

UNITED STATES of America et al.,
Plaintiffs,

v.

RESERVE MINING COMPANY et al.,
Defendants.

No. 5-72 Civil 19.

United States District Court,
D. Minnesota,
Fifth Division.
April 20, 1974.

Supplemental Opinion May 11, 1974.

Additional Supplemental Opinion
Aug. 3, 1974.

The United States and the State of Minnesota brought an action against a taconite mining and processing company to prevent the company from continuing the discharge of taconite tailings into the waters of Lake Superior, which practice allegedly resulted in release into the air and water of large amount of minute amphibole fibers said to be a cause of various types of cancer in humans. The District Court, Miles W. Lord, J., held, inter alia, that defendant's discharge of the tailings into interstate and intrastate waters both violated the Federal Water Pollution Control Act and constituted a common-law nuisance both in the waters of Lake Superior and in the ambient air in surrounding communities and that, in view of the demonstrated threat to the public health and defendant's intransigent refusal to dispose of the tailings by safer alternative means, a decree enjoining further discharge of the tailings was justified despite the adverse consequences which such a decree would have upon the economy of the area.

Injunction issued.

See also, 8 Cir., 490 F.2d 688.

Cause remanded 8 Cir., 498 F.2d 1073.

1. Health and Environment ⇐28

Navigable Waters ⇐35

Action of taconite mining and processing company in discharging taconite tailings into waters of Lake Superior

in such manner as to release into air and water large quantities of minute asbestos-like amphibole fibers known to be directly associated with occurrence of cancer in humans constituted both violation of Federal Water Pollution Control Act and common-law nuisance in interstate and intrastate waters of Lake Superior and in ambient air of surrounding communities. 28 U.S.C.A. §§ 1331, 1345; Federal Water Pollution Control Act, §§ 1 et seq., 10, 10(c)(5), (g)(1, 2), (h) as amended 33 U.S.C.A. §§ 1151 et seq., 1160, 1160(c)(5), (g)(1, 2), (h); Rivers and Harbors Appropriation Act of 1899, §§ 10, 13, 33 U.S.C.A. §§ 403, 407; Fed. Rules Civ.Proc. rule 42(b), 28 U.S.C.A.; M.C.L.A. § 691.1201 et seq.; M.C.L.A. Const.1963, art. 4, § 52; W.S.A. 29.29, 30.15(4); M.S.A. §§ 115.07, 115.071, subds. 2(b), 3, 116.081, subd. 1, 116B.02, subd. 5, 116B.04, 609.74; Occupational Safety and Health Act of 1970, § 2 et seq., 29 U.S.C.A. § 651 et seq.; Federal Food, Drug, and Cosmetic Act, §§ 1, 409 as amended 21 U.S.C.A. §§ 301, 348.

2. Corporations ⇐1.6(9)

Where taconite mining and processing subsidiary was mere instrumentality or agency of its steel manufacturing parents, who used subsidiary as shield to protect themselves from consequences of subsidiary's illegal pollution of Lake Superior, and where subsidiary's profits were siphoned off by its parents, independent corporate entity of subsidiary would be disregarded in order to insure effective remedy if civil fines or other monetary relief were called for. 28 U.S.C.A. §§ 1331, 1345; Federal Water Pollution Control Act, §§ 1 et seq., 10(c)(5), (g)(1) as amended 33 U.S.C.A. §§ 1151 et seq., 1160(c)(5), (g)(1); Rivers and Harbors Appropriation Act of 1899, § 13, 33 U.S.C.A. § 407; Fed.Rules Civ.Proc. 19(a)(1), 28 U.S.C.A.

3. Health and Environment ⇐28

In view of court's finding that taconite mining and processing company's discharge of taconite tailings into Lake Superior resulted, through release of large amount of minute amphibole fibers

into water and ambient air, in daily exposure of thousands of people to substantial quantities of known human carcinogen, and in light of company's intransigent refusal to make provisions for alternative methods of disposing of tailings, despite company's financial ability to do so, decree enjoining further discharge of tailings into lake was justified despite expense of alternative disposal methods and detrimental effects on area's economy which halting of company's operations would entail. 28 U.S.C.A. §§ 1331, 1345; Federal Water Pollution Control Act, §§ 1 et seq., 10(c)(5), (g)(1) as amended 33 U.S.C.A. §§ 1151 et seq., 1160(c)(5), (g)(1); Rivers and Harbors Appropriation Act of 1899, § 13, 33 U.S.C.A. § 407.

SUPPLEMENTAL MEMORANDUM

4. Constitutional Law ⚖️309(1)

Joinder of corporate parents as co-defendants in late stages of action against corporate subsidiary to prevent it from continuing discharge of taconite tailings into waters of Lake Superior in violation of various environmental statutes and regulations did not result in denial of due process of law to parents in view of facts that counsel for parents had closely followed course of litigation and that evidence showed subsidiary to be agent of parents in state where pollution allegedly occurred. Federal Water Pollution Control Act, §§ 1 et seq., 10, 10(c)(5), (g)(1, 2), (h) as amended 33 U.S.C.A. §§ 1151 et seq., 1160, 1160(c)(5), (g)(1, 2), (h); Rivers and Harbors Appropriation Act of 1899, §§ 10, 13, 33 U.S.C.A. §§ 403, 407.

5. Corporations ⚖️506

Where privity between corporate parents and subsidiary accused of pollution of Lake Superior and ambient air surrounding its taconite processing plant was sufficient to give res judicata effect to decision of federal district court against parents, parents were not prejudiced by being joined as codefendants in action against subsidiary to halt pollution. Federal Water Pollution Control

Act, §§ 1 et seq., 10, 10(c)(5), (g)(1, 2), (h) as amended 33 U.S.C.A. §§ 1151 et seq., 1160, 1160(c)(5), (g)(1, 2), (h); Rivers and Harbors Appropriation Act of 1899, §§ 10, 13, 33 U.S.C.A. §§ 403, 407.

6. Health and Environment ⚖️28

Navigable Waters ⚖️35

In action against taconite mining and processing company to enjoin release of taconite tailings into Lake Superior, evidence supported conclusions that exposure to asbestos fibers can and does produce significant and detrimental changes in human body; that although the heavier the exposure the more likelihood there is of contracting asbestosis, even low level exposure to asbestos can and does produce detrimental changes in human body; that there is no known safe limit of exposure to such fibers; and that detrimental changes produced by exposure to asbestos will not be manifested in detectable way until 20 to 30 years after initial exposure. Federal Water Pollution Control Act, § 1 et seq. as amended 33 U.S.C.A. § 1151 et seq.

7. Health and Environment ⚖️28

Navigable Waters ⚖️35

In view of facts that study which resulted in determination by Department of Labor that asbestos fibers less than five microns in length were not dangerous was subject to serious question and that department's resulting occupational standard ignored fact that exposure to asbestos produces cancer, court could give no credence to such occupational standard in determining whether it should enjoin taconite processing company's discharge of taconite tailings, which contained asbestos-like amphibole fibers, into waters of Lake Superior. Federal Water Pollution Control Act, § 1 et seq. as amended 33 U.S.C.A. § 1151 et seq.

8. Health and Environment ⚖️28

Navigable Waters ⚖️35

Where evidence was virtually uncontradicted that there is extensive latency period before asbestos-related diseases are manifested after asbestos is ingested into human system and that it might be

20 to 45 years before adverse effects from taconite processing plant's discharge of amphibole fibers into ambient air and waters of Lake Superior might become evident, fact that there might be no evidence that anyone had been seriously injured by such discharges as of date of trial did not prevent court from abating discharges. Federal Water Pollution Control Act, § 10(c)(5), (g)(1) as amended 33 U.S.C.A. § 1160(c)(5), (g)(1).

9. Nuisance ⇌**80**

When public nuisance is found, propriety of injunction depends, first of all, on showing of substantial injury to plaintiffs or public.

10. Nuisance ⇌**80**

Propriety of issuance of injunction against public nuisance must be weighed very heavily in favor of such injunction when injury alleged is danger to public health.

11. Health and Environment ⇌**28**

Taconite processing company's discharge of amphibole fibers into ambient air was, in itself, sufficient cause to call for closing of processing plant, whether or not its discharge of such fibers into taconite tailings into waters of Lake Superior constituted grounds for such action. Federal Water Pollution Control Act, § 10(c)(5) as amended 33 U.S.C.A. § 1160(c)(5).

12. Health and Environment ⇌**28**

Navigable Waters ⇌**35**

Minnesota water and air purity regulations were violated by actions of taconite mining and processing company in releasing asbestos-like amphibole fibers contained in taconite tailings into ambient air and waters of Lake Superior. M.S.A. §§ 115.07, 116.081, subd. 1, 116B.04.

13. Health and Environment ⇌**28**

Navigable Waters ⇌**35**

Fact that taconite processing plant had been issued state permits to discharge taconite tailings into waters of Lake Superior did not serve as defense to action to abate such dumping where,

permits notwithstanding, state court judge had ordered that substantial modifications be made to form of discharge and where, in any case, discharge constituted violation of permits because its scope exceeded nine-mile limit imposed therein. M.S.A. §§ 115.07, 116.081, subd. 1, 116B.04.

14. Health and Environment ⇌**28**

Navigable Waters ⇌**35**

In action against taconite mining and processing company to enjoin continued discharge of asbestos-like amphibole fibers, said to cause cancer in humans, into ambient air and waters of Lake Superior, evidence failed to show that alternate methods of disposing of taconite tailings, such as on-land disposal, were either economically or technologically infeasible. Federal Water Pollution Control Act, § 10(h) as amended 33 U.S.C.A. § 1160(h); M.S.A. § 116B.04.

After Remand

15. Courts ⇌**406.9(5)**

Where Court of Appeals, in determining whether or not it should stay injunction issued by district court granting discharge by taconite processing plant of asbestos fibers into air and water, found it necessary to give preliminary forecast of views on merits of issues, concluding that defendants had established likelihood of succeeding on merits on issue concerning public health and that district court's resolution of doubts in case in favor of public health instead of in favor of defendants marked decision by federal court that should have been left to legislature, such decision did not constitute resolution of merits of claim presented in action and therefore did not limit res judicata effect of district court's findings.

16. Health and Environment ⇌**28**

Navigable Waters ⇌**35**

Provisions of Federal Water Pollution Control Act giving district court jurisdiction to enter such judgments and orders enforcing its judgment as public interest and equities of case may require

did not give federal court power to disregard applicable state laws and administrative procedures and require state to grant its land and powers to private citizen or to grant permits necessary to enable taconite processing plant to use given area as storage place for its taconite tailings. Federal Water Pollution Control Act, §§ 1 et seq., 10 (c)(5), (h) as amended 33 U.S.C.A. §§ 1151 et seq., 1160(c)(5), (h).

17. Courts ⇨325

Where State of Minnesota appeared as party in suit to prevent taconite processing plant from discharging taconite wastes into Lake Superior only after defendants filed motion to compel joinder of state, state did not voluntarily submit itself to court's equity jurisdiction so as to give court authority to order state to convey necessary state lands and to grant necessary permits for defendants to use specified tract of land as receptacle for its wastes.

18. Courts ⇨359.1(1)

Federal district court lacked power to ignore state law and administrative procedure in order to provide taconite processing company with economical depository for its taconite tailings by directing state to issue permits required by state's environmental statutes as prerequisite to such land use. M.S.A. §§ 105.37-105.55, 105.38(1), 105.41, 105.42, 105.44, 105.45, 105.47, 105.64, 105.64, subds. 3, 5, 116D.02-116D.04, 116D.04, subd. 6.

19. Health and Environment ⇨28 Navigable Waters ⇨35

Minnesota statutes concerning use of public waters do not give courts original jurisdiction in water permit matters, but limit courts to appellate review of action by Commissioner of Natural Resources. M.S.A. §§ 105.37-105.55, 105.38(1), 105.41, 105.42, 105.44, 105.45, 105.47, 105.64, 105.64, subds. 3, 5, 116D.02-116D.04, 116D.04, subd. 6.

20. Administrative Law and Procedure ⇨751, 754

Judiciary performs very limited review functions in relation to duties of administrative agencies, cannot usurp agencies' functions, and cannot force agency discretion to be exercised in any particular manner.

21. Administrative Law and Procedure ⇨704

Mines and Minerals ⇨90

Where taconite processing company had made no application for state permits authorizing on-land disposal of its taconite tailings prior to appearance of Minnesota Commissioner of Natural Resources as witness in proceeding to prohibit company from discharging tailings into Lake Superior, Commissioner's testimony that he was not disposed to grant permits for on-land disposal at site being considered by parties during settlement negotiations, did not constitute final agency action subject to review by district court. M.S.A. §§ 105.37-105.55, 105.38(1), 105.41, 105.42, 105.44, 105.45, 105.47, 105.64, 105.64, subds. 3, 5, 116D.02-116D.04, 116D.04, subd. 6.

22. Mines and Minerals ⇨90

Even if federal district court had concurrent jurisdiction with Minnesota Department of Natural Resources to consider issue whether or not permits should be issued and state land given to taconite processing company for disposal of taconite tailings, such issue would be one for initial determination by Department of Natural Resources, not by court. M.S.A. §§ 105.37-105.55, 105.38(1), 105.41, 105.42, 105.44, 105.45, 105.47, 105.64, 105.64, subds. 3, 5, 116D.02-116D.04, 116D.04, subd. 6.

23. Mines and Minerals ⇨90

Evidence in action to prohibit taconite processing company from discharging taconite tailings into Lake Superior demonstrated that company's proposal for on-land disposal of tailings at given site in basin formed by construction of series of man-made dams was neither sound from an engineering and safety standpoint nor ecologically reasonable.

24. Health and Environment ⇨21

Minnesota air pollution regulation APC 17 was reasonable and constitutional.

25. Health and Environment ⇨28

Federal district court lacked power and inclination to grant variance from state air pollution regulation in favor of taconite processing company.

26. Courts ⇨405(15)

Defendants in action to prohibit taconite processing company from discharging tailings into Lake Superior were guilty of bad faith in devoting substantially all of their time and efforts in revising plan for on-land disposal of tailings which had little or no possibility of being implemented and in failing to make any application for permit at any site for on-land disposal of tailings, and further stay of court's injunction against discharge of tailings into Lake could therefore not be recommended by district court to Court of Appeals.

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Charles Murnane and Robert T. White, Murnane, Murnane, Battis & Conlin, St. Paul, Minn., for defendant Armco Steel Corp.

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MEMORANDUM AND ORDER

MILES W. LORD, District Judge.

This action for injunctive relief is before the Court after 139 days of trial, which included testimony from well over 100 witnesses, over 1621 exhibits, and over 18,000 pages of transcript. Of necessity, it will require several weeks before the Court will be able to set forth in writing its detailed findings of fact and conclusions of law. Inasmuch as the case deals with issues concerning public health, the ultimate resolution of the problem should not be delayed by this procedural matter. The Court has carefully considered all of the evidence and hereto sets forth its essential findings of fact and conclusions of law to be refined and supplemented at a later date.

Findings of Fact

1) Reserve Mining Company (Reserve) is set up and run for the sole

benefit of its owners, Armco Steel Corporation (Armco) and Republic Steel Corporation (Republic), and acts as a mere instrumentality or agent of its parent corporations. Reserve is run in such a manner as to pass all its profits to the parents.

2) Reserve acting as an instrumentality and agent for Armco and Republic discharges large amounts of minute amphibole fibers into Lake Superior and into the air of Silver Bay daily.

3) The particles when deposited into the water are dispersed throughout Lake Superior and into Wisconsin and Michigan.

4) The currents in the lake, which are largely influenced by the discharge, carry many of the fibers in a southwesterly direction toward Duluth and are found in substantial quantities in the Duluth drinking water.

5) Many of these fibers are morphologically and chemically identical to amosite asbestos and an even larger number are similar to amosite asbestos.

6) Exposure to these fibers can produce asbestosis, mesothelioma, and cancer of the lung, gastrointestinal tract and larynx.

7) Most of the studies dealing with this problem are concerned with the inhalation of fibers; however, the available evidence indicates that the fibers pose a risk when ingested as well as when inhaled.

8) The fibers emitted by the defendant into Lake Superior have the potential for causing great harm to the health of those exposed to them.

9) The discharge into the air substantially endangers the health of the people of Silver Bay and surrounding communities as far away as the eastern shore in Wisconsin.

10) The discharge into the water substantially endangers the health of the people who procure their drinking water from the western arm of Lake Superior including the communities of Beaver Bay, Two Harbors, Cloquet, Duluth, and Superior, Wisconsin.

11) The present and future industrial standard for a safe level of asbestos fibers in the air is based on the experience related to asbestosis and not to cancer. In addition its formulation was influenced more by technological limitations than health considerations.

12) The exposure of a non-worker populace cannot be equated with industrial exposure if for no other reason than the environmental exposure, as contrasted to a working exposure, is for every hour of every day.

13) While there is a dose-response relationship associated with the adverse effects of asbestos exposure and may be therefore a threshold exposure value below which no increase in cancer would be found, this exposure threshold is not now known.

Conclusions of Law

1) The Court has jurisdiction over the subject matter of the various claims pursuant to 28 U.S.C. §§ 1345 and 1331. As to those claims based upon state law, the Court exercises its jurisdiction pursuant to the doctrine of pendant jurisdiction.

