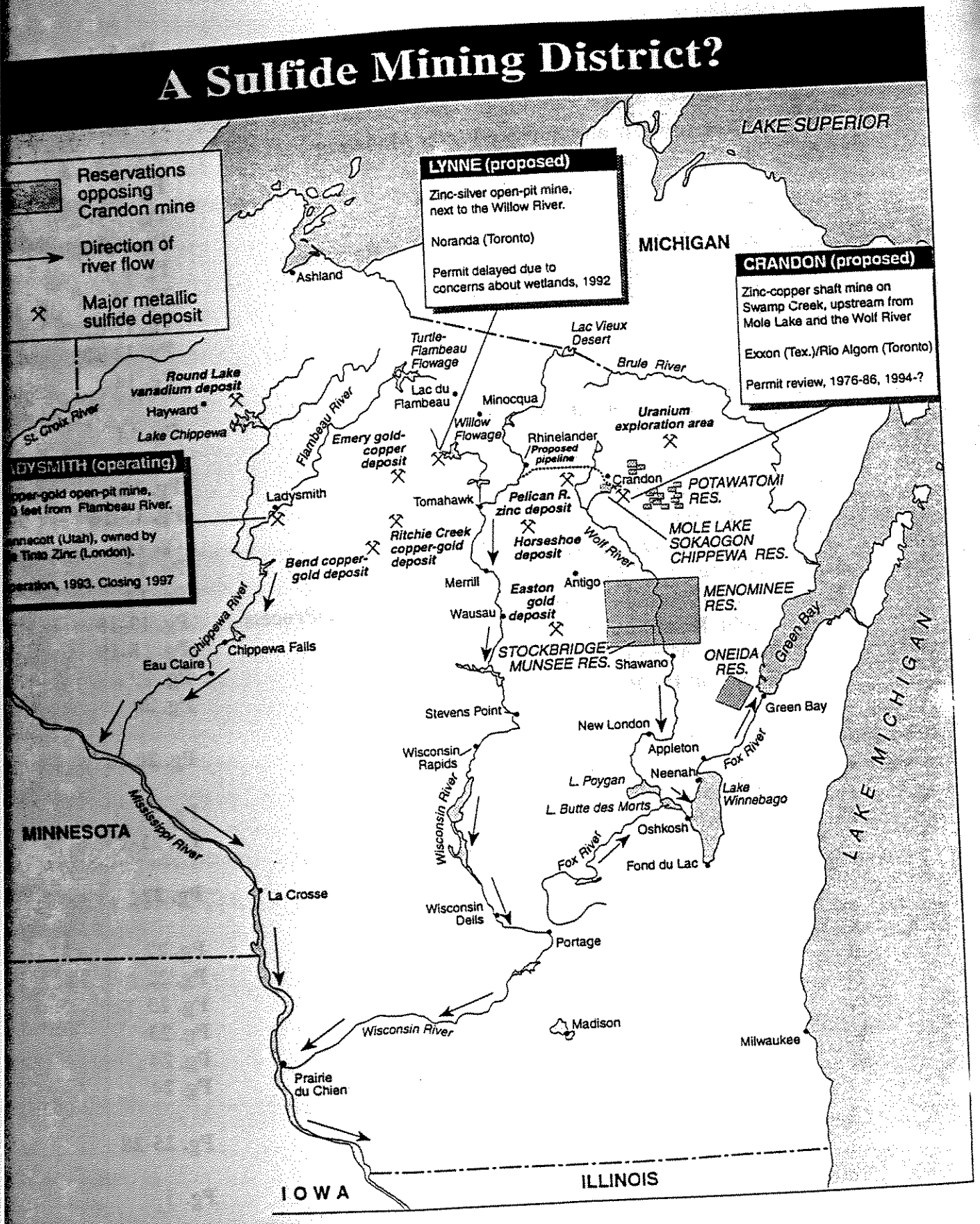
pt 73

WISCONSIN'S DECISION FOR ETERNITY:

A CLOSER LOOK AT THE PROPOSED CRANDON MINE AND ITS POTENTIAL ENVIRONMENTAL IMPACTS

Future Site of Rio Algom/Exxon's Crandon Mining Company Legacy to Wisconsin:
44,000,000 (Million) Tons of Waste To Be Stored Here Forever

A Sulfide Mining District?



Overview

Crandon Mining Company (CMC), a wholly owned subsidiary of Exxon and Rio Algom, wants to extract 55 million tons of zinc, copper, lead, silver and gold from a sulfide ore body located in the Town of Nashville, in Forest County. The proposed operation would generate approximately 44 million tons of tailings, crushed rock and water treatment sludge. Half of the waste will be backfilled into the mine itself WITHOUT any liners or other control technologies, while the other half will be permanently stored in an aboveground tailings landfill covering 365 acres and reaching 90 feet in thickness. The proposed mine site would be situated in the Wolf River watershed at the headwaters of the mighty Wolf River. The Wolf River is a 223 mile long pristine river designated by the State of Wisconsin as an Outstanding Resource Water and is the State's largest whitewater trout stream.

The River begins as a small stream in Northeastern Wisconsin about 25 miles south of the Michigan border, gathers volume at Pine Lake and flows southerly to Lake Winnebago. The river flows through Post Lake and borders the Nicolet National Forest before passing into the Menominee Indian Reservation. That portion of the Wolf River, which traverses the entire width of the Menominee Indian Reservation (approximately 27 river miles), is designated as a National Wild and Scenic River.

The Menominee people's use of the Wolf River from Post Lake to Lake Winnebago is documented in prehistoric, ethnographic and historic sources and that segment of the river which passes through the Menominee reservation has been occupied by the Menominee for 8000 years. The Wolf River has been and continues to be a highly significant social, cultural and economic feature of the Menominee reservation. Historically, the Wolf River has provided the necessary resources for Menominee habitation and subsistence activities, as well as providing a transportation corridor for the movement and settlement of people, the fur trade, logging and now recreational activities. The Menominee people have been born, have lived and have died along the banks of the Wolf River since the time of their creation, and their identity is inseparable from the legends, sites and resources of the river[1].

Exxon originally announced its mineral find at the Crandon deposit in 1976. The company filed its first mine permit application in 1981, which was later withdrawn in 1986. In 1992, Exxon returned to Wisconsin with partner Phelps Dodge. However, Phelps Dodge later withdrew from its partnership with Exxon. In November 1993, Exxon along with its new partner Rio Algom, formed the wholly owned Crandon Mining Company. In 1994, the company resubmitted an application to mine the Crandon mineral deposit. Since Exxon's original application was submitted, several highly questionable circumstances and events have plagued the mine permitting process and the intensity has imposed enormous burdens on the citizens and resources of Wisconsin. On-going objections and doubts raised about key technical, political, legal and socioeconomic components of the project have caused widespread apprehension about the State's ability to objectively and effectively assess the proposed mine.

The Wisconsin Department of Natural Resources and the Army Corps of Engineers have in essence, been reviewing the proposed Crandon Mine project for eight years (cumulatively), since the original application was submitted in 1981. Rather than working on one comprehensive environmental impact statement, the DNR and Army Corps of Engineers are each developing

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[1] "Traditional Cultural Properties Inventory", Menominee Historic Preservation Office, Menominee Indian Tribe of Wisconsin, 1997.

separate documents. Despite such a lengthy timeframe, Crandon Mining Company has not been able to adequately predict the environmental impacts of its proposed mine and waste facility, to the satisfaction of state or federal regulators, the scientific community or the citizens of Wisconsin.

The technology chosen by CMC to extract minerals from deep within the earth and to pump the water out of the underground mine, is not new. Neither is its ability to transport the ore by rail, although the shipment of 8,000-13,000 tons of chemicals and fuels to the mine site annually does pose threats to communities throughout Wisconsin. However, there are several key components of the Crandon Mine Project, which have not been adequately addressed and which are the focus of this paper.

(1) it is unclear exactly what effect mine dewatering will have on the highly complex Wolf River watershed, as the underground mine pulls water out of the Wolf River basin for several square miles;

(2) the technology, to be used to permanently contain the mine waste above ground, from air and water, has not been proven for an extended time period, numerous cases exist which document the leakage of liners, failure of the top cover has not been modeled and 22 million tons of mine waste will be backfilled into the mine without any liners or other control technologies;

(3) existing mine regulations are being manipulated, revised and changed to accommodate the needs of Crandon Mining Company, while at the same time, the permitting process is being influenced by a pro-mining Governor and his administration.

The number of unanswered questions and the level of inconsistencies involved in the Crandon Mine project's data, models and predictions, have put ALL citizens of Wisconsin in a precarious situation. To date, neither State nor Federal regulators have been able to adequately or correctly determine the effects of the proposed mine on the public's health, safety, water rights or environment. Instead, after eight years of review and taxpayers' resources, regulators continue to struggle with data that is dangerously lacking in technical stability, subject to chance and unknown conditions and in many instances based upon uncertain or unproven premises. Yet, Crandon Mining Company is only one of many corporations, who are stalking Wisconsin's mineral resources. In 1996 alone, some "twenty-one (21) acquired lands prospecting permits for hardrock ore bodies"[2] were in effect in the State of Wisconsin, covering over 7,441 acres of Wisconsin lands. As a consequence, the future of Wisconsin's environmental quality may hinge on the precedents set by the Crandon Mine project. Currently, Wisconsin's economy is strong and growing by way of its tourism and recreation industry. Is Wisconsin willing to sacrifice its environment for short term economics? The decisions made today are surely "Wisconsin's Decision for Eternity".

[2]U.S. Department of the Interior. Bureau of Land Management. "Public Land Statistics". 1996

I. Technical Areas: Introduction

The Wolf River watershed is a highly complex system of lakes, streams, springs and wetlands and from the standpoint of the groundwater and overall topography of the area, an Exxon engineer admitted, "you couldn't find a more difficult place in the world to mine"[3].

The impact of mine dewatering on groundwater and surface water, in such a complex watershed, is still unknown. The model used by CMC to predict impacts has been found to contain numerous inconsistencies, inadequate sampling methods and conceptual discrepancies regarding the interpretation of the aquifer system. As such, the Wisconsin Department of Natural Resources and the Army Corps of Engineers have continually been forced to delay the permitting process. The redundant system of liners and a top cap, proposed by CMC to permanently contain the mine waste from air and water, has not been proven effective for an extended period of time and the company has refused to predict what will occur if the top cap fails or disintegrates. To complicate matters further, the tool used to predict the movement of contaminants in the groundwater is an unproven science, while the input values are uncertain and essentially unverifiable. Contaminant transport modeling can only be conducted after an acceptable groundwater model is complete.

A. Groundwater and Surface Water Modeling

Mine dewatering is the process which removes the water (from the overlying glacial aquifer) that enters the underground mine workings. Groundwater modeling is used to predict the impact of the dewatering; to predict changes to the groundwater system from mine pumping; to predict the amount of water that would need to be pumped to maintain proper working conditions; to predict changes to surface waters (lakes, streams and wetlands) in response to drawdown; to predict potential contaminant movement; and to provide an additional tool for monitoring during site operation. The importance of the groundwater model in the permitting process is of primary importance. The model is the tool used to predict the mine's impacts in regards to drawdown and also as the foundation in the contaminant transport analysis.

The first redflag in this area relates to CMC's inability to accurately predict the impacts that mine dewatering will have on surface waters and groundwater surrounding the mine site. CMC used the numerical computer program MODFLOW, which is a saturated groundwater flow model used to simulate water flow in an aquifer. The model simplifies the natural system into a series of mathematical equations and requires extensive input data that cannot be verified exactly, but are instead assigned a hypothetical reasonable range. The model requires hydraulic conductivity values in three dimensions, two horizontal and one vertical. Hydraulic conductivity is a soil property that represents the ability of a fluid (water) to move through a porous media (soil). The number of soil parameters (numerical values assigned to different types of soil) and hydrologic input (rainfall, evaporation, streamflow, recharge etc.) which is fed into the model is staggering.

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[3]Van Goethem, Larry. "Exxon Mine Will Feature Elaborate Waste Water Plan". Milwaukee Journal. March 28, 1982.

In a recent nationwide survey of all State Departments of Natural Resources/Environmental Quality, the Menominee Tribe found only six (6) States that used MODFLOW in their mine permitting process. Of the six States, one-half used MODFLOW to simulate water flow for surface mines only; two used it only in the case of evaluating coal mines only; while the remaining State did not use it for active mines. In the two States that indicated they had permitted deep shaft sulfide mines in their States, neither used MODFLOW to simulate water flow[4].

CMC's MODFLOW model was evaluated for its usefulness by the Wisconsin DNR, the US Geological Survey and WGNHS. DNR has suggested extensive revisions to the model[5], in response to a document prepared by Dunning (USGS) and Johnson (WDNR) in which the following critiques were made:

> *"Numerous inconsistencies in the model input made review difficult. In particular the input was not consistent throughout the model, and in places, was not consistent with the flow model narrative. Resolving the identified inconsistencies between the input data and the EIR could have an effect on the model's results and predictions. It was impractical to verify model input values for every cell and layer, so this review began by looking at model input data for approximately 175 cells."*[6]

CMC submitted its first numerical groundwater flow model in September of 1995. Two years after the original model was submitted, the DNR is giving CMC yet another opportunity to create a useable product. Not only is the mining company being given another chance, but the State of Wisconsin is supplying the technical expertise for model development and review. The model can never be viewed as "fatally flawed" by the WDNR because the agency is bound by regulations that do not consider this situation. The WDNR is only allowed to suggest improvements to the modeling effort. There is no limit on the number of alterations the model can undergo, nor is there a set time limit for model verification and completion.

