurements are not useful for assessing the impacts of the mining operation. For instance, the requirement for sampling for organic substances is aimed at detecting certain agricultural pesticides or industrial solvents. Because the project area is not used agriculturally and has not been an industrial site, the test may not be needed. A second

example is turbidity, which is useful in measuring how cloudy or muddy surface waters are, but may not be useful measure for groundwater. The written decision will grant or deny the requested exemptions based on evidence as to whether the requests would comply with all environmental protection requirements.

Master Hearing

15.

Q: Where is the Master hearing being held - Madison or Crandon?

A: Because the master hearing may last for several weeks, it probably will begin in Crandon and then move to Madison or another location. This was the case during the Master Hearing on the Flambeau mine - the hearing began in Ladysmith and adjourned to Madison.

Local Agreements

16.

Q: Has an assessment been made of the local agreement between the Town of Nashville and the Crandon Mining Company?

A: DNR staff have read the signed local agreements, but we don't evaluate them or judge their usefulness. The negotiations for the terms of the local agreement were between the municipalities and the Crandon Mining Company and did not involve the Department. Many of the provisions in the agreement involve monetary compensation, local land use and zoning provisions, how the project would be operated, repairing roadways and other conditions which are most important to local municipalities and citizens. These things are not regulated by the State. The terms of the local agreement pertaining to payments to local municipalities will contribute to our evaluation of whether there is a net positive economic impact associated with the project.

Cost/Benefit Considerations

17.

Q: What is the cost/benefit ratio for the project when mining begins? 5 yrs. later? 10 yrs. later? 40 yrs. later? How does Exxon know there is enough value in the mineral deposit to make a profit, in other words can the DNR make the environmental costs greater than the value of the ore deposit?

A: The Department does not apply a cost/benefit test to mining proposals. However, it does ensure that any approved proposal meets the strict state requirements for environmental protection. Regardless of the benefit, the project will not be permitted if it would not comply with our environmental laws. Regarding social and economic impacts, we will evaluate the project to see if it will produce a net positive economic impact if it were

permitted. The law does not specify how economic impacts are to be addressed. To help assess the economic impact of the project, the Department is in the process of hiring consultants with expertise in this area.

The Crandon Mining Company, as the mining applicant, presumably is skilled at evaluating the costs of mining in Wisconsin. In 1986 Exxon Coal and Minerals withdrew its permit applications citing low minerals prices (compared to the cost of mine development and complying with environmental protection requirements). Should the permits eventually be approved, the company will have to decide if the conditions attached to the permits would make mining at the proposed site too expensive.

Monitoring

18.

Q: Will DNR oversee operation for the entire life of the site if built?

A: Yes. The Department will have an ongoing responsibility to administer the various permits if they are in fact issued. This responsibility includes conducting periodic inspections of the site to ensure that the operator is complying with the applicable laws and regulations in addition to specific permit conditions; reviewing monitoring data submitted by the operator and reviewing the adequacy of the permits; and approving plans and related financial instruments in light of changing technology and regulatory requirements. Our responsibilities in regard to the site would continue through operation and closure and extend indefinitely into the future.

19.

Q: Who will monitor the construction and continued usage of the tailings pond? How long after the mining is done does Exxon have to monitor the tailings pile?

A: Construction of a tailings facility would be closely monitored by several parties. First, the permittee must document and maintain extensive records of the construction process and provide those records to the department upon completion of construction. Second, a third party, typically a consulting engineering firm, would generally be retained to exclusively oversee the Quality Assurance and Quality Control requirements specified in the permit or approval. This party's sole responsibility would be to ensure that the construction materials and installation methods meet all applicable specifications. Finally, Department staff would frequently be present to oversee the construction and ensure compliance with the approvals.

Following construction of the facility, the primary means of monitoring the operation of a tailings facility is through self monitoring and reporting requirements specified in the administrative codes and permits. In addition, as a check on the operation, Department staff will make frequent inspections, both announced and unannounced, of the site to ensure compliance. The company is responsible for monitoring the performance of the site forever. Full-scale monitoring would be required of the company through the forty year long-term care period - after that, the company could petition to modify the monitoring program.

20.

Q: Who performs all the monitoring on the site during the operation period? The DNR or CMC?

A: The operator is primarily responsible for conducting the required monitoring and reporting the results to the Department during operation. Department staff routinely accompany the company representatives to either observe the sampling methods or obtain split samples for independent analysis. In addition, the Department also will periodically conduct independent monitoring activities at the site in certain instances. All laboratory analyses must be completed by a state-certified lab which further ensures the integrity of the monitoring data. Self-monitoring by the regulated party is common throughout all of our regulatory programs and is not something which is unique to mining operations.

Liability

21.

Q: Is there any kind of surety bond required of Crandon Mining Company to pay for unforeseen damages which might occur? What would the penalties be? Who will pay for cleanup if there is a chemical spill?

A: Yes, a mining company must obtain surety bonds. A reclamation bond is required in the amount necessary to pay for complete site reclamation should the company be unable or unwilling to do so. In that case, the State would use the money to reclaim the site. In addition, a mining company is required to maintain a liability insurance policy (or satisfy state and federal requirements for self-insurance) covering all mining activities in the State and affording personal injury and property damage protection in an amount to be deemed adequate by the Department.

In the event of a chemical spill, the responsible party would have to pay for cleanup. This could include the mining company (for an on-site spill), a rail company, or another transporter.

Recent proposed changes to the mining rules include a provision for a dedicated trust fund that would be funded by the mining company prior to operations. A financial institution would manage the trust, and only the Department could withdraw funds. The trust fund would be designed to be self sustaining and remain in place for an indefinite period of time after operations ceased. Its purpose is to serve as a backup source of funding to cover remedial actions related to unanticipated spills, releases from mining waste facilities, and replacement of damaged water supplies.

Penalties for violations of environmental regulations can vary considerably, depending on the nature of the activity. The maximum penalties for environmental programs in Wisconsin range from $5,000 to the more common maximum of $25,000 per violation. For each of the major environmental programs, each day of a continuing violation is considered to be a separate offense, subject to a penalty. Therefore, there could be a $25,000 per day penalty for ongoing violations.

Chemical spills are treated differently. Because the State of Wisconsin wants to offer an incentive for spills to be reported, there may be no penalty for spills that are reported. This way spills can be cleaned up when they happen - if people were penalized for spills, they might be tempted not to report them. Penalties, as the word implies, are punitive actions--

such as a speeding ticket, for example; Penalties are separate from the responsibility to correct a harm to the environment or to another individual. Therefore, although there may be no penalty for a spill, the responsible party must still clean up the spill and may have to pay damages to other parties whose property has been negatively affected by the spill. This is similar to circumstances in which there has been a car accident. The responsible party must pay for the damage, regardless of whether or not a ticket was issued for the action which caused the accident.

22.

Q: Please explain the difference between long term care under Wisconsin law and what that minimum length of time is - and long term liability which <u>may</u> require the mining company to provide a perpetual reclamation bond. The law does not say 'shall' as it is now written.

A: Mining operations in Wisconsin are subject to a number of different requirements pertaining to financial responsibility for the site.

First, the reclamation bond, required as a part of the mining permit, is intended to guarantee that the State would have resources available to reclaim the site in accordance with the approved Reclamation Plan should the operator default. The reclamation bond is set at an amount adequate to allow the State to implement the Reclamation Plan. Following completion of reclamation, the bond amount is reduced but a portion of the bond is retained by the Department for twenty years after reclamation has been certified as complete.

The second form of financial responsibility is related to long term care of the mining waste facility. Long term care generally refers to regular monitoring, leachate recovery and treatment, if needed, and routine maintenance of the land surface. Owners of mining waste sites must establish a perpetual source of funding to ensure completion of the necessary long term care activities. No sooner than forty years after closure of the facility, the owner may petition the Department to be released from the obligation to provide proof of financial responsibility. However, the owner's responsibility to complete the necessary long term care functions never ends.

Another statutory requirement, unique to mining operations, holds mining companies strictly liable for any mining related damage resulting from the operation. Damage is defined as death or injury to a person or property resulting from environmental contamination caused by seepage, leakage or other discharges or from land subsidence. The company, or any future owner of the property, remains responsible for the site. The company's liability persists regardless of changes in the corporate structure, including reorganization, merger, consolidation, and liquidation.

Finally, in addition to these measures, the Department is also currently developing a revision to the mining rules which would require a mining operator to post an additional financial assurance mechanism. Under the proposed rule, permittees would have to establish an irrevocable trust fund in an amount determined by the Department. This amount would have to be enough to cover remedial costs associated with unforeseen environmental problems arising at the site and for replacing certain protective components of a waste facility, such as periodic replacement of a cover system. The fund would be used at the discretion of the Department and would remain indefinitely or until such time that the Department determines it is no longer needed.

23.

Q: Who would pay the cost of determining damage to wells and any repairs? Is the company going to replace or repair wells that are affected by drawdown?

A: The Crandon Mining Company would be required to deepen water wells, provide new wells, or in some way provide potable water for those residences that would be predicted to have inoperable wells due to the groundwater drawdown. This activity would have to be completed during construction of the mine and before the groundwater drawdown would be significantly developed. State law makes it clear that these preventive actions are required. The company also has agreed to perform these preventive measures under the terms of the local agreement signed with Nashville, and it presumably will be a part of future agreements as well.

Should there be a water well problem that unexpectedly arises during the mining operations period, there is a statutory process to determine if the mining company is responsible for the problem. Initially, the local municipality must provide potable water (the Crandon Mining Company would assume this responsibility under the terms of its local agreement with the Town of Nashville). After information gathering and a hearing on the matter, the cause for the well problem would be determined by the Department, and if the mining company is found to be responsible, the mining company must reimburse the municipality and pay for any needed improvements to the water well.