[1] 2) Reserve's discharge into the water is in violation of the Federal Water Pollution Control Act as amended in 1970. 33 U.S.C. § 1151 et seq. The violations involve both interstate and intrastate waters and are subject to abatement pursuant to 33 U.S.C. § 1160(c)(5) and (g)(1). Specifically Reserve's discharge is in violation of water quality standards referred to as WPC 15(a)(4), (c)(6) and (c)(2).

3) Reserve's discharge into the water creates a common law nuisance in both interstate and intrastate waters of Lake Superior.

4) Reserve has no permit that sanctions its violations of the Federal Water Pollution Control Act as amended in 1970.

5) Reserve has no permit that sanctions its creation of a common law nuisance in the waters of Lake Superior.

6) Reserve's discharge into the air creates a common law nuisance condition in the ambient air in Silver Bay and the surrounding communities and is subject to abatement. Furthermore, the air discharge violates Minnesota Regulations APC 5, 6 and 17.

7) Industrial standards for asbestos exposure do not apply to environmental exposure and are therefore not applicable to the facts in this case.

[2] 8) In that Reserve is a mere instrumentality or agent of its parents who have used Reserve as a shield to protect themselves from the consequences of Reserve's illegal pollution of Lake Superior, Armco and Republic must bear legal responsibility for Reserve's actions. Furthermore, since Reserve's profits are siphoned off by its parents, in order to insure an effective remedy if civil fines or other monetary relief are called for, the independent corporate entity of Reserve must be disregarded.

9) All additional legal questions including the question of civil fines, financial responsibility for water filtration systems in Lake Shore communities, alleged violations of the Refuse Act, 33 U.S.C. § 407, specific Wisconsin criminal and civil statutes as well as the Wisconsin Public trust doctrine, and Reserve's counterclaims against the State of Minnesota are taken under advisement and will be decided at a later date. The question as to what part of the potential fines and penalties should be awarded to Reserve employees or others who would lose their jobs is likewise held for further argument and consideration.

Memorandum

[3] It has been clearly established in this case that Reserve's discharge creates a serious health hazard to the people exposed to it. The exact scope of this potential health hazard is impossible to accurately quantify at this time. Significant increase in diseases associated with asbestos exposure do not develop until 15 to 20 years after the initial ex-

posure to the fibers. The state of the scientific and medical knowledge available in this area is in its early stages and there is insufficient knowledge upon which to base an opinion as to the magnitude of the risks associated with this exposure. The fact that few fibers have been found in the tissue of certain deceased Duluth residents may indicate that the general contamination in the community of Duluth has not yet reached alarming proportions. Unfortunately, the real answer to the problem will not be available until some ten to twenty years from this date when the health experience of those exposed to the fibers emitted from Reserve's plant is reviewed. At present the Court is faced with a situation where a commercial industry is daily exposing thousands of people to substantial quantities of a known human carcinogen. Emphasis is placed upon the fact that the Court is not dealing with a situation in which a substance causes cancer in experimental animals where the effect on humans is largely speculative. Fibers identical and similar to those emitted from Reserve's plant have been directly associated with a marked increase in the incidence of cancer in humans.

The Court has been constantly reminded that a curtailment in the discharge may result in a severe economic blow to the people of Silver Bay, Babbitt and others who depend on Reserve directly or indirectly for their livelihood. Certainly unemployment in itself can result in an unhealthy situation. At the same time, however, the Court must consider the people downstream from the discharge. Under no circumstances will the Court allow the people of Duluth to be continuously and indefinitely exposed to a known human carcinogen in order that the people in Silver Bay can continue working at their jobs.

Naturally the Court would like to find a middle ground that would satisfy both considerations. If an alternate method of disposal is available that is economically feasible, could be speedily implemented and took into consideration the

health questions involved, the Court might be disposed to fashion a remedy that would permit the implementation of such a system. However, if there is no alternative method available, the Court has no other choice but to immediately curtail the discharge and stop the contamination of the water supply of those downstream from the plant.

With these considerations in mind, the Court on February 5, 1974, took the unusual step of relating to the parties the Court's view of the evidence to date concerning the public health issue. The Court had heard in one form or another from substantially all of the world's experts in the area. The Court was led to believe by Reserve that little had been done in the way of devising an alternative method of disposing of the tailings on land and, in fact, that Reserve knew of no feasible way to accomplish such a system. At that time, it was Reserve's posture in this litigation that the only feasible alternative to the present discharge was the creation of a pipe system that would carry the tailings to the bottom of the lake. If, in fact, the deep pipe system was unacceptable, the Court was led to believe that Reserve had no alternative method for disposing of the tailings. Hence the Court found it essential that Reserve's attention be focused directly on the problem and a possible on land disposal alternative be developed as quickly as possible.

The Court was at one and the same time hearing a motion for a temporary restraining order and a permanent injunction. The reluctance of the Court to make a formal ruling on the temporary restraining order at an early time was done out of caution with the anticipation of hearing from more of the world's experts. It was after hearing all of this evidence that the Court gave its tentative findings on the health issue with the caveat that further evidence would be taken. The statement was made with a view toward giving Reserve an impetus to start resolving its problems and to give Duluth and the Lake Shore communities time to seek clean water. It

did not have the desired effect in either instance.

As it turned out, after days of testimony on the underwater disposal alternative proposed by Reserve, it became clear to the Court that this alternative in no way lessened the public health threat and possibly created additional problems relating to public health. The Court's findings in this regard turned out to be superfluous in that later testimony by representatives of Armco, half owner of Reserve, indicated that Armco had long since disregarded this underwater disposal system on the basis of engineering infeasibility alone, without any regard to its effect on the lake or public health. Upon further inquiry to officers of Armco and Republic, who also serve on the Board of Directors of Reserve, it appeared that several plans had been developed dealing with the possibility of on land disposal. Although these plans had been asked for by plaintiffs by way of interrogatories and by the Court by direct order, they were not produced nor mentioned until the representatives of Armco and Republic were deposed on March 1, 1974. The Court is apprised that defendants' failure to produce these plans for on land disposal will be the subject matter for motions by the plaintiffs to collect costs involved in the litigation so this matter will be dealt with at that time. The Court has stated on the record and will repeat here that Reserve's insistence on advocating the underwater disposal system which had been deemed infeasible by one of its owners and the failure to timely produce the documents dealing with possible on land disposal systems has substantially delayed the outcome of this litigation in a situation where a speedy resolution is essential.

The Court refers to this history in the case only to point out that since February 5 defendants were informed that the present method of discharge would stop and that if they chose to keep Reserve in operation they had to come up with an on land disposal alternative that would satisfy the health problems creat-

ed by the present discharge in the air and water. It was the Court's fervent wish that the health hazard could be abated without the economic problems that would be imposed upon the people in the North Shore communities if Reserve in fact closed down permanently. The documents of Reserve's parent companies indicate that they have known for some time that they would have to make modifications in their discharge, Judge Eckman in December of 1970 came to this same conclusion. In Reserve Mining Company v. Minnesota Pollution Control Agency, Sixth Judicial District of Minnesota he stated:

"In view thereof the Court finds that the continuance of the present method of discharge for any substantial period of time, and particularly for the next forty-year expected life span of Reserve's operations, is intolerable and that substantial modifications must be put into effect."

Even when faced with the evidence in this case that their discharge creates a substantial threat to the health of the people exposed to it, defendants are reluctant to curtail their discharge until the latest possible moment, presumably in order to prolong the profitability of the present discharge.

It was not until a few days ago that there was any indication to this Court that Reserve had a feasible plan for the disposal of taconite tailings on land. The testimony in the case by Reserve and representations by Reserve's counsel indicated that they not only had no such plan but that the engineering problems of such a system were insurmountable. The plaintiffs, on the other hand, introduced testimony indicating that on land disposal is feasible. Reserve took issue with this testimony even after the major engineering problems were solved and maintained that it would simply be too expensive to change their method of disposal to on land.

The evidence in the case indicates that the daily profit in the operation at Reserve is in the neighborhood of \$60,000.

00 per day. Each year that the plant remains in operation there is a 90 per cent return on owners' equity. In other words, for every dollar Armco and Republic initially invested in Reserve, they get back ninety cents each year the plant remains in operation.

This is not to say that the companies could not afford to make modifications. The testimony adduced at trial was to the effect that (with product improvement) Reserve, Republic and Armco could afford *at the very least* a \$180,000,000 to \$200,000,000 capital outlay with reasonably associated operating costs without substantially changing their economic situation as to profitability, intra-industry position, interest coverage, bond rating, etc. This figure should come as no shock to the defendant. Their own documents, recently discovered, support this fact. In this area it should be noted that any reduction in the royalty rate paid by Reserve or the interest rate, by such devices as revenue bonds or industrial bonds, would make even larger capital outlays, with accompanying operating expenses, possible. The defendants deny that they have made any overtures towards the Mesabi Trust with respect to a possible adjustment of the royalty rate and that no such overtures are contemplated. Therefore this Court's finding as to the financial ability of Reserve, Armco and Republic to abate the discharge is made without reference to any reduction in the royalties. This is not an occasion that calls for massive public aid to a dying industry. There is no evidence that either state or federal assistance is needed by the defendant to make this investment. The protestations by Reserve that it cannot do it alone must be put in the same class of assertions as the one that the "deep pipe" plan was the only possible alternative method of tailings disposal. The evidence is clear that Republic and Armco are two of the largest corporations in this country. They are prosperous now and would remain prosperous even after the necessary alterations are made. Defendants have had

the means to implement a feasible, economical alternative. It was their choice whether they would make the investment or abandon their employees and the State of Minnesota.

It should be noted in this regard that the State of Minnesota is here in the posture of asking the Court for fines and penalties as well as injunctive relief. Reserve on the other hand still has outstanding counterclaims against the state. It would, therefore, be inappropriate and premature for this governmental unit to subsidize the company before these matters are decided by the Court.

Today, April 20, 1974, the chief executive officers of both Armco and Republic have testified that they are unwilling to abate the discharge and bring their operation into compliance with applicable Minnesota regulations in an acceptable manner. They proposed a plan for an on land disposal site in the Palisades Creek area adjacent to the Silver Bay plant. Although this particular plan was in existence for several years it was not brought forward until the latest stages of this proceeding. The plan, which has been rejected by the plaintiffs because it is not environmentally sound, is totally unacceptable to the Court because of the conditions imposed with it. In the first place implementation of the proposal fails to effectively deal with the problem caused by the discharge of amphibole fibers into the air. Secondly, the plan contemplates that the discharge into the water will continue for five more years. In light of the very real threat to public health caused by the existing discharge, this time period for abatement is totally unacceptable. Third, it is suggested that the Court order all appropriate state and federal agencies to grant permits that would immunize Reserve's operations from ever complying with future environmental regulations as they might be promulgated. The Court seriously doubts that it has the power for such an order, and states flatly that if it had the power it would not grant such an order. Reserve

in this case has argued that certain state and federal permits granted years ago sanctions their non-compliance with existing regulations and should preclude the Court from abating the discharge of human carcinogens into the air and water. Such a claim is preposterous and the Court will have no part in perpetuating such claims. The proposal is further conditioned on obtaining compensation from the federal and state governments. The Court has previously discussed the lack of necessity for such a subsidy and finds the suggestion absurd. Finally, the proposal was conditioned upon favorable findings by the Court as to the public health issues. The Court finds this condition to be shocking and unbecoming in a court of law. To suggest that this or any other court would make a finding of fact without regard to the weight of the evidence is to ask that judge to violate the oath of his office and to disregard the responsibility that he has not only to the people but also to himself.

Defendants have the economic and engineering capability to carry out an on land disposal system that satisfies the health and environmental considerations raised. For reasons unknown to this Court they have chosen not to implement such a plan. In essence they have decided to continue exposing thousands daily to a substantial health risk in order to maintain the current profitability of the present operation and delay the capital outlay (with its concomitant profit) needed to institute modifications. The Court has no other alternative but to order an immediate halt to the discharge which threatens the lives of thousands. In that defendants have no plan to make the necessary modifications, there is no reason to delay any further the issuance of the injunction.

Up until the time of writing this opinion the Court has sought to exhaust every possibility in an effort to find a solution that would alleviate the health threat without a disruption of opera-

tions at Silver Bay.¹ Faced with the defendants' intransigence, even in the light of the public health problem, the Court must order an immediate curtailment of the discharge.

Therefore, it is ordered.

1) That the discharge from the Reserve Mining Company into Lake Superior be enjoined as of 12:01 A.M., April 21, 1974.

2) That the discharge of amphibole fibers from the Reserve Mining Company into the air be enjoined as of 12:01 A.M., April 21, 1974 until such time as defendants prove to the Court that they are in compliance with all applicable Minnesota Regulations including but not limited to APC 17.

SUPPLEMENTAL MEMORANDUM

On April 20, 1974, the Court issued an injunction halting the discharge into the water and the discharge of amphibole particles into the air at defendants' operations at the Reserve Mining plant. Attached to the order were the Court's essential Findings of Fact, Conclusions of Law and a short Memorandum setting forth the reasons for issuing the injunction. The Court indicated at that time that a more detailed Memorandum would be forthcoming but because of the substantial danger to public health that is created by the discharge the injunction could not wait. This Memorandum is to supplement the Findings of Fact, Conclusions of Law and Memorandum that the Court issued on April 20, and, along with those documents, comprises the Court's Findings of Fact and Conclusions of Law in this matter.

1. In an effort to alleviate the health risk, the Court ordered that the Army Corps of Engineers provide potable water to the affected communities. This, however, is only a temporary stop-gap solution. In the first place, it does nothing to lessen the air pollution problems and is an unsatisfactory answer over the long run to the problems caused by the discharge into the water. It is possible that water filters can be installed which would have some degree of success at

Plaintiffs

This action was originally brought by the United States of America at the request of the Administrator of the Environmental Protection Agency and with the consent of the Governor of Minnesota. The States of Wisconsin and Michigan subsequently moved to intervene as plaintiffs as did the following:

1) The Minnesota Environmental Law Institute, Inc., a non-profit corporation whose members are residents of Minnesota and use Lake Superior as an aesthetic, recreational and conservational resource.

2) Northern Environmental Council, a non-profit confederation of forty-four environmental organizations in Minnesota, Wisconsin, Michigan, North Dakota, South Dakota and Indiana, members of which own property adjoining Lake Superior, receive drinking water from Lake Superior and use Lake Superior as an aesthetic, recreational and conservational resource.

3) Save Lake Superior Association, a non-profit corporation founded for the protection of the Lake from pollution, whose members include owners of property adjoining the lake, persons who receive their drinking water from the lake and use the lake as an aesthetic, recreational and conservational resource.

4) The Michigan Student Environmental Confederation, Inc., a confederation of 130 environmental groups representing citizens throughout the State of Michigan.

All of the above motions for intervention were granted in the Court's Order of June 15, 1972.

reducing the number of amphibole fibers ingested, but actual installation of these filters is months away and their effectiveness is uncertain. The only real answer to the problem is curtailment of the discharge. This would have a dramatic effect on the air pollution problem and result in a tenfold decrease in the fiber concentrations in the Duluth water supply within a two month period.

Pursuant to Reserve's motion and the Court's Order of July 31, 1973, the State of Minnesota was made a party plaintiff. Minnesota subsequently filed a complaint in its capacities as *parens patriae* to prevent harm to its interests; as trustee over the waters of Lake Superior within its boundaries and the lake bed underlying those waters; as protector of its citizens from public nuisances degrading the quality of its water; and as the sovereign entity responsible by law for implementation and enforcement of the laws designed to preserve and protect the waters of the State. The Minnesota Pollution Control Agency was also a named plaintiff along with the State of Minnesota.

The Environmental Defense Fund's ("E.D.F.") motion to intervene was granted in the Court's oral order of July 31, 1973. The E.D.F. is a non-profit public benefit corporation, incorporated in New York. It has a nationwide membership of 40,000 several of whom live in areas of Minnesota, Wisconsin and Michigan that are affected by Reserve's discharge. Other members regularly visit the "affected area" for recreational and aesthetic purposes.

When it became apparent that the accumulation of carcinogenic amphibole fibers in the water supplies of Duluth, Minnesota and Superior, Wisconsin would necessitate expensive filtration systems to protect the health of its citizens, both cities moved to intervene as party plaintiffs in this case. Their intervention was not opposed, although defendants contest the claims asserted in intervention. The Court granted their motion to file claims as intervening plaintiffs on April 19, 1974.

Defendants

Reserve Mining Company is a Minnesota corporation that was set up and is operated for the sole benefit of its parent corporations, Armco Steel Corporation, an Ohio corporation, and Republic Steel Corporation, a New Jersey corporation. Reserve was the original named defendant. Pursuant to motions by the

plaintiffs on January 4, 1974, the Court ordered that Republic and Armco be joined as party defendants. In accordance with 28 U.S.C. § 1292(b), the Court certified the question for review by the Court of Appeals for the Eighth Circuit as to whether joinder at that state in the proceedings was proper. On January 21, 1974, the Court of Appeals ruled that it was an abuse of discretion to join Armco and Republic at that time but that the matter could be resubmitted to this Court for its decision at a later date after the resolution of the public health and liability aspects of the litigation. Pursuant to the Order from the Court of Appeals, the motion for joinder was refiled and granted by this Court on March 29, 1974.