As of October 1997, the groundwater model continues to be plagued with numerous problems while major conceptual discrepancies linger between CMC and the reviewers of the model. Specifically the glacial stratigraphy (geologists interpretation of the aquifer system) is in the process of revision, along with the area being simulated. This is essentially the starting point in model construction and layer development. It is undoubtedly the most time consuming aspect of modeling. WDNR staff and CMC are planning to review individual bore logs to resolve the disagreement between glacial stratigraphic interpretations. The Army Corps of Engineers has recently drilled more bore holes in the mine site area to acquire more accurate data. According to Dunning and Johnson:

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[4]Menominee Indian Tribe of Wisconsin. Treaty Rights & Mining Impacts Office. "Survey of States' Environmental Agencies Use of Modflow for Groundwater Modeling Related to Deep Shaft Sulfide Mining". September 9, 1997.

[5]Carlson, Bureau of Waste Management, Wisconsin Department of Natural Resources, Letter to Crandon Mining Company, "Subject: Review Comments on CMC Groundwater Flow Model, Dated August 1996: Model Input-Unconsolidated Glacial Geology", August 15, 1997

[6]Dunning and Johnson, "Verification of Model Input Data Representing Unconsolidated Glacial Deposits in the Crandon Mining Company's Groundwater Flow Model", U.S. Geological Survey-Water Resources Division, August 1, 1997

> *"The reconstruction of selected cross sections illustrates how a glacial stratigraphic framework will change the interpretation of geology in the vicinity of the proposed Crandon mine. From this review it is clear that a significant portion of the model area might be affected by a revised glacial stratigraphic interpretation. A revised interpretation of glacial stratigraphy would undoubtedly lead to different model layer configurations. It is also important to keep in mind that most of the existing data was NOT collected for the purpose of defining the glacial stratigraphy.[7]"*

Furthermore, according to a statement made by Dr. John W. Attig-Professor with the University of Wisconsin Extension's Geological and Natural History Survey:

> *"As noted by Dunning and others, the evaluation of the glacial material at the proposed Crandon Mine site is based on data that was collected for purposes other than a planned Pleistocene stratigraphic research effort. Using such data it is not surprising that some key stratigraphic relationships may not be fully documented.[8]*

The Army Corps of Engineers is also in the process of creating a groundwater model, which was originally to be completed by November 1997. They are using a finite element, saturated and unsaturated groundwater flow, contaminant transport model known as FEMWATER. This model is able to represent glacial stratigraphy in much greater detail than MODFLOW. The original scope of work, which the Army Corps. supplied to its contractor, Waterways Experiment Station (WES), was to develop a model using approximately the same model constraints and boundary conditions as the CMC model. However, this process would in effect result in nothing more than an evaluation of CMC's results, using an alternative numerical program. Therefore, due to criticisms by interested parties, the ACOE is reevaluating their initial scope of work to include the prediction of mine inflow and to expand the model extents to include lakes that may be effected by the mine. The results of ACOE's model will be verified by the United States Environmental Protection Agency's (USEPA) surface water model.

The USEPA surface water model Hydrologic Simulation Program-Fortran (HSPF) is going to be used to evaluate the processes of erosion, runoff, snowmelt, evaporation, interception and flow of water that will result in the construction of the mine and mine waste site. This program will be able to supply essential information regarding the effects of the mine on surface water quality and quantity, as well as subsequent changes to plant, animal and aquatic communities. Crandon Mining Company's model is not capable of doing so.

> *"Given the potential seriousness of the possibilities of mining impacts on such a geologically and hydrologically complex area, the modeling provides an examination of the entire hydrologic cycle with an emphasis on surface waters as thorough as the ground water flow, but which CMC's Environmental Impact Report provides unintegrated and insufficient data. EPA believes that the data currently available regarding the potential effects to the watersheds and ecosystems surrounding the mine are lacking certain information on aquatic habitats, hydrologic integrity and areas of hydrologic vulnerability. Since all*

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[7]Dunning, Johnson and Batten, "Review of Stratigraphy of Glacial Sediments in the Vicinity of the Proposed Crandon Mine." June 30, 1997.

[8]Attig, Dr. John W., University of Wisconsin-Extension, Wisconsin Geological and Natural History Survey, Correspondence to Christopher Carlson, Wisconsin Department of Natural Resources, July 3, 1997.

the aquatic resources in the Upper Wolf Watershed are designated as fully usable, the potential of any permanent damage to those designations must be considered significant due to the rarity of such undeveloped watersheds. Information gained through this model will be used to add, confirm and/or refute data regarding a potential irrevocable loss of an already threatened ecosystem by the project."[9]

Conclusion

As of December 1997, there is still no acceptable saturated groundwater model developed for the Crandon Mine Project. There has not been verification of any saturated and unsaturated groundwater model or surface water model as of this time, which is not surprising given the glacial history and complexity of the Wolf River Basin aquifer. The lack of long term, accurate hydrological data in the proximity of the mine is also a stumbling block on the modeling efforts.

Because CMC has been unable to produce a useful groundwater model, the Environmental Impact Statement/Report timelines, developed by State and Federal agencies, have experienced continual delays. The technical review of CMC's groundwater model has taken over two years and the modeling process is essentially starting over. Review of the contaminant transport model, which requires the use of a completed groundwater flow model, will be even more complicated and time consuming. To complicate matters further, contaminant transport modeling is a relatively new, unproven science with many unknowns.

With so many unanswered questions, the prospect of approving CMC's project at the headwaters of the Wolf River remains uncertain. Until the true impacts of the mine project can be predicted with a strong sense of scientific accuracy, the controversy over "safe" mining will remain heated and the stakes will remain high. In the words of George Meyer, head of the WDNR:

"Our decisions on the proposed Crandon Mining Company mine will be among the most significant ones we will make this decade, not only in terms of natural resources issues, but also because this project has received so much attention from so many sources."[10] Truly, Wisconsin's decisions for eternity.

B. Design Management Zone

1. Tailings Management Area (TMA)

The tailings management area (TMA), proposed by Crandon Mining Company, to permanently store its mine waste will be the largest solid waste management facility in the State of Wisconsin. CMC plans to store half of its waste (approximately 22,400,000 tons of zinc, copper and lead tailings) in a ninety foot high containment area equal to the size of 330 footballs fields. These tailings have been calculated to contain approximately 53% or 23.7 billion pounds of pyrite. The volume of the tailings, to be stored in the tailings management area will equal 17,110,000 cubic yards of waste--enough to fill 33,000 silos, each 70 feet high and 16 feet in diameter. The remaining waste (approximately 22 million tons) will be backfilled into the mine

[9] "U.S. EPA Position Paper Regarding the Need for a Hydrologic and Hydraulic Model to Evaluate the Potential Impacts to the Upper Wolf River Watershed, the Swamp Creek Watershed and Pickerel Creek Watershed Due to the Proposed Crandon Mine Project" Revised May 13, 1997

[10] Meyer, George. Secretary of the Wisconsin Department of Natural Resources. July 21, 1997.

without any liners or other control technologies, although half of the backfilled waste will be mixed with portland cement for structural purposes.

High sulfate concentrations, as well as low pH conditions can result in streams that are fed by drainage from abandoned mines and other exploited mineral-bearing deposits. The sulfide minerals present are oxidized, through a combination of bacterial and chemical action, to produce sulfuric acid. Not only does the sulfate content increase in streams to which mine drainage discharges, but the lowered pH and high iron content produce added harm to water quality. "With pyrite present, almost every type of heavy metal contaminant may be present in acid drainage from metal mine operations. Fe(III) and H+ in the groundwater increases the rate of the chemical reaction which breaks up base metal sulfides, to such an extent that they become important constituents in metal mine drainage. Contaminants such as lead, cadmium and arsenic are harmful at concentrations far lower than manganese; while iron, zinc and copper are harmful to aquatic life at concentrations far less than drinking water standards. For example, in a wetland, trace elements such as copper and mercury may kill plants long before the pH level, iron or manganese would be harmful."[11]

Crandon Mining Company claims it will be able to keep its above ground mine waste from damaging the environment, through the use of a redundant system of liners and a top cap. The TMA cover proposed to contain the waste will only be a few feet thick. As a result, tree roots could grow through and burrowing animals could penetrate the plastic cover, thus ruining its integrity. The design of the tailings management area itself is still under review and contaminant transport modeling cannot be conducted until the groundwater flow model is complete. Residual metals and chemical wastes backfilled into the abandoned mine, may also pose a threat to the regional groundwater system.

2. Contaminant Transport

Contaminant transport is a tool used to predict the movement of contaminants in the groundwater. The model is supposed to predict the concentration, direction and time of contaminant travel. This is a recently developed tool, with an unproven track record. The contaminant transport model requires input from a source term model and a groundwater flow model.

The source term model used by Crandon Mining Company is called the HELP model (Hydrologic Evaluation of Landfill Performance). This model is supposed to predict the influx of contaminants into the transport model. CMC proposed to have the bottom liner of the tailings management area deteriorate after 150 years, but **refused to consider any deterioration of the top cover system**. The reason for this conceptual discrepancy--between the top cover never deteriorating and the bottom liner completely deteriorating--is to minimize the source term for the contaminant transport model. The top cover is the most critical aspect of the entire aboveground waste site and by not modeling deterioration of the cover itself, CMC has essentially eliminated the possibility of fluids (water) entering the system or fluid (contaminants or leachate) leaving the system. The only parameter used to simulate a manufacturing flaw in

[11]Sengupta, M. "Environmental Impacts of Mining: Monitoring, Restoration and Control". Lewis Publishers.
p 405. 1993.

the top 0.06" thick geomembrane liner is 1 pin hole per acre. The HELP model is limited to simulate only a 100 year scenario and is incapable of simulating deterioration or disintegration of components (e.g. geomembranes) in the calculation process.

The number of parameters that are required as input in the transport model is considerably more complex than groundwater models, while input values are even more uncertain and virtually unverifiable. Contaminant transport models are based on the results of groundwater flow simulations. If the groundwater model is not extremely accurate, the results of the transport model will magnify such errors.

In regard to the 22 million tons of waste that will backfilled into the mine, the groundwater which will flood the mine may help extinguish acid production, but there is still the issue of residual metals left in the wastes due to the inefficient milling/beneficiation cycle, plus any chemical process wastes and residuals such as cyanide, sulfuric acid and various chemical reagents. Any substance of concern showing up in the TMA is potentially a problem in the abandoned mine. The groundwater flow through the abandoned mine and wastes will transmit contaminants into the regional groundwater flow system, since the same flow paths transmitting water into the mine, will likely move contaminants out. This practice, of backfilling wastes underground, is illegal for any other industry, except mining.

3. 1200' Design Management Zone and 150' Mandatory Intervention Boundary

The WDNR is attempting to convince the public "that mining operations are subject to the same groundwater rules as other types of facilities around the state."[12] However, certain existing mining regulations and proposed new revisions do not support such a statement. For example, in a revised draft of changes to NR182, Section 3. NR182.075(1) is repealed and recreated to read: "(b) Design Management Zones. 1. The horizontal distance to the boundary of the design management zone for mining waste facilities shall be 1,200 feet from the outer edge of the facility"[13]. The design management zone (DMZ) or allowable pollution zone (APZ)--formally referred to as a compliance boundary-- is the area surrounding the mine or mine waste disposal site that allows contaminants to exceed groundwater standards. Wastewater disposal lagoons are allowed a 250 foot compliance boundary, new solid waste landfills are allowed 150 feet and the compliance boundary set for toxic waste sites is 0 feet.

The decision by the DNR to allow mining companies a 1200' Design Management Zone (DMZ) exemplifies the leniency by which the DNR favors the mining industry and illustrates the department's disregard for public concern on this critical issue. The Metallic Mining Council (MMC), the majority of whose members lack the technical aptitude to fully understand groundwater and contaminant transport modeling, was emphatic about the need for a 1200' DMZ. Despite the obvious lack of technical knowledge in areas of contaminant transport modeling the council was willing to defend the 1200' DMZ based on the future analysis of predictive contaminant transport modeling. The time required for water to travel from the edge

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[12]Meeting Between WDNR and the Menominee Treaty Rights & Mining Impacts Office: Discussion Regarding Proposed Revisions to Chapter NR 182.

[13]Lynch, Larry. "Revised Draft of the Changes to NR182". Wisconsin Department of Natural Resources. October 29, 1997.

of the facility to the boundary of the DMZ is on the order of 30 to 40 years. It will take 30 or more years for contaminants to reach the limits of the DMZ if they move with the groundwater.