Prior record

24.

Q: What is Exxon's record for cleaning up other mine sites?

A: The records of Crandon Mining Company and its parent companies, Exxon Coal and Minerals and Rio Algom, will be considered during the Master Hearing process. However, under current state law, only very specific portions of their records are applicable to the process. Only under any one of three conditions could a mining permit be denied due to the company's environmental track record over the past ten years: forfeiture of a prior mining reclamation bond, prior felony conviction for violating an environmental law, or failure to reclaim a previous mining site. Therefore, these conditions are considered in the DNR's review process; other environmental track record considerations not related to mining projects, such as the oil spill in Prince William Sound, are not. These three situations are detailed below; for exact language please refer to the statutes.

- Forfeiture of prior bond: According to s. 293.37 (old numbering 144.85), Wis. Stats., the mine permit will be denied if CMC, Rio Algom, or Exxon has forfeited a mining reclamation bond in the U.S. within 10 years before submitting the application.

- Violation of environmental law: Also under 293.37, the permit would be denied if CMC, a related person, or an officer of CMC has, within 10 years before the application is submitted, been convicted of more than one felony for violations of laws for the protection of the natural environment arising out of the operation

of a mining site in the United States, unless one of the following applies:

a) The person convicted has been pardoned for all of the felonies;
b) The person convicted is a related person or an officer or director of the applicant with whom CMC terminates its relationship; or
c) CMC includes in its permit application a plan to prevent the occurrence in this state of events similar to the events that directly resulted in the convictions.

Failure to reclaim mine site: The permit would also be denied if a mining permit or other mining approval issued to the applicant or a related person was permanently revoked (within the last ten years) because of a failure to reclaim a mining site in the United States in violation of state or federal law and that failure has not been and is not being remedied.

25.

Q: Has Exxon submitted any examples to the DNR of a successful sulfide mining operation that has not caused pollution problems? Has there ever been a successful reclamation of a metallic sulfide mine?

A: Information about successful operations elsewhere is not required under the existing permitting requirements. Such information would have little relevance to the determinations that are currently required in Wisconsin. Simply because a given technology worked or failed in another setting does not guarantee the same result here nor does it mean that the technology used in the example operation would be appropriate for a specific project in Wisconsin.

Under our present regulatory structure, each mining project is subjected to a comprehensive review through which the applicant must demonstrate that the project is designed and will be operated and closed in a manner which will not cause violation of Wisconsin's applicable environmental protection laws and regulations. In conducting its review, Department staff will rely on their training, experience and familiarity with current technology to determine whether a given project is acceptable. Should the Department find that a proposed project will not comply with the applicable regulations, the necessary permits would not be issued. The Department believes this approach, conducting a thorough and critical technical review of each specific proposal on its own merits, is the proper mechanism for evaluating whether a proposed project meets Wisconsin's standards for environmental protection and ultimately whether such a project should be approved.

There are a number of sites around the world where sulfide mining wastes have been successfully reclaimed. Some of the sites may not be geologically similar enough to proposed sites in Wisconsin, some sites were reclaimed after problems were allowed to develop and some use technology that would likely not be approved in Wisconsin, but the sites have nevertheless been reclaimed. All of this information is important insofar as it adds to our understanding of the technology available to deal with potentially acid-generating waste materials, but it cannot substitute for case-by-case evaluation of a proposed project.

26.

Q: It sounds like very little is known about the modelling - lots of estimates and assumptions. The earth is too complex to put into numbers. What assurances do we have that the tailings will not pollute in the future? When the words 'predict' and 'assumption' are used in this presentation, wouldn't the word 'guess' be more suitable? Who is writing the computer program for all assumptions? From any past environmental issues, what has been the success or failure of computer generated flow models?

A: The natural environment is a highly complex system. In the last few decades, with the advent of large, fast computers and the development of our understanding of the natural world, we have begun to be able to predict the state of natural systems in the future. In order to do so, however, many simplifying assumptions must be made. Even the largest and fastest computers cannot mimic the natural environment completely - partially because we do not know everything and partially because many aspects of the system may behave differently than expected. The necessary simplifying assumptions can be tested to ensure they match our understanding and our predictions. The resulting model will be a reasonable approximation of reality.

Numerical groundwater models, such as the one being developed and reviewed for this project, have been successfully used to predict the effects of high capacity wells, remedial measures at clean-up sites, and surface water impoundments/diversions, among others. The program being used to develop the model for this project is a modified version of MODFLOW, which was written by the U.S. Geological Survey. The development of the model is being done by the mining company's consultants under the review of the Department and its consultants, as well as other interested parties. The final model submitted by the company will then be reviewed in detail and modified as needed to appropriately simulate the project.

27.

Q: How can you know as much as you say you do about groundwater, since you can't see where the rivers flow underground? How can you know that Lake Lucerne won't be affected without doing dye tests and seeing where the dye comes out?

A: With basic information about the geology and hydrology of an area, it is possible to gain an understanding of groundwater flow in that particular area. In the area of the proposed mine, groundwater exists filling in the pores and fractures in the subsurface geologic materials. Groundwater flows through these pores and fractures from areas of higher energy to areas of lower energy, following the laws of physics. We know this through our knowledge about the surface and subsurface geology and hydrology and our accumulated knowledge about geologic processes. We know that "underground rivers" can exist in some geologic environments, such as karst (limestone-dominated areas that are or were subjected to intense chemical weathering), however, those type of geologic environments do not exist in the area of the proposed mine.

Based on the information we have from the site area, it is clear that Lake Lucerne is hydrologically separated from the drawdown at the proposed mine by Swamp and Hemlock Creeks. This hydrologic separation could only be broken by pumping the mine at substantially larger volumes than currently predicted. Even then, Lake Lucerne is located high in the

landscape a couple of miles from the ore body, limiting potential effects. If we thought a dye trace of some sort would be useful, we would not hesitate to use it. However, in general, dye tracing is not useful to track groundwater flow over long distances in environments such as the one that exists in the area of the proposed mine.

Groundwater drawdown

28.

Q: What is the project's anticipated effect on groundwater as far as lowering groundwater levels? What effect will the drawdown have on Rolling Stone Lake? On Lake Lucerne? What would the approximate drawdown on lakes closest to the mine be? What is the total number of acres involved in the drawdown area? What is the drawdown area in miles?

A: Should the project be permitted, groundwater will be drawn down in an area surrounding the ore body to allow for mining. The drawdown would be most substantial directly over the ore body and would diminish outward. The maximum depth and extent of drawdown would take several years to develop. At that point it would remain relatively constant until the pumps are turned off following the completion of mining. This maximum drawdown would be in excess of 1200 feet deep over the ore body. This number is not definite because at this point, the numerical modeling which we are using to aid in the prediction of the drawdown is not complete.

Based on the information available now, the maximum horizontal area of the predicted drawdown (the one-foot level is the limit of the predictive accuracy) would be bounded by Swamp Creek on the north, Hemlock Creek and an adjacent wetland on the east, the area extending from Kimberly Lake to Walsh Lake to St. John's Lake to Rolling Stone Lake to the south, and Pickerel Creek to Mole Lake to Rice Lake on the west. This is an area of about 16 square miles (about 10,250 acres). At this point in the modeling, it appears that the predicted effect on lake level in Rolling Stone Lake is insignificant. However, the predicted reduction in water entering the lake may have a detrimental effect on the amount of winter kill of fish in the lake. If it appears that this would be the case, a mitigation plan for the influent streams (those that flow into the lake) and/or the lake would have to be developed. Unless the mine pumping is increased well beyond the currently predicted amounts (maximum of about 1400 gallons per minute), Lakes Lucerne, Metonga, and Ground Hemlock would not be affected by the drawdown.

29.

Q: When you speak of the one foot drop in the drawdown zone, is that the maximum drawdown over 35 years, one year, one day, etc.?

A: The drawdown zone encompasses the entire area over which we expect drawdown to occur during the life of the mine. The drawdown would take several years to fully develop and would last, at that level, for the duration of active mining (predicted to be about 28 years). Once groundwater no longer is being pumped out of the mine, the groundwater would recover to its former level. The drawdown zone originates at the ore body, which is the area of maximum drawdown (in excess of 1200 feet). This zone extends out to

the area where the model predicts that the drawdown would be about one foot. One foot is the smallest unit of drawdown that the model can predict with an acceptable degree of accuracy. This area encloses the area of maximum expected drawdown over the duration of the pumping. In making our impact analysis, we use the worst case condition or maximum drawdown that could reasonably be expected to occur over the life of the project. (See Response #28.)

30.

Q: How big a change in the water table would be considered as too big - i.e. how big a change would be unacceptable?

A: A water table change would be unacceptable if it resulted in impacts to public rights in surface waters beyond what can be reasonably mitigated by the company or if it resulted in significant adverse impacts to public rights to groundwater.

31.

Q: What effect will the mine's consumption of water have on the water table for shallow wells in the shaded area on your map and beyond (10 miles)? What effect will it have on the water tables in the Pickerel area?

A: The predicted drawdown area is only approximate at this point because the groundwater modeling is not yet complete. Shallow wells within the current predicted one foot drawdown limit could see a drop in the water level. The depth of drawdown would be greater closer to the ore body. Depending on the current level in the well, the well may become dysfunctional after pumping begins. If this occurs, the company would have to correct the situation by providing an alternate water supply. This would most likely involve deepening the well. In the area beyond the one-foot drawdown area, effects are predicted to be insignificant. The area around Pickerel Lake is south of the predicted area of drawdown by a substantial distance. The community of Pickerel on Highway 55 is even farther south. Both areas should not be affected by the drawdown. See Question #23 for a further discussion of well mitigation.

32.