On behalf of the defendants several groups have intervened in this law suit. Each alleges a general economic interest in Reserve's continued operation. The Village of Silver Bay is a Minnesota municipal corporation which was built and organized in conjunction with defendants' plant.

The Town of Beaver Bay is a municipal corporation duly organized and existing as a Township in Lake County, Minnesota. Defendant Reserve presently supplies employment directly or indirectly to many of its citizens.

The Village of Beaver Bay is a municipal corporation located adjacent to the site of Reserve's taconite plant.

Silver Bay Chamber of Commerce is a non-profit Minnesota corporation created to promote the commercial, industrial, recreational, civic and general interests of the Village of Silver Bay and its trade area.

The Village of Babbitt is a municipal corporation which alleges total economic dependence on the operations of Reserve.

The Range League Municipalities and Civic Associations is an unincorporated association of cities, villages, schools and towns formed to promote the general and community welfare and employment opportunities of the Northeastern Minnesota regional area.

The Northeastern Minnesota Development Association is a non-profit Minnesota corporation formed for scientific and educational purposes to promote the general and community welfare and employment opportunities in the Northeastern Minnesota area.

The Duluth Area Chamber of Commerce is a Minnesota non-profit corporation organized to promote the advancement of the industrial, civic and municipal interests of the Duluth, Minnesota area.

St. Louis County is a municipal corporation that borders on Lake County.

Lake County is a duly organized county government which contains the Reserve operation at Silver Bay within its limits.

Lax Lake Property Owners Association is a non-profit Minnesota corporation created to foster, develop and promote recreational, civic and community welfare.

Claims

The United States, in its second amended complaint asserts five independent legal bases for its claim for injunctive relief. First it is claimed that Reserve's discharge is subject to abatement pursuant to the Federal Water Pollution Control Act ("FWPCA")¹ as amended in 1970, 33 U.S.C. § 1151 et seq. Section 10(c)(5) of the Act provides, in part:

1. All references to the FWPCA refer to the Act prior to the amendments of 1972. Pursuant to § 4(a) of PL. 92-500, the 1972 amendments have no effect on actions pending prior to the effective date of the amendments. See Court's memorandum and order dated July 31, 1973 at p. 6.

2. (4) *Natural Interstate Water Quality.* The interstate waters may, in a state of nature, have some characteristics or properties approaching or exceeding the limits specified in the standards. The standards shall be construed as limiting the addition of pollutants of human origin to those of natural origin, where such be present, so that in total the specified limiting concentrations will not be exceeded in the interstate waters by reason of such controllable additions; except that

(5) The discharge of matter into such interstate waters or portions thereof, which reduces the quality of such waters below the water quality standards established under this subsection (whether the matter causing or contributing to such reduction is discharged directly into such waters or reaches such waters after discharge into tributaries of such waters), is subject to abatement in accordance with the provisions of paragraph (1) or (2) subsection g of this section (33 U.S.C. § 1160(c)(5).)

Subsection 10(g)(2) provides that the Secretary (now Administrator):

in the case of pollution of waters which is endangering the health and welfare of persons only in the State in which the discharge or discharges (causing or contributing to such pollution) originate, may, with the written consent of the Governor of such State, request the Attorney General to bring a suit on behalf of the United States to secure abatement of the pollution. (33 U.S.C. § 1160(g)(2).)

It is claimed that Reserve's water discharge violates interstate water quality standards for the Minnesota waters of Lake Superior known as Minnesota Regulation WPC 15, which were approved by the Secretary of the Interior on November 26, 1969. Specifically, the U.S. claims that Reserve is in violation of WPC 15(a)(4), (c)(2) and (c)(6).²

where the background level of the natural origin is reasonably definable and normally higher than the specified standard the natural level may be used as the standard for controlling pollutants of human origin which are comparable in nature and significance with those of natural origin but where the natural background level is lower than the specified standard and where reasonable justification exists for preserving the quality of the interstate waters as nearly as possible to that found in a state of nature, the natural level may be used instead of the specified standard as the maximum limit on the addition of pollutants. In the adoption of standards for individual interstate waters, the Agency will be guided by the standards set forth herein but may make reasonable modifications of the same on the basis of evidence brought forth

Basically WPC 15(a)(4) is a non-degradation regulation requiring that waters of a quality better than the established standards be maintained at high quality. WPC 15(c)(2) prohibits industrial discharges which cause nuisance conditions. WPC 15(c)(6) requires that secondary treatment or its equivalent be applied to all non-biodegradable industrial wastes. Secondary treatment facilities are further defined as works which will produce an effluent having a total suspended solids concentration of no more than 30 milligrams per liter, turbidity of 25 units, and five-day biochemical oxygen demand of 25 milligrams per liter.

In Count II the United States alleges that Reserve's discharge into Lake Superior constitutes interstate pollution and endangers the health and welfare of persons in the states of Michigan and Wisconsin and is subject to abatement pur-

at a public hearing if it is shown to be desirable and in the public interest to do so in order to encourage the best use of the interstate waters or the lands bordering such interstate waters.

Waters which are of quality better than the established standards will be maintained at high quality unless a determination is made by the State that a change is justifiable as a result of necessary economic or social development and will not preclude appropriate beneficial present and future use of the waters. Any project or development which would constitute a source of pollution to high quality waters will be required to provide the highest and best practicable treatment to maintain high water quality and keep water pollution at a minimum. In implementing this policy, the Secretary of the Interior will be provided with such information as he requires to discharge his responsibilities under the Federal Water Quality Act, as amended. [Minn.Reg. WPC 15(a)(4).]

* * * * *

(2) No raw or treated sewage, industrial waste or other wastes shall be discharged into any interstate waters of the state so as to cause any nuisance conditions, such as the presence of significant amounts of floating solids, scum, oil slicks, excessive suspended solids, material discoloration, obnoxious odors, gas ebullition, deleterious sludge deposits, undesirable slimes or fungus growths, or other offensive or harmful effects. [Minn.Reg. WPC 15(c)(2).]

* * * * *

suant to the FWPCA, 33 U.S.C. § 1160(c)(5) and 33 U.S.C. § 1160(g)(1). The latter statute provides that the Secretary (now the Administrator):

In the case of pollution of waters which is endangering the health or welfare of persons in a State other than that in which the discharge or discharges (causing or contributing to such pollution) originate, may request the Attorney General to bring a suit on behalf of the United States to secure abatement of pollution.

The identical water quality standards are invoked in this Count.

In Count III the United States alleges that Reserve's discharge is in violation of 33 U.S.C. § 407 ("Refuse Act") which provides:

It shall not be lawful to throw, discharge, or deposit, or cause, suffer or

(6) It is herein established that the Agency will require secondary treatment or the equivalent as a minimum for all municipal sewage and biodegradable, industrial or other wastes to meet the adopted water quality standards and a comparable high degree of treatment or its equivalent also will be required of all non-biodegradable industrial or other wastes unless the discharger can demonstrate to the Agency that a lesser degree of treatment or control will provide for water quality enhancement commensurate with present and proposed future water uses and a variance is granted under the provisions of the variance clause. Secondary treatment facilities are defined as works which will provide effective sedimentation, biochemical oxidation, and disinfection, or the equivalent including effluents conforming to the following

SUBSTANCE OR CHARACTERISTIC LIMITING CONCENTRATION OR RANGE
25 milligrams per liter
1,000MPN/100 ml
30 milligrams per liter
Essentially free of visible oil
25
6.5-8.5
5-day biochemical oxygen demand
Total coliform group organisms
Total suspended solids
Oil
Turbidity
pH range
[WPC 15(c)(6).]

procure to be thrown, discharged, or deposited either from or out of any ship, barge, or other floating craft of any kind, or from the shore, wharf, manufacturing establishment, or mill of any kind, any refuse matter of any kind or description whatever other than that flowing from streets and sewers and passing therefrom in a liquid state, into any navigable water of the United States . . . and provided further, that the Secretary of the Army whenever in the judgment of the Chief of Engineers anchorage and navigation will not be injured thereby, may permit the deposit of any material above-mentioned in navigable waters, within limits to be defined and under conditions to be prescribed by him provided application is made to him prior to depositing such material.

In Count IV the United States alleges that Reserve's discharge into the water constitutes a nuisance that is subject to abatement pursuant to the Federal Common Law as recognized in *Illinois v. City of Milwaukee*, 406 U.S. 91, 92 S.Ct. 1385, 31 L.Ed.2d 712 (1972). This count alleges that Reserve's discharge into Lake Superior contains substantial quantities of amphibole fibers, that many of these fibers which are in the cummingtonite-amosite-grunerite series are identical or similar to amosite asbestos fibers, and that they constitute a public health hazard to the persons of Duluth, Silver Bay, Beaver Bay, Two Harbors, Superior, Wisconsin and other communities which are dependent upon Lake Superior for drinking water. Further allegations in the complaint include the claim that the discharge results in the stimulation of the growth of algae and bacteria, creates substantial increase in turbidity in the lake, impairs the ecological balance of the lake, accelerates the eutrophication of the lake,

causes what is known as the "green water" phenomenon and substantially detracts from the natural scenic beauty and aesthetic enjoyment and use of Lake Superior. It was further alleged that the discharge decreases the quality of the water and destroys aquatic biota in the lake. Due to the serious nature of the allegations going to the issue of public health the Court ordered that these matters be tried first, pursuant to Rule 42(b) Fed.R.Civ.Pro. leaving the issues of potential harm to the lake environment to be tried at a later time.³

In Count V the United States claims that Reserve's discharge into the air creates a common law nuisance subject to abatement pursuant to the Federal common law. The factual allegations which form the basis for this count include the claims that Reserve discharges into the air substantial quantities of amphibole fibers in the cummingtonite-amosite-grunerite series which are similar or identical to asbestos, the inhalation and ingestion of which is a substantial hazard to human health. It is claimed that the discharge creates a public nuisance and significantly endangers the health of all those who breathe the contaminated air.

The United States originally prayed for an injunction halting the discharge into both the air and the water within such time and upon such schedule as the Court deemed to be reasonable and proper. After months of testimony on the public health issue the United States joined the other plaintiffs in asking for an immediate curtailment of the discharge. They further request "such other relief as the Court may deem just and proper", as well as costs and disbursements.

The State of Michigan brings its action as an intervening plaintiff to protect Michigan state waters, including Lake Superior, from pollution, impair-

3. Obviously there was a substantial overlap in the issues. In order to determine whether or not Reserve's discharge has any health effect on the City of Duluth and Superior, the Court had to hear testimony as to the cur-

rents in the lake, and the effectiveness of Reserve's density current, both of which would be relevant also to the issues of the environmental effect on the lake.

ment and destruction under Act 127 of Michigan Public Acts of 1970 and under Mich.Const. Art. 4, § 52. As for the legal theories advanced by the State of Michigan, they join in the claims of the United States in Counts I through IV.

The State of Wisconsin joins in the United States' claim that the discharge into the waters of Lake Superior constitutes a common law nuisance in Wisconsin that is subject to abatement pursuant to the federal common law. In addition it is claimed that Reserve's discharge creates a public nuisance by openly, repeatedly, persistently and continuously violating Wisconsin criminal statutes. In particular it is alleged that Reserve's discharge violates Section 29.29 of Wisconsin Criminal Statutes.⁴ Wisconsin alleges further that Reserve's discharge creates a condition that unreasonably interferes with the use and enjoyment of Lake Superior by the people of Wisconsin in violation of the state's public trust doctrine. *Muench v. Public Service Commission*, 261 Wis. 492, 53 N.W.2d 514 (1952); *Just v. Marinette County*, 56 Wis.2d 7, 201 N.W.2d 761 (1972). Finally, Wisconsin alleges that the existence of a deposit by Reserve of material on the bed of Lake Superior within Wisconsin boundary waters is in violation of Wis.Stat. § 30.15(4), and is a nuisance *per se*.

The State of Minnesota and the Minnesota Pollution Control Agency (M.P.C.A.) in their joint complaint have alleged that the discharge into the air and water creates a common law nuisance. Minnesota joins the United States in the claim that the discharge into the water violates WPC 15. In addition to the specific regulations cited in the United States complaint the State of Minnesota includes WPC 15(c)(6)(c) which deals with unspecified toxic substances, WPC 15(d)(1) concerning discharges that

make certain waters unfit to drink even after chemical treatment, and WPC 26 which is a general effluent standard for Lake Superior that incorporates the standards in WPC 15. It is alleged that Reserve's discharge into the air and water is subject to abatement pursuant to the Minnesota Environmental Rights Act, Minn. Stat. § 116B.02(5). Further it is claimed that Reserve has no permit for its discharge into the water from the pilot plant, main plant, and mine pits and is in violation of Minn. Stat. § 115.07. As for the discharge into the air it is claimed that this is in violation of Minnesota Regulations APC 17 (emission standard for asbestos), APC 5 and 6 (particulate emission standards), APC 1 (primary and secondary air standards), APC 3(a)(2) and Minn.Stat. § 116.081(1) (operation without a permit). Minnesota seeks an immediate abatement of the discharge and civil fines pursuant to Minn. Stat. § 115.071(3). Minnesota also seeks a monetary award from defendants for the withholding of certain documents concerning on land disposal systems in violation of the Duty of Candor set out in Minn.Reg. MPCA 1 and 11 and Minn. Stat. § 115.071(2)(b).⁵

The various environmental groups have intervened as plaintiffs on each of the first four counts in the complaint of the United States. E.D.F. has the additional claim that Reserve's discharge into the air creates a common law nuisance. E.D.F. also filed cross claims against the United States and the State of Minnesota. These cross claims have been severed for separate trial.

The Cities of Duluth, Minnesota and Superior, Wisconsin have intervened as plaintiffs claiming that Reserve's discharge into the water creates a nuisance endangering the health of their citizens and necessitating the installation of ex-

disposal systems. The question of civil fines and sanctions for failure to make discovery will not be treated in this memorandum and are taken under advisement by this Court to be decided at a later date.

4. See p. 56.

5. The United States has moved for a money award in the form of a sanction for failure to make discovery, resulting from defendants' withholding of documents concerning on land

pensive filtration systems. They seek an injunction halting the discharge and compensation from Reserve for the installation of the filtration system. They also have a cross claim against the United States based on the fact that the Chief of Engineers of the United States Army Corps of Engineers has found their communities to be confronted with a source of contaminated drinking water causing or likely to cause a substantial threat to the public health and welfare of the inhabitants of the locality. Therefore it is claimed pursuant to Public Law 93-251 (amending 33 U.S.C. § 701n) that the Corps of Engineers must provide these communities with safe drinking water. Defendant-intervenors have brought similar claims against the United States seeking the Corps of Engineers participation in providing clean water. They make no cross claims against Reserve.

Defendant Reserve Mining Company alleges two counterclaims in its answer to the complaint of the State of Minnesota.⁶ The first counterclaim is for damages and is based on the allegation that since Reserve has valid permits and licenses for its operation any restriction, limitation or termination of such rights would constitute the taking of defendants' property without just compensation in violation of the Fifth Amendment of the United States Constitution and Article 1, Section 13 of the Constitution of the State of Minnesota. Reserve's second counterclaim, again based on the alleged validity of its permits, is for money damages for impairment of the contractual rights of Reserve Mining Company contrary to the provisions of Art. 1, Sec. 10, Clause 1, of the Constitution of the United States and Art. 1, Sec. 11, of the Constitution of the State of Minnesota. The question of Reserve's counterclaims is taken under advisement and will be dealt with at a later time.

6. Their counterclaims against the United States were dismissed without prejudice by the order of the Court dated July 16, 1973.

Armco Steel and Republic Steel were joined as defendants on March 29, 1974. Because of the prior action of the Court of Appeals the Court takes this opportunity to set out in detail its findings on the questions of the joinder and on the accountability of the parents for the actions of the subsidiary.

It is the finding of this Court that the independent corporate identity of Reserve Mining Company must be and is disregarded since this Court cannot allow the interposition of corporate entity to frustrate the implementation of a judgment that is required by justice. *General Underwriters v. Kline*, 233 Minn. 345, 46 N.W.2d 794 (1951), *citing In Re Trust Under Will of Clarke*, 204 Minn. 574, 284 N.W. 876 (1939). The Court finds that this subsidiary (Reserve) is so dominated by its parents (Armco Steel Corp. and Republic Steel Corp.) that it is a mere agency or instrumentality of the parents. *National Bond Finance Co. v. General Motors Corp.*, 341 F.2d 1022 (8th Cir. 1965). The Court further finds that this subsidiary is being used as a shield to protect the parents from the consequences of an illegal act. *United States v. Del Campo Baking Mfg. Co.*, 345 F.Supp. 1371 (D.Del. 1972). Finally the Court finds that complete relief cannot be accorded plaintiffs if Reserve is considered a separate entity. Fed.R.Civ.P. 19(a)(1).

With respect to the finding that Reserve is a mere agent of Armco and Republic, the Court is aware of the wide divergence in the case law as to what factors have been found to justify disregarding the corporate entity. The Court rules in this case that the following facts are true and when taken together lead to the inescapable conclusion that the parents so control the subsidiary that the subsidiary is not an independent decision making entity.