On December 3, 1997 the Wisconsin Natural Resources Board adopted order SW 21 97 (B) revision to Chapter NR182, Wis. Adm. Code. This action created a 150' mandatory intervention boundary. The Mandatory Intervention Boundary is in reality a location where monitoring wells will be placed and **does not mandate** implementation of active **groundwater remediation**. In essence, this action does nothing new to protect the groundwater, since the monitoring locations for the TMA would have been required despite the addition of the Mandatory Intervention Boundary. As is the case regarding the 1200' DMZ, it will take years (7-15) for contaminants to reach 150' and the mandatory intervention boundary does not require remediation (cleanup) at that distance. The following comment 96 and response 96 are taken directly from the June 4, 1997 CMC letter from Don Moe to Larry Lynch of the DNR.

"Comment 96: Section 7.1.1.2, page 233. Monitoring locations along the compliance boundary will need to be established in addition to those within the boundary. Further, additional groundwater monitoring points will need to be established immediately adjacent to and/or directly beneath the facility. Wells to monitor groundwater beneath the facility could be installed through interior berms or could be angle-drilled from the perimeter of the facility.

Response 96:
a) CMC will evaluate the merits of a combination of redistributing the proposed wells and adding additional wells. The results will be included in the planned future Mine Permit Application update

b) CMC's detailed assessment of devices and systems available for monitoring liner performance has concluded that a leak location survey will provide the highest level of confidence regarding system integrity (see Response 94b above). Monitoring wells adjacent to or beneath the TMA, or lysimeters generally prove to be ineffective. The proposed monitoring points coupled with the leak location survey provides more than reasonable environmental safeguards. **CMC believes that additional monitoring beneath the TMA or around its perimeter will not provide data that can be effectively interpreted."**

It is clearly illustrated from the above comment that close monitoring of the facility was requested by the DNR however CMC did not believe that it was warranted. Now instead of monitoring adjacent to and beneath the facility, the regulations will mandate monitoring at a 150' mandatory intervention boundary and the company will avoid monitoring adjacent to and beneath the facility since it is not required to by regulation.

Groundwater remediation is only required when environmental standards are exceeded at the 1200' DMZ and natural attenuation is an acceptable response. This is illustrated by the following comment taken from page 26, November 20, 1997 letter from George E. Meyer to the Natural Resources Board.

"Section 15 NR 182.08(2)(e)9. is amended to read:

<u>If it is expected, with reasonable certainty, that a preventive action limit will be exceeded beyond the design management zone, the applicant shall request an exemption under s. NR 140.28 and</u>

182.19 which shall include an assessment of why it is not technically and economically feasible to achieve the preventive action limit."

Additional evidence supporting CMC's reliance on natural attenuation to treat groundwater is taken from comment 33 on pages 37 and 38, December 22, 1997 letter from Ben Wopat (ACOE) to Don Moe (CMC).

"USCOE Comment 33. TERTIARY CONTROL ALTERNATIVES. Provide a more thorough description of tertiary controls that would be installed, if needed, and the feasibility of the tertiary controls (discussed under Section 10.5 of the TMA report). What would instigate the installation of tertiary controls?

CMC Response 33:

...The use of tertiary controls would be instigated if groundwater monitoring indicated that there might be an exceedance at the facility's compliance boundary... Tertiary controls would be implemented to prevent exceedances at the compliance boundary.

The tertiary control for collection, should the groundwater be impacted by the facility, would be the installation of a series of groundwater recovery wells between the facility and the compliance boundary. The location, spacing, depth, size, etc., of the wells would be determined by using the existing groundwater data for the impacted area. Groundwater would be pumped from these recovery wells at a rate necessary to prevent further migration of water to the compliance boundary. Each well would be connected via a header pipe flowing to the selected treatment system. Groundwater pumping and treating would continue until the concentrations are within the limits defined by the permit conditions.

Tertiary treatment controls, discussed in Section 10.5 of the Feasibility Report, include passive and active treatment systems. An example of a passive treatment system would be a wetland into which impacted groundwater is pumped and natural processes result in the amelioration of the effluent water quality. Ameliorization of water quality in a wetland occurs as a result of a combination of natural processes..."

In addition to the distance of the design management zone and the mandatory intervention boundary, recent proposed revisions to Chapter NR182 (as well as elements proposed to be retained) favor the mining industry and result in regulatory loopholes by: (1) creating conflicting language in the regulations covering groundwater quality; (2) allowing an exemption from compliance with preventive action limits, if it is not technically and economically feasible to maintain compliance; (3) overlooking ambiguous language in the requirements for predictive modeling and groundwater monitoring (the language lacks a formal or structured method for evaluating and implementing an extensive groundwater network and does not require mines to apply a comprehensive monitoring network adjacent to and beneath the waste facility-ONLY along the mandatory intervention boundary).

Conclusion

Several concerns exist in regard to the design management zone associated with the proposed Crandon Mine project. This mine waste will be stored in Wisconsin for eternity and:

- the presence of bacteria in the soils surrounding the mine site can increase-- by one million times--the natural reaction which produces sulfuric acid.
- deterioration of the top cover has not been simulated and no cover alternatives have been considered.
- a drainage layer between synthetic liners should be used so primary liner failure can be detected early.
- it will take roughly 7-15 years for contaminants to be detectable along the Mandatory Intervention Boundary (150 feet away from the tailings management area). The Mandatory Intervention Boundary requires monitoring, but does not require remediation.
- the mine waste, to be backfilled into the abandoned mine, may contain residual metals and chemicals which could be transmitted into the regional groundwater flow system.
- wind erosion and deposition modeling has not been performed to assess the impact of wind eroded tailings particles (as the tailings surface will be bare and dried prior to covering).
- the stability and integrity of the TMA structure, liners and top cap may be compromised in a variety of ways: poor quality control during manufacturing of liner sheets can cause a liner to be too thin in places and too thick in others, foreign matter and moisture can produce tiny pinholes in the sheets, liners can be punctured, torn, damaged or contaminated during shipment and storage, liner sheets can be damaged during installation, particularly at the seams which are sealed by a chemical or heat process on-site, seams can be faulty if the liner is installed during weather that is too hot or too cold, burrowing animals may penetrate the liners or cap, tailings material may slide or shift causing damage to the liners, natural occurrences such as flood, freezing and thawing can compromise the system stability, and root growth of vegetation may penetrate the membranes.

C. Other Water Related Issues

1. Mitigation of Surface Waters

"The primary goal of surface water mitigation is to protect public rights to lakes, springs and streams in the area of proposed groundwater drawdown. The guiding principle of surface water mitigation should be the preservation of the existing hydrologic and ecologic systems. In addition, mitigation should attempt to minimize additional pumping of groundwater to provide mitigation water. Mitigation alternatives that use available clean intercepted mine inflow water first and treated wastewater, where viable, second are preferable to limit groundwater drawdown and interbasin transfer."[14] The quality (chemical composition and temperature) of mitigation water is also critical in the surface water mitigation plan and the selection of appropriate trigger organisms (plant/critter) need to be finalized.

[14]Conceptual Framework for Development of the Crandon Mine Surface Water Mitigation Plan. April 1997.

the case of the proposed Crandon Mine, the mine site is situated in an extremely sensitive cological area. "The water quality problem of CMC mitigation water revolves around the oncept of base metal enrichment in the form of carbonates, especially in regard to the very soft vater lakes closest to the zone of potential drawdown resulting from mine dewatering."[15]

On August 21, 1997 the WDNR and Crandon Mining Company held a technical meeting at the DNR's Regional Headquarters in Rhinelander to discuss the surface water mitigation plan for the proposed mine project. "Due to an oversight on the DNR's part, interested parties were not notified of the meeting. At the meeting, the DNR presented a summary of the approach that would be taken to establish discharge limits for mitigation water in response to CMC's concern about how the DNR would treat discharges to tributaries of an Outstanding Resource Water"[16] (namely the Wolf River). The following excerpts are from the DNR's conceptual discharge standards approach:

- in regard to what effluent limits would apply to a tributary to the Wolf River, "the discharge must not result in a detectable increase in substances of concern in the Wolf River, **BY THE TIME THE DISCHARGE REACHES THE WOLF**. The discharge doesn't necessarily have to equal ambient water quality in the Wolf at the point of discharge and the effluent limit **MAY CONSIDER DILUTION** in the tributary".
- in regard to what effluent limits would apply to a wetland discharge, "wetlands in the project area could be considered areas of special natural resource interest because of the proximity to the Wolf River. According to s. NR 104.02(5), Wis. Adm. Code and s. NR 207.03(5)(a)1 and 2, Wis. Adm. Code, effluent criteria for upstream discharges are based upon the most critical downstream classification. If the wetland doesn't directly drain to another surface water and is only connected to groundwater, the discharge limits would be the groundwater preventive action limits". However, ch. NR 140.02(3) **provides an exemption from preventative action limits, if it is not technically and economically feasible to achieve or maintain compliance**.
- in regard to unmitigated impacts, ONLY those impacts that the DNR thinks can't be mitigated will be considered in the draft EIS. If the DNR identifies an impact that they believe can be mitigated, they will identify no impact. If the DNR identifies any significant impact, they will request CMC to mitigate it, and once mitigated the DNR will determine that there is no impact. In other words, the **DNR's premise is that there will be no significant impact due to the mine--as long as all the impacts can be mitigated**.

2. Inter-Basin Water Transfer

In February 1997, the Menominee Nation, the Sierra Club, National Wildlife Federation, Wisconsin Wildlife Federation, Great Lakes United and other organizations asked various Great Lakes state governors to consider whether the Water Resources Development Act (WRDA) should apply to CMC's proposed pipeline, due to the apparent transfer of Great Lakes waters into the Mississippi river watershed. Two major concerns that prompted the request were: the question of whether WRDA should apply to only surface water and not to withdrawals of

[15]Howlett, George Jr. Menominee Environmental Services Department. "Correspondence to Christopher P. Carlson-Wisconsin Department of Natural Resources". June 2, 1997.

[16]Carlson, Christopher P. Wisconsin Department of Natural Resources. Bureau of Waste Management. "Correspondence to Surface Water Mitigation Interested Parties: Subject-Summary of Technical Meeting on Surface Water Mitigation for the Proposed Crandon Mine". August 22, 1997.

groundwater, as proposed by CMC, and whether--if WRDA were not to apply--approval of CMC's request would set an important precedent that might allow new requests for Great Lakes groundwater from entities outside the region. Great Lakes governors thus far, have chosen not to challenge the DNR's interpretation of WRDA and allow the state of Wisconsin and the Army Corps of Engineers to wield authority over the applicability of WRDA to the proposed pipeline. There remains a great regional concern over the precedent set by this controversial interpretation.

WRDA prohibits diversions of ANY AMOUNT of water from the Great Lakes without prior approval from the governors of all the eight Great Lakes states. However, the Army Corps of Engineers has interpreted this law to apply only to surface water diversions. In a letter from Valdas V. Adamkus (EPA) to Colonel Wonsik (Army Corps.):

> *"the USEPA believes that the U.S. Army Corps of Engineers, as the project's lead Federal agency, is the appropriate agency to determine WRDA's applicability to the Crandon Mine Project. However, assuming that the WRDA water diversion issue can be resolved, USEPA would like to encourage the USCOE to carefully consider the potential environmental impacts of the proposed diversion. Section 1109(a)(3) of WRDA states that any new diversions of Great Lakes water for use outside of the Great Lakes basin will have significant economic and environmental impacts, adversely affecting the use of the resource by the Great Lakes States and Canadian provinces. USEPA believes that* ***any diversion of any waters -- surface water or groundwater -- from the Great Lakes Basin must be closely scrutinized*** *to determine whether it will have environmental impacts that will adversely affect the use of the Great Lakes' water resources. Therefore, USEPA encourages the USCOE to ensure that the Federal Environmental Impact statement fully addresses the concerns regarding potential environmental impacts of the proposed diversion in the immediate project area and in the portion of the Great Lakes Basin and that these concerns be thoroughly analyzed and properly mitigated, if necessary. CMC's environmental impact report makes it clear that the groundwater and surface water in the project area are connected in numerous locations, such that the pumping of groundwater will be taking water out of the surface water systems."*[17]

In Wisconsin, interbasin diversions are regulated under s. 144.026 of Wisconsin Statutes and Chapter NR 142 of the Wis. Adm. Code. Diversions more than 5 million gallons per day out of a Great Lakes basin requires an application and approval of the Great Lakes states and Canada. A person proposing to divert Great Lakes water is required to obtain a permit from the DNR only if the diversion exceeds 2 million gallons per day. Wisconsin's statute which regulates inter-basin transfers of water does not distinguish between surface and groundwater. However, the State Legislature specifically stated that no such transfer, be it of surface or groundwater, requires a permit from the state unless the transfer exceeds 2 million gallons per day.

The WDNR's preliminary calculation on the amount of water loss from the inter-basin transfer for the Crandon Mine project is less than the two million gallons per day threshold. Thus, the DNR believes that CMC needs only to register the withdrawal with the Department and report the volume and rate of withdrawal. Although CMC proposes to divert 886,000 gallons per day, **the volume of water to be diverted cannot be verified until an acceptable groundwater model is available**.

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[17] Adamkus, Valdas, V. U.S. Environmental Protection Agency. Correspondence to Col. Wonsik. U.S. Army Corps of Engineers.