Q: Explain how groundwater in the surface layer and the bedrock interact.

A: In the area of the mine site and the TMA, there is little natural driving force providing for interaction between water in the bedrock and water in the overlying glacial material. Therefore, at present there is little interaction. In the area of the ore body, however, there is a small downward flow into the bedrock on the east end and upward flow on the west end. Evidence from the site indicates that there is good connection (hydrographs from wells in the bedrock are similar to hydrographs from wells in the glacial material), but that any flow is limited by the relatively lower hydraulic conductivity of the upper portion of the bedrock (the saprolite) and the base of the glacial material. Due to this lack of a driving force over most of the area, it is not clear how well connected the bedrock is to the overlying material in the surrounding area.

Groundwater Technical Information

33.

Q: You say half of the tailings will be put into the mine shafts "below" the water table. Observing that used mine shafts tend to draw from the water table and fill up, what safeguards are required to ensure this does not re-enter the water table? For how long? When will we know effects on flow rates and water levels? Wouldn't the mine shafts themselves allow groundwater to flow through the rock to lower levels?

A: Except for the three vertical shafts, the uppermost mine workings are proposed to be a minimum of 100 feet below the bedrock surface or at least 300 feet below the ground surface. The question therefore is whether contaminated mine water will flow vertically upward and cause contamination of the near surface sand and gravel aquifer. In order to prevent this (and for other reasons), approximately 90% of the underground voids will be backfilled. The remaining shafts and drifts must remain open until mine closure in order to provide access and ventilation for the miners. These unfilled shafts during closure would be plugged at appropriate locations to prevent water circulation. The Department has not completed its evaluation of the potential for contaminants to leave the mine, but this will be done and the results will be included in the DEIS.

The Tailings Management Area (TMA) Structure

34.

Q: With the tailings area to encompass approximately 350 football fields, and with the tailings having a potential for water pollution for thousands of years, how long will the liners in the barrier layer system above the waste continue to seal off water without dissolving or failing? Can the strength of the TMA be guaranteed? What is the estimated leakage of the waste management system?

A: The proposed TMA would cover 279 acres when completed, including the perimeter berms and the four interior cell dividers. 217 of these acres would be lined, and the total area of disturbance during operation would be approximately 345 acres. The four cells would be constructed sequentially as needed over the life of the facility. Each filled cell would be capped as soon as the stored waste has de-watered and settled sufficiently to provide for cap stability. The proposed design calls for a composite liner, a drainage collection system, and a composite cap for each cell. The proposed base liner composite would include a prepared compacted subgrade followed by a compacted soil layer consisting of fine sand, silt, and clay; a geosynthetic clay liner (GCL) manufactured with clay that swells when wet (which has been proposed to be treated to be compatible with the anticipated tailings pore water chemistry); followed by a 60 mil thick plastic liner which in turn is protected by a geotextile; the drain soils; another geotextile; a till filter layer; additional till soils; and riprap as needed to prevent erosion of the liner system.

The liner system, with the exception of the geomembrane, is expected to be permanent. All of the soil materials used in the liner and cap, including the bentonite clay in the GCL, are expected to be unaffected by age. Although CMC used a worst case scenario of a 150 year liner lifespan for an input into the groundwater model, these soils are predicted

to last several centuries. In order to be approveable, the proposed design must provide for compliance with groundwater standards to a high degree of certainty under simulated worst case conditions. Potential worst-case leakage rates resulting from the proposed design have not yet been determined, but will be part of the Department's analysis and will be included in the DEIS when completed.

35.

Q: What is the life of the plastic liner? Please address the freezing of the tailings material to the liners and the inside of the retaining berm. When cell #1 is filled it will be open for five winters. How will freezing of the semi-solid material effect the integrity? What impacts would 100 years of freeze and thaw, expansion and contraction have on the TMA?

A: The plastic liner, or geomembrane, is made of polyethylene. These type of plastics were developed for pipelines, sheeting, geomembranes, and other exposed uses. Plastics can be decomposed by various mechanisms, but the rate is decreased by protecting the plastics from exposure to sun, air, and changing temperature and moisture conditions. Recent work done by researchers in plastics chemistry indicate that geomembranes should have a useful life of several centuries when used in waste disposal sites. This is due to both the geomembrane qualities and to their protection from sunlight, air, and weather changes.

The upper surface of the tailings may freeze, but the depth of freezing would be limited, since wet tailings would take longer to freeze than dry soil. The continued discharge of tailings during the winter months would limit the depth of freezing as well. The tailings surface that freezes one winter would be buried and protected by the time the next winter comes along. Actually, freezing tailings does have beneficial effects, since this would aid in densifying the tailings and reducing the moisture content. The tailings would not freeze directly to the top of the geomembrane, since the geomembrane would be protected by a layer of till soil.

One hundred years or more of winters will result in freezing during the winter of the upper few feet of the final cover system on the top of the TMA and the soil embankments on the sides of the TMA. The soils would thaw during each successive spring. The effects on these soils would be the same as the effects of winter and freeze-thaw on other soils in the area. The capping layer would be protected by enough soil to prevent freezing conditions from reaching it during most winters. The depth of freezing on these soils would not be as deep as might be expected around buildings, since foundations artificially deepen the zone of freezing. None of the components of the capping layer would be damaged by occasional freezing.

36.

Q: Will the berms be able to withstand the pressure from freezing?

A: Yes. Freezing would be limited to a few inches of tailings surface during active filling life, since any frozen surface would be covered by fresh tailings in a few weeks. If a cell were not actively being filled, freezing might extend down a few feet from the surface, but the bulk of the tailings mass would not freeze, any more than natural soil would. The major effect of the tailings on the berms would be the weight of the tailings and water. As the tailings become more dense, they would become more stable physically and would increase the stability of the entire structure.

37.

Q: How thick will the TMA GCL be? How thick will the liner be?

A: The GCLs, as currently manufactured, are about one quarter of an inch in thickness when dry. In contact with soil, they would start to absorb water and swell as the clay (known as bentonite) becomes waterlogged. The amount that the bentonite would swell would be limited by the weight of tailings, drain layers, and soil above the liner or capping layer, and the final thickness after bentonite becomes wet would probably be only a little thicker than its dry thickness.

The liner is a composite structure made of three materials, as is the capping layer in the final cover. The lowermost layer is a minimum of 12 inches of soil sieved from onsite soils, consisting of fine sand, silt, and clay particles. This material is described as the P40 material, since the particles will be less than the Number 40 sieve used to size it. The GCL thickness was discussed in the previous paragraph. The plastic geomembrane over the GCL is 60 mils thick (or about as thick as a quarter), a standard thickness for waste containment site liners.

38.

Q: How can the TMA cover keep water out for thousands of years?

A: The challenge is to control both water and air entry to the tailings mass. Air and water *together* are what would cause oxidation of the sulfide portion of the tailings. Final cover designs use climate, soils, vegetation, and drainage to protect disposal sites and to limit or prevent damage to barrier layers. How long they will last is hard to say, but if we use the natural landscape as an example, slopes and hills made of densely compacted soils with good vegetative covers can stay intact for thousands of years. More specific protective items are discussed below.

Limiting the surface area occupied by a waste disposal site limits potential problems. This limits the amount of lined and covered area that has to be built and maintained. In limiting surface area, the depth may be increased. This would mean that the tailings would be thicker. Thicker tailings also means more densification and reduced permeability to air and water. It also means that, even under the worst conditions, the deeper tailings layers will be protected from contact with air and water by the tailings layers above.

The final cover surface slope would be built up to shed water and to support vegetation. The exterior slopes of the perimeter berms would be vegetated and stabilized for years before the topslopes are constructed. The topslopes would be built up with soil to drain to the perimeter of the site. This would divert several inches per year of precipitation drainage that would otherwise be trapped in the cover soils. A healthy vegetative cover is also essential for limiting water entry to the waste mass, since evapotranspiration by the plants pumps water out of the soil and back to the atmosphere.

The 4½ feet of soils over the capping layer and several feet of fill below the barrier layer would limit the passage of water and air to the tailings, even without the presence of the barrier layer. These soil layers are also protective elements for the barrier layer. The soil layers below the barrier layer limit settling effects on the barrier layer and provide a solid subbase to construct the barrier layer. The soil layers above the barrier layer protect the barrier layer from effects of exposure, such as freeze-thaw, desiccation, sunlight, oxygen, burrowing animals, plant roots, and erosion.

The processed till layer and bentonite in the GCL are natural materials that have

already survived for hundreds of thousands of years and would not be expected to change. The polyethylene geomembrane and polypropylene or polyesther geotextiles have expected survival lives of several centuries under buried conditions.

39.

Q: Is 12 inches of compaction at the base going to do any good when built on swamp land? Will solid ground have to be established before the basin can be constructed on top?

A: All surface soils within the TMA construction area would be removed. Any softer soils would not be left either under the berms or under the TMA lined area. The soils below the TMA have been made highly dense by the weight of several glaciers that passed over the area in the past. The soil borings and test pits dug over the years in the TMA area all confirm that the subsurface conditions would provide suitable earthwork construction support.

40.

Q: Will the top cover be thick enough for large trees to root? If roots can grow through sewer pipes how is your plastic cover going to stop them? How will trees be kept off the TMA forever?

A: The soil layers proposed for construction above the bentonite and geomembrane (thick plastic) layers of the reclamation cap would consist of a one foot drainage layer of sand or coarser material, a three foot rooting layer and one-half foot of top soil. While we have not completed our analysis of this proposal, it should be sufficiently thick to prevent roots from reaching the plastic geomembrane. In addition, the drainage layer should be saturated for a significant portion of the year, meaning that the roots would have difficulty obtaining oxygen for sustained root growth.