1. Armco and Republic each own 50% of the outstanding stock of Reserve.

2. The policy making body of Reserve, its Board of Directors, is made up of eleven individuals; five from Armco, five from Republic, and one from Reserve. The Reserve Board in reality makes no decisions. Armco and Republic jointly agree on policy decisions which are then "rubber stamped" by the Reserve Board.⁷

3. Reserve was initiated by Armco and Republic with money supplied by or guaranteed by Armco and Republic.

4. Reserve's total production of pellets goes to Armco and Republic and to no one else.

5. All debts of Reserve are guaranteed by Armco and Republic and therefore the parents have an equitable interest in all Reserve's assets.

6. All crucial management decisions such as rate of production and major capital expenditures are made by Armco and Republic.

7. Armco and Republic do not "buy" Reserve's product at market price. Rather they reimburse Reserve for all its costs including depreciation, taxes, laboratory and experimental expenses, and all other expenses in proportion to their ownership.

8. All "profits" and tax losses flow through to the parents.

The dominance of Reserve by its parents was pointedly brought out at trial when Reserve's witness Mr. Kenneth Haley testified that the decision as to how much money would be spent for pollution control equipment if the Court were to order it would be made by the Boards of Directors of Armco, Republic and Reserve, not Reserve alone. A second similar example was in the testimony of Reserve witness Fr. William T. Hogan, S. J., who said that the decision as to whether or not the parents would maintain the Reserve operation or close

7. The Board has not met since 1971 yet crucial decisions are being made daily by Armco and Republic who are each weighing their individual interest in order that they reach a consensus that is effectuated at the Reserve plant.

it and purchase taconite pellets on the open market would be up to Armco and Republic, not Reserve.

As to the question of whether or not the corporate entity of Reserve was used to shield the parents from the consequences of an illegal act there can be no doubt.⁸ The evidence adduced at trial proved that the discharge into the water and air was in violation of ten federal or state statutes and regulations. The evidence also proved that the discharges create a common law nuisance in the inter- and intrastate water and air. The evidence further proved that the parents make a large profit by getting their blast furnace feed at cost from Reserve instead of at the market price. Therefore, if the Reserve corporate entity were respected, Armco and Republic would be free to take the benefits of these violations without being accountable for any fines, penalties, or liabilities that attach to such conduct.

The fact that Armco and Republic have utilized Reserve as a shield also goes to the question of whether Reserve, due to its relationship with its parent companies, would be able to meet any and all obligations imposed upon it by the Court. The evidence clearly indicates that Reserve alone could not. They make no "profit". They merely "break even" each year. In fact, the profitability of Reserve cannot even be measured without looking at the books and records of the parents.

Therefore they have no fund from which the penalties, claimed by plaintiffs to be somewhere in the neighborhood of one hundred million dollars, could be satisfied. Reserve, Armco and Republic have all urged upon the Court the view that Reserve's assets in Minnesota are a sufficient fund from which any fines or penalties could be satisfied, if assessed. This strikes the Court as a

8. The use of the corporate entity to frustrate discovery in this case will be dealt with in detail in the section entitled "Technological Feasibility of Abatement."

curious position. It in effect tells the Court that it may not levy fines and penalties without shutting down the plant. Absent funds from Armco and Republic how else could the fines be paid but to sell off the capital equipment?

It is quite clear to this Court that Reserve is a mere instrumentality or agent of Armco and Republic which is being used to shield the parent companies from the consequences of the pollution of Lake Superior and the ambient air. It is in the interest of justice, therefore, to disregard the separate corporate entity of Reserve because it is a distinction that exists only on paper, not in reality, and to do so would insure full and complete relief to the plaintiffs and the citizens of the North Shore.

[4] Armco and Republic have claimed a violation of due process by their late joinder. This argument cannot stand since the evidence clearly establishes that Reserve is the agent of Armco and Republic. Reserve is the personification of Armco and Republic in the State of Minnesota. Because of this, service upon Reserve is service on Armco and Republic. Notice to Reserve is notice to Armco and Republic. With these facts there can be no due process violation.

[5] In addition, the privity between Republic, Armco and Reserve is sufficient to give *res judicata* effect to the decision of this Court against Armco and Republic. Therefore they are not prejudiced by joinder. *Sunshine Coal and Coke Company v. Adkins*, 310 U.S. 381, 60 S.Ct. 907, 84 L.Ed. 1263 (1939).

Moreover, it was clear from the testimony of the counsel from Republic Steel and others that the parents were following the course of the litigation to the point that they read copies of the daily transcripts that were sent to Republic and Armco by Reserve attorneys. It was also brought out in cross examina-

tion of high Armco and Republic officials that it has not been unusual in the past for the legal departments of the parents to assist the subsidiary in their litigation. It was also shown quite clearly that the corporate parents were kept well informed of this case and were briefed frequently during the trial on what was happening in Court. This Court has no doubt that Armco and Republic were fully apprised of the situation and assisted Reserve in its presentation of the case.⁹

INTRODUCTION

In an attempt to deal in an organized fashion with the numerous and complex legal and factual problems raised in this case, the Court will first address the issues raised concerning the chemical and physical properties of the ore mined by Reserve. The Court will trace the material from the mine at Babbitt, Minnesota, through Reserve's beneficiation operation, to its discharge into the ambient air of Silver Bay and the water of Lake Superior. The problem of the transport of the material once discharged will be discussed. Secondly the Court will deal with the substantial medical and scientific testimony that was produced to determine the health effect of exposure to the Reserve discharge. The Court will then turn to a discussion of the applicable law which in turn requires the Court to balance the equities involved. To do this the Court will have to analyze in great detail the economic ability of the defendants to devise a feasible alternative to the present mode of discharge and the weight that that ability will be given.

I.

A. Operations

Reserve Mining Company is a Minnesota corporation. All its officers, save 10 out of 11 members of the Board of Directors, and 3,200 employees are Min-

and were to be produced. This ruling was repeated several times before the joinder of Armco and Republic.

9. In the pretrial stages of this litigation there was an evidentiary ruling that the books and records of the parent companies were relevant and material to the issues before the Court

nesota residents. Reserve produces merchantable iron ore in the form of pellets from taconite, a hard, gray rock in which are embedded fine particles of magnetite, a black magnetic oxide of iron.

The taconite is mined at Babbitt, Minnesota where Reserve's mineral body is located. After the scrub tree growth and brush are removed, the glacial till and overburden is stripped away to expose the taconite. Jet piercers sink 40-foot deep holes in the hard rock. The holes are loaded with explosives and "shot" to break the taconite into pieces. Shovels load the broken taconite into trucks which haul the material—about 90,000 tons per day to two crushing plants. Here the processing of taconite begins. A series of crushers reduce the taconite to chunks smaller than four inches. Then 150-car trains carry the materials on Reserve's 47 mile long intra-plant railroad to Silver Bay for further processing.

At Silver Bay the railcars are unloaded and the taconite is conveyed to the fine crushing plant where two stages of crushers reduce the taconite to minus $\frac{3}{4}$ inch pieces. The taconite is then conveyed to the concentrator plant where water enters the process.

Tailings result when iron ore particles rich in iron oxide are separated from those that are very lean or barren. The lean or barren portions are the tailings. The separation or mineral beneficiation is performed in three stages of grinding and five steps of separation. After the taconite is coarsely ground in rod mills, the first separation—magnetic separation—is performed. Separation is made at a very coarse size, with some particles being as large as $\frac{5}{8}$ of an inch.

Next, the iron-rich product is fed into ball mills which grind the material to an intermediate size. Following the ball mill grinding, the second step of magnetic separation is performed. At this intermediate size, some tailings particles are as large as $\frac{3}{32}$ of an inch.

Following this magnetic separation, the iron-rich portion of the materials is separated according to its particle size. The particles too large for further processing are returned to the ball mills. The proper size material is fed into the third and fourth stages of separation. The third step is a hydraulic separation step in which the heavier, iron-rich particles sink in relatively still pools of water, and the low-iron content particles are caused to overflow as tailings.

From this hydroseparation step, the iron-rich portion of the material is fed into finisher magnetic separators, the fourth separation step. The iron-rich material is then pumped to another step of separation by particle size. The large particles are fed into the third stage of grinding, a ball mill operation, where they are ground to the proper size and returned to the hydroseparation step described above. The proper size particles are fed into the final or fifth stage, another hydroseparation step. The heavier, iron-rich particles settle to the bottom of a rather still pool of water and are pumped out as a final concentrate. The lighter, low iron-bearing particles are caused to flow over the top of the receptacle and are discharged as tailings.

All these grinding-separation steps are performed with solid material suspended in water. The tailings are all joined together from each step of separation and then are transported down a system of troughs, or "launders," as a slurry of approximately 2.7% solids. Reserve has 22 concentrating sections feeding tailings by gravity through two main launders to the shore of Lake Superior. The tailings originally discharged at the shore from each of these two launders have formed a beach or delta. The very coarse fraction settles first to form this beach. The finer fraction of tailings flows across this beach and enters the lake as a slurry of approximately 1.5% solids. This tailings slurry then forms a heavy density current which generally flows toward the

bottom carrying the suspended particles with it.

The concentrate is filtered to 10% to 11% moisture, and conveyed to the pelletizing plant. Here the concentrate is rolled into green pellets of about $\frac{3}{8}$ " diameter with the use of bentonite as a cohesive agent. They are hardened by heating to approximately 2,350° F. Pellets are then placed into pellet storage or loaded into ore boats.

The ore body at Babbitt is located on the Laurentian Divide with the land area to the north of the mine lying in the Hudson Bay drainage area and the land to the south of the mine lying in the Lake Superior drainage area.

At the Silver Bay plant, 2,062,500 tons of water are required for each day's production of pellets. Water is used, not consumed, in the process and then is returned to Lake Superior in the tailings slurry.

B. Mineralogy

Dr. Gunderson in his work on the metamorphosed Biwabik Iron Formation of the Eastern Mesabi District, in which Reserve's Peter Mitchell Pit is located, reported that cummingtonite-grunerite (Mg_1Fe) $Si_8O_{22}(OH)_2$, is the most abundant silicate which occurs in almost all of the submembers of the metamorphosed iron formation. The most abundant variety of cummingtonite-grunerite, although not as abundant in the eastern end of the range as it is in the western, is the typically fine to medium grained, prismatic to acicular¹⁰ grunerite.

Next to magnetite and quartz, cummingtonite-grunerite is generally the most abundant mineral throughout the iron formation on the East Mesabi, ex-

cept, of course, where other metamorphic silicates have already developed. In many parts of the upper slaty and cherty, where Reserve mines, cummingtonite-grunerite commonly exceeds 60% of the rock.

These general findings have been confirmed by witnesses for both sides during the trial. While the percentages may be contested, and will be dealt with later, the following witnesses identified amphiboles¹¹ in the cummingtonite-grunerite series: Drs. Kramer and Stout in pit samples; Dr. Stout in mill samples; Dr. Krause in the tailings and stack dust from the pelletizer; Mr. Johnson in pelletizer dust and tailings; and Dr. Cook and Dr. Langer in the tailings.

Reserve's Exhibit 92B, used not only to indicate the presence of minerals, but also their relative abundance, indicates at least 31% amphibole in the initial concentrating and pelletizing step—rod mill feed. Using this figure, this equals 1227.60 L.T.P.H. (long tons per hour) of amphiboles.

It was conceded by defendant Reserve that approximately 26% of the deposit in the Peter Mitchell Pit is amphibole mineral in the cummingtonite-grunerite series.

One of the issues in this case is whether or not the amphibole minerals mined in the Peter Mitchell Pit are "identical to" or "similar to" amosite asbestos. It must be noted that asbestos is a commercial term that has no independent mineralogical or geological significance.¹² Amosite too, is a trade name and a non-mineralogical term, for certain fibrous minerals in the cummingtonite-grunerite range that have commercial importance. The name was derived from a certain mine in South

10. Like a needle in shape, slender and pointed.

11. A group of minerals with essentially alike crystal structures involving a silicate chain $[OH(Si_4O_{11})N]$ and generally containing three groups of metal ions: sodium or calcium, iron or magnesium or manganese, and silicon or aluminum. The general formula being $A_2B_5(SiAl)_8O_{22}(OH)_2$.

12. Asbestos is a generic term for a number of hydrated silicates that, when crushed or processed, separate into flexible fibers made up of fibrils. The serpentine mineral, chrysotile and the amphiboles, actinolite, amosite, anthophyllite, crocidolite, and tremolite are all used commercially as asbestos.

Africa. Amosite does not indicate a specific mineral composition; it is a range of mineral compositions with a range in bulk chemistry. (U.S. Exhibit 169)

Reserve knew as early as 1960 that the Peter Mitchell Pit contained "asbestos." Reserve witness Dr. Gunderson testified that he had analyzed drill core samples sent to him by Reserve and had reported to Reserve on July 1, 1960 that the analysis showed the presence of asbestos. This particular material was the commercial type asbestos.

Generally, it can be said that cummingtonite-grunerite is a series of silicate amphiboles that vary in their iron to iron plus magnesium ratio, the higher iron percentage being termed grunerite although the whole range is generally called cummingtonite. Within this range lies a sub-range that in some areas is identical to the commercial material called amosite. Therefore, while not all hand-picked samples of cummingtonite-grunerite will be identical to amosite in chemical composition, it has been proven that a part of the material has the precise iron to iron plus magnesium ratios of amosite. When one considers the fact that Reserve's tailings will be representative of the whole cummingtonite-grunerite series, a large portion of the tailings will have a chemistry identical to or similar to amosite.

Dr. Cornelius S. Hurlbut, a Reserve witness, admitted that cummingtonite-grunerite from Reserve Mining Company and amosite from South Africa were chemically identical while being physically different.¹³ He also stated that the unit cell of cummingtonite-grunerite from Reserve and the unit cell of amosite would be substantially identical. Dr. Zussman, another Reserve witness, agreed with the unit cells being identical with the only distinction being that the

single unit cell of cummingtonite would be smaller.

There were two differences pointed out by Dr. Hurlbut between cummingtonite-grunerite and amosite: refractive index and angle of extinction. While this may be true when the two are in groups of crystals, a single crystal of cummingtonite-grunerite would have the same refractive index and angle of extinction as a single crystal of amosite. In addition, it has no probative value either way since no evidence has been introduced that says either one of these characteristics has any particular biological or physiological significance.

Cummingtonite-grunerite and amosite have overlapping chemistries that are identical in some cases. The morphology of the two minerals is so similar that numerous witnesses could not distinguish them one from the other. Electron diffraction patterns from the two are similar with the phenomena of "streaking" being found in both. X-ray diffraction and infrared spectroscopy give identical results in both cases. Scientists for both sides have found that cummingtonite-grunerite and amosite have in most instances similar morphology, crystallography and chemistry and are, therefore, indistinguishable.

The Court has found that cummingtonite-grunerite and amosite are similar and in some cases identical. The next question is whether some part of tailings from Reserve are similar or identical to amosite fibers (the known human carcinogen). Several witnesses for both sides could not distinguish between amosite fibers and fibers discharged by Reserve Mining based on morphology alone. This Court after many months of expert testimony and after personally studying a great number of transmission electron microscope (T.E.M.) photographs feels itself knowledgeable on the

13. Defendant attempted to point out myriad differences between a crude taconite rock and a block of amosite such as color, specific gravity, tensile strength, etc. Since the size fraction that is under consideration is well below that visible to the naked eye and

since it is not crude taconite we are interested in but liberated cummingtonite-grunerite, the differences are irrelevant and testimony thereon merely serves to confuse the issue.

subject of distinction based on morphology alone; and no one, to the Court's satisfaction, could point to any distinguishing characteristics.

As to crystallography, U.S. Exhibit 171 shows an infrared presentation comparing cummingtonite-grunerite from Reserve to amosite from Johns Manville. The patterns are identical in all significant respects. Infrared spectroscopy is one indicator of crystal structure. When one compares U.S. Exhibit 28 which is an x-ray pattern for amosite and U.S. Exhibit 6 which are patterns of water with taconite tailings added, one again sees patterns that are identical in all significant respects. Reserve's own witnesses, David Pytynia for example, testified that on the basis of the electron diffraction pattern amosite and cummingtonite-grunerite from Reserve are indistinguishable.

The testimony of Dr. Arthur M. Langer is particularly enlightening on the chemistry. Dr. Langer analyzed tailings from Reserve using the three methods required by the consensus of the experts: morphology, crystallography and chemistry. He, like many others, found them similar or identical on the first two bases. It is in this third category that his analysis was more definitive than that done by any other investigator. Analyzing tailings and standards for amosite in terms of their five basic elements: silicon, iron, manganese, calcium and aluminum; Dr. Langer found that tailings contain particles of cummingtonite-grunerite. And of these particles, a percentage were chemically within the amosite range. This procedure was duplicated with air sample materials with similar results.

At this point, the Court has made no finding as to the relative abundance of cummingtonite-grunerite and amosite in the air and water discharge of Reserve Mining Co. It is sufficient to say that in Reserve's discharge into both the air

and water there are fibers within the cummingtonite-grunerite range of fibrous amphiboles and within this number there are fibers that have the identical morphology, crystallography and chemistry as amosite asbestos, a known human carcinogen.