3. B.O.D. Reallocation

Chapter NR 212, specifies how biochemical oxygen demand (BOD) discharge--which results from the decay of organic material--is to be allocated among dischargers on the Wisconsin River. The Wisconsin River is prone to dissolved oxygen concentrations (DO) falling below the minimum value of 5 mg/l during low flow periods and existing point source discharges claim they have difficulty maintaining standards during these periods. A dissolved oxygen concentration below 5 ppm indicates the amount of oxygen depleting BOD entering the river (from permitted dischargers and from non-point sources), should be changed and a decrease in the total amount of BOD being discharged to the river will be necessary. To address this concern, the DNR must first determine how much the river can absorb and naturally degrade without harming fish and wildlife. Then they must determine how that total capacity will be allocated to industries, municipalities, non-point sources and other demands. CMC's proposed pipeline to the Wisconsin River, will likely add to the problem of too much BOD in the river. Currently, the DNR has established a Segment A Waste Load Allocation Advisory Committee. The Advisory Committee is made up of representatives from (5) local municipalities, (2) private organizations, (1) Indian Tribe and (4) companies including Don Moe, the Technical/Permitting Manager for Crandon Mining Company.

I. Political Areas: Introduction

In May 1976, Exxon announced the discovery of one of the world's largest and richest zinc-copper deposits immediately adjacent to the Sokaogon Chippewa reservation at Mole Lake, Wisconsin. Since the 1970s, multinational mining companies such as Exxon, RTZ, Kennecott, Rio Algom and BHP have leased the mineral rights to over 300,000 acres of land in northern Wisconsin for exploration and prospecting[18]. In order to get permits to conduct metallic sulfide mining in northern Wisconsin, Exxon and other multinationals initiated a campaign to:

- weaken State laws regulating mining
- gain control of the State Legislature
- disempower the DNR
- remove the Public Intervenor
- eliminate citizen control of local governments
- abrogate/neutralize Wisconsin Indian treaty rights
- gain control of the state media
- create a business climate favorable to mining; and
- increase public acceptance of mining.

By 1997, the mining industry had accomplished most of its objectives. Wisconsin laws regulating mining had been weakened to the point that no state agency could provide proof that Wisconsin's mining laws are the "toughest" in the country as claimed by Governor Thompson in 1996. Funding for the Public Intervenor had been eliminated from the budget. The DNR was completely politicized with the Secretary being made an appointee of the Governor. Mining companies were allowed to make local agreements with local governments against the wishes of the majority of its voters. Tribal sovereignty over their resources is being challenged in court

[18]Gedicks, Al. The New Resource Wars: Native and Environmental Struggles Against Multinational Corporations. Boston, MA: South End Press. 1993

while the Governor attempts to force Tribes to trade treaty rights/sovereignty for gaming rights. The mining industry dominates Governor Thompson's policies regarding transportation, commerce and economic development, education and the environment.

Faced with the relentless assault of the mining industry on the state's environment and $6 billion tourist industry, by the end of 1995 citizens across Wisconsin had united into a broad-based statewide coalition of environmental groups, sport fishing and hunting groups, Native American tribes, churches and local governments opposed to sulfide mining and Exxon/CMC's proposed Wolf River mine.

A. Pro-mining Administration

Governor Tommy Thompson's campaign manager and first Secretary of Administration was James Klauser, former Exxon Lobbyist and former attorney/mining consultant for promining Wisconsin Manufacturers and Commerce, who stated in 1982 that "by the year 2000, Wisconsin could have 10 metal mines operating.[19]

Governor Thompson has, in the name of economic progress, pursued mining with a goal of making it one of the state's principal industries[20].

Since mining companies viewed Native American treaty rights and gaming income to be an obstacle to getting their permits, the industry worked to increase prejudice against Native Americans, negate treaty rights, and prevent tribes from developing their own air and water quality standards.

Throughout the spearfishing controversy in 1987-1991, the Governor and his Secretary simultaneously pursued a pro-mining, anti-treaty agenda[21]. Governor Thompson and his Secretary met with representatives of Anti-Indian groups, PARR (Protect America's Rights & Resources) and STA (Stop Treaty Abuse), which were both members of CERA (Citizens Equal Rights Alliance) a national Anti-Treaty organization. In 1988, CERA participated with anti-environment/wise use organizations in a national Multiple Use Strategy Conference in Reno, NV called in response to efforts to reform the 1872 mining law.[22]

B. Weakening of Laws Regulating Mining

For over 20 years, Wisconsin's Executive leadership, former Governor Tony Earl and current Governor Tommy Thompson, have supported and promoted legislation to weaken state laws regulating mining. Since its passage in 1978, the mining industry has demanded and received dozens of modifications to any state mining code that hinders mining development.[23]

During that time, powerful lobbying organizations, paid by multinational mining companies such as Wisconsin Association of Manufacturers and Commerce, and wise use/anti-environmental and

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[19] Seely, Ron. "Mining Has Strong Potential in Wisconsin." Wisconsin State Journal. January 31, 1982.

[20] Gedicks, Al. Resource Wars. 1993

[21] Whaley, Rick and Bresette, Walter. Walleye Warriors: An Effective Alliance Against Racism and for the Earth. Philadelphia, PA: New Society Publishers. 1994

[22] Gedicks, Al. Resource Wars. 1993

[23] Kewley, M.J. "Wisconsin Mining Laws: How Tough They Aren't". City Pages. 1996. July 7, 1996

anti-Indian organizations who support Governor Thompson's pro-mining agenda have made campaign contributions and used their political influence to pressure state Legislators to weaken state laws regulating mining.[24]

The Governor's Ad Hoc Task Force on Mining helped pass the Local Agreement Law, drafted by a Kennecott lawyer, without public debate or legislative scrutiny, which circumvents local mining moratoriums or bans, and allows mining companies to negotiate directly with business committees set up by local units of government.[25]

Beginning in 1981, the mining industry succeeded in changing the environmentally protective mining regulations which the industry viewed as expensive obstructions to getting their permits and as a result, the State of Wisconsin:

- dropped its non-degradation of water standard
- allowed mining companies an exception from clean groundwater standards
- allowed foreign companies to invest in state corporations; and
- passed local agreement law overriding local communities mining ordinances[26].

Governor Thompson used the biannual budget process not only to pass into law, the Local Agreement law--without any Legislative debate or citizen input[27], but to eliminate funding for the Public Intervenor[28], politicize the DNR by making the DNR Secretary an appointee of the Governor[29], and to repeal the Badger Fund.[30] However, the Metallic Mining Council, largely comprised of pro-mining and mining industry representatives, continues to receive State funding for the upcoming fiscal year.

C. Politicization of DNR

Governor Thompson controls the DNR which has increasingly demonstrated a promining bias. These promining forces in state Legislature have worked with the DNR to progressively weaken Wisconsin mining laws[31]. For example, the DNR has:

(1) used sanguine assumptions and predictions about the capability of unproven technologies to successfully prevent pollution.
(2) in some cases been party to the weakening of important water quality laws.
(3) failed to disclose the potential impacts of mining plans in the environmental review process.
(4) been excessively lenient to CMC in its response to numerous errors and inconsistencies in CMC's groundwater flow model.
(5) not actively promoted public involvement in the environmental review process (e.g. the August 21, 1997 Water Mitigation Meeting. Only the DNR and CMC were involved).

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[24] Wisconsin's Environmental Decade. Fool's Wisdom: An Analysis of the Anti-Conservation Movement in the Midwest. Madison, WI. Wisconsin's Environmental Decade Institute. pp. 27-39. 1996.

[25] Whaley, Rick. Walleye Warriors

[26] "Wisconsin Mining Laws". Letter to from Menominee Nation to State Officials. July 10, 1997.

[27] Gedicks, Al. Resource Wars. Ibid p. 99.

[28] Culhane, Ed. "Process Loses Public Intervenor." Dec. 3, 1995. Appleton Post-Crescent.

[29] ECCOLA. A Question of Bias? The Wisconsin Department of Natural Resources' Record on Metallic Mining Issues. Minocqua, WI. 1996.

[30] Douglas La Follette, Secretary of State, Press Release "LaFollette, Badger Board Raid", September 20, 1995.

[31] ECCOLA. 1996.

1. Natural Resources Board and DNR

Since 1980, the Natural Resources Board has consistently pursued a promining agenda. Despite overwhelming public opposition, the Board rewrote groundwater rules in 1982 to allow mining companies to contaminate groundwater to federal maximum contaminant levels for drinking water as specified in the Safe Drinking Water Act. This occurred at the same time Board members--who were appointed by Governor Thompson--consistently blocked designation of the Wolf River as an Outstanding Resource Water, until the massive citizen/tribal campaign overcame the opposition.[32]

The DNR has consistently chosen to interpret the laws regulating mining in a way that benefits mining corporations.[33] For example, on the trust fund issue the DNR plans to assess dollar amounts on a case-by-case basis, rather than using the trust fund as a tool to establish a process to be followed in the event of an accidents.

One memo from Crandon Mining Company to the DNR confirms DNR staff working with CMC on a public relations campaign. CMC's summary memo to Exxon/Rio Algom documents authorization by Exxon/Rio Algom for a million dollar public relations campaign.[34]

D. Elimination of Public Intervenor

Elimination of the Public Intervenor was one of the goals of Wisconsin Association of Manufacturers and Commerce (WMC).[35] After the Wisconsin Mining Association was formed in January 1995 to promote mining by Wisconsin Manufacturer's & Commerce Association goals, Governor Thompson's 1995 budget proposal deleted funding for the Public Intervenor.[36]

E. Local Agreement Law Bypasses Democratic Processes

Local Agreement law was instrumental in getting Ladysmith's Flambeau mine permitted.[37]

In Nashville, members of the Town Board met more than a dozen times from November 1993 to November 1996 in closed session, against the wishes of local citizens, to develop a local agreement with Crandon Mining Company.[38] Despite open records requests by local citizens, members of the former Nashville Town Board refused to provide any information pertaining to the negotiations and local agreement with CMC.[39] After three years of negotiation, virtually in

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[32] Gedicks, Al. Resource Wars. Ibid. 79.

[33] ECCOLA. Ibid.

[34] Theo, Peter. Memo Regarding Discussions with Maryann Sumi. Wisconsin Department of Natural Resources. Aug. 13, 1995.

[35] Vukelich, George. "Paper Trail: Thompson's Moves Can be Traced to 10-Year-Old Memo." Isthmus. May 12, 1995.

[36] Seely, Ron. "Public Intervenor Praised: Citizen's Blast Thompson's Plan to Ax Office." Wisconsin State Journal. Feb. 28, 1995. np.

[37] Gedicks, Al. Update. p. 6.

[38] Ibid.

[39] Gedicks, Al. Update. Ibid.

secret, the Town of Nashville released its proposed Local Agreement on November 13, 1996.[40]

The Local Agreement would (1) exempt CMC from all town zoning ordinances, regulations and laws (2) limit the powers of local government and courts to directly or indirectly prohibit mining, and (3) give CMC final approval for disposal of all wastes with their proposed Wolf River Mine.[41]

On December 7, 1996, over 350 town residents gathered in a Special Town Meeting to express their opinion on the draft Local Agreement. The Town Chairman declared the meeting illegal and shut it down before it started.[42] The Town Board ignored the recommendation of their state Representative Lorraine Seratti, who urged the board not to sign the agreement until the scientific impact studies for the mine were completed. On December 12, 1996 the Forest County Board and the Town Board of Nashville each signed Local Agreements with CMC, in meetings which occurred at the same time in two different locations. Impacted citizens living in the Town of Nashville and Forest County were unable to be present at both meeting.[43]

Kevin Lyons and Cook and Franke, the legal firm responsible for preparation and research of the Local Agreement, billed over $350,000 in legal fees to the Town of Nashville. However, the legal fees not only included billings for preparation of the local agreement, they also included billings for research of Wisconsin Indian Tribes and citizen groups opposed to the proposed mine.[44] The firm researched Menominee and Chippewa treaty rights, as well as air and water quality standards, which were to be approved by EPA. This activity was ineligible for funding from the Mining Investment and Local Impact Fund Board (which receives its revenues from a portion of the net proceeds taxes collected from the Flambeau Mine and created to, among other things, help municipalities pay for the cost of developing local agreements). As a consequence, the large legal bill was left for the Town of Nashville's taxpayers and newly elected Town Board to deal with.

F. Public Relations Campaign

Exxon/Rio Algom and their wholly owned subsidiary, Crandon Mining Company, pursue a public relations campaign rather than pursuing state of the art technology. Exxon/Rio Algom spent at least one million dollars on ads in statewide newspapers and on radio and television ads across the state. Exxon/CMC authorized its public relations staff to "spend whatever it takes to defeat the Mining Moratorium Bill".

Exxon/Rio Algom and other peer multinationals have supported/support state Legislators, WMC & other business lobbying organizations, anti-environment "wise-use"[45] & anti-Indian groups to promote mining & weaken legislation regarding mining.[46]

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[40] Ibid.

[41] Ibid.

[42] Ibid.

[43] Seratti, Lorraine. "Comments on Local Agreement". The Forest Republican. December 11, 1996.

[44] Imrie, Robert. "Mining Charges Raise Questions." Wisconsin State Journal. September 14, 1996.

[45] Gallon, Alby. "Digging in: Business Group Seeks to Kill Mining Bill." The Business Journal. Aug. 1, 1997. p. 1+.