Sewer pipes have joints and eventually develop tiny cracks, and it is through these tiny openings that tree roots can penetrate and grow, eventually clogging the pipe. Sewer pipes provide ideal conditions for root growth: oxygen, available nutrients and moisture, thus encouraging root growth. These conditions would not exist in the TMA final cover.

We have not completed our review of the proposed reclamation cap, thus we are only able to provide a tentative response to the third question. The proposed vegetation type for the TMA is a savanna, with scattered trees. A savanna would likely be maintained with fire or mechanical means to reduce the numbers and sizes of invading trees. Herbicide application may be another alternative to kill woody species. Small trees and shrubs on the surface and sideslopes may actually be desirable because they would stabilize the soil from erosion and would draw water from the soil above the TMA.

41.

Q: What safeguards will there be against rodents or other animals digging into the TMA?

A: Once a final cover is in place, it would not be possible to prevent all burrowing, nor are we interested in that type of control. The presence of small burrowing rodents would provide evidence of the success of the cover vegetation in providing food, cover, and den material. The question is probably more accurately whether burrowing would have any effect

on the integrity of the final cover or the capping layer.

The problem of animal effects is limited to rodents and their predators. Small rodents in this part of the U.S. burrow only a few inches below the soil surface. Larger predator species such as foxes, coyotes, and badgers are strong animals known to burrow deeper. Although there are four species in the study area that are known to burrow deeper than three feet (badger, striped skunk, woodchuck, and red fox), these animals rarely dig to the depth of the proposed GCL in the capping layer. The habitat on the TMA topslopes would not prevent such animals from looking for den sites, but it also would not encourage them. The TMA topslopes would be exposed and offer little shelter due to grassy vegetation and even topography. The TMA topslopes would more likely be used as a hunting area than as a denning area.

Burrowing into the sideslopes is not likely to lead to any damage to the liner, since the horizontal distance from soil surface to the underside of the liner is tens or hundreds of feet. Burrows and displaced soil are mainly a problem in terms of affecting drainage paths on the sideslopes. Deer trails can cause similar problems. Both are readily visible and can be repaired. Burrowing into the topslope is not likely to cause erosion problems, due to the very shallow surface slope (2% or less). Soil displaced to the surface would stay close to the burrow entrance. When the burrow collapses, it would result in a slight depression at the ground surface.

The gravel drain would discourage all burrowing creatures from digging down to the geomembrane component of the capping layer. Gravel or cobble layers have been used as "biobarriers" in some types of disposal sites, particularly in the Western U.S. as a defense against prairie dogs. The polyethylene geomembrane itself is a tough barrier to a burrowing animal. It is too slick and stiff to easily get a grip on and has no odor or taste that makes it attractive to chew on. For animals to expend energy to dig through a tough soil layer, there has to some expectation of a benefit for doing so. The combination of gravel drain and a geomembrane were developed to drain percolation but would also serve to protect the barrier layer from burrowing animals.

The Operation of the TMA

42.

Q: **Will the tailings pond smell like rotten eggs?**

A: A "rotten eggs" smell is caused by hydrogen sulfide gas. Air Management staff do not believe that the tailings ponds would be a source of hydrogen sulfide odors under normal operating conditions. Although there would be significant quantities of sulfide minerals in the ponds, special chemical reactions would have to take place for hydrogen sulfide gas to be produced. Sulfate must generally be in conditions where oxygen is absent in order to become hydrogen sulfide. However, oxygen would be present on the surface of the TMA. In addition, DNR specialists who have visited other metallic mines have never noticed the smell of rotten eggs at the tailings impoundments. Therefore, the minerals in the tailings pond would not be considered to be a source of hydrogen sulfide odors.

Air management staff are working on an analysis of the water treatment stream to assess points and quantities of hydrogen sulfide generation at the mine/mill site. The results will be available in the DEIS.

43.

Q: If the tailings are toxic, how does this affect wildlife drinking the water?

A: During active filling, the tailings ponds would not contain any vegetation or other life forms that would constitute feed for wildlife. In the absence of feed, the use of the ponds by wildlife is expected to be low. Our initial review indicates that neither the fresh tailings or the mill water which would cover the tailings is expected to be acutely toxic and occasional use would not result in wildlife mortality. Nevertheless, several months ago we asked the company to address the question of wildlife use based on the experience that other mines have had with wildlife at similar tailings management facilities.

44.

Q: How will you control massive flooding in the pond area as we see in Minnesota?

A: The berms at the perimeter of the tailings containment cells would extend to elevations well above the surrounding landscape. Therefore, no surface runoff would enter the basins from other areas. The only storm water entering the actively operating cells would be the 24 to 48 inches per year of precipitation that would fall directly into the tailings containment cells. Any surplus storm or process water in the tailings management facility would be returned to the mill as needed for process water. The TMA facility is designed to accommodate both water storage and wave action.

45.

Q: What are the components of the tailings that we should be concerned with? Heavy metals? Nutrients? Sediment? Low oxygen water? etc.? Identify what kinds of heavy metals (including radioactive metals) will be found in tailings from this mine project according to your findings based on core samples and other studies (including company)? What about the residue from the milling reagent chemicals that enter the TMA? Address arsenic, cyanide, and heavy metals. Is it not true that the oxidized hydrogen sulfide mining waste would actually be sulfuric acid?

A: Tailings are ground up rock which contain all of the minerals that are present in the ore body. The milling process would remove most of the valuable minerals including sphalerite (zinc sulfide) chalcopyrite (copper sulfide) and galena (lead sulfide), but traces of these and other sulfide minerals (primarily pyrite or iron sulfide) remain. None of these are of particular concern if they remain insoluble as they have existed in the ore body over the past billion plus years.

However, the exposure of sulfide minerals to air in combination with water can, over time, result in the oxidation of the sulfide minerals (a process which can be accelerated by bacterial action). This oxidation reaction would produce dilute sulfuric acid which can dissolve minerals and make the metal ions water soluble.

If there is an adequate quantity of buffering compounds (primarily limestone) present in the tailings, the acid would be neutralized and metal ions would be precipitated out of solution as insoluble metal hydroxides. When the acid is neutralized, the reaction product is gypsum (calcium sulfate) or similar sulfate compounds depending on the nature of the buffering material.

In the absence of adequate buffering compounds in the tailings or adjacent soils, the

soluble metal ions could travel in groundwater until tied up by ion exchange with clay minerals or until discharged with the groundwater to surface waters. Gypsum and similar sulfate compounds are very water soluble and will move with groundwater unimpeded by soil conditions.

Sulfates in water are known to cause several problems. Sulfates in high concentrations will cause gastro-intestinal distress if consumed by humans who are not accustomed to drinking high sulfate water. Sulfates in surface waters in concentrations above about 10 parts per million can cause problems with wild rice production. Since the movement of sulfates in groundwater is unimpeded by soil conditions, this group of compounds is the most likely to violate groundwater standards if there is excessive leakage from a mine or tailings basin. For this reason, the Department is focusing on sulfate as it reviews its groundwater and contaminant transport models. If the tailings facility would be shown to violate sulfate standards any time in the future, it could not be permitted.

Some of the mill reagents are of concern while in transport or bulk storage because of the potential for hazardous accidental spills. The Department has not completed its analysis of the impacts related to milling reagents, however, according to the company, reagent concentrations are not expected to be significant in the tailings or treated wastewater. Nitrates resulting from unburned blasting agents in the mine are a potential concern, but are expected to be in low concentrations in the tailing basins and treated wastewater.

Arsenic and other metals are present in small quantities in the orebody and would, thus, be present in the tailings. At this time we do not have complete information from the company on the expected metals present in the leachate from the tailings facility. We cannot complete our analyses until the company completes their work. The final conclusions will be included in the DEIS.

Sodium cyanide is used in small quantities in the milling process as a depressant to keep pyrite from floating off with the other minerals. Most of the cyanide would be bound to the pyrite grains. Cyanide decomposes when exposed to air and sunlight. Toxic concentrations in the air or water are not expected.

There were radiological tests conducted in the 1970s and 1980s on the ore, waste rock, and tailings. Many of these tests could not detect the presence of radioactive materials. Where radioactive materials were detected, they were found to be lower than concentrations in the nearby unmineralized rock. Based on these test results, the Department does not consider radioactivity to be a significant issue with this proposal.

46.

Q: If there were big leaks in the liner, how would they be fixed?

A: Leaks can be detected by several means, but the most important is inspection, testing, and observation of the liner or capping layer during construction. Most leaks are detected by these means. Large holes and tears are easy to find. Most of the effort is spent on close inspection to find the small ones. Repairs are made by the same methods used initially to weld the geomembrane, patch the GCL, or to replace and thicken the P40 soil layer.

After a liner or final cover capping layer has been constructed and covered by drains or other cover soils, the geomembrane can be inspected for leaks by some specialized methods. If leaks are found, the locations can be identified, the geomembrane exposed, and the leak can be repaired.

47.

Q: How long are the waste ponds toxic?

A: "Toxic" is not the correct term for the tailings from a metallic mining operation. Evidence from other metallic mining operations as well as samples of simulated tailings from the Crandon Mine have shown that the tailings coming out of a mill are not "toxic" as defined by recognized EPA test methods. The term "reactive" is probably more appropriate. The tailings in the tailing facility would be potentially reactive indefinitely. However, they would not become reactive unless exposed to air and water. That is the reason the tailings facility is designed to limit infiltration of water and air. In addition, it is designed to limit the escape of water to, restricting the movement of any materials dissolved in water present in the facility during operation or that moves into the facility following reclamation.

48.

Q: While the tailings basin is being filled you talk about the tailings being "pumped" into cells. How much moisture will there be and what effects will it have in the cells during filling? How long would the tailings be fluid?