C. *Cummingtonite as a Tracer*

In determining the quantity of suspended solids deposited into Lake Superior, Reserve has in the past relied on a number of different figures depending on the forum they were in. The most consistent figure, and the figure used in the answer to the plaintiffs' interrogatories in this case is 60,000 long tons or about 67,000 short tons on the average day. The plant has discharged as much as 64,800 long tons¹⁴ (72,576 short tons) in one day but this is the outside capacity of the plant. In the litigation, Reserve has chosen a lesser figure as the average discharge per day. And, in fact, it is the lesser figure that Reserve uses in its tailings inventory, which purportedly accounts for 99.6% of all of the tailings ever discharged. These varying estimates have caused the Court considerable difficulty. For the purposes of this litigation, it is the Court's conclusion that the credible evidence supports the claim of the plaintiffs that the average daily discharge is about 67,000 short tons per day. However, this figure is not of great importance. Even assuming the lower figure urged by Reserve which is 55,000 long tons (60,500 short tons) the Court is dealing with an extremely large discharge. To get some idea of the immense size of Reserve's operations and the lake discharge, it should be compared with the total amount of solids which naturally enter all of Lake Superior from streams and shore erosion each day which is approximately 12,000¹⁵ tons per day. Even if the Court were to adopt the figure opted for by Reserve during this litigation, Reserve's contribution to the suspended

14. One long ton equals 2,240 pounds. All references to tons will be references to short tons (2,000 pounds) unless otherwise designated.

15. Plus or minus 6,000 tons.

solid concentration in Lake Superior would be five to six times larger than the suspended solids entering the Lake from all of its natural sources. Clearly, Reserve's discharge is the singularly most significant input of suspended solids into Lake Superior. Furthermore, the thrust of the public health claims are aimed at the small fibers contained in Reserve's discharge. Therefore, it is important to note that of the natural sources of solids entering Lake Superior only 640 to 1,300 tons of such solids are finer than five microns whereas some 3,500 to 5,800 tons of Reserve's discharge contain particles that are finer than five microns.

Approximately 44% of the total tailings discharged into Lake Superior are made up of amphibole material of which 50 to 70% is in the cummingtonite-grunerite series. The per cent amphibole increases as the tailings are ground finer. Similarly, the number of fibers increases as the tailings are more finely ground.

In tracing the migration of the particles from Reserve's discharge, the plaintiffs devised a procedure where they would analyze a sample of the lake water or bottom sediment by x-ray diffraction. Upon identifying the element cummingtonite, a principal element in Reserve's discharge, they would conclude that the sample contained tailings from Reserve's discharge. Upon quantifying the amount of cummingtonite present in the sample, it was possible to determine the quantity of tailings from the discharge that was present. Obviously, since cummingtonite was used as a tracer, a basic assumption behind this procedure was that cummingtonite in identifiable quantities was not present in the lake from sources other than Reserve's discharge. This assumption was vigorously, although ineffectively, challenged by Reserve, which argued that cummingtonite enters into the lake from a variety of

natural sources, and hence was an inaccurate tracer for Reserve's discharge.

The assumption that cummingtonite in identifiable quantities does not enter the lake from natural sources is consistent with the geological make-up of the area. Substantially all of the natural cummingtonite in this area is found in the areas of highly metamorphosed rock. There are only four iron formations in the area in which cummingtonite-grunerite might be found. They include the Mesabi, Gogebic, Gunflint and Marquette ranges. These areas in the Gunflint Range and in the Marquette Range do not drain into Lake Superior. The drainage areas from the Mesabi and Gogebic Ranges do lead to Lake Superior but it is unlikely that significant quantities of cummingtonite-grunerite from these areas ever reach the lake, in that the particles would have to travel significant distances through terrain characterized by flat, swampy land, ponds and dams.

Additionally, there may be small pockets or traces of amphiboles in the cummingtonite-grunerite series found in the glacial till.¹⁶ However, at the very most, only .5% of the total till could be comprised of cummingtonite-grunerite. Cummingtonite-grunerite has never been found to occur in unconsolidated sediments anywhere in the world. It can be liberated from its host rock naturally by a process of weathering, but this is an extremely slow process and does not amount to significant quantities of the minerals being freed. Furthermore, that part of the till that is most readily transported by the rivers and streams is the finest or clay size fraction and it would be a rare occurrence for cummingtonite-grunerite to be found in a natural state in the clay size fraction. It would be highly unlikely that substantial quantities of cummingtonite were carried into Lake Superior by the rivers and streams that drain into it.

16. The till is comprised of the material which is deposited from the glacial ice directly. It is unsorted material which contains coarse materials, pebbles and boulders, intermediate

size materials such as silt and sand, and very finely ground up rock flour in the clay size fraction.

The plaintiffs have collected suspended sediment from over fifty Lake Superior tributaries, including all of the streams between Duluth and Silver Bay. Many of the streams were sampled twice and all were sampled at high flow when there would be a larger amount of suspended sediment present in the stream. The samples were analyzed by x-ray diffraction and only one, the Montreal River, contained cummingtonite-grunerite in detectable quantities. Furthermore, Mr. Stewart, a witness for the United States examined samples from the Beaver, Stewart, Baptism, and St. Louis Rivers which lie between Silver Bay and Duluth by electron microscope and found no amphibole fibers of any kind present.¹⁷

Reserve also did a study in which they analyzed by x-ray diffraction many samples from the tributaries entering into Lake Superior. It was the conclusion of Reserve's expert witness that the studies revealed the presence of cummingtonite-grunerite in 60 tributaries emptying into the lake. However, when exposed to extensive cross examination during which the original graphs were re-examined in Court, it became clear that the criteria used for identifying cummingtonite-grunerite in this study was highly subjective with bias entering into the determination. Therefore, the Court, as trier of fact, cannot give these particular results much weight.¹⁸

Even if the Court were to accept the results of Reserve's study, it would prove only that cummingtonite-grunerite enters into the lake from the rivers and streams in barely detectable quantities. Once in the lake, these small quantities of cummingtonite-grunerite would become even more diluted so as to become undetectable in the Lake itself. In light of the vast quantities of cummingtonite-grunerite deposited in the lake by Reserve it can safely be said that where cummingtonite-grunerite is found in detectable quantities in the lake, that its source is Reserve's operation.

This finding is consistent with the testimony that cummingtonite-grunerite is not present in sediment from the bottom of the lake that pre-date Reserve's operations. If detectable amounts of cummingtonite-grunerite entered the lake from natural sources, it should have been present in core samples from the bottom of the lake. Secondly, the analysis of bottom sediments from Lake Superior show a continuous layer of cummingtonite-grunerite stretching from Reserve's discharge towards Duluth becoming thinner as it approaches Duluth. The analyses of surface water samples from the North Shore show that amphibole peak heights declined as the sampling moved from Silver Bay toward Duluth. In a similar vein the analyses of surface water samples from the North Shore show that the number of samples without detectable amphibole in general, cummingtonite-grunerite in particular, increased as time passed after Reserve's plant was closed for maintenance. Finally, the plaintiffs analyzed historical samples of intake water of the Duluth Water Supply from the Lakewood Pumping Station. The samples were taken during the periods 1939-1940, 1949-1950, and 1964-1965, and preserved in small vials. After treating the samples to make them more sensitive to an analysis for cummingtonite-grunerite, the samples were analyzed. No cummingtonite-grunerite was detected in the samples collected prior to Reserve's operations although those samples which were taken after Reserve began its operations showed positive indications of cummingtonite-grunerite.¹⁹

crosscopists had the opportunity to analyze stream sediments but no evidence of positive results was offered.

17. Similarly a lack of detectable amphibole fibers were reported by Clayton and Associates, who performed electron microscopy studies on the Knife, Manitou, St. Louis and Lester Rivers. The study was conducted for Reserve.

18. It should also be noted that during the course of the trial Reserve's electron mi-

19. Reserve's claim that cummingtonite-grunerite might have been present in the older samples, but that it dissolved over the years is not consistent with the evidence taken as a whole, which indicates that cummingtonite-

The conclusion is clear that cummingtonite-grunerite in detectable quantities is generally not deposited into Lake Superior from natural sources. The Court finds that where cummingtonite-grunerite is found in the Western Arm of Lake Superior in detectable quantities, it can be traced to Reserve's discharge.

D. *Transportation of Discharged Tailings*

Reserve dumps 67,000 tons of tailings waste into Lake Superior each day. Thirty to forty per cent of the particles therein are less than 45 microns (a micron is 0.000039 inches); five to eight per cent are less than five microns; and two per cent are less than two microns. To put this into terms that can be understood more readily, let us assume, for the sake of an illustration only, that all discharged particles are spherical with a five micron diameter. If this were true, Reserve would be dumping 1.5×10^{19} particles in Lake Superior each day (15,000,000,000,000,000,000).

Reserve's method of discharging these solids is through a system of troughs or launders as a slurry of 2.7% solids. This creates what is known as a "density current" which is a gravity-driven current that results from a portion of the fluid in a system being more dense than the surrounding fluid. The force of gravity pulls the heavier fluid downward, entraining the surrounding particles therein. This is the process that Reserve claims to be efficient in depositing its waste in a quiescent state on the Lake floor in an area called the Great Trough. It is the finding of this Court that although the existence of the heavy density current is a fact, there are a number of physical phenomena working both on the density current and the tailings after they escape the force of the current that precludes it from being effective. The following is a list of those phenomena: prevailing currents, the presence of thermoclines, deep currents,

grunerite may dissolve in water but that it is a slow process. Only a small portion could dissolve in a 30-40 year period. If cumming-

wind action, internal wave action, upwelling, wave action, slumping, and vertical mixing.

It is agreed by both sides that the prevailing currents in the western arm of Lake Superior are from the northeast to the southwest, from Silver Bay toward Duluth, and then around to the northeast along the Wisconsin side. These are of sufficient intensity to affect any particles in suspension in the area in which they operate.

A major contributing factor to the inefficiency of the density current is the presence of thermoclines. A thermocline is a zone of water where the change in temperature is great with respect to change in depth. A concomitant density difference is also present. This is a naturally occurring phenomenon that is common in all large bodies of water. It was proven to the Court by plaintiff's witness Mr. Gerard that such thermoclines exist in this area of Lake Superior and effectively peels off a portion of the density current as it goes down the delta slope and through the thermocline. This phenomenon is more pronounced during the winter thermocline period since the thermocline is then deeper in the lake and the density current has less force to overcome it. The effect of this is to free a portion of the tailings entrained in the density current and suspend that portion above the thermocline layer. Materials in the area directly above the thermocline are more likely to be affected by the air-sea interface forces and to be moved by the horizontal prevailing currents because of the less dense nature of the water and because the currents are strongest in the first one hundred feet depth of the lake.

The often sighted "green water" phenomenon, one instance of which was proven in great detail by the plaintiff, is consistent with the shearing off of tailings by the thermocline. Great quantities of light reflective tailings then ap-

tonite-grunerite occurred in the lake naturally in detectable quantities, it should have been detected in these historical water samples.

pear in the surface water over many square miles of Lake, giving the green appearance. These particles are then transported throughout the lake, towards Duluth and Wisconsin, by the normal surface currents and eventually can be found as far as the state waters of Michigan.

The density current is a force to a depth of 300 to 500 feet during winter thermocline and lower during the summer. At the point where it loses its force, the tailings spread out and form a nepheloid layer that can be as large as 37 miles wide, 3 miles long and 100 to 300 feet in height. A nepheloid layer is an area of turbid water which is found within another body of water. Reserve's witness Dr. Rogotski testified that a current of 4 cm./sec. would be sufficient to move particles above the nepheloid layer. Reserve's witness Mr. Vaplon testified to average current speeds in that area of 8.8 cm./sec. with a maximum being measured by Reserve of 27.8 cm./sec. Internal wave action, another common event in large bodies of water, is also of sufficient strength in this area to move these small particles in suspension.

The density current influenced by the earth's rotation turns to the right and diagonally descends to deeper waters along the western arm of Lake Superior. This current entrains other waters and in so doing measurably increases the natural currents which go down the western side of the lake. This major current heading in a southwesterly direction climbs up the edge of the deep trough to Duluth. Portions of the current follow the contours of the southern end of the lake up the Wisconsin shore toward Michigan.

There is yet another phenomenon that leads to the ineffectiveness of the density current to settle tailings on the floor of Lake Superior. During the spring and fall, the winter and summer thermoclines break up. To use the fall period as an example, the lake at that time is layered with a thermocline separating

the warm water from the deeper essentially isothermal cold water. At some point the water nearer the surface reaches four degrees, the densest water temperature for fresh water, and at that point there is no thermocline and nothing to inhibit the complete deep mixing of the lake. At that time there is a complete turbulent mix. Even a little wind or wave action can have an effect all the way to the bottom. At this time there is no retarded vertical movement due to density differences. In effect the tailings particles that do not otherwise mix before being carried down to the bottom of the lake are now free to be carried upward by wind or wave action, then in the direction of the prevailing currents.

A final phenomena that destroys the Reserve theory that the density current places the tailings on the lake floor is the phenomenon of the wave action on the delta slope and the fact of the slumping of the delta. Both of these cause the material that has been deposited on the delta slope to be resuspended in water and therefore subject to the prevailing currents.

When all these phenomena are considered, especially in light of the fact that the particles that are of critical importance are those in the less than five micron size range and tending therefore to remain in suspension, the allegation of Reserve that the density current is effective is erroneous. Large numbers of particles are not caught up by the density current, are sheared off of it and remain in suspension, or are deposited and resuspended. The currents in the lake at or around Reserve are not only of sufficient intensity to move suspended particles many miles but also are of sufficient intensity to resuspend sediment on the delta slope.

In the Reserve situation a convenient check is provided on the accuracy of the preceding statements. If all the statements are correct tailings should be found outside of the area in which Reserve claims they are. Using cummingtonite as a tracer, a practice heretofore

adopted, one plaintiff's witness confirmed the presence of tailings in an area in excess of 600 square miles near the bottom of the western arm; in the public water supplies of Beaver Bay, Two Harbors, Silver Bay, Duluth and Superior, Wisconsin, all of which are to the southwest of the Reserve discharge; and in the water and sediment of Wisconsin and Michigan. Reserve itself admits to depositing tailings over 1,058 square miles of Lake Superior.

Reserve further attempted to prove the effectiveness of the density current as a discharge device by alleging that in an area of 1,058 square miles it could account for 99.6% of the tailings discharged since the commencement of its operations. There are two egregious weaknesses in this attempted proof. First, for the sake of argument, let us take Reserve's inventory as true. Even if it is, the .4% that is unaccounted for is equal to 268 tons of tailings missing every day. Since the larger particles will settle faster (Stoke's Law),²⁰ it is reasonable to assume that the smaller (more dangerous) particles will be the ones escaping.

The second weakness is that the Reserve witness who performed and supervised the inventory operation admitted that there was insufficient data on which to base an estimate of error margin. It is conceded that some error must be present but it is not known what the range of error might be. Following a line of reasoning proffered by an attorney for the plaintiff, he admitted that it led to the conclusion of an error factor of plus or minus 15% (10,050 tons/day). A witness for the plaintiffs

testified that the inventory had an inherent error of plus or minus 10% (6,700 tons/day). Neither estimate is very useful since the data is too scanty to determine the range of error. About all that can be said about this line of proof is that it is so weak as to be nearly useless. The margin of error could be so large it would prohibit any utilization of the inventory. The weakness of the inventory was underscored by the comparison of the 1970 and 1972 tailings inventory. Either the inventories were grossly erroneous (as this Court has decided) or in two years the area covered by tailings had increased from 650 square miles to 1,058 square miles—a 38% increase in 12% of the time the plant had been in operation.

By traveling over the lake and seeking out the perimeter of the tailings deposit the defendants seem to say that it is acceptable to place the tailings anywhere so long as most of them can be found and accounted for. The only thing that can be said of the "inventory" is that a goodly share of the material settles eventually. It leaves unaccounted some 97,820 tons per year plus or minus 9,782 tons. With this fact known, it is reasonable to assume that the actual area of Lake Superior despoiled by the waste from Reserve is over 2,000 square miles, or an area approximately the size of the State of Delaware.

Defendants made yet another attempt to refute the plaintiffs' case on transport by offering into evidence their 1972 Near Shore Survey. Through this they hoped to show that there was no correlation between tailings and the green water²¹ in the lake or tailings and the

20. The force required to move a sphere through a given viscous fluid at a low uniform velocity is directly proportional to the velocity and radius of the sphere.

21. As to the question of green water, the evidence proves that the presence of the fine fraction of the tailings in suspension, in conjunction with the sun's rays, is a cause of the phenomenon. This fact was determined by Judge Eckman in the state court case when he made the following finding of fact:

29. Appellant's discharge of tailings into Lake Superior has had a measurable effect upon Lake Superior and the use thereof in regard to:

(1) The aesthetic enjoyment of the Lake by the increase of the "green water phenomenon" both within and without the zone of discharge as described in the Permits.

The fact of the enhancement of the green water effect by the Reserve tailings was ad-

turbidity found in the Lake. However, under cross examination, Mr. Haley was forced to admit three factors that intentionally or unintentionally biased their data: sampling or failing to sample when the occurrence or non-occurrence of a heavy rain would affect the turbidity; failing to sample during known occurrences of green water; and failing to admit obvious correlations. As to the first two, the lack of a predetermined sampling schedule opens up the whole survey to a strong question of bias. As to the third, plaintiffs counsel, using the same data, was able to point out high correlations between the presence of tailings and both green water and turbidity. Mr. Haley admitted in response to the Court's question that by using the methods he was using in sampling the waters of Lake Superior, one would properly hypothecate the proposition that every lake should have a discharge of this kind in order to clarify the waters.