[46] Whaley, Rick and Walter Bresette. Walleye Warriors: An Effective Alliance Against Racism and for the

Wood Communications, the advertising firm which did Exxon/CMC's public relations campaign, was one of the main sponsors and coordinators of the "We the People" television/radio series. Wood Communications worked with the Wisconsin State Journal, Wisconsin Public Television and Wisconsin Public Radio on the "We the People" broadcasts. At least one of the "We the People" broadcasts focused on the Exxon/CMC issue. Questions arise since, during the past two years, the editors of the Wisconsin State Journal published numerous editorials strongly biased toward Exxon/CMC. News reporters for Wisconsin Public Radio have been unable to get airtime to broadcast segments of the public hearings about the Mining Moratorium Bill.

G. Metallic Mining Council

On April 7, 1997 Governor Thompson issued an Executive Order (#309), creating the Wisconsin Science Advisory Council on Metallic Mining. The purpose of the Council is to identify technologies that are effective in preventing or eliminating environmental degradation from metallic ore mining; review proposed metallic ore mining in this state and determine the effectiveness and feasibility of implementing technologies to reduce or eliminate environmental impacts; formulate and submit recommendations to the Secretary of the Department of Natural Resources concerning the existence of technology that will ensure compliance with state groundwater and surface water statutes and confirm that any proposed metallic ore mining operation would utilize these technologies.

The Secretary of the DNR appointed five members to the Council, the majority of which are mining industry representatives. Crandon Mining Company has a particular interest in this Council, as the following excerpt from a letter to the Wisconsin DNR attests:

> *"Crandon Mining Company fully supports the Department's (DNR) statements that there must be clearly identified and focused objectives for this Council. CMC is available to work with the Department or the Council to facilitate their review. As the Department implements the provisions of the Executive Order, CMC DOES NOT TAKE EXCEPTION TO THE DEPARTMENT RECOVERING THE COST OF THE COUNCIL'S WORK under the Crandon Project EIS process, provided that these charges are directly related to technology that is proposed for use on our project."*[47]

Members of the Metallic Mining Council include:

Rodney Harrill	Crandon Mining Company
Thomas Myatt	Kennecott Mining
James Buchen	Wisconsin Manufacturers & Commerce
Dr. Douglas Cherkauer	
Richard Chier	
Susan Courter	Michels Materials
Erhard Huettl	Forest County Board of Supervisors
Donald Moore	Great Lakes Inter-Tribal Council
Dr. James Robertson	Wisconsin Geological & Natural History Survey

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Earth. Philadelphia, PA: New Society Publishers, 1994.

[47]Moe, Don. Crandon Mining Company. Letter to William Tans. Wisconsin Department of Natural Resources. June 16, 1997.

H. Repeal of the Badger Fund

The Badger Fund was created in 1977 and was to be funded through a portion of the net proceeds tax collected on metallic mineral mining. In 1994, the Flambeau Mining Company began paying net proceeds tax on its open pit mining operation in Ladysmith and a portion of the taxes were allocated to the Badger Fund. In June of 1997, the Badger Fund was repealed and the estimated $5-$7 million in the fund went to the general pool of state budget money. Rather than serving its intended purpose—to offset the impacts of mining on communities—the money instead went into State coffers. Essentially, the monies in the Badger Fund ended up being a contribution from mining companies, to the State of Wisconsin.

III. Socioeconomic Areas: Introduction

The economic contributions of the proposed Crandon Mine project, as predicted by CMC include: the creation of 400 full-time jobs with an average salary of $34,500; payment of $29-$233 to the State of Wisconsin in net proceeds taxes over the life of the project; and the generation of $3-$4 million in increased state and county sales taxes, $22-$28 million in workers' state income taxes, and $7-$65 million in state income taxes paid by CMC.

The taxes to be paid by CMC will be smaller when mineral prices are low and labor costs are high. As such, the net proceeds taxes may reach zero in years with relatively low mineral prices and/or high labor costs. For example, in a review by the Wisconsin Department of Revenue, "the effect of metal prices on the mine's net proceeds tax is dramatic. At 100% of CMC's claimed prices, the total tax would be $117.3 million. At 90% of CMC's claimed prices, the total tax falls to $69.3 million and at 80%, the tax falls to $28.4 million. Based on the behavior of metal prices in the last 10 years, we find that the metal prices used by CMC appear to be on the high side for zinc, copper and gold. It should be noted that at CMC's claimed prices, the mine would essentially be operated on a breakeven basis from 2016-2027."[48]

In regard to the benefits associated with the creation of 400 mining jobs, CMC pronounces that they will hire 70% of their required labor force from the local area and that the jobs will last for 28 years. If most of the project's workforce was drawn from existing residents, the impacts of new residents on housing, water, waste water treatment, roads, health, human services and educational systems would be minimized. However, according to a report prepared by Foth & Van Dyke, "in 1992, only 75 people out of the total work force of more than 22,000 were employed in mining. In addition, the proportion of the study area's population between the prime working ages of 15 to 64 is significantly lower than for the state as a whole. This reflects the relatively large number of study area retirees and the out-migration of youth."[49]

With a retiree-dominated population and a relatively low unemployment rate, the area will likely not be able to supply a large number of people with the right mix of skills, age and experience for Crandon Mine's needs. As such, the local hire rate, may be as low as 30% and the DNR may

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[48]Rosner, Ron. Wisconsin Department of Revenue. "Memorandum to Bill Tans, Department of Natural Resources. Subject: Crandon Mine Projected Net Proceeds Tax". February 20, 1997.

[49]Foth and Van Dyke. "Crandon Project Summary: Project Description and Environmental Baseline Data". 1995b.

use a 50% local hire rate, in its analysis of the mine project. If the local hire rate turns out to be less than 70%, the mine-related population impacts could be underestimated by as much as 150 percent."[50]

Job stability related to the mining industry is also of concern. The Flambeau Mine, in Ladysmith, which was expected to operate for eight years, closed four years prematurely. In 1992, one year prior to the mine opening, the unemployment rate was 7.9% in Rusk County. However, by early

1997 as the mine was closing, the unemployment rate rose to 10.2%--the highest unemployment level for the County in a decade. The White Pine Copper Mine in Michigan laid off 1,000 mine workers in 1995 and unemployment in that county soared from 6.6% to 20.2%.

A. Transportation of Ore and Chemical Reagents

CMC will have (20) chemical reagents, fuel, diesel and propane transported to its mine site on a regular basis. According to company projections some 8,000 to 13,000 tons of chemicals and fuels will be transported to the mine site each year. Specific transportation routes, for the chemicals have NOT been made public by Crandon Mining Company. As such, it is difficult to analyze the direct or indirect impacts of a chemical release on any specific Wisconsin community or to calculate the probability of a transportation related chemical spill with any degree of accuracy. Two of the chemicals, sulfur dioxide and calcium oxide will be transported by rail on Wisconsin Central Railroad. Wisconsin Central Railroad's accident rate for 1996 was nearly double that of all other U.S. railroads and 72% greater than all other railroads in its category.

B. Air Quality and Mercury

"DNR staff believe wind erosion is most likely to occur when a tailings management area cell is full to nearly full and is being dried prior to covering. A filled TMA cell would have a bare tailings surface during the settling and consolidation period and impact assessment of wind eroded tailings must be carefully considered. Ecosystem effects would be heavily influenced by deposition patterns and loadings rates, which would in turn be affected by wind speed and direction, type of land/water resources where the deposition occurred and the frequency of wind erosion events. Modeling is a possible tool to analyze the impacts, but problematic. In the opinion of the DNR, the air monitoring plan provided in CMC's Mine Permit Application did not provide sufficient coverage."[51]

According to the Public Service Commission, generating electricity to serve the Crandon project would emit a level of mercury equivalent to that released to power 18,000 homes. A significant majority would enter the pool of atmospheric mercury and a substantial fraction would enter the continental and global circulation patterns. Some increased local and regional deposition of mercury would occur, but estimating the proportions would be highly speculative.

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[50]Goerold, Thomas W., Ph.D. Lookout Mountain Analysis. "A Critique of Existing Socioeconomic Impact Reports Evaluating the Proposed Crandon Zinc-Copper Mine, Wisconsin". April 2, 1997.

[51]Jepsen, Ed. Bureau of Air Management. Wisconsin Department of Natural Resources. Correspondence to Christine Hansen. Forest County Potawatomi Tribe. May 6, 1997.

Mercury is extremely bio-accumulative and becomes more concentrated in each step of the food chain. Animals near the top of the food chain, such as certain fish and eagles, are more susceptible to mercury. Since wildlife that eat fish are the most sensitive to the bioaccumulation of mercury, CMC's proposed discharge must meet 1.3 parts per trillion. However, "the mercury analysis sampling techniques conducted by CMC may not have met generally accepted clean methods and the possibility exists that the samples were contaminated with mercury. If so, existing background mercury levels would be overestimated and detecting any changes in background conditions due to mining would not be feasible."[52]

IV. Legal Areas: Introduction

Governor Thompson, the Wisconsin Department of Natural Resources and State Legislators were formally requested, by the Menominee Tribe, to provide citations for studies showing how Wisconsin's regulations are the "toughest" in the country. Not one response containing such citations were received by the Menominee Nation as of the publication of this report.

In terms of "Wisconsin's tough mining laws", regulations regarding the permitting, operation, monitoring, remediation and mitigation of mines/mine sites have been continually weakened, through a series of waivers, exemptions, variances and revisions since 1981. Although most of the changes in and reinterpretations of mine regulations, have favored the mining industry, public comments to the Wisconsin DNR have recommended a regulation change which would safeguard public interests. The regulation under scrutiny deals with the compliance boundary or design management zone, mentioned in the technical section. Under existing rules, the distance is set at 1,200 feet for mines/mine waste facilities. The citizens of Wisconsin are recommending that the distance be changed to 150 feet or less, to ensure that mine facilities are regulated as stringently as all other industries in the State. Despite public comment, a final decision by the DNR has not yet been made.

The following list documents the on-going changes being made in Wisconsin's so-called, "tough mining laws".

A. Regulation of Mining Corporations

ss710.02
Removes limits on foreign ownership of Wisconsin land for mineral/oil exploration and development.

B. Permitting

ss144.838-839
Local Agreement Law overrides elected town authority by empowering unelected "Local Impact Committees" to negotiate contracts and exemptions to local zoning ordinances.

ss144.836(4)(c)
Limits the opportunity for public testimony by combining the Permit NR 182.09(1) Application and Environmental Impact Statement Process

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[52]Ibid.

SB240
Exempts mining company environmental track records from consideration in permit process. Civil penalties and environmental permit violations outside Wisconsin may not be examined or considered.

NR103.06(3)
Exempts mining companies from wetlands alteration standards, pursuant to NR 131 & NR 132 (rules for prospecting and mining).

ss70.375
Abolishes the per ton mineral severance tax, establishes net proceeds tax. Based on profits, there are no guarantees of tax revenue even if millions of tons of ore are removed. Amended, in 1983, increasing deductions and further lowering tax rates

C. Operation/Monitoring

NR182.075
Exempts mining company from all groundwater pollution standards on the site. Only the compliance boundary is required to meet groundwater rules. Mining company is unregulated within its boundary.

NR182.02(10 & (11)
Exempts any backfilled mine from virtually all siting criteria, inspection and monitoring requirements, certified lab testing, record keeping and minimum design and operation standards. The process of backfilling waste underground is illegal for any other industry.

ss144.83
State laws controlling groundwater standards say only that DNR makes rules. In 1982 DNR approved new groundwater maximum contaminate levels, eliminating former policy of non-degradation.

Chapter 160.19(12)
Exempts mining companies from the law controlling groundwater standards.

NR 132.06(4)(d)
Allows use of wetlands for disposal and storage of mining waste, if mine is shown to be viable. As used in this section "viable" is defined as technically and economically feasible.

D. Remediation/Mitigation

ss144.855
Requires local municipalities to supply water to any owner of a well that has been contaminated or gone dry from mining. Until the mining company is proven responsible, taxpayers will pay for it.

E. Exemptions & Variances

ss144.83(4)(j)
Permits DNR to waive most laws and provide variances for mining.

NR182.19 & NR132.19

When fish kills occur, operations may continue while company and DNR investigates the problem.

Mining Disclosure Law does not require mining corporations to publish lease purchases, reveal value of minerals being leased; state can keep results of drilling activity confidential for 13 years.

F. What's Missing from Wisconsin Laws Regulating Mining

Nothing in Wisconsin Statutes to require applicants for mining permits to produce concise Environmental Impact Reports. For example, under the National Environmental Protection Act (NEPA) CFR 1500.4 "Agencies shall reduce excessive paperwork by ...preparing analytic rather than encyclopedic environmental impact statements."

Mining is the only industry in Wisconsin that can store its wastes underground and leaves the State with no ability to monitor/regulate hazardous/nuclear waste stored in backfilled mines.

Citizens may participate in the permitting process but state & federal laws do not provide ordinary citizens a means for halting the process. Multinational mining corporations have virtually unlimited funds to drag permitting processes out indefinitely, draining citizen financial, mental, and emotional resources. Citizens must invest their own time and money for years to fight what they perceive to be a dangerous threat to their lives, property and livelihoods. Citizens' only means to halt the permitting process is to elect officials who they can trust to follow constituent's wishes and make changes in the law or pursue costly legal actions.