A: Tailings are transported to the TMA through a surface pipeline as a water slurry containing 12 to 30 percent solids by weight. This slurry is discharged inside the containment cell. The solids in the tailings slurry would begin to settle out as soon as it is placed in the TMA cell or mine stope, much as sand and silt will settle out in a bottle of water after you shake it. The clarified water would be removed from the top or drained from the bottom and returned to the mill for reuse. The water circuit between the mill and the TMA is therefore a closed loop with some losses of water due to evaporation and some gains due to precipitation within the TMA cell.

During the filling process the TMA cell surface would have the consistency of a fine sand beach around the perimeter and a shallow pond with a soft bed in the interior. The tailings would not be fully compacted until the filling is completed and the water is drained. At that time the surface should support heavy equipment as needed to install the cap.

49.

Q: Would the water that carries tailings to the TMA be considered contaminated? What process is there to clean that water?

A: The water in the TMA, called process water, would not be scheduled for treatment under normal circumstances because it would be recycled and reused in the mill. The process water would move in a closed loop as follows: from the mill, where the zinc, copper and lead concentrates would be removed in the concentrator circuits, the finely ground tailings would be pumped as a slurry (with process water) to be deposited in the TMA. The tailings fines would settle and separate from the process water. This process water would then be pumped to the reclaim pond where more settling would occur. Finally, it would be pumped to the mill for re-use. Normally the milling process consumes water because some leaves with the concentrates and some is lost to evaporation, thus water usually needs to be added to the process water. Therefore, treatment of "extra" water usually wouldn't be an issue. However, the wastewater treatment facility could be used to treat process water if there were large amounts of precipitation entering the TMA, in case of a project shutdown, or before closure of the facility. Any discharge of treated process water would have to meet

effluent limits prior to discharge. (See also responses #48 & #71.)

50.

Q: Explain what you mean by an operational life of the TMA of 35 years.

A: The term "operational life" refers to the time period during which the TMA would be used for the disposal of tailings and other mining or milling wastes. That period would be approximately 35 years for the TMA as a whole, but the active life of an individual cell would be shorter, depending on the size of the cell and the volume of mining and milling. The operational life of the TMA as a whole includes the construction of the initial cell, filling and construction of successive cells, closure of the first three cells while active filling is going on, and closure of the last cell after waste disposal has ceased. Regardless of the length of the operational life of the TMA, a considerable amount of reclamation and closure work would be done during the operational period on exterior sideslopes and on the final covers of the first three cells.

51.

Q: An alkaline solution completely destroys the impermeable integrity of bentonite clay - please comment on this statement.

A: Highly concentrated alkaline liquids usually have high concentrations of divalent ions (electrically-charged atoms), mostly calcium and magnesium. These ions are able to combine readily with other molecules. Adding a concentrated alkaline liquid to bentonite can cause changes to the highly active clay minerals in the bentonite, but will not cause physical destruction of the bentonite. If the divalent ions displace sodium ions in the mineral structure of the bentonite, they can cause the minerals to alter their physical behavior, and in certain situations this can lead to an increase in permeability (making it easier for liquid to pass through the clay). Such changes can be reversed by flushing bentonite with solutions high in sodium. The resulting mixtures of sodium and divalent ions typically have less of an effect on permeability.

Tests on bentonite minerals using actual leachate show little or no change in bentonite permeability or physical behavior. Leachates are more complex mixtures that tend to offset the effects of highly alkaline pH or high concentrations of divalent ions such as calcium and magnesium.

Destruction of bentonite minerals by a highly alkaline liquid can occur in a laboratory setting, but it does not occur where that liquid has to percolate through other soil or tailings layers before reaching the bentonite minerals. As it passed through the TMA layers, the liquid would be altered and buffered by passage through the soil cover and tailings, making it less alkaline.

It is not clear that changes to the bentonite minerals by divalent ions have any effect on the ability of the TMA cell liner to block the flow of leachate down into the groundwater beneath the TMA. The till layer is intended to limit any potential for bentonite particles to be pushed out of the GCL structure. The weight of the overlying tailings will keep the GCL heavily compressed. This compression would help to limit the passage of liquids through the liner, and therefore help to offset any changes caused by ions in an alkaline solution.

As an added measure to guard against the effects of alkaline solutions, the mining company has proposed to add a substance to the bentonite that would buffer, or reduce the alkalinity of, liquids coming into contact with the bentonite. DNR is reviewing the need for and

benefits of this treatment.

52.

Q: **I've always been under the assumption that the tailing pile was to be sealed to prevent leakage. Now I'm really concerned about the possible pollution of the Wolf River. What effect would the failure of the TMA barrier systems have on the local waterways?**

A: The intent in designing the tailings management area is to minimize leakage from the facility. Even with the best design, construction and operation practices, no constructed facility can be expected to stop movement of liquid completely and indefinitely. Though we are not finished reviewing the proposed tailings facility, it is clear that its design is intended to stop as much liquid movement as possible. A complete failure of the tailings facility barrier system is highly unlikely. If some type of failure were to occur, it would most likely involve only portions of the system. A failure of this type could lead to increased movement of contaminants out of the tailings facility.

At this time, the effect of these contaminants on the area groundwater and surface water is difficult to predict, since the DNR's modeling is not yet complete. However, we do know that movement of groundwater from the area of the TMA to the nearest surface water body - Hemlock Creek - takes around 25 years. For a substantial amount of groundwater contamination to reach the creek would take a lot longer. This should give us time to appropriately clean up the groundwater prior to an impact to Hemlock Creek if there is a problem, making the chances for major surface water contamination very limited. The likelihood of any impact to the main stem of the Wolf River is even more limited, as it is several miles downstream and has a larger base flow.

53.

Q: **Please explain the probability of the waste from the storage facility becoming oxidized.**

A: The mineralized zone which contains the Crandon ore body is composed largely of sulfur-metal minerals. In their present state far underground, they are very stable chemically. This is because at that depth in the earth, there is limited availability of compounds capable of oxidizing those minerals (such as oxygen). Once moved to the earth's surface, however, there are abundant oxidizing compounds and some level of oxidation will occur. The fundamental question is whether enough oxidation will occur to develop acid drainage. The waste materials (tailings and waste rock) will have to be managed to limit the amount of oxidation that occurs to ensure that development of acid drainage will not happen. Limiting oxidation involves limiting oxygen and water contact with the tailings. The Department has not yet completed its review of the waste composition and oxidation potential, however, once the reviews are completed they will be published in the DEIS.

54.

Q: **How much of the ore body will be taken out as minerals?**

A: The ore body has two distinct parts consisting of a zinc massive ore (30 million tons) and a copper stringer ore (25 million tons). Approximately 20% of the total tonnage would be shipped and sold to a refinery as concentrates of zinc, copper and lead. The remaining 80% of the ore body mass would be tailings, a waste product, which would be

disposed about equally below ground in the mined out cavities and above ground in the tailings management area. Gold and silver values contained in the concentrates would be recovered at the refinery. The average metal grade (content) of the ore as it would enter the mill for concentration is projected to be as follows:

Massive Ore - 30 Million Tons		Stringer Ore - 25 Million tons	
9.4%	Zinc	1.0%	Zinc
0.4%	Copper	1.7%	Copper
0.8%	Lead	0.1%	Lead
	Silver 2.1 oz/ton		Silver 0.3 oz/ton
	Gold 0.05 oz/ton		Gold 0.01 oz/ton

55.

Q: Why can't 100% of the tailings be put back underground?

A: Crushing ore changes a very dense rock into a mass of very fine particles. Tiny air spaces occur between the faces where these tiny particles touch. Since there would be billions of these finely ground rock particles where there once was dense rock, the tailings take up more space than the ore did. It won't fit back into the underground voids it was taken from. This is the same principle you notice when you grate a block of parmesan cheese - the pile you produce takes up more space than did the block you began with. This holds true even though 20% of the ore body would be removed as minerals - the expansion for this type of ground rock is generally about 2 to 1. (See also Response #54.)

56.

Q: Estimated leakage was referred to several times - in other words it is admitted that there will be leakage - any leakage poses a hazard to our clean water - in all of life clean water is our most valuable resource both now and in the future! How can this project even be considered with such a risk!!!

A: Discussions of leakage from mining waste facilities, specifically the proposed tailings facility for the Crandon project, is a recognition of the fact that no containment facility is perfect. Over time, facilities designed to contain waste material, such as landfills, wastewater lagoons, septic tanks, and mining waste facilities will leak. It is the current regulatory approach to minimize the rate of leakage and control, to the extent possible, and control the quality of the leakage so that the resulting impacts on groundwater and surface water resources are limited to a degree that does not interfere with existing and future uses of the resource. The application of numerical groundwater standards as discussed previously (response #10) ensure that current and future uses of groundwater resources are protected.

TMA location

57.

Q: Is it necessary to put this basin on 23 acres of wetlands?

A: State mining regulations acknowledge a difference between mining and other industries. Since ore bodies are immobile, any mining facilities must be located somewhere in proximity to the ore body. In other words, the location of mining facilities in relation to an ore body is not flexible. State rules (s. NR 132.06), Wis. Admin. Code) require that wetlands be avoided, if at all possible. If damage to wetlands cannot be avoided, then it must be kept to a minimum. The Department must verify this by reviewing the process the applicant used to select a proposed mill location and tailings disposal site.

The TMA proposed at the Crandon site was initially located with the goal of minimizing direct wetland impacts. Department staff later directed that its location be moved somewhat in order to minimize disruption of rainfall runoff to an uncommon wetland ("Bur Oak Swamp") down-slope of the TMA. Those citizens who have studied maps of the site have likely noticed that, just as with northern Wisconsin as a whole, the area is wealthy in wetlands. Attempting to avoid them all would require a less stable design that would be far more difficult to monitor, thus such a TMA site could threaten far more than the 23 acres of wetland that would be destroyed by the proposed TMA construction.