II.

In dealing with the possible health effect of Reserve's discharge, the parties, with some help from the Court, were able to produce in one form or another evidence from nearly all of the experts in the world on the subject. Plaintiffs claim that Reserve's discharge into the air and water substantially endangers the lives of those exposed. The defenses raised by Reserve centered around several key issues. Initially it was claimed that Reserve's discharge settled on the bottom of the lake and had no effect on the water supplies downstream from the plant. Secondly it was argued that fibers emitted from Reserve's discharge were distinct from those fibers that

mitted by Reserve's chief technical witness Mr. Kenneth Haley.

While the concern for the decrease in the aesthetic beauty of the lake pales in comparison to the concern for the health of the population of the North Shore area, the testimony on the green water shows the transport of the particles to the water intakes of a number of North Shore communities.

have been associated with substantial health problems elsewhere. Both of these contentions were not supported by the evidence and were discussed previously in the opinion. Defendants further maintained that:

1) The length of the fibers emitted from Reserve's operation were too short to create any public health problem.

2) The level of exposure to the people of Silver Bay and surrounding communities who inhaled fibers from Reserve's discharge, as well as the level of exposure to those downstream from the discharge in the water who ingested fibers from Reserve's discharge, was insufficient to create any health problems.

3) No health problem could be associated with the ingestion of these fibers.²²

In this section, the Court will deal with these issues.

A. *Adverse Health Effects of Asbestos Exposure*

[6] Dr. Irving Selikoff, currently Professor of Medicine and Director of the Environmental Laboratory at the Mount Sinai School of Medicine in New York, and one of the world's foremost experts on the health effects of asbestos fibers, traced the history of scientific research in the field of asbestos-related diseases beginning in 1924 when Dr. Cook discovered asbestosis, a disease which involved diffuse scarring or fibrosis of the lung. The scientific and medical world has been slow to act in the area of asbestos-related diseases and it was only recently that intensive efforts were made to study the question. Perhaps the main reason for the general tardiness of the medical and scientific

Satellite photographs of the green water in the western arm of the lake show the widespread dispersion of the tailings and also the phenomenon of upwelling.

22. Obviously this claim could serve as a defense only to the claim that the discharge into the water created a public health problem and does not speak to the problem created by the air discharge.

community to recognize the real dangers involved in asbestos exposure is the fact that the various diseases associated with such exposure are not apparent until 20 to 30 or 45 years after the initial exposure. Dr. Sluis-Cremer in South Africa found that among white amosite miners x-ray abnormalities of the lung did not appear until 15 or more years after onset of exposure. This long latency period was confirmed in Dr. Selikoff's own study. Seven hundred and twenty-five asbestos insulation workers were studied by Dr. Selikoff. Of those who had less than 20 years of exposure, most had normal x-rays. However, after 20 years had passed from the onset of exposure, most had abnormal x-rays. Further it was found that the pleural scarring and calcification and scarring also occurred mainly after 20 years.

Epidemiological studies were conducted by Dr. Selikoff together with Dr. Hammond on two cohorts of asbestos insulation workers; New York-New Jersey amosite asbestos insulation workers who were followed from January 1, 1943 to December 31, 1971 and 17,800 insulation workers in the United States and Canada who were followed from January 1, 1967 to December 31, 1971. After calculating expected death rates based on age and specific death-rate data of the United States National Office of Vital Statistics and comparing them with the actual death rates of the group studied, the results were startling. In the New Jersey plant one-third of the men had worked for less than three months before quitting; one-third, from three to eleven months; and one-third for one year or more. Of 278 men who worked less than three months, there should have been 3.5 deaths from lung cancer but 13 had occurred as of the time of the study. Of 321 men who worked from three to eleven months, there should have been three or four deaths from lung cancer, but 15 occurred. Of the 333 men who worked for more than one year, there should have been 4

deaths, but 45 occurred. Of the 932 workers, there should have been 50 cancers; 143 occurred.

The epidemiological study of insulation workers with a base of 17,800 men was analyzed in terms of whether the men had reached 20 years from first exposure. There was no great difference between expected deaths and observed deaths prior to the lapse of 20 years: 179 expected and 211 occurred. However, after 20 years, the differences did become significant with 37 deaths of lung cancer expected and 191 occurring; 23 deaths from gastrointestinal cancer expected and 80 occurring. An additional 73 deaths of asbestosis and 72 of mesothelioma (a fatal disease peculiar to asbestos exposure) occurred where none would be expected in an unexposed population. Forty-five to fifty per cent of asbestos workers die of cancer, whereas in the general population 15 to 20 per cent die of cancer.

Unfortunately the environmental exposure to asbestos fibers has been equally gruesome. In Finland, Dr. Kiviluoto reported 500 cases of pleural calcification in a county where anthophyllite asbestos was mined and milled and no such cases in a similar cohort of several thousand people in another county. Incidences of mesothelioma in one area of South Africa where crocidolite asbestos was produced were also reported. Furthermore, exposure to asbestos by simply living in the household of an asbestos worker has been associated directly with disease.

Mesothelioma in the Patterson, New Jersey plant was not limited to those occupationally exposed to amosite asbestos. The office manager died of mesothelioma as did the general manager. Likewise an engineer and the chief engineer's daughter who used to handle asbestos products brought home by her father, died of mesothelioma.

Some of these exposures have been markedly brief. Dr. Selikoff examined a case of mesothelioma in a woman who had worked in a shipyard²³ and had

23. Ships use asbestos extensively for insulation purposes.

been exposed to asbestos for a period of six weeks, 28 years before. A 30 year old man who died of mesothelioma and was found on biopsy to have asbestos in his lungs, had lived in the neighborhood of the Brooklyn Navy Yard as a child. Seventy-four cases of mesothelioma were investigated by Dr. Newhouse. Thirty-one had worked directly with asbestos. Of the 45 who had not, nine had lived with someone who worked with asbestos and 11 had lived within one-half mile of an asbestos plant. Dr. Lieben studied 42 cases of mesothelioma. Of these, 20 had occupational exposure to asbestos. Three had lived in the household of an asbestos worker and eight had lived within one-half mile of an asbestos plant. The evidence is clear that it is not necessary to have direct occupational exposure to asbestos to contract a fatal asbestos related disease.

Dr. Selikoff testified to a potentiating or multiplicative effect of asbestos fibers. His studies showed that the carcinogenic effect of asbestos is greatly multiplied by exposure to a co-carcinogen, cigarette smoking for example. An asbestos worker who smokes has a 92 times greater risk of lung cancer than a man the same age who neither smokes nor works with asbestos.

It can be concluded from the testimony of Dr. Selikoff, whom the Court found to be a highly credible witness and whose testimony stands unimpeached,²⁴ that:

1) Exposure to asbestos fibers can and does produce significant and detrimental changes in the human body.²⁵

2) Although the heavier the exposure the more likelihood there is of contracting asbestosis, even low level exposure to asbestos fibers can and does produce detrimental changes in the human body.

24. Dr. Selikoff's testimony was largely corroborated by the other witnesses in the case including Drs. Wagner, Rankin, Brown and to a large extent Davis and Wright.

25. The Minnesota Department of Public Health has from time to time during the trial issued public statements which in a large part coincided with the defendants' version of the health risk.

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Frequently where there are asbestos-produced cancers, there is no indication of asbestosis.

3) There is no known safe limit of exposure, below which it can be said that no detriment to the body will result.

4) The detrimental changes produced by exposure to asbestos will not be manifested in a detectable way until 20 to 30 years after the initial exposure.

Throughout the trial, much was made of the issue of whether or not Reserve's discharge contained fibers suitable for producing commercial asbestos. It should be emphasized that whether the fibers are classified as commercial asbestos or not is really not important. As was noted previously, asbestos is a generic term for a number of hydrated silicates that, when crushed or processed, separate into flexible fibers made up of fibrils. A serpentine mineral, chrysotile and the amphiboles, amosite, crocidolite, are used commercially as asbestos. Actinolite, tremolite and anthophyllite have additional commercial uses. Exposure to each of the minerals listed above can produce cancer in man. The cancers appear in various areas of the body, including the larynx, lung, pleura, peritoneum, and gastro-intestinal tract. Exposure to asbestos can result in mesothelioma, a diffuse, invariably fatal cancer of the linings of the pleura and the abdomen. It may be that no human tissue is immune to disease caused by exposure to asbestos fibers. Inhalation of asbestos has been shown to cause pathological changes in the chest including diffuse interstitial scarring (fibrosis) of the lung, pleural plaques, and pleural calcification.

Studies to date are insufficient to determine the relative pathogenicity of the different types of fibers used in the pro-

The only testimony submitted by that agency was that of Mr. Coleman, the Assistant Director of Environmental Health of that department. It demonstrated that his projections of one increased death per year due to amphiboles in the water of Duluth was of no help whatsoever. He admitted under cross examination that in a 50 year period that the excess death could range from 50 to 250.

duction of commercial asbestos. Dr. George Wright, a Reserve witness, who also served as a retained consultant to Johns Manville (one of the largest users of asbestos), as late as 1972 was of the opinion that the amphibole fibers were more carcinogenic than chrysotile, which is the primary mineral used in the manufacture of asbestos. In his testimony given at the Occupational Safety and Health Act hearings in 1972, which was considering regulating the asbestos industry, he took the position that amosite (the fibers discharged by Reserve) and crocidolite should be more strictly controlled than chrysotile. In the present trial, as a Reserve witness, Dr. Wright indicated that he has changed his opinion and that amosite and chrysotile are equally dangerous.

In 1971, the National Academy of Sciences Committee on Biological Effects of Atmospheric Pollutants convened a distinguished panel to address the health problems associated with asbestos. After due deliberation, the panel, which included Dr. Selikoff and Dr. Wright as well as Dr. Gross, another Reserve witness, published a report that reached the conclusion that no type of asbestos can be regarded as free from hazard. This conclusion was buttressed by the testimony in the trial and the Court adopts it as a finding of fact.

B. *Fiber Length*

[7] It was argued by Reserve that the fibers in their discharge could not be compared with commercial amosite because the average length of the fibers emitted by Reserve are much shorter than the average length of the fibers used in the production of commercial asbestos. It was Reserve's position that the adverse health history associated with amosite was due to the long fibers and that the shorter fibers were in fact not harmful. In an attempt to establish this point, Reserve relied on several animal studies as well as the occupational standard adopted by the Department of Labor which permitted asbestos contamination in the air up to five fibers per

cubic centimeter, counting only those fibers that were in excess of five microns in length. (This standard is to be reduced to two fibers per cubic centimeter in 1976.) It was argued by Reserve that this was a definitive determination by the Department of Labor that fibers less than five microns in length were not dangerous. The evidence however does not support this claim.

The National Academy of Sciences Panel on Asbestos concluded that there is no body of scientific knowledge which permits the assigning of relative risk factors to fibers less than five microns in length compared with fibers greater than five microns. There have been no epidemiological studies that would shed light on the human experience when exposed only to fibers shorter than five microns or only to fibers longer than five microns. There have been several animal studies attempting to deal with this issue but the results have been inconsistent and inconclusive. To begin with, there are inherent problems in relating the results in animal studies to the human experience. Some substances cause cancer in man which, when given to animals, induce little or no response. Researchers have had particular difficulty inducing disease in animals exposed to asbestos while there is little doubt that human exposure may result in disease. Secondly, it is extremely difficult to separate short fibers from long fibers and, in many of the experiments, there was incomplete separation. Reserve witnesses discussed a number of studies in which animals were exposed to fibers which had been ball milled to shorten the fiber length. The hypothesis put forward by these witnesses was that these experiments supported the theory that at least in animals, the fibers smaller than five microns posed no health threat. However, in other experiments in which ball milling was not done and animals were exposed to fibers shorter than five microns, the results indicated that the shorter fibers were equally dangerous to the health of the animal. The effect which ball milling has on the dis-

ease-producing potential of asbestos fibers is unresolved. The results of the animal experiments are conflicting and as mentioned before may not be analogous to the human experience. Based on the record in this case which reflects the top scientific and medical input in this area today, it cannot be said that the fibers less than five microns in length are more or less dangerous than the larger fibers.

It may well be that the shorter fibers are actually more carcinogenic than the longer fibers. Although long fibers can be ingested, it is the shorter thinner fibers which penetrate most deeply in the lungs. There is presently no explanation of the mechanism by which asbestos is pathogenic, but if it is the surface of the asbestos fiber that is the biologically important locus of activity, then small fibrils would have a greater pathogenic potential for a given total volume because of their greater surface area. In comparing the health history of asbestos manufacturing workers with that of asbestos miners and milling workers, the available evidence indicates that the manufacturing workers, who are generally exposed to shorter fibers than the other groups, have a worse record as to health in general and to mesothelioma in particular. As the fibers are mined and milled, they are broken down into shorter lengths and at the manufacturing stage, due to increased handling of the fibers, the median length of fibers ranges from .9 to 1.4 microns. About 96 to 98% of all such fibers are shorter than 5 microns. Furthermore Dr. Langer testified that most fibers found at the center of the workers' lungs, and nearly all of those fibers found at the periphery, where pleural mesotheliomas occur, are shorter than five microns.

As for the effect of the federal standard for occupational exposure, it was the position of the plaintiffs that the standard was totally inadequate in an occupational setting and irrelevant to the present proceedings which deals with ex-

posure in the community environment. Reserve later took the position that although this standard was not directly controlling, it should be a factor in the Court's decision.

There are substantial differences in the considerations that might go into setting a standard for an occupational setting as opposed to a community setting. In the occupational situation the workers are generally a healthy lot, at least they are healthy enough to go to work; they go to work on their own volition, that is, they are free to seek work elsewhere if the health risk concerns them; they are exposed to the contamination only eight to ten hours a day, usually five to six days a week and from thirty to fifty years of their lives. Contamination in the community exposes the healthy and unhealthy alike to the problems associated with asbestos contamination. The residents in the community lack the ability to make a choice about whether or not they wish to be exposed; they are a captive lot whose only alternative would be to move to another area in the state. Furthermore, they are subjected to contamination 24 hours a day, every day of the year, and their exposure begins at birth, not some twenty years later when they join the work force. It is clear that the occupational standard should not be directly applicable to this proceeding which deals primarily with environmental contamination.

Reserve argues strenuously that the standard, nonetheless should be considered by the Court as a definite determination by the Department of Labor that fibers shorter than five microns pose no health danger to the human body. Dr. Selikoff and Dr. Wagoner, both of whom worked on the Criteria Document on which, in part, the standard was based, testified that the standard based on fibers longer than five microns was established not because of health considerations but because only fibers of such size can be practically and efficiently counted by the laboratories available to

local enforcement agencies.²⁶ Fibers smaller than five microns often have diameters too small to be detected by the standard optical microscope and can only be detected with the aid of electron microscopes. Most laboratories are not equipped with such sophisticated equipment.²⁷ The rationale behind the standard was that by counting the larger fibers there would be some indication of the total number of fibers present in the atmosphere. For every larger fiber observed there are a substantial number of shorter fibers present. Furthermore, there is no evidence that this occupational standard will provide any protection from whatever onslaught of cancerous malignancies associated with asbestos exposure as contrasted to asbestosis which is its basis. Even the evidence that the standard might reduce asbestosis is subject to question.

The standard adopted by the Department of Labor was largely based upon a report of the British Occupational Hygiene Society, which in turn, was founded upon a study of the Turner Brothers Asbestos Company plant in Rochdale England. The study was performed by Dr. John Knox, Medical Director of the Turner Brothers Asbestos Company, and their industrial hygienist, Dr. Holmes. Dr. Knox reported to the Society in 1966 that only about one to two per cent of the workers in the plant who had a lifetime exposure of 100 million fiber years (2 fibers per cubic centimeter each working day for 50 years) had x-ray evidence of asbestosis. Hence, the British Hygiene Society adopted the standard of 2 fibers per cubic centimeter to be applied in occupational settings in England. The Committee made it clear that the standard only applied to the prevention of asbestosis and that there was no

evidence that the standard would prevent cancer. The evidence in the case indicates that a significant number of cancers can develop at exposure levels too low to produce asbestosis. Furthermore, there is some doubt whether or not the standard could even prevent asbestosis. Recent x-rays of the same work force by Dr. Lewinsohn reveal that among the older workers, who had twenty years of exposure, fifty per cent had abnormal x-rays. At present there is no explanation for the contradictory findings but it is entirely possible that the study upon which the British standard was based was faulty and the standard is therefore insufficient. Since the Department of Labor's standard was modeled after the British experience, it too could be insufficient to insure that the workers in the United States are protected from contracting asbestosis. Even if the standard is sufficient to prevent asbestosis, there is no evidence that it provides protection against developing cancerous malignancies.

In this environmental setting, the Court can give no credence to the occupational standard of 2 fibers in excess of 5 microns per cubic centimeter. Not only is the standard based on a study that is subject to serious question, but the standard ignores the fact that exposure to asbestos produces cancer. The Court cannot ignore this.