V. Chronology

1954	Mining companies observed conducting mineral exploration by helicopter.
	Menominee Termination begins.
1970	Kennecott announces finding Ladysmith deposit.
1973	Menominee Restoration begins.
1974	State passes first mining reclamation law.
1976	In DNR hearing re adequacy of EIS for Ladysmith project, only Kennecott lawyer allowed to question: EIS ruled adequate.
	Exxon officially announces the Crandon deposit.
1977	After motion by Public Intervenor, Hearing examiner dismisses Kennecott permit application for Ladysmith mine.
1977-1978	First comprehensive mining law passed.
1981	State drops non-degradation water quality standard.
	Exxon files its first mine application with the Wisconsin Department of Natural Resources (DNR).
	James Klauser, Exxon Lobbyist tells Wisconsin Manufacturers & Commerce that "Wisconsin could host up to ten metal mines by 2000, including Ladysmith."
1983	Mining is exempted from clean groundwater standards.
	Limits on foreign corporations owning more than 640 acres dropped.
	Spearfishing struggle intensifies; PARR & STA emerge.
1983-1992	Spearfishing struggle continues with anti-treaty/anti-Indian groups supported by pro-mining government officials and corporations.
1986	Tommy Thompson speaks to PARR group.
	Tommy Thompson elected Governor.
	Exxon withdraws its mine permit application.
1987	Governor appoints James Klauser, Exxon lobbyist to be Secretary of Administration.
	Kennecott announces plans to mine copper/gold in Ladysmith.
	Natural Resource Board declares Wolf River an Outstanding Resource Water

Local Agreement law is passed as amendment to state budget.

Large Wise Use meeting held in Montana; attended by WI officials & mining officials.

Exxon Valdez disaster destroys Prince William Sound.

State removes restrictions on trucks hauling iron ore.

Legislature fails to pass mining ban on state lands.

DNR fails to thoroughly assess environmental impacts of proposed Ladysmith mine in DEIS & FEIS.

1991 State passes "bad actor" law, but law ineffective due to DNR's ability to grant waiver.

1992 Walt Bresette & Rick Whaley publish Walleye Warriors documenting WI government/DNR & corporate involvement in Spearfishing struggles.

Kennecott opens Ladysmith mine.

Exxon returns with partner Rio Algom & wholly owned Crandon Mining Company.

Al Gedicks, Ph.D. publishes The New Resource Wars: Native and Environmental Struggles Against Multinational Corporations.

1994 DNR begins Northern Initiatives Process.

Exxon/Rio Algom submits application for Crandon mining.

Coalition begins collecting two petitions: one to ask DNR to strengthen rules regulating sulfide mining, one asking DNR to ban sulfide mining.

Coalition submits petitions to Natural Resource Board.

1995 American Rivers declares Wolf River Threatened. The next day CMC announces plan to pipe wastewater 38 miles to Hat Rapids.

CMC releases incomplete EIR.

DNR Releases "White Paper."

Governor's Budget cuts Public Intervenor and makes DNR Secretary a Governor appointed position.

DNR issues decision that it does not have authority to ban sulfide mining.

Coalition begins lawsuit challenging DNR decision that it does not have authority to ban sulfide mining.

Judge Henderson rules DNR does have authority to ban sulfide mining.

DNR's Northern Initiatives Strategic Plan discounts participants skepticism towards mining issues.

Mining Moratorium bill introduced by Representative Spencer Black.

Mining Moratorium buried in committee.

Appeals court overturns Judge Henderson's decision--DNR does not have authority to ban sulfide mining.

Wisconsin's Environmental Decade publishes *Fool's Wisdom* documenting Wise Use groups active in Wisconsin & Midwest.

Speaking Tour travels to 22 communities along Wolf & Wisconsin Rivers.

Legislature votes to bring Mining Moratorium to floor for debate.

1000 people march at Rally in Rhinelander.

Legislature dismisses a week early, avoids Mining Moratorium bill.

Mining Moratorium Pledge Campaign initiated.

Resolution campaign initiated to get local communities to pass resolutions against sulfide mining.

Nashville Zoning Board denies BHP Exploration permit. BHP initiates suit against Nashville town board. Nashville Board of Adjustment grants BHP permit.

Exxon steps up PR campaign.

Wisconsin Manufacturers & Commerce hires Carol McCoshen to do grass-roots organizing on lobbying.

ECCOLA publishes *Question of Bias* documenting DNR pro-mining bias.

CMC announces intent to sign Local Agreements with Forest County and Town of Nashville.

Nashville citizens call a special town meeting; special meeting is closed by Nashville Town Board.

CMC signs Local Agreement with Nashville & Forest County.

Nashville citizens & WRPC initiate lawsuit against Nashville town board.

1997

Environmentally Responsible Mining Conference.
WI Senate passes amended Mining Moratorium bill SB3 29-3
Metallic Mining Council Reactivated with pro-mining majority.

Exxon runs newspaper, radio, and TV ads opposing Mining Moratorium which include quote by DNR Secretary George Meyer.

Nashville elects new Town Board; other anti-sulfide mining candidates elected.

American Rivers declares Wolf River Fifth Most Endangered River.

Wise Use groups -- People for the West, NASH, Coalition for Fair Regulation surface. Earth First! holds protest; 29 EF! arrested; numerous violations of civil rights witnessed; ACLU takes EF! case.

Mining Moratorium held in Assembly Environment Committee.
Assembly Environment Committee Chairman issues "Media Information Packet"

Duff sends letter to Representative Black & Senator Shibilski.

The Badger Fund is repealed and $5 million-$7 million balance goes to general pool of state budget money.

Nov. 11, 1997

State Assembly Environment Committee voted 6-4 to send the Moratorium Bill to the full State Assembly

State Assembly Majority Speaker expects Moratorium Bill to come before the full State Assembly for a vote in January 1998

Dec. 3, 1997

Wisconsin Department of Natural Resources Board adopts order SW 21 97 (B) revision to Chapter NR182, Wis. Adm. Code creating a 150' mandatory intervention boundary for mine sites—requiring mandatory monitoring locations. The revision DOES NOT require mandatory remediation (clean up).

I. Point Summary

Issues of Public Concern Regarding the Proposed Crandon Mine Project and the Mine Permitting Process	
Ground and Surface Water Modeling	The impact of mine dewatering on groundwater and surface water in the highly complex Wolf River watershed is still unknown, as an acceptable model has not yet been developed. The current data regarding the potential effects to the watersheds and ecosystems surrounding the mine are lacking certain specific information. There is no limit on the number of alterations CMC's model can undergo, nor is there a set time limit for model verification or completion.
Tailings Management Area and Mine Wastes	The redundant system of liners and a top cap, proposed by CMC to permanently contain its aboveground mine waste, from air and water has not been proven effective for an extended period of time. The tailings from the mine will contain 23.7 billion pounds of pyrite. With pyrite present, almost every type of heavy metal contaminant may be present in acid drainage from metal mine operations.
Contaminant Transport	Modeling for the movement of contaminants in the groundwater cannot be completed without an accurate groundwater model. The top cover of the TMA is the most critical aspect of the aboveground waste storage site, yet CMC has refused to consider any deterioration of the top cover system. 22 million tons of waste will be backfilled into the mine. Any substance of concern in the TMA is potentially a problem in the abandoned mine, since the same water flowing into the mine will likely move contaminants out.
Design Management Zone and Mandatory Intervention Boundary	Wastewater disposal lagoons are allowed a 250' compliance boundary, (which is the area surrounding a site that allows contaminants to exceed groundwater standards), new solid waste landfills are allowed 150' and the compliance

Issues of Public Concern Regarding the Proposed Crandon Mine Project and the Mine Permitting Process	
	boundary set for toxic waste sites is zero. Mine and mine waste disposal sites are allowed a 1,200' compliance boundary and a 150' mandatory intervention boundary. It will take approximately 7-15 years for water and contaminants to move 150 feet out from the edge of the facility and 30-40 years to move 1,200 feet. The mandatory intervention boundary does not require remediation at that distance, only monitoring. Furthermore, mine facilities are allowed an exemption from compliance with preventive action limits, if it is not technically and economically feasible to maintain compliance.
Mitigation of Surface Waters	The DNR's premise is that there will be no significant impact due to the mine--as long as all the impacts can be mitigated. This essentially asks the public to put all its faith in mitigation technology (fixing the problems instead of preventing them).
Interbasin Transfer	Crandon Mining Company will divert millions of gallons of water each year out of the Great Lakes basin and into the Mississippi River watershed, via its proposed pipeline. Current debate centers around whether or not the Water Resources Development Act should apply to the proposed pipeline and whether the Act should apply to the diversion of groundwater. Approval of CMC's request to divert groundwater from the Great Lakes basin may set an important precedent that might allow new requests for Great Lakes groundwater from entities outside the region.
BOD Reallocation	The Wisconsin River is prone to dissolved oxygen concentrations that fall below the minimum value of 5 mg/l and existing point source discharges claim they have difficulty maintaining standards. The low dissolved oxygen content indicates the amount of oxygen depleting BOD entering the river now should be decreased. CMC's proposed discharge to the Wisconsin River will likely

Issues of Public Concern Regarding the Proposed Crandon Mine Project and the Mine Permitting Process	
	add to the problem of too much BOD in the river, at a time when current dischargers are already having difficulty maintaining standards.
Pro-Mining Administration	In the name of economic progress, Governor Thompson has pursued mining with a goal of making it one of the State's principal industries. Governor Thompson has used the bi-annual budget process to: (1) pass the Local Agreement Law, (2) eliminate funding for the Public Intervenor, (3) make the DNR Secretary an appointee of the Governor, (4) repeal the Badger Fund, and (5) to create the Wisconsin Science Advisory Council on Metallic Mining (which is comprised mainly of pro-mining interests).
Weakening of Wisconsin Mining Laws	Governor Thompson has supported and promoted legislation to weaken State laws regulating mining and the mining industry has demanded and received dozens of modifications to the State mining code.
Politicization of WDNR, The Natural Resources Board and the Metallic Mining Council	Again, the Governor appoints the DNR Secretary. The Natural Resources Board rewrote groundwater rules to allow mining companies to contaminate groundwater to federal maximum contaminant levels for drinking water. The Advisory Council on Metallic Mining, which is to make recommendations to the Secretary of the DNR on acceptable mining technology, is comprised mainly of pro-mining interests. CMC has agreed to pay the DNR for the Metallic Mining Council's work under the Crandon Project EIS process. The DNR has been party to the weakening of important water quality laws. And the DNR has worked with CMC to develop and be reimbursed for a public relations campaign including public forums.
Public Intervenor	Governor Thompson's 1995 budget proposal deleted funding for the Public Intervenor.

Issues of Public Concern Regarding the Proposed Crandon Mine Project and the Mine Permitting Process	
Local Agreement	CMC's local agreement with the Town of Nashville (1) exempts CMC from all town zoning ordinances, regulations and laws, (2) limits the power of local government and courts to directly or indirectly prohibit mining, (3) gives CMC final approval for disposal of all wastes from their proposed mine, and (4) makes CMC responsible for the clean up of chemical spills and hazardous materials ONLY within the boundaries of the mine site. Taxpayers in the Town of Nashville were left with a $350,000 legal bill (under the guise of developing the local agreement) when their attorneys billed them to research Menominee and Chippewa treaty rights and air/water quality standards.
Public Relations Campaign	Exxon, Rio Algom and Crandon Mining Company spent over a million dollars on a Statewide public relations campaign, rather than pursuing state of the art technology.
Repeal of the Badger Fund	In 1997, the Badger Fund (funded through a portion of the net proceeds tax collected from the Flambeau Mine) was repealed and an estimated $5-$7 million dollars from the Fund went to the general pool of state budget money.
Socioeconomic Factors	CMC bases its potential contributions to the economy on (1) a 70% local hire rate/creation of 400 jobs; and (2) the level of taxes it will pay e.g. up to $117.3 million in net proceeds taxes. However, with a retiree-dominated population and a relatively low unemployment rate in the counties close to the mine, the area will likely NOT be able to supply a large number of people with the right mix of skills, age and experience for Crandon Mine's needs. As such, the local hire rate may be as low as 30%, which would result in the mine-related population impacts being underestimated by as much as 150%. In regard to the net proceeds taxes paid by CMC, "the effect of metal prices on the mine's net proceeds tax is dramatic and the taxes may reach zero in years with relatively

Issues of Public Concern Regarding the Proposed Crandon Mine Project and the Mine Permitting Process	
	low mineral prices and/or high labor costs. At CMC's claimed prices, the mine would essentially be operated on a breakeven basis from the year 2016 to 2027."
Transportation of Ores and Chemical Reagents	Some 8,000-13,000 tons of chemicals and fuels will be transported through Wisconsin communities by highway and rail, to the mine site EACH YEAR.
Air Quality and Mercury	Ecosystem impacts from wind eroded mine tailings would be heavily influenced by deposition patterns, but modeling for wind erosion is problematic. Generating electricity to serve the Crandon project would emit a level of mercury equivalent to that released to power 18,000 homes. A substantial fraction of the mercury emitted would enter the continental and global circulation patterns, while increased local and regional deposition of mercury would occur. Mercury is extremely bio-accumulative and becomes more concentrated in each step of the food chain.
Legal Areas	Since 1981, Wisconsin regulations regarding the permitting, operation, monitoring, remediation and mitigation of mines/mine sites have been continually weakened through a series of waivers, exemptions, variances, revisions and reinterpretations.