58.

Q: Why can't the tailings management area be located a distance away from the Wolf River watershed or the tailings shipped out altogether?

A: Shipment of the ore without milling and concentrating to a refinery (as done at the Flambeau Mine at Ladysmith) has not been considered at this proposed facility because the ore grade is not high enough to support a direct shipment operation. The transport of the tailings and waste rock to a more distant location was considered during the initial TMA siting process. Approximately 35 sites were considered within about a twelve mile radius of the mine. In most cases these sites were mapped, drilled, and sampled to determine geological and environmental characteristics, potential waste volume holding capacity and construction feasibility. None of these sites were found to have significant advantages over the location finally selected.

Based on Department experience with other regulated facilities, the further away a disposal site is from the waste generation site, the harder it is to manage, operate, and maintain the disposal site. Some of the environmental costs associated with long distance tailings and waste rock transport include additional fuel consumption, the physical damage that results from haul road and pipeline construction including wetland and river crossings, and the associated road noise, dust, exhaust, and potential for spills. In order to balance these environmental costs plus the economic costs, one would have to show that a more distant site has characteristics that are a significant improvement over the nearby sites.

Contaminant Transport

59.

Q: If there were a leak in the tailings holding facility, about how long would it take for the acid to eat to the 18 foot minimum to the water table which extends under all of Wisconsin? Approximately how long will it take the drainage (if any) to reach this (New London) area?

A: A leak in the tailings facility liner would cause additional movement of potential contaminants out of the facility and into groundwater. It is important to recognize that, in all likelihood, leaking liquid will not be acidic in nature and it would not eat its way to the water table. It may have high metals content, however. Based on field tests, it takes from about 7 to 15 years for rainfall on the ground in the area of the proposed tailings facility to percolate down to the water table. From there the local groundwater flows toward Swamp/Hemlock Creeks or Pickerel Creek/Creeks 11-4 and 12-9 and is discharged into those streams. Therefore, the real question with respect to surface waters is what happens to the nearby creeks. With appropriate drawdown mitigation and clean-up of any potential releases, the upper Wolf River would not see any measurable affect at all. By the time the Wolf flows down to New London, it is difficult to envision a scenario whereby any effects could be seen.

60.

Q: If seepage occurs and is not detected immediately, what will or can be done once the watershed is polluted by toxins and heavy metals?

A: If this project is permitted, it will have an extensive environmental monitoring program that will require detailed groundwater and surface water monitoring on and around the facility. In addition to groundwater and surface water monitoring, the mine and tailings facility would be monitored closely to make sure they are performing as designed and predicted. This monitoring should detect discharges of contaminants to groundwater or surface water quickly. Should a significant release of contaminants occur that is not quickly detected, the monitoring program would find it prior to movement outside the watershed. At that point, a clean-up program would be initiated. Depending on the type of release, clean up could involve repair of the tailings facility, pumping of groundwater for treatment or to control movement, installation of reactive walls, installation of cutoff walls, or many other techniques.

Natural disasters

61.

Q: What will happen if we have a natural disaster? Earthquake? Flood? Tornado? Does the DNR have any records of earthquake action in this general area since Richter scale use? If so, what were the magnitudes of these earthquakes? Wisconsin has fault lines throughout the state - does the tailing storage area take this into consideration?

A: A natural disaster is always a possibility. We do consider natural disasters in our review of all major projects. Determination of this likelihood, however, is extremely difficult. With the positioning of the tailings facility well above the flood plain, a flood would

only likely lead to more mine pumping (and less drawdown). A direct hit from a tornado could severely damage mine buildings and disrupt tailings facility construction. However, any operational or closed portions of the tailings facility would not likely be substantially affected.

A major earthquake with an epicenter near the mine site could cause substantial damage to the mine and the tailings facility. This portion of the state contains many Precambrian-age faults. However, there is no evidence of any recent faulting (since the end of the last glacial advance) in northern Wisconsin. The nearest area of active faults is associated with the New Madrid fault zone in southern Illinois. Low to moderate magnitude earthquakes do occur in the central part of the continent. These earthquakes are usually only felt right around the epicenter and rarely cause any damage. Indeed, it is likely that the tailings facility, being constructed on highly compacted soils, could withstand a moderate earthquake without failure.

Drought

62.

Q: What will happen if there is a drought? How will this change this draw off of the groundwater? Will this lower the water level of the nearby lakes? How would a volume of groundwater that could be as much as 1,728,000 gallons a day pumped from the mine site to the Wisconsin River affect the ecosystem of the Wolf River and surrounding waterbodies during and after a period of drought? If the State can control individual water usage, why can't the state make the company slow down water usage during drought conditions? If we would enter into a drought situation - would the mining company be required to slow operations? How is low rainfall factored into water flowing into the Wolf River?

A: The figure of 1,728,000 gallons per day represents the design capacity of the proposed wastewater pipeline to the Wisconsin River. According to the company, the actual discharge is expected to be about half that amount, however, we can not project a firm number regarding the facility water balance until we complete the groundwater flow model analysis and review any needs and methods for surface water mitigation.

Pumping water from the mine and treating it for discharge is an expensive operation and the company is therefore motivated to reduce mine inflow to the fullest extent possible. Under drought conditions, evaporation from the various ponds at the facility would increase and therefore the discharge of treated surplus water to the Wisconsin River would decrease. The groundwater drawdown would take years to develop and about an equal amount of time to recover following mine closure. Because of the time required, shutting down of the mine during a drought would not reduce impacts. For this reason, the Department's analysis of the impacts of the groundwater drawdown resulting from mine pumping will be based on worst case conditions, including an extended drought.

63.

Q: Does the model take into effect channelling through the liners?

A: We are uncertain, in this question, what sort of "channelling" the questioner is referring to. The model used to evaluate the behavior of the liner and final cover does account for the actions of pinholes or other defects in geomembranes. If the questioner

would like to clarify his or her meaning, please contact Chris Carlson at WDNR, WA/3, P.O. Box 7921, Madison, WI 53707.

Worst case scenarios/contingency plans

64.

Q: **What could possibly happen should things not go as planned? Will the permit require emergency measures if the model proves inaccurate and a disaster appears eminent? How will the provisions be enforced? Will any worst case scenario (i.e. massive leakage of tailings into groundwater and/or surface water) be done to evaluate total potential economic loss to every person downstream?**

A: The State's mining and mining waste rules each require an applicant to identify various scenarios of failure and the remedial measures that would be taken if such events occurred. The risk assessment and the contingency plan evaluate short term events, such as spills or pipeline breaks and also address long term problems, such as leakage from a waste facility. In addition, the applicant must also consider natural events, such as heavy precipitation, tornadoes or forest fires, and have corresponding plans to deal with those situations as well. The plans and approvals will clearly delineate when certain actions must be taken, so that related impacts are minimized. These plans are reviewed and approved as part of the regulatory process, and, if a project is approved, the risk assessment and contingency plan are made part of the permit or approval. As such, they essentially have the force of law.

In conducting its review of a mining project, the Department will analyze various scenarios of failure or leakage from a waste facility. The degree of failure analyzed will be bounded to some extent by what the Department feels is reasonably likely to occur. As discussed in response #21 above, under the proposed mining rule revisions, the Department will also determine the costs associated with implementation of remedial measures needed if such failure took place and require posting of adequate funds to cover those costs.

65.

Q: **You were supposed to be coming here as unbiased experts, but all we've heard is how there won't be any problems with the mine. Isn't there always a potential for disaster, no matter how well your assumptions look? What is really the worst thing that could happen? Could we lose the whole river system?**

A: Throughout the Department's analysis, we have pointed out the need for improvements in the proposed mining plan in order to protect natural resources. CMC has been making the design improvements and collecting the additional data the Department has requested.

As with any human activity, there is always a risk of harm or injury, but the Department's review is addressing ways to keep risks to a minimum. One of the risks most difficult to control is that involving the highway or rail transport of hazardous substances used in ore processing. A chemical spill has the potential to devastate aquatic life along many miles of stream under worst-case circumstances (a large volume of a highly toxic substance spilling into a small stream when the ground is frozen). Even though the risk of this kind of

disaster is very small, CMC would have to develop a spill prevention, response and recovery plan acceptable to the Department.

If the Department identifies a risk of destruction of, or even a measurable harm to, the Wolf River system, the mining project would not be permitted.

66.

Q: You mentioned that landfills, etc. are also potential pollution sources - why should we add yet another potential area of pollution?

A: This is a policy question best asked of the legislature. Clearly, the laws governing mining indicate that mining is an acceptable practice in Wisconsin if it can be done while meeting all the requirements of the law. Our current living standards necessitate that additional sources of potential pollution be sited all the time. For example, new landfills, new manufacturing facilities, new gas stations, new dry cleaners, and new mines are all potential sources of pollution.

67.

Q: Given mining's past record, on a scale of 1-10, what is the potential of ecological degradation? Are the economical benefits of this mine going to outweigh the risks of an ecological disaster?

A: If this proposed mine was as unregulated or as loosely regulated as historic mines, the odds would be great that the long-term ecological harm would outweigh the economic benefits. Fortunately, Wisconsin's mining laws have been strengthened, and the scientific tools we are using to evaluate this proposed project are far more useful and accurate than any that have been used in the past. These tools include devices for measuring and mapping groundwater flow, and for analyzing the chemical makeup of ore and tailings. Using these tools, the Department will be able to judge with a high degree of confidence whether or not the proposed mine could meet all the environmental protection standards that apply.

68.

Q: Can the DNR stop the mine if environmental degradation is occurring? Can Tommy Thompson veto that authority?