The Court has fully considered the opinion of the Court of Appeals for the District of Columbia in *Industrial Union Department v. Hodgson*, *supra*, in which they substantially upheld the validity of the questioned regulation setting industrial limits on exposures to asbestos. To the extent that the Court there dealt with the problems addressed in this case, one must recognize the limited role

26. In reviewing the implementation of this standard the United States Court of Appeals for the District of Columbia found in the case of *Industrial Union Department v. Hodgson*, 499 F.2d 467 (No. 72-1713, 1974) that:

Although the size and shape of fibers are relevant to this propensity to cause harm, the count is limited to fibers longer than five microns for practical rather than medi-

cal reasons. The most accurate sampling technique that can feasibly be employed, the membrane filter method, does not measure smaller particles. *Id.* at 478.

27. The evidence in this case indicates that even with an electron microscope, it is extremely difficult to accurately count fibers smaller than five microns.

of the reviewing Court in its considerations of a record which had been made by a Hearing Officer in only four days of testimony. The purpose of the Court was not to actually reach a conclusion as to the various matters, but rather to determine whether or not certain determinations were supported by substantial evidence. They were also to decide whether or not the Secretary "given an essentially legislative task to perform, has carried it out in a manner calculated to negate the dangers of arbitrariness and irrationality in the formulation of rules for general application in the future." At 475 *citing* *Automotive Parts & Accessories Association v. Boyd*, 132 U.S.App.D.C. 200, 407 F.2d 330, 338 (1968).

The scope and the depth of the review of the literature and scientific knowledge in this area which was presented to this Court has not been approached either in the field of science or in law. While in general this Court agrees with the conclusions of the Court of Appeals as it applies to certain of their technical findings concerning asbestos, this Court must, as it has in the final analysis, come to its own conclusions on the medical effects of asbestos. To the extent that this Court's findings might in any way vary from the conclusions of the Court of Appeals of the District of Columbia on any specific of the matter, this Court must conclude that the preponderance of the evidence supports the findings in this opinion.

C. *Threshold Level*

Much testimony was elicited concerning a dose response relationship associated with asbestos exposure. Almost everyone would agree that the heavier the exposure to asbestos the more likelihood there would be of contracting one of the asbestos related diseases. Fur-

thermore, there probably would be a consensus of opinion that there is a level of exposure below which there is no detectable increase in asbestos related diseases—a so-called threshold.²⁸ Unfortunately, no one can state with any authority what this level of exposure is. Some of Reserve's witnesses maintained that the industrial standard of 5 fibers greater than 5 microns per cubic centimeter has a built in safety factor that takes into account the threshold limit as to those people exposed during a normal work day for a normal working career. Unfortunately, the evidence is to the contrary. The Court has previously discussed the deficiencies in the standard promulgated by the Department of Labor.

The evidence discloses that epidemiological studies in several countries have demonstrated an association between diseases and relatively light neighborhood and household exposure to asbestos. Dr. Selikoff testified that he was conducting a clinical study in which he had recently x-rayed 115 people who lived in the households of amosite workers 20 to 30 years ago. Thirty-nine per cent of the people had x-ray abnormalities characteristic of exposure to asbestos. While many fibers ingested or inhaled into the body may pass through the body systems and be expelled, obviously some remain in the body. Carcinogens such as asbestos are stored by the body; their effects are often cumulative and irreversible. Hence, even if it were possible to establish a threshold level, exposure below the threshold may increase the risk of cancer when acting with a co-carcinogen such as cigarette smoke.

Reserve witnesses have cited four epidemiological studies to establish a threshold level at which exposure to asbestos will not cause excess deaths from

28. There is one school of thought in the medical and scientific world to the effect that there is no level of exposure to asbestos, no matter how slight, which is free from the danger of inducing some type of fatal disease.

Reserve has argued that many carcinogens, similar to asbestos, are already present in

the environment. From this they say that the subject population should accept the additional instant risk and suffer the consequences. Cigarettes are a carcinogen but no one would argue that this Court should require every infant in Duluth to inhale cigarette smoke from the day of birth.

at least some kind of cancer.²⁹ None of these studies identifies such a threshold level.

1. Dr. Knox in his study concluded that the reduction of dust exposure to coincide with the occupational standard of two fibers per cubic centimeter substantially reduced the risk of contracting cancer. However, Dr. Knox stated that he was unable to determine the extent of the risk that remained. There were two factors cited by Dr. Knox that precluded him from determining what risk remained at this level of exposure. First of all, several of the death certificates of workers studied linked asbestosis with the cause of death. Certainly if several workers contracted asbestosis at this level of exposure it could not be classified as a safe level of exposure. Secondly, out of the group studied few had worked in the scheduled areas for more than twenty years. As noted by Dr. Knox the risk of lung cancer is relatively small until after twenty years of exposure. Furthermore, the Court finds that similar studies in which Dr. Nicholson participated indicate that the period of observation in the Knox study was of too short a duration to draw conclusive results.

29. Any use of present epidemiological studies must take into account wasted exposure. In this case several epidemiologists in the field have sought to interpolate their results by measuring the lifetime exposure of persons within a cohort who have succumbed to a particular asbestos related disease. However, since there is a twenty to forty-five or more year latency period between the initial exposure and cancer, many people might die of an asbestos related disease before they could die of cancer. Thus the figures on cancer do not take into account those who died of asbestosis and did not live long enough to get cancer. All exposure after that necessary to cause death is wasted on that particular individual. Thus the comparisons in the testimony of Dr. Wright, using studies by Dr. McDonald and Dr. Enterline whereby Dr. Wright concluded that the amount of amphibole in the Duluth water supply was insufficient to cause cancer, must fail. Dr. Wright admitted that he did not know the threshold level below which no cancer would occur. Given lack of knowledge of a threshold level, the twenty or more year latency period be-

The undetermined risk described in Knox's study is precisely the risk that is of particular concern to the Court, and must be ascertained before any threshold level of exposure is determined. Once defined then the Court could determine whether or not it is an acceptable risk. The question of whether or not a risk is an acceptable risk in any given situation must entail the consideration of the consequences that are suffered by that group of persons who are exposed. This is not an exposure to influenza, typhoid, hepatitis, or other distressing but curable ailments. The asbestosis and various cancers associated with asbestos exposure is generally irreversible and often fatal. Furthermore, the risk is a direct risk to human life. As explained in the Court's Memorandum of April 20 at p. 17, the fact that it has been clearly established that the fibers emitted by Reserve have in other situations been found to cause cancer in humans is of great significance. The largest single cohort ever examined was 17,800 asbestos workers scattered throughout the United States. Dr. Selikoff found 356 excess deaths in this group due to cancer of the lung and gastrointestinal tract, mesothelioma and asbestosis. In

tween exposure and onset of disease, imprecise knowledge as to the exposure of those who have succumbed to disease, and imprecise knowledge as to the amount ingested by those who have succumbed to gastrointestinal cancer, one cannot conclude that the levels of asbestos in the Duluth and other North Shore water supplies are insufficient to cause cancer. The mere fact that some persons who have been indirectly exposed to low levels of asbestos in neighborhoods near asbestos plants and homes of asbestos workers have died of mesothelioma, precludes the setting of any level of exposure below which it can be assumed that there is no risk to the populace. It is a fallacy to talk in terms of 30 or 40 years of lifetime exposure and lifetime dose with respect to the people in Duluth, Two Harbors, Beaver Bay and Silver Bay. The cancer which will occur in the future is set in the past—at a time when the exposure was much less than the total exposure will be at the time of death. This is true of asbestos workers and it is true of people living in these communities.

this case we have approximately 200,000 people already exposed although perhaps not to the same degree. When dealing with such a large population even a very small increase in mortality rates would result in many deaths to people who have never benefited from Reserve's profits or payrolls.

2. Dr. Newhouse published a report in which she concluded that based upon 16 years of observation workers in low and moderate exposure groups did not show excess mortality. However, when she was able to update her data in 1973 to cover 25 years of exposure those workers in low and moderate classifications did show a significant excess in deaths by cancer as well as total excess deaths.

3. Dr. Enterline's study is cited as support for the conclusion that there is a threshold level, yet Dr. Enterline found excess deaths from cancer at every level of dust exposure he studied.

4. Dr. J. Corbett McDonald studied chrysotile workers exposed to asbestos in the mining and milling industry. Dr. McDonald's paper cannot be relied upon to establish a threshold level. He effectively compared the death experience of those workers most heavily exposed to asbestos with those workers who experienced lesser exposure to asbestos. Whereas it might be concluded from this study that those with greater exposure had a higher death rate than those with lesser exposure, under no circumstances could this study support the claim that those of lesser exposure suffered no ill consequences from their exposure. In fact, if McDonald's results as to the cancer death rate of those exposed to the asbestos were compared with the cancer death rate of the surrounding communities, a relatively unexposed population, it would show as did the study by Enterline that there was an excess number of deaths by cancer even in the least exposed workers included in the study. Dr. McDonald was retained by Reserve in this case, but unfortunately, was never called to the stand to explain his study.

Furthermore, the dust counts for these studies were based on crude approximations in that no measurements were in fact made. Moreover, the state of the art at present is so limited as indicated by the various studies in this case that man's ability to quantify the amount of particles in the air and water is subject to substantial error. Hence we are faced with the situation where too much exposure to these particles results in fatal disease, and yet nobody knows how much is too much. To put it another way, *there is no known safe level of exposure.*

Without knowing what a safe level of exposure is, to permit the present exposure to continue is nothing more than a gamble with the hopes that the threshold level, if there is one, has not been or will not be reached.

D. *Fiber Counts*

Under the Court's auspices certain studies were conducted in an attempt to quantify the number of fibers found in the air and water around Reserve's discharge. Each side of the law suit designated certain laboratories to conduct the actual counting of fibers and the collection of the samples was done by a Court witness from the Mayo Clinic. The experiment was set up in such a way as to test not only the number of fibers present in the samples but to gauge the intra and inter laboratory accuracy.

Perhaps the most meaningful evidence that was developed by this experiment was that one should be very cautious in accepting as definitive the results of any single investigator who is attempting to define through electron microscopy the levels of fibers in a given air or water sample. It was revealed in the cross examination of witnesses such as Dr. Zussman that every aspect of laboratory technique must be examined before a fair appraisal of results can be made. It was shown to be true by the study of the Court's witnesses that on any given replicated sample the results may vary 10-fold upward or downward from a mean according to the laboratory being

studied. It was also shown that some laboratories were fairly constant in arriving at a result consistent with the mean of all the laboratories. The figures therefore have meaning and are sufficient for this court to make findings. However, these findings rest upon weeks and months of careful investigation into the matter by the Court, and not upon a single fiber count study.

The Court finds, consistent with the Court's study of amphibole fiber concentrations in the water supplies of Beaver Bay, Two Harbors and Duluth, that on the 28th of August, 1973, in the samples analyzed by seven laboratories that the mean fiber concentrations were: 12.5 million fibers per liter in the public water system at Duluth, 21.1 million fibers per liter in the water at Two Harbors, 63 million fibers per liter in the water at Beaver Bay, and 450,000 fibers per liter at Silver Bay. The Court further finds, consistent with Dr. Nicholson's analysis, that Superior, Wisconsin's drinking water has an amphibole fiber level of four million fibers per liter. These fiber counts are consistent with the plaintiffs' view of the case that by a process of entrainment the density current from Reserve's discharge takes most of the solid material in the discharge to or near the bottom of the lake only to surface several miles downstream from the discharge. From there the effect of the discharge diminishes slightly as it moves down the shore to Duluth and Superior. The other evidence in the case indicates that the time in which the samples were taken, late summer, is a time of the year when Reserve's discharge has its least effect on the water downstream from Silver Bay. This is largely due to the summer thermocline which in combination with the heavy density current tends to keep more of the discharge on the bottom of the lake than in the other seasons when the lake is isothermal and there is no thermocline or when the thermocline is located deeper in the water and actually retards the settling of the discharge on the bottom of the lake. In an event, it

can only be concluded that at all times Reserve adds millions of asbestos fibers to every quart of water drunk by every citizen of Duluth, Two Harbors, Beaver Bay, and Superior, Wisconsin at every time of year. These concentrations may exceed one hundred million fibers per liter at certain times of year, notably the spring and fall. Farther away from the discharge, the number of fibers decreases slightly but steadily.

Before considering the question of the number of fibers in the ambient air of Silver Bay, the Court must reiterate and emphasize two facts. The first is that the time constraints placed on all investigators due to the substantial threat to human health and the state of the art under which all investigators operated, give rise to a serious question as to the certainty that the Court can attach to any particular fiber count. Secondly, there is no body of scientific knowledge that has established a safe level for the inhalation of these fibers. Therefore the Court is not called upon to decide what is the actual number of fibers per cubic meter of air in Silver Bay. Rather the Court must, and hereby does, find that there is a significant concentration of asbestos-like fibers in the ambient air as a result of the Reserve operation and these numbers are comparable to those that were found by Dr. Nicholson to have been associated with disease in other environmental situations.

Dr. William J. Nicholson of the Mount Sinai School of Medicine testified to fiber counts made on a number of samples, from a number of sites around the Silver Bay area. For example, from a sample site on a hilltop overlooking the ore loading facility, Dr. Nicholson found two and one-half million amphibole fibers per cubic meter of air. From a sample taken at the top of a smoke stack at Reserve, he found a concentration of 140 million amphibole fibers per cubic meter of air. From a sample taken in an area located south-southwest of the pellet storage area, he calculated 400,000 amphibole fibers per cubic meter of air. These few examples show not only the

presence but give an indication of the wide range of concentrations. The other concentrations found were 3,200,000 amphibole fibers per cubic meter, 11,000,000 and 6,500,000.³⁰

Dr. Jack Zussman, a witness for Reserve, also reported fiber concentrations in the air of Silver Bay. Using Reserve's Exhibit 345 and converting the measurements to fibers per cubic meter so as to make them comparable to Dr. Nicholson's data, his measurements of total fibers ranged from 6,000 fibers per cubic meter to 81,000 fibers per cubic meter. Another Reserve witness Clayton & Assoc. had air counts that ranged from less than 6,100 fibers per cubic meter to 320,000 fibers per cubic meter.

The Court air sampling experiment reported concentrations of amphibole fibers per cubic meter ranging from 1,620 amphibole fibers per cubic meter to 145,200 fibers per cubic meter.

The question arises as to what weight is to be given to the foregoing analyses. As to the Court's air sampling attempt, there were many deficiencies. The major one was that the Court, in its effort to obtain information on inter and intra laboratory variance, also attempted to determine what the amphibole fiber burden was in the ambient air. The experiment, as it turned out, could not supply the latter information. The Court, extremely pressed for time by the substantial public health threat, limited by the capabilities of the laboratories involved, and limited by the very state of the art did not allow sufficient time for the sampling program to run. As a consequence, when the Court's experts chose four sampling periods, it happened that two of them were on or following days of precipitation, days in which the normal fiber load would not be present.³¹ Had the sampling run for a much longer period of time or had the counting laboratories involved been able to handle more samples, the results of these

30. No witness has questioned the hazardous propensities of fibers when inhaled.

chance occurrences would have been minimized by time but even so there is no guaranty that the results would have been dispositive. Instead the Court was left with data that through no one's fault or design was biased. The most that can be gained from the Court air study is the very roughest approximation of fiber levels.

Dr. Zussman's air counts were also flawed. The most damaging flaw was that the method used by Professor Zussman and his associates failed to adequately count the smaller fibers. Plaintiffs' attorney showed Mr. Rickards, a member of the Zussman group, a photomicrograph that Mr. Rickards had previously counted and had concluded that there was only one fiber shorter than three-quarters of a micron. Plaintiffs' attorney then stated that in fact there were five such fibers. Mr. Rickards did not deny that fact. This seemingly small error in counting has a tremendous effect on the results. The second major flaw was that the Zussman group failed to include in their calculations a mathematical correction factor for exceptionally small fibers or for fibers that are blocked out by large particles. This too threw off their counts by a wide range.

Other Reserve fiber counters under cross examination admitted to their utilization of procedures that had the effect of substantially lowering their fiber counts.

The major deficiency in the air samples analyzed by Dr. Nicholson on behalf of the MPCA is that the data is "worst case" data; meaning that the samplers always took their samples directly under the smoke plume at the Reserve plant.

But, as was pointed out earlier, it is not necessary to know the absolute number of fibers per cubic meter of air in Silver Bay. It is sufficient if one knows the number ranges between 1,620 fibers per cubic meter and 140,000,000,

31. The important variable of wind direction as it applied to the direction of the plume was not explored and may have had an effect.

and that any particular count may be off by a factor of ten. One fact, however, cannot be denied. There is a significant burden of amphibole fibers from Reserve's discharge in the air of Silver Bay. A burden that is commensurate with the burden that was found in areas in which there had been a proven health hazard.

Another study was undertaken to try to quantify the fiber load in the area of Reserve's air discharge. This was a study of the snow in the area as a measure of the number of fibers falling on the ground. The measurements were taken in different areas ranging as far away as 46 miles at the National Water Quality Laboratory and 30 miles at Sand Point and Park Point, Wisconsin. Restricting this evidence to an analysis of those areas where the tracer cumingtonite was found, the study shows emissions from Silver Bay being transported in decreasing amounts as you go away from Silver Bay as far as 46 miles. This includes the two sites in Wisconsin. While there were problems with the study insofar as it applied to Michigan the Court will take it as supplementary and corroborative of the other testimony in the case and as evidence of the presence of these fibers in the air as far away as Wisconsin and Duluth.