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Acknowledgements:

Menominee Tribal Legislature- Apesanahkwat, Tribal Chairman; Margaret Snow, Vice Chairwoman; Wendall Askenette, Secretary; Llewellyn Boyd, Chairman of Mining Impacts Committee; Frieda Bergeon; Lisa Waukau; Robert Deer; and Eugene Caldwell.

Menominee Treaty Rights & Mining Impacts Office- Ken Fish, Director; Debbie Fowler, Administrative Assistant; Phil Seem, Mining Specialist; Terri Holzman, Technical Mining Data Projects Coordinator; and Kelly Summers, Secretary.

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METALLIC SULFIDE MINING

IMPACT REPORT

BY

John Kariger

Marie Anderson

Robert Bourke

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The Town of Cleveland
Mining Impact Committee

A Report

Submitted to Further the Understanding
of the Impacts of
Metallic Sulfide Mining

To

The Town of Cleveland
Board of Supervisors

MARCH 1997

APPROVAL PAGE

We approve the report of the Town of Cleveland Mining Impact Committee.

John H. Kariger — MARCH 4, 1997
John H. Kariger, committee chair — **date**

Marie Anderson — March 4, 1997
Marie Anderson, committee member — **date**

Robert Bourke — March 4, 1997
Robert Bourke, committee member — **date**

Bruce Thayer — March 4, 1997
Bruce Thayer, committee member — **date**

EXECUTIVE SUMMARY

I. HISTORY OF THE MINING ISSUE IN THE TOWN OF CLEVELAND

In February of 1996, a number Cleveland Township residents learned that Flambeau Mining Company offered mineral exploration leases to a number of town residents. The Town Chairman confirmed the lease offerings at the March 14th town meeting.

At the annual Town meeting the Board was authorized to adopt an ordinance, which provided local control of the mining issue, by unanimous vote of the 36 electors in attendance.

At the regular monthly meeting in May, the Board moved to appoint John Kariger as chairman of a local Mining Impact Committee to be made up of volunteers. Marie Anderson, Bob Bourke, Rebecca Clark, and Bruce Thayer volunteered to serve on the committee.

Discussion at the Committee's first May 16th organizational meeting identified the Impact Committee's mission as: get educated and educate others. Discussion of this mission established a statement of purpose: Gather a file of as much relevant information as possible, organize it, study it, summarize it and submit a report. A series of Informational Meetings were also planned.

On June 13, 1996, the Board passed a Code of Ordinance, and then, under that authority, adopted the revised Metallic Mining Regulations, with all three board members as signatories.

On August 8, 1996, Flambeau's permit application was tabled pending legal consultation and review.

Ninety-six citizens voiced their opinion, in September, by signing a petition in support of the committee's recommendation to allow time to create this report, have a public hearing and a referendum. The petition was presented to the Board at the September 12 meeting, and was tabled by the Chairman with no discussion and no comment.

On October 10, 1996, Attorney Wm. Theil presented his opinion to the Board, making the case that the Metallic Mining Regulation (Appendix A) is essentially a zoning ordinance, and as such was improperly enacted and therefore invalid and un-enforceable. Mr. Theil outlined four options from which the Board could choose to retain local control of the situation.

With a 2 to 1 vote, the Board adopted a 90 day moratorium on mining activities to allow time to evaluate the options. The chairman cast the dissenting vote. A representative of the mining company agreed to the moratorium.

On November 9, 1996, John Kariger, chairman of the Mining Impact Committee, submitted to the Board two other legal opinions on the validity of the Town's Metallic Mining Regulations.(MMR)

On January 9, 1997, Interim zoning was adopted by a motion and a second by the two supervisors present. (The chairman was not in attendance). A hearing was scheduled for February 20, 1997, to hear testimony on the permit application.

II. THE BASIC MINING PROCESS

Metallic mining is the process by which various metals are removed from the ground. Commonly removed metals include copper, gold, lead, silver, and zinc. These minerals are most frequently not found in a pure form, but are fused to sulfur, forming sulfide compounds. Mining of these metals is referred to as metallic sulfide mining. Examination of the earth for metals is performed by the processes of exploration and prospecting. The processes generally used to remove metals from the earth are deep-shaft mining and open-pit mining.

"Exploration" is the on-site geologic examination from the surface of an area by core, rotary, percussion or other drilling, where the diameter of the hole does not exceed 18 inches, for the purpose of searching for metallic minerals or establishing the nature of a known metallic mineral deposit, and includes associated activities such as clearing and preparing sites or constructing roads for drilling.

"Prospecting" means engaging in the examination of an area for the purpose of determining the quality and quantity of minerals, other than for exploration but including the obtaining of an ore sample, by such physical means as excavating, trenching, construction of shafts, ramps and tunnels and other means, other than for exploration, which the department, by rule, identifies, and the production of prospecting refuse and other associated activities

"Mining" is defined as: "the process in the mining of metallic minerals other than exploration or prospecting, including commercial extraction, agglomeration, beneficiation, construction of roads, removal of overburden and the production of refuse."

"Reclamation", the last mining operation, is defined as the rehabilitation and restoration of the mining site to a condition as close as possible to its original pre-mining state. The goal is to eliminate, minimize, or mitigate physical or chemical environmental threats.

III. CASE STUDIES

This section will first look, in greater detail, at two examples of how mining is accomplished depending on how the orebody is situated in the ground and how deep the deposit. Two case studies are presented to illustrate deep-shaft and open-pit mining operations. Excerpts from the 280-page Crandon Mining Company (CMC) Mine Permit Application (CMC, 1995) provide information on deep-shaft mining. Exerpts from the Final Environmental Impact Statement-Flambeau Mine, March 1990 provide information on open-pit mining. Secondly we will briefly review a number of mines that appear to be operating safely and finally we will look at some resent modern mine failures..

A. Deep-Shaft Mining- "The Crandon Mine".

In the project area and its vicinity, CMC holds about **2200 acres** of surface land in fee, has agreements for purchase of approximately an **additional 1800 acres**, and has easements on about another 10 acres. This acreage includes the area needed for the construction of the plant site and Tailings Management Area (TMA) facilities, the **railspur corridor** to the existing rail line, the common corridor for the access road, power line, pipeline waste water discharge and the **buffer area** around these sites. The layout of these facilities will require an area of about **128 acres**. The principal structures at the plant site will be the **65 foot tall mine headframe**

Tailings Management Area (TMA) southeast of the plant site, will cover **355 acres over 90 feet deep.** The total area covered by the mine site is approximately **483 acres**.

Access to the mine will be through the 22- to 26-foot diameter central services and production shaft [entrance and exhaust air]. A second shaft will be sunk on the eastern end of the ore body [16-19 foot air intake]. A third shaft will be excavated in the last year of the construction period to provide additional ventilation as the mine extends to the west. When completed, this shaft will serve as the primary exhaust point for mine air. The ventilation air requirements for the 5,500 tpd operation are estimated to be **700,000 cubic feet per minute (cfm)**.

The mill will operate **24 hours per day, for 365 days per year**, while the mine will operate on either a five-day or seven-day-per-week schedule. Waste rock generated during mine development will be transported to the surface and stored in a lined facility (TMA). During operations, a portion of the waste rock will remain underground as backfill. At full production, approximately 2,200 tons per day of tailings [finely ground rock particles containing tons of hazardous or toxic chemicals from the on site processing of the ore], will be pumped to the TMA. Along with septic system wastes, clarifier solids and filter backwashes, the waste products of the wastewater treatment system will also be added. Reclamation of the site will occur on an ongoing basis from construction through the operating phase. After final reclamation, the area will be used for forestry and recreation.

B. Open-Pit Mining

Flambeau Mining Company (Flambeau Mine) located near Ladysmith, Wisconsin is the site of the newest open-pit mine in the state (scheduled to cease operation in February of 1997). It has been described as the smallest and richest open pit mine in the world. The open pit at its maximum extent would be **32 acres** in size and would be excavated to a maximum depth of 225 feet. The **181 acre mine site** is completely owned by Kennecott, including both the surface and mineral rights. Kennecott also owns an additional **2,500 acres** in the Town of Grant

In accordance with the Local Agreement, blasting and rail shipping operations would be conducted during daylight hours Monday through Saturday only. Mining activities are currently planned to occur one shift per day, five day[s] per week. All other mining operations (e.g. construction and reclamation) are allowed during three eight hour shifts, 365 days per year.

The deposit could have been mined by sinking a shaft or decline near the center of the deposit and extracting ore to a depth of approximately 225 feet below the surface. This approach would be very expensive, has greater risk to workers, would result in less complete ore removal, and would be more difficult to backfill compared with the open pit method. Flambeau Mining Co. would probably not proceed with the project if this approach was dictated. The Local Agreement did not allow any on site processing of material to take place. Upon completion of mining, the pit would be sequentially backfilled with the stockpiled waste materials. The liners and over-lying drainage blankets and piping from the ore crushing, ore stockpile, ore loadout, high sulfur waste rock stockpile, rail spur and runoff pond areas would be placed in the pit with the high sulfur waste material.

C. Environmentally responsible mines

Crandon Mining Company commissioned a study in the Fall of 1995 to determine the extent and degree of environmental awareness and sensitivity in mining and processing operations and to locate examples of environmentally responsible operations in a sulfide ore environment. Hundreds of potential sites were screened followed by telephone contacts with corporate and

mine site environmental directors and managers, and with various state and federal regulatory agencies. Over the course of several months more than 150 telephone conversations were able to document that environmentally responsible mining is taking place.

D. Modern mines that failed to protect the environment

To list all the failures of modern mining companies to protect our environment would certainly exceed the scope of this report. We will only scratch the surface in relating just a few of the more recent tailings dam and mine waste impoundment failures

IV. IMPACTS OF SULFIDE MINING

. A series of references to recent scientific studies, governmental reports, and case studies is used to illustrate potential impacts in three areas of concern: Economic, Environmental and Social.

A. Economic

Predicting economic impacts of a mine on a nearby community is complicated and is, by its very nature, laden with uncertainties. The margin of error commonly reaches average levels of 100 percent. Mining operations provide good paying jobs for mine employees whether local residents or persons moving to the area. Since it is unlikely that all Town residents would seek mining employment, the benefits of job creation would be primarily realized by persons outside the Town. A must for a successful mining operation is to have a labor pool which they can draw from, or add to, quickly. This means quick hiring and quick layoffs. This is exemplified in the classic "Boom and Bust" of mining towns in general. It is also in the best interests of a mining company that no other stable, well-paying, long-term employer move into the area to compete for the labor market.

Land speculation, during the early phases of mining development, often drives the value of property faster than the per capita income which can cause local property tax burdens to increase. This form of inflation is mostly felt by senior citizens and others living on fixed incomes. An analysis of the economic picture from Rusk County shows that of all the profit earned by Flambeau Mining Co., only about five cents of every dollar came back to the local governmental bodies. They in turn used that money primarily to retain jobs that might have been lost due to possible relocation of those businesses.

B. Environmental

An environmental analysis is the process of carrying out a comprehensive study and review of a broad range of environmental features such as topography, hydrology, geology, and cultural status for a specified land area. The intent of the environmental section of this report is to familiarize readers with several environmental impacts that must be considered prior to introduction of sulfide mining into the community. Mining's potential threats to the ecosystems have been recognized for centuries.

Metallic sulfide mining creates large quantities of dangerous waste. For example, each ton of copper ore only yields about 8-10 pounds of copper, leaving 1,990 pounds of tailings.

When slurries of processed ground rock are dumped in tailings ponds, liners are used at the bottom of the ponds (or should be) to keep toxins from leaching into the underlying soil. All liners leak. That is the most important thing to understand about the liners used in mining technology. The only difference among them is some have leaked and others will leak.

There are many examples of recent mining disasters. Only a few of the most recent are recounted in this section.

In 1988, **Kennecott Copper** (Utah) **inadvertently** filed Toxic Release Inventory (TRI) reports with EPA for its mineral extraction and beneficiation operations (see **Table 4**). The result: of more than 18,000 facilities that reported TRI data that year, Kennecott was ranked first in releases of toxic metals and fourth in the nation in total toxic releases to the environment.

Mining exploration poses a number of ecosystem threats. In Cleveland Township the aquifer is contained in sand and loosely cemented sandstone, which is highly porous and water moves through it easily. This makes our water supply very susceptible to the kind of contamination that can accompany metallic sulfide mining and exploration. Drilling operations may penetrate multiple aquifers. This can cause water from different aquifers to mix, changing water chemistry. Aquifer elevations may also change, causing wells to go dry. Drilling sludge, the material ground up and brought to the surface during drilling, may contain sulfide ore, heavy metals and other contaminants. This is born out by experiences in other parts of the country. Some of the land leased in the Town of Cleveland, by the mining company, contains wetlands. These wetlands are the source headwaters for the north and south branches of the Buffalo River. All of the area in Section 20 is a primary recharge zone for the underlying aquifer. The flora and fauna using the wetlands, water from the aquifer, and settling ponds that might be needed for a mine are at risk from the effects of acid mine drainage. Any large-scale removal of water from an aquifer can lower the level of water of ponds and streams fed by the aquifer or the level of water in wells. The draw-down of water sources surrounding actual mine sites is usually underestimated or understated in pre-mining impact statements prepared by mining officials.