A: Under the mining law, the Department can issue a stop order, requiring an immediate cessation of mining activities if there is an immediate and substantial threat to public health or the environment. In addition, the Department can avail itself of the standard enforcement procedures which exist to bring the operation into compliance. These actions are provided for in state law and are not subject to gubernatorial approval or veto.

Discharge Location

69.

Q: Where is the discharge to occur? Is there going to be a pipeline built to the Wisconsin River to get rid of any wastewater? Why can't the water be reclaimed and put back into the Wolf River system? Why are they going to pump the wastewater into the Wisconsin River at Hat Rapids and out of the Wolf River basin? Why is it okay to pump the drain off water in the Wisconsin River but not the Wolf?

A: The company's current proposal is to pump the treated wastewater via pipeline to the Hat Rapids Dam on the Wisconsin River, several miles south of Rhinelander. State laws do not allow the Department to dictate where a company will discharge its wastewater. However, the Department is responsible for ensuring that any discharge into any waterway can meet water quality standards. The Wolf River is designated as an Outstanding Resource Water and therefore has higher water quality standards that would apply to a surface water discharge. CMC has decided that it would be more economical to discharge to the Wisconsin River than to try to meet the much higher water quality standards on the Wolf River. If the company can meet the all the environmental requirements to discharge into the Wisconsin River, the Department must issue a permit for that discharge.

70.

Q: Is it technologically possible to treat the water to meet discharge standards to Swamp Creek?

A: Yes. To discharge to the Swamp Creek, wastewater would have to be treated to meet the background water quality of Wolf River. Because the Wolf River is classified as an Outstanding Resource Water, its water may not be lowered in quality. Reverse osmosis or ion exchange are advanced wastewater treatment processes which could potentially achieve the Wolf River background water quality. Advanced treatment would follow the lime and sulfide base treatment which removes the majority of the dissolved metals. The advanced treatment would removal additional metals, plus other pollutants including sulfate. Use of advanced treatment processes would make the treatment system more complex to operate and would generate additional solid wastes needing disposal. See Response #69 for a discussion of why the Department cannot require this option.

Wastewater discharge

71.

Q: What and where is the proposed treatment of wastewater? How will the discharge water be filtered? Will the filter have an overflow bypass?

A: The proposed wastewater treatment system would be located on the mine site. Accumulated wastewater would first be stored in two wastewater storage basins, each with a capacity of 1.73 million gallons or the volume of one day of wastewater at a maximum flow of 1400 gallons per minute. Wastewater would be processed by two parallel treatment units, each with a 600 gallon per minute capacity. The treatment processes for the removal of

dissolved metals consist of lime precipitation, sedimentation of the metal hydroxides in a clarifier, sulfide precipitation for additional metals removal, filtration through sand filters to remove suspended solids, and pH adjustment. Any overflows or discharges of untreated wastewater into the effluent pipeline would not be permitted. The tailings ponds would provide reserve wastewater storage for times when the capacity of the wastewater treatment system is exceeded. See also Response #72.

72.

Q: **How many gallons per day will be pumped out? What happens to this 1-2 million gallons of water used each day - where is all this water cleaned or stored? The comment was made that the wastewater would not go to the Wisconsin River until it passes discharge standards. Doesn't the preliminary engineering report for wastewater treatment facilities allow Crandon Mining Company to apply to the DNR to discharge a buildup of contaminants to the Wisconsin River if their recycled water significantly interferes with the ore recovery process and this interference cannot be treated?**

A: The average volume of mine drainage water that would be pumped to the wastewater treatment system is estimated at 571 gallons per minute or 822 thousand gallons per day. The maximum volume of wastewater that the treatment system and pipeline capacity could handle would be 1200 gallons per minute as currently proposed. Treated wastewater would be stored temporarily in two effluent holding ponds, each with a capacity of 1.73 million gallons (the volume of one day of wastewater at a maximum discharge rate of 1200 gallons per minute). Before discharging to the Wisconsin River pipeline, the effluent would be monitored for compliance. If the effluent quality doesn't meet permit limits it would be returned to the treatment system or to the tailings ponds. Wastewater at volumes exceeding the capacity of the treatment system, could be diverted to the tailings ponds, be used as makeup water in the mill, or in extreme circumstances the mine could be flooded.

The wastewater being treated would consist primarily of mine drainage water, which is the groundwater seepage into the mine that is contaminated by the ore and mining activities. Process water from the mill would be processed in a closed loop, and wouldn't be routed to the wastewater treatment system. Exceptions are provided for in the mining regulations when the process water may be discharged, but only after treatment. Process water may be routed to the wastewater treatment system if there is excessive precipitation that exceeds the capacity of the tailings ponds, or if there is a buildup of contaminants in the process water which requires replacement with new makeup water. For the process water to be discharged, it still must always meet permit effluent limits for a discharge from the wastewater treatment system. The direct discharge of process water isn't allowed. See also Response #71.

73.

Q: **How is it possible to remove dissolved heavy metals from water?**

A: Depending on the conditions, the chemical form of a metal can change from a solid to a dissolved state. Some dissolved metals are present in the mine drainage water in an ionic state, similar to salt being dissolved in water. For example, under acidic conditions, zinc sulfide can partially dissolve in water, becoming Zn^{+2} (zinc), and S^{-2} (sulfide).

When the pH is raised to basic (non-acidic) conditions (by adding a base such as lime) and chemical reagents are added, the solubility of the metal is reduced and it precipitates out as a solid. A typical treatment process uses lime (calcium hydroxide) and sodium sulfide in

successive steps to precipitate out metal hydroxides and metal sulfides. The precipitated metal is then removed through sedimentation or filtration.

74.

Q: You say the discharge pipe water is fairly clean much like Eastern treatment plants tout that their water is drinkable. But, tests have shown that these heavy metals accumulate on the ocean floor and create dead zones. What precautions are being taken to ensure this does not happen where the effluent settles in places like Lake Alice? The Hat Rapids discharge pipe is nine miles above Lake Alice. What testing have you done in the Lake Alice area to provide a baseline measurement for pollutants from the pipeline?

A: The Department shares this concern. Like many environmental pollutants, heavy metals attach to particles in the water and can deposit on sediments. Over time, this accumulation can lead to toxicity to aquatic organisms in/on the sediments. Since Lake Alice is the first significant depositional area in the Wisconsin River downstream of the proposed discharge, it warrants careful consideration as a potential depositional zone. Limitations which are placed upon a point source discharge do not directly protect sediments, therefore data needs to be collected to insure that concentrations of pollutants do not increase appreciably in Lake Alice sediments. The Department has been collecting sediment data for many pollutants of concern which the Company has proposed to discharge. Along with water monitoring, sediment monitoring will continue to characterize sediment concentrations at many locations in the vicinity of the proposed discharge. If discharge begins, we will be able to determine whether sediment concentrations are changing. If significant changes were detected, CMC could be required to adjust the wastewater discharge and/or mitigate (see Response #9) the polluted sediment.

75.

Q: What are the likely levels of organics and soluble metals in the wastewater? What would the temperature be?

A: Because of the length of the pipeline, water being pumped to the Wisconsin River would likely be in the pipeline for approximately 2½ days. The pipeline would generally be buried about 4½ feet below the surface. Therefore, the temperature of the water when released at Hat Rapids Dam should be approximately that of groundwater - which can vary between 40 degrees in the winter and 60 degrees in the summer.

The Department has information about the potential levels of organics and soluble metals in the wastewater. These numbers are from treatability studies conducted by CMC to evaluate treatment processes and optimum treatment conditions. Synthetic wastewater was generated from actual rock, ore, tailings, and groundwater from the mine site. This wastewater was treated in bench scale (using large beakers as treatment vessels) pilot tests at the Foth & Van Dyke (consultants for CMC) laboratory, where the effectiveness of various treatment processes was evaluated. The effluent was analyzed to characterize the expected discharge quality. Bench scale tests can accurately simulate full scale processes. The following effluent sample from the bench scale treatability pilot study was collected on April 26, 1995. (DNR split sample analysis done by the State Lab of Hygiene.) Since the proposed treatment process might be adjusted prior to any permits being issued, these numbers may be subject to change:

Expected Quality of the Treated Wastewater (Preliminary Figures)

PARAMETER	BACKGROUND AT HAT RAPIDS DAM
Total Solids	1,430 mg/L
COD*	17 mg/L
Hardness	830 mg/L
Alkalinity	14 mg/L
pH	7.14 su
Conductivity	1600 µmhos/cm
Ammonia N	804 µg/L
Nitrate N	217 µg/L
Tot. Kjeldahl N	1000 µg/L
Chloride	41,000 µg/L
Fluoride	210 µg/L
Phosphorus	26 µg/L
Boron	46 µg/L
Cyanide	<10 µg/L
Aluminum	61.7 µg/L
Antimony	<2 µg/L
Arsenic	0.3 µg/L
Barium	150 µg/L
Beryllium	0.005 µg/L
Cadmium	0.03 µg/L
Calcium	190,000 µg/L
Chromium	0.38 µg/L
Copper	5.7 µg/L
Iron	50 µg/L
Lead	0.016 µg/L
Magnesium	87,000 µg/L
Manganese	4.7 µg/L
Mercury	.04 µg/L
Molybdenum	4 µg/L
Nickel	4.9 µg/L
Potassium	14,000 µg/L
Selenium	110 µg/L
Silver	0.024 µg/L
Sodium	51,000 µg/L
Sulfate	900,000 µg/L
Thallium	<1 µg/L
Zinc	2.9 µg/L

* COD stands for chemical oxygen demand. COD is always a larger number than BOD (biochemical oxygen demand). No results were obtained from the BOD analysis due to problems in running the test.

76.