At one mile away, blasting is a major concern with noise levels of 114 dB. Even at approximately 2 miles from a blast site, the sound level would be at 109 dB. As reported in the Final Environmental Impact Statement-Flambeau Mine, the United States Department of Housing and Urban Development has determined that decibel levels over 75 are clearly unacceptable in residential areas. Industrial development requires a substantial amount of lighting for security purposes. Since the Town is all rural and at some distance from any city or town, nighttime security lighting would likely interfere with viewing of elements seen in the night sky, specifically, the stars and northern lights. The Final Environmental Impact Statement-Flambeau Mine indicated that dust emissions were expected to reach a maximum of **53 tons per year**, even with dust suppression controls.

C. Social

The prospect of a mining operation coming to an area is often perceived to be positive for the community as a whole. A recognized drawback is the influx of newcomers and their perceived detrimental impact on the small community. The rural area becomes a target for speculators of every kind. Land is often cheap in rural areas and many types of businesses sprout up with little overhead costs. This rapid change can cause increased frustrations among all citizens. Further, the threat of lawsuits against communities that oppose mining further intimidates residents and local governmental officials, as seen in the cases of Rusk County and the Town of Nashville.

There is strong indication that the residents of the Town of Cleveland desire to protect productive agricultural lands and preserve the area's rural quality of life. The preliminary results of the County-wide Survey indicate that the responding households in the Town of Cleveland

wish to protect productive farmland (83%), use zoning to protect scenic areas (54%), and maintain the farming appearance of the County (81%)(CedarCorp, 1996).

V. REGULATORY ENVIRONMENT

On the national level, House and Senate conservative legislators have attempted to cut the budget of the Environmental Protection Agency during the last year. Budget restrictions would limit the ability of the EPA to enforce virtually all pollution laws including The Clean Air Act and The Clean Water Act.

The State of Wisconsin has a number of statutes pertaining to metallic mining. The DNR has authority to enforce Wisconsin statutes by creating administrative rules pertaining to metallic mining.

According to one State statute, §70.37, under legislative findings, it reads:

> The activity of mining metalliferous minerals has a **permanent and often damaging effect on the environment** of the state.
>
> The activity of mining metalliferous minerals **significantly alters the quality of life in communities** directly affected by mining.

The DNR's actions since the inception of metallic mining operations in the late 1960's could accurately be described as promoting metallic mining, rather than extending protection to the state's natural environment.

Regulatory options available to protect the health, safety, and welfare of local citizens, include regulatory ordinances, and zoning ordinances which require permits.

Simple zoning can provide a degree of local control over changes affecting the character of an area.

VI. RECOMMENDATIONS

By unanimous decision, The Town of Cleveland Mining Impact Committee recommendations to the Town of Cleveland Board of Supervisors that exploration or mining for metallic minerals should not be allowed. The community should also develop a basic land use plan that preserves the unique character and quality of Cleveland Township without infringing on the rights of ordinary citizens to pursue opportunities to develop their property as long as it fulfills the vision of that plan. And finally, the Town Board should institute regulations that improve and protect the waters of the Town.

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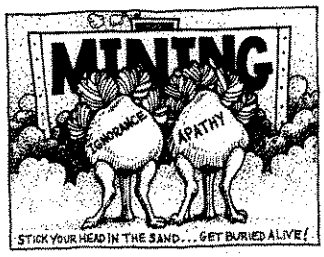

DEDICATED TO:

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ACKNOWLEDGMENTS

The committee wishes to thank Chris Straight for providing the initial outline for this report and additional research and proofreading, Nancy Watenphul for her input on the outline and review of research material and proofreading and Tom Wilson for his contribution of reference material. We also wish to thank Sue Pearson for compositional editing of this report, Mary Melcher for the artwork and all the individuals and organizations that contributed research material. Last but not least, we wish to thank our families, friends and neighbors for their encouragement and support.

I. HISTORY OF THE MINING ISSUE IN THE TOWN OF CLEVELAND

A summary of the recent development of the mining issue in the Town of Cleveland is appropriate to this report and is included here as a review for those readers who have been following this issue closely as it evolved over the past year and as historical background for any reader who has not been involved from the beginning. This summary will cover four areas:

A. Flambeau Mining Company Activity.

B. Cleveland Town Board Responses and Actions.

C. Mining Impact Committee Activity.

D. Citizen Response and Activity.

A. Flambeau Mining Company Activity

1. Leases

In February of 1996, residents of west central Cleveland Township became aware of a rumor that a Mining Company had approached several neighboring landowners with offers to lease acreage for mineral exploration. It didn't take long to find out there was, indeed, substance to this rumor. Approximately 25 people showed up at the March 14 Town Board meeting to inquire as to what was going on. At that meeting, the Town chairman confirmed that a mining company had expressed interest in leasing land from several landowners - had offered them lease agreements - and that two meetings of these landowners had already been held. The Town chairman, who was in attendance at these meetings because he also had been offered a lease, urged those in attendance to use caution and adopt a wait-and-see attitude. The number of landowners was not revealed, nor were they identified. And so begins the account of the year the Flambeau Mining Company came to this peaceful rural community.

Flambeau Mining Company operates a 32 acre open pit copper/gold/silver mine at Ladysmith, Wisconsin. It began extracting ore in 1993 and is scheduled to complete operations in the spring of 1997. Flambeau Mining Company, a Delaware Corporation with a Utah address, claims in their recent video and some of their literature to be a subsidiary of Kennecott Minerals. Other documents they have produced indicate they are

a subsidiary of a Kennecott Corporation (which operates 11 mines in the United States). Still other documents from them indicate a Kennecott Holdings Corporation or a Kennecott Minerals Holdings Company, which is an indirect wholly owned subsidiary of Rio Tinto Zinc PLC,(RTZ), a United Kingdom company, the world's largest mining company.

Flambeau Mining Co. began approaching private landowners with lease offers after the County Boards of Jackson, Clark, Eau Claire and Trempealeau counties turned down their proposals for exploration on county-owned lands and adopted moratoriums on any Flambeau Mining Co. negotiations regarding county-owned lands. (Clark Co. passed a 10 year moratorium 6/13/96; Jackson Co. passed a 10 year moratorium 6/25/96).

Between March 21, 1996 and July 21, 1996, nine leases of private land were acquired by Flambeau Mining in the Town of Cleveland totaling 865.66 acres. Seven of these leases comprise a block consisting of 785.66 acres in sections 17 and 20, leased for 20 years with option to purchase. Two leases were short-term, exploration-only leases that expired 12/31/96 and involved two 40 acre parcels, one in section 9 and one in section 12. Concurrently, Flambeau was acquiring 20 year leases on acreage in nearby townships: a 580 acre tract involving five landowners in the Town of Adams, (Jackson Co.), and a 620 acre tract involving five landowners in the Town of Mentor (Clark Co.), adjoining the Town of Cleveland on the east. Other townships where leases were signed include: Garfield, Albion, and Springfield in Jackson County, along with Butler Township in Clark County. Eau Claire and Trempealeau Counties also have been targeted.

2. Application for Exploration Permit

On July 9, 1996, Flambeau submitted an application for a permit for exploration to the Town Board, pursuant to the Town's Metallic Mining Regulations Ordinance.

3. Public Relations

Throughout the summer months, Flambeau pursued a public relations campaign with a series of half-page advertisements in the local papers, the airing of radio ads, and the scheduling of numerous promotional tours to the Ladysmith mine from local points of departure. The company has utilized direct mailings of printed and video taped promotional materials to Township residents. The most noteworthy of these was a December 9 packet mailing with a letter indicating that their plans for exploration would

be discussed at the December 12 Board meeting, even though this topic had not been placed on the agenda for that meeting and even though the Township had enacted a 90 day moratorium on mining related activities. This letter and meeting were notable because, after giving notice in no uncertain terms to all residents that exploration plans would be on the agenda, Mr. Myatt failed to show up! Flambeau representatives present at the meeting offered no explanation nor did they or Mr. Myatt offer an apology to the 36 people who set aside their busy holiday schedules to attend to a matter they had trusted could be laid aside in truce during the Christmas season. It can be assumed that this bit of public relations strategy most probably relayed a message quite different than that intended.

4. Flambeau Representation at Local Town Board Meetings

Flambeau Mining Co. has maintained an official presence at Town Board meetings throughout the past year, with one or more company representatives present at most meetings.

5. Exploration (electromagnetic and drilling)

Extensive on-the-ground electromagnetic surveys were conducted at the end of July 1996 on lands in the Town of Cleveland and in the Town of Mentor. Because the Town of Mentor has no mining regulations requiring a permitting process, that work was followed up with 3 exploratory drill holes:

1. 9/5/96 - 9/20/96, 578 feet long, 460 feet vertical depth.
2. 10/27/96 - 11/6/96, 828 feet long, 660 feet vertical depth.
3. 12/14/96 - 1/20/97, 1238 feet long, 1030 feet vertical depth.

The Town of Cleveland does require a permit, but since no permit had been granted for exploratory drilling, the July work was followed up in late October with further magnetic testing on acreage in sections 19 and 20, according to Flambeau geologist John Gartner.

B. Cleveland Town Board Actions

The Town Board has demonstrated a commendable willingness to listen to discussion and input from the citizens throughout this process. Meetings have been characterized quite consistently by an atmosphere of civility and respect for dissenting opinions, to the credit of the

Chairman, the Town Board, and the people of this township. This is no small accomplishment given the on-going nature of the situation and the intensity of the opinions on the issue.
The current Town Board office holders are:

Chairman	Jerry Bowman
Supervisor 1	Fred Vance
Supervisor 2	David Duerkop
Clerk	George Remkus
Treasurer	Randy Julien

April 9, '96:

At the annual Town meeting, John Kariger was asked to explain a proposed ordinance he had provided to Board members for review, a week earlier. The Board unanimously agreed to adopt the Metallic Mining Regulations (MMR) (Appendix A) in response to the resolution unanimously approved by the citizens in attendance.

May 9, '96:

The Board moved to appoint John Kariger as chairman of a local Mining Impact Committee to be made up of volunteers. Marie Anderson, Bob Bourke, Rebecca Clark and Bruce Thayer volunteered to serve on the committee.

June 13, '96:

The Board passed a Code of Ordinance, and then, under that authority, adopted the revised Metallic Mining Regulations, with all three board members as signatories.

July 11, '96

Chairman Bowman reprimanded the Impact Committee for scheduling attorney Michael D. Orgeman, a municipal law specialist, hired by Impact Committee member Robert Bourke, to speak at the time of a regular monthly Impact Committee meeting, instead of scheduling a separate Informational Meeting. This meeting was held just prior to the monthly Board meeting (in lieu of the regular monthly Impact Committee meeting). Impact Committee member Anderson responded that the committee was doing the job it had been given to do: Arrange Informational Meetings for the public with guest speakers who have expertise in the various issues involved. (See section "C" for summary of Informational Meetings.)

August 8, '96:

Flambeau's permit application was tabled pending legal consultation.

September 12, '96:

The Board tabled, with no comment, a petition with 96 signatures requesting that the Board postpone action on Flambeau/Kennecott's permit application pending:

1. Completion of the Impact Committee's report,
2. Public hearings, and
3. A referendum.

The Board entertained discussion on the status of the permit application. Chairman Bowman expressed his opinion that the application is in compliance with the Town's Metallic Mining Regulations. However, members of the Impact Committee were of the opinion that the application is not in full compliance.

The Board agreed to hire the law firm of Weld, Riley, Prenn and Ricci of Eau Claire to look into the matter.

October 10, '96:

Though not on the agenda, Attorney William Theil (of Weld, Riley, Prenn and Ricci) presented his opinion to the Board, making the case that the Metallic Mining Regulations (Appendix A) is essentially a zoning ordinance, and as such was improperly enacted and therefore invalid and un-enforceable. It was apparent from the fact that all the Flambeau leaseholders (including those from Eau Claire) were in attendance at the meeting that they had been advised that Mr. Theil would be present and would be offering an opinion favorable to their right to proceed with exploration. It is noteworthy that the Mining Impact Committee had not been advised that Mr. Theil would be making a presentation, and, as mentioned, he was not on the agenda. Mr. Theil was not prepared to offer an opinion on Flambeau/Kennecott's application, other than to say it did appear that their assets should be reviewed. It is unclear as to whether or not he had been asked to review the application. (Appendix B)

Mr. Theil outlined four options from which the Board could choose:

1. Non-binding referendum
2. County zoning
3. Adopt local zoning
4. Do nothing

With a 2 to 1 vote, the Board adopted a 90 day moratorium on mining activities to allow time to evaluate the options. The chairman cast the dissenting vote.

November 9, '96

John Kariger, chairman of the Mining Impact Committee, submitted to the Board two other legal opinions on the validity of the Town's Metallic Mining