Q: You stated that the wastewater discharge would have to pass bioassay tests to be released. Is this a requirement for all industries or just for mining?

A: Bioassays, or whole effluent toxicity tests, are tests in which fathead minnows (Pimephales promelas) and water fleas (Ceriodaphnia dubia) are submerged in the undiluted effluent. Two types of tests are done - acute and chronic. The acute tests last 96 hours for the minnows and 48 hours for the water fleas. The effluent passes the acute test if the organisms live. The chronic tests last seven days for the minnows and 3 generations for the water fleas. The effluent passes the chronic test if the organisms' growth and reproduction are unaffected.

These tests are not limited to the mining industry. Many surface water dischargers, including both municipal and industrial wastewater treatment systems, are required in their WPDES (Wisconsin Pollution Discharge Elimination System) permit to do whole effluent toxicity testing. Dischargers with little potential for effluent toxicity, such as non-contact cooling water, are not required to do the tests. The Department has developed a scoring system which takes into account a number of criteria such as the quantity of wastewater, industrial category, potential for presence of toxic substances, and the classification of the receiving water, to help determine when whole effluent toxicity testing is appropriate. Based on the score, acute and or chronic tests may be required at a frequency relative to the potential for toxicity.

77.

Q: Isn't it true that copper sulfides even in very small amounts are lethal to fish? When you said that the water was clean but not drinkable are you saying that you can drink a strong acid and have no harmful effects?

A: Copper is toxic to fish and other aquatic life in relatively low concentrations. Concentrations which cause death to aquatic life can be in the range of 10 to 100 micrograms of copper per liter of water (parts per billion). CMC must comply with the applicable water standard for copper and other pollutants in the Wisconsin River in order to protect fish and aquatic life from toxicity. The only way in which the drinkability of the water would be an issue is if the Wisconsin River is classified as a public drinking water supply, which means that the waterbody serves as a drinking water source for humans. The Wisconsin River does not serve as a source of drinking water for humans, so is not classified as a public drinking water supply. The company must also comply with water quality standards intended to protect humans from cancer and non-cancer effects from exposure to a chemical in water (drinking or recreational contact) or food (fish consumption), and also with water quality standards to protect wildlife from toxicity. We are not suggesting one can drink an acid. The surface water discharge would have its pH adjusted to near neutral before discharge.

78.

Q: Why will the pipeline only be double encased at Swamp Creek, the Wolf River and Mud Creek? What about smaller streams, including those in the Wisconsin River Watershed? Has a damage control plan been established for a severed pipeline, etc.?

A: Where the pipeline would cross streams designated as Outstanding Resource Waters, a double encased pipe is proposed to provide extra protection against leaks. The

Department doesn't require the double lining of effluent pipelines. Prior to being placed into operation the pipeline will be pressure and leak tested. When in operation, effluent flow in the pipeline would be monitored at three locations: at the mill where it's pumped into the pipeline, at the booster station near the midpoint of the pipeline, and at the point of discharge to the Hat Rapids Dam. Flow monitoring would provide continuous leak detection, and any discrepancies in flows must be investigated. If leaks are detected the pipeline would be shut down until they are repaired. A break or leak from the pipeline would likely not be environmentally significant because the effluent would meet the water quality standards of most receiving waters.

79.

Q: Over what right of way will the pipeline travel?

A: The route of the proposed pipeline would be as follows: along the plant site access road to STH 55, then north to CTH S. It would continue north along CTH S to USR 8. Proceeding west along USR 8 to Rhinelander, it would then turn south to follow STH 17 to Hat Rapids Road. From Hat Rapids Road the pipeline would go to the river, then turn north and follow the river to Hat Rapids Dam. The entire length of the pipeline would be 38.3 miles. With the exception of the route along the river, the entire pipeline would fall inside existing federal, state, county, or town right-of-way. Along the Wisconsin River, the pipeline would be located on Wisconsin Public Service Corporation property.

Wolf River Effects

80.

Q: How will mining affect the wildlife of the Wolf River? Wouldn't the tailings management area be like a ticking time bomb at the headwaters of the Wolf? How long would the effects last?

A: With appropriate surface water mitigation of the drawdown, the existing regulations ensure that there would be no impact to public rights. Therefore, the fish, wildlife, and vegetation of the Wolf should be unaffected. The waste from this proposed mine is chemically reactive when exposed to oxygen (or other oxidizing compounds) in the presence of water. The key to safe and stable management is to isolate the material from the surrounding environment to the maximum possible extent and to limit the ability of water and oxygen to come into contact with the wastes. The tailings facility, if properly designed, constructed, operated, and closed can be a stable repository for the potentially chemically reactive waste from this proposed mining operation.

Endangered Species

81.

Q: Has an environmental impact statement been addressed for flora and fauna that are on the endangered species list within this area?

TMA location

57.

Q: Is it necessary to put this basin on 23 acres of wetlands?

A: State mining regulations acknowledge a difference between mining and other industries. Since ore bodies are immobile, any mining facilities must be located somewhere in proximity to the ore body. In other words, the location of mining facilities in relation to an ore body is not flexible. State rules (s. NR 132.06), Wis. Admin. Code) require that wetlands be avoided, if at all possible. If damage to wetlands cannot be avoided, then it must be kept to a minimum. The Department must verify this by reviewing the process the applicant used to select a proposed mill location and tailings disposal site.

The TMA proposed at the Crandon site was initially located with the goal of minimizing direct wetland impacts. Department staff later directed that its location be moved somewhat in order to minimize disruption of rainfall runoff to an uncommon wetland ("Bur Oak Swamp") down-slope of the TMA. Those citizens who have studied maps of the site have likely noticed that, just as with northern Wisconsin as a whole, the area is wealthy in wetlands. Attempting to avoid them all would require a less stable design that would be far more difficult to monitor, thus such a TMA site could threaten far more than the 23 acres of wetland that would be destroyed by the proposed TMA construction.

58.

Q: Why can't the tailings management area be located a distance away from the Wolf River watershed or the tailings shipped out altogether?

A: Shipment of the ore without milling and concentrating to a refinery (as done at the Flambeau Mine at Ladysmith) has not been considered at this proposed facility because the ore grade is not high enough to support a direct shipment operation. The transport of the tailings and waste rock to a more distant location was considered during the initial TMA siting process. Approximately 35 sites were considered within about a twelve mile radius of the mine. In most cases these sites were mapped, drilled, and sampled to determine geological and environmental characteristics, potential waste volume holding capacity and construction feasibility. None of these sites were found to have significant advantages over the location finally selected.

Based on Department experience with other regulated facilities, the further away a disposal site is from the waste generation site, the harder it is to manage, operate, and maintain the disposal site. Some of the environmental costs associated with long distance tailings and waste rock transport include additional fuel consumption, the physical damage that results from haul road and pipeline construction including wetland and river crossings, and the associated road noise, dust, exhaust, and potential for spills. In order to balance these environmental costs plus the economic costs, one would have to show that a more distant site has characteristics that are a significant improvement over the nearby sites.

be described as a copper mine, when the stringer ore would be mined. During this phase, zinc concentrates would provide the second greatest source of value, while lead, silver, and gold would provide relatively smaller levels of revenue. Zinc in the massive ore and copper in the stringer ore would provide approximately 70% of the gross ore value depending on future metal prices. See also Response #54.

Payment for Costs Incurred

86.

Q: Will the state receive any money from the Exxon Company? Who is paying for all the studies and work that the DNR has performed on this project since 1994? How much money is the DNR going to get out of this through permits?

A: Should the Crandon project be approved, constructed and operated, it would have to annually file a net proceeds tax form with the Department of Revenue. This tax is a mining profits tax. Our EIS will contain estimates of how much tax could be received, based on a variety of minerals prices, throughout the project operations.

CMC must pay the State of Wisconsin for all costs associated with preparation of our environmental impact statement and for reviewing the permit applications. We will not know this amount until the process has been completed, although it could be several million dollars.

Meeting Format

87.

Q: Why can't we ask questions verbally like normal humans?

A: The Department appreciates feedback on the formats of these meetings. Many opinions have been gathered regarding people's preferred formats during these meetings. These opinions have helped guide the Department in choosing formats such as the one at the New London meeting.

The chosen format for this meeting was to write questions on cards which would then be read by a moderator and answered by the panel. The Department realizes that there are both benefits and drawbacks to this approach. The benefits include having a record of the exact question asked - this is especially useful to both the Department and to the questioner when answer summaries such as this one are prepared. Other benefits include that everyone has an equal chance of getting a question in, regardless of where they are sitting or how good they are at drawing attention to themselves. People that might not otherwise feel comfortable asking a question in a large group session have the benefit of anonymity. The biggest drawback seems to be that a follow-up question can't generally be asked directly. However, it is always possible to submit another card with a follow-up question. Also, during the New London meeting, follow-up questions were entertained from the audience. At future meetings we will try to ensure an opportunity for the audience to ask verbal questions.

88.

Q: Why isn't Exxon at this meeting, and also when and where will they hold their meetings?

A: The Crandon Mining Company was not expressly invited to participate in this public meeting. However, all public meetings such as this one are open meetings for all interests to attend. Therefore, CMC representatives have the right to attend if they wish.

The Department is not familiar with CMC's meeting schedule, so it would be best to ask them this question directly. Their address is: Crandon Mining Company, 7 North Brown Street, 3rd Floor, Rhinelander, WI 54501-3161.

Weather

89.

Q: Are there weather conditions that play a part in the review?

A: Climatic factors, especially wind direction & velocity, and temperature ranges, are being considered in the Department's impact analysis. Wind influences the concentration and flow of dust particles and machine exhaust. Temperature plays a role in evaluating the proposed depth of pipelines, and the durability of such things as the TMA liner and cover materials.