Under Court auspices, a study of autopsy tissue from certain deceased residents of North Shore Communities and a control group from Houston, Texas was undertaken. Tissue from the liver, gastrointestinal tract, jejunum, small intestine and the colon was gathered and examined by Court witnesses. Seven fibers were found in the tissue examined that could not be explained by contamination. Two amosite fibers were found in Duluth tissue and one was found in Houston tissue. Four tremolite fibers were found, all in Duluth tissue.³² The question is what conclusions can be drawn from this meager information.

In order to answer the foregoing question the weaknesses of the tissue study must be faced. The most obvious deficiency is that due to the time constraints and the limitations of the state of the art, only an extremely small portion of tissue could be examined. The amount looked at could possibly cover the surface of the blunt end of a straight pin.³³ Secondly, the parts of the body that were examined were ones that the Court's witnesses thought would be the places where fibers would be found, not areas in which fibers had been found by other investigators. Thirdly, this was the first attempt to look for fibers in a population that had only environmental exposure. All other tissue studies had been conducted on workers who had had massive doses of asbestos and those studies concentrated on the lung. Science tells us that fibers are found in the lung tissue of industrially exposed people. Science also tells us that people with only an environmental exposure have an increased risk of disease. Science does not yet tell us if or what levels of fibers will be found in tissues other than lung in people with environmental or industrial exposure. Since this comparison has not been made, we do not know what if any significance can be associated with the fibers found in Duluth residents.

With all these weaknesses in mind Dr. Brown did not nor can the Court draw dispositive conclusions from the tissue study. The Court can say that the level of lung tissue burden in the people of Duluth is less than that of an industrially exposed asbestos worker. No study was made of the lungs of the people of Silver Bay. The evidence does show that those living near asbestos plants had an increased rate of disease. Beyond this the Court cannot go. Reserve, in its supplemental findings of fact on this very issue would take the results of this one study as a complete exoneration of their position. This is shortsighted and

32. Reserve's discharge does contain tremolite.

33. It was described as one-two billionth of the total body weight of an individual.

in direct contradiction to the credible evidence. When the lack of definitive results of this study with all its infirmities is put up against the months of epidemiological testimony by the world's leading experts in the field, the weight to be given it is clear.

In the same supplemental findings, the defendants give great weight to two statements made by Dr. Brown on the public health question. The first was to the effect that at present he sees no evidence for an increased incidence of cancer in those communities that could be attributed to asbestos fibers in air or water. The second was that it is impossible to predict on scientific grounds that there will be an increased incidence of cancer in the population of Duluth by virtue of their exposure to asbestiform fibers in the air or water.

Both of these statements must be considered in context and in light of all the other testimony given. As to the first statement, as to no evidence of an increased risk of cancer at present, it must be remembered that such an increase is not to be expected for 20 or 30 years. And even at that time, it may not be so pronounced as to be immediately and drastically apparent. As to the second statement, the distinction between Dr. Brown speaking as a scientist and as a physician must be kept in mind. As a scientist, which means a 95% or 99% certainty before finding a cause-effect relationship, Dr. Brown testified that at present the body of scientific knowledge is not sufficient to predict a cancer increase,³⁴ nor is it sufficient to conclude that there would not be an increase.

But as a physician, with the same studies, testimony and literature in mind, Dr. Brown said that the presence of a known human carcinogen in the environment cannot be tolerated.

And having concluded or having come to the conclusion that I have given

34. Dr. Brown's attention was not drawn to the study discussed in a later section in which

you, the carcinogenicity of asbestos [the Court having ruled that Reserve's discharge is the same as asbestos] I can come to no conclusion, sir other than that the fibers should not be present in the drinking water of the people of the North Shore.

The same view was expressed on the question of asbestos fibers in the air. But the presence of a known human carcinogen, sir, is in my view a cause for concern, and if there are means for removing the human carcinogen from the environment, that should be done.

After discussing the Court tissue study and as a summary statement, Dr. Brown said:

As a physician, I take the view that I cannot consider, with equanimity, the fact that a known human carcinogen is in the environment. If I knew more about that human carcinogen, if I knew what a safe level was in the water, then I could draw some firm conclusions and advise you in precise terms. That information is not available to me and I submit, sir, it's not available to anyone else. And that until that information is developed in a scientific way, using techniques that would be acceptable to the medical community, until that time has arrived, then I take only the view that I have expressed.

And that view was that it must be removed.

E. Ingestion

The evidence in this case clearly indicates that the ingestion of amphibole or asbestos fibers creates a hazard to human health. Dr. Selikoff conducted epidemiological studies in four groups of workers exposed to asbestos. In each group there was a significant number of excess deaths due to gastrointestinal cancer. Even the epidemiological studies conducted on behalf of the asbestos industry reveals a significant number of

it shows that there is an increasing rate of cancer of the rectum in Duluth.

excess deaths due to gastrointestinal cancer in groups of workers exposed to asbestos. When asbestos workers inhale asbestos approximately 50% of what they inhale is coughed up or brought by ciliary action into the back of the throat, and then travels to the stomach. Furthermore, once fibers are ingested they have the ability to pass through membranes and find their way to various parts of the body. This is consistent with the findings of Dr. Volkheimer who testified to the transmigration of large particles from the gut through the mucosa and into the body. Although much of Dr. Volkheimer's work concerned the transmigration of starch particles, he received similar results when injecting iron particles, celluloid fibers, pollen grains, polyvinyl chlorite, crushed crab and lobster shells, powdered rabbit hairs, parasite eggs, powdered silicate fibers, diatomaceous earth, and ammonite, a kind of asbestos. Dr. Volkheimer performed his experiments upon humans, dogs, rats, pigeons, goats, rabbits, hens, roosters, guinea pigs, and sometimes geese. Thus his experiments approach universal application. Dr. Brown, relying upon the experiments of Drs. Cunningham and Pontrefact and Dr. Westlake, who have experimented specifically with asbestos, also came to a consistent opinion that ingested particles pass through the gut wall.

To the extent that the Court makes these findings concerning the health risk of ingestion, the Court rejects in large part the testimony of Reserve's witnesses. In particular the Court, as trier of fact, could give little weight to the testimony of Dr. Gross. After observing Dr. Gross and listening to his testimony for several days the Court has serious questions as to this witness' ability to report as an unbiased investigator and consequently as to his credibility. In order to support their conclusion that ingestion of asbestos does not create a hazard to health, Reserve witnesses cited three

studies which upon close scrutiny are wholly inadequate to support such a conclusion. Dr. Smith conducted an experiment in which he fed asbestos to only 45 hamsters. Although one of the hamsters developed gastrointestinal cancer it is claimed that the experiment supports Reserve's position in the case. Dr. Davis testified that he had optically³⁵ examined the gastrointestinal tract of only six rats that had been fed asbestos. Since under the optical microscope Dr. Davis found no signs of cell damage or fiber penetration, it is argued that ingestion of asbestos causes no such cell damage or fiber penetration. Clearly the limited design and scope of this experiment disqualifies it from being of any help in the determination as to whether or not ingestion of asbestos fibers in man results in increased incidence of disease. Finally, Dr. Wright relied on an experiment reported by Bonser and Clayson in which asbestos was fed to forty rats. Dr. Wright, however, admitted that there was an insufficient number of rats and that they had not had an adequate duration period from the onset of exposure so that no valid conclusions could be drawn from this experiment. These studies and others referred to by Reserve witnesses are insufficient to refute the evidence introduced by the plaintiffs in this matter. It should further be noted that the levels of fibers in the Duluth water and that of other cities is such as to give rise to the conclusion that, given the variabilities of measurement, the residents of these communities may ingest as many fibers as do asbestos workers. Dr. Wright, in his testimony attempted to show that ingestion levels of asbestos workers were much higher. However, he computed his figures using epidemiological studies of McDonald and Enterline, without comparing the Duluth situation with the least occupational exposure found to have caused an increase in gastrointestinal cancers. Dr. Nicholson,

35. Optical examination is of limited value in the detection of asbestos particles in that

many particles are so small as to be undetectable under optical microscopy.

using figures from the epidemiological studies of Dr. Selikoff, concludes that the levels of amphibole fibers in the drinking water in Duluth were comparable to exposures found to cause gastrointestinal cancer in asbestos workers. When appropriate comparisons are made it cannot be said that industrial exposure found to cause gastrointestinal cancer is greater than the exposure of the people in Duluth. In reviewing the scientific studies it should be kept in mind that the fact that the effects of asbestos exposure do not appear until 20 or more years after the initial exposure indicates the forces of disease were put in action many years prior to the time the disease becomes detectable and that any continuing exposure after the forces of disease were put into effect is wasted exposure. Since we do not know the threshold level for the people of Duluth—if a threshold level exists—we cannot say when a person might have reached the total dosage that would ultimately cause his death.³⁶

F. *Present Effects of Discharge*

[8] It has been argued by Reserve that their discharge should not be abated in that there is no evidence that to date anybody has been seriously injured by it. To make the argument is to ignore the realities of the situation at hand. It is virtually contradicted that there is an extensive latency period before asbestos related diseases are manifested. Generally it is not until twenty or thirty years have elapsed from the initial date of exposure to a population that there is a detectable increase in disease. The actual latency period may be from twenty to forty-five years. The Reserve plant has been in operation for only seventeen years and it was only in 1960, after a major plant expansion, that present levels of taconite

36. Evidence was presented as to the health risk created by the Homestake gold mine in Lead, South Dakota, which has been depositing quantities of cummingtonite into a flowing stream for several decades. Such evidence as was produced revealed that those in proximity to the discharge may have suffered an increased rate of gastrointestinal cancer.

discharge were achieved. Because of these factors it would be highly unlikely that the public health effects from the discharge would be noticed for some years to come. In cases of heavy exposure in the air certain changes in chest x-rays may develop in as short a time frame as 15 years from the date of initial exposure. Unfortunately early changes in x-rays due to asbestos exposure are indistinguishable from changes caused by other disease processes. More distinctive x-ray signs of asbestosis do not appear until more than twenty years from the onset of exposure.

Dr. Leonard Bristol, Director of the Department of Silicosis Control at the Trudeau Institute was called as a Reserve witness. Dr. Bristol has been retained by Reserve since 1952 to review x-rays of its workers. Part of his duties is to aid Reserve in its defense of claims made against it by workers for compensation for job related dust disease. Dr. Bristol, in support of his conclusion that Reserve's work force was in excellent physical condition, testified that since 1952 he had not seen any sign of asbestosis or a single case of parenchymal change equivalent to $\frac{1}{4}$ on the UICC scale. This includes the one Reserve employee who is presently receiving workmen's compensation for disability caused by pneumoconiosis. As with much of the testimony furnished by Reserve, the Court finds this testimony to be somewhat incredible. Dr. Russell Morgan, Dean for the Johns Hopkins University School of Medicine, also a Reserve witness directly contradicted this testimony. According to Dr. Morgan, of Reserve employees who have been employed for fifteen years or more, approximately 5% have x-ray signs of minimal non-specific fibrosis corresponding to $\frac{1}{4}$ on the UICC scale.³⁷ A

However, there was insufficient data on which to base any valid conclusion.

37. Nearly 100 of the most recent x-rays of the employees who have worked at Reserve for fifteen years or more were not even proffered to Dr. Morgan for his examination.

reading of $\frac{1}{2}$ is probable evidence of a disease process. Although these x-rays are of limited value to the Court, it is not possible on the present evidence to rule out early asbestosis as a cause of fibrotic changes in a number of Reserve workers. Furthermore, even if no Reserve employees ever develop asbestosis, this would not foreclose the risk of cancer. Exposure to asbestos produces excess deaths from cancers at levels of exposure which are not high enough to produce asbestosis. More intense exposure causes more asbestosis deaths. A lesser exposure may permit an individual to survive the threat of asbestosis, which allows him to live long enough to develop cancer.

A great deal of information about the cancer experience of the people of Duluth is available as a result of an ongoing study by the National Cancer Institute. It is too early to attach any real significance to the negative cancer experience of the City of Duluth due to Reserve's discharge. It should be pointed out that Duluth residents do not at this time enjoy a fortunate position with respect to the cancer experience for the entire state of Minnesota. There is at this time a statistically significant excess of rectal cancer with an increasing trend. Dr. Thomas Mason, a statistician for the National Cancer Institute, testified that for the period from 1965 to 1969, being the most recent period available for epidemiological study, Duluth had fifty-two extra deaths from cancer compared to mortality rates from the State of Minnesota. Of these, eleven deaths are attributable to the stomach, large intestine and rectum.

The mode of administration of a carcinogen is related to the site of the cancer which later develops. Therefore, we cannot say that the increase seen, although small in number at this time, is not due to ingestion by these persons of asbestos from Reserve's taconite waste.

38. There are several ongoing studies in Duluth that are attempting to deal with the question; including a study to the effect of

We also cannot exclude the possibility that this increase will, at a later date, parallel Dr. Selikoff's findings with respect to the three-fold increase in cancer of the gastrointestinal tract. Consistent with past experience of populations exposed to asbestos, the actual health effects of Reserve's discharge on the people in Duluth will not be known for many years.³⁸

Defendants are exposing thousands to significant quantities of a known human carcinogen. If there is such a thing as a safe level of exposure to his human carcinogen, it must be very low and there is no credible evidence before this Court to indicate what that level is. Nonetheless the Court is asked to permit the present discharge until such a time as it can be established that it has actually resulted in death to a statistically significant number of people. The sanctity of human life is of too great value to this Court to permit such a thing.

III.

A. *Conclusions of Law*

Although the legal issues in this case gave rise to a considerable number of pretrial motions and very thorough consideration of the applicable law in this area, the final resolution of the case depends largely on factual determinations and a balancing of the equities involved. In each of the various legal theories advanced, the Court is left with the same question of balancing the various equities in order to determine if injunctive relief is required.

It is indisputable that Reserve's discharge into the water of Lake Superior is in violation of WPC 15(c)(6) which limits the allowable suspended solid content of effluent emissions to 30 mg/liter. The Court has found on the basis of the evidence that Reserve's discharge results in the green water phenomenon, has a harmful effect on the people who

the use of Lake Superior water in humidifiers and a study of the incidence of mesothelioma in the North Shore area.

drink the water thereby creating nuisance conditions in violation of WPC 15(c)(2), and degrades the high quality of Lake Superior water in violation of WPC 15(a)(4). Furthermore, the discharge pollutes the waters of Lake Superior so as to endanger the health and welfare of persons in Minnesota, Wisconsin and Michigan. Hence it is clear that the discharge is subject to abatement pursuant to the FWPCA 33 U.S.C. § 1160(c)(5) and (g)(1). However, in considering whether or not the Court should abate such a discharge under the FWPCA the Court is required not only to consider the practicability, physical and economic feasibility of securing abatement of the pollution but also to consider the public interest and the equities involved in the case.³⁹ The legislature has left the final decision as to when or if the pollution should be abated largely to the discretion of the Court after due consideration of the factors set forth above. In a later section the Court will discuss the appropriateness of injunctive relief after a consideration of the equities involved.

As for the claims that Reserve's discharge into the air and water creates a common law nuisance, the facts indicate a violation under both the federal common law and the applicable state laws of nuisance. The federal common law claim is based on *Illinois v. City of Milwaukee*, 406 U.S. 91, 92 S.Ct. 1385, 31 L.Ed.2d 712 (1972), in which the Court stated:

When we deal with air or water in their ambient or interstate aspects there is a federal common law. 406 U.S. 103

The Court has dealt with the plaintiffs' right to bring a claim under the federal common law of nuisance and its applicability in this case in its Orders of November 30, 1972 and January 28, 1974.

Because a nuisance case is a proceeding in equity, each case involves two inquiries: whether the conduct complained of is, in fact, a nuisance; and,

if a nuisance is found, whether an injunction is the appropriate remedy. *Harrisonville v. Dickey Clay Co.*, 289 U.S. 334, 337-338, 53 S.Ct. 602, 77 L.Ed. 1208 (1933). A public nuisance may arise from "an unlimited variety of fact situations." *St. Joseph Lead Co. v. Prather*, 238 F.2d 301, 305 (8th Cir. 1956). "The broad indefinite measuring rule is that a person must so control and use his property as to prevent injury to others in the rightful use of themselves and their property." *Id.* at 305-306. To the extent, therefore, that the conduct of Reserve and its parent companies injures the people of Minnesota, Wisconsin and Michigan as they engage in the normal conduct of their daily lives, the conduct constitutes a public nuisance.

[9] When a public nuisance is found, the propriety of an injunction depends, first of all, on a showing of substantial injury to the plaintiffs or the public. *Klaber v. Lakenan*, 64 F.2d 86, 92-93 (8th Cir. 1933). Often, even when substantial injury is shown, a balancing of the harm or inconvenience to those injured by the nuisance with the overall harm which would occur if the injunction is granted is undertaken by the courts. Injunctions have been denied in such circumstances upon a finding that the harm caused by enjoining the nuisance would be great and that the plaintiffs may be compensated for their injury with the payment of monetary damages. *Harrisonville, supra*, 289 U.S. at 339; *Boomer v. Atlantic Cement Co.*, 26 N.Y.2d 219, 309 N.Y.S.2d 312, 257 N.E.2d 870, 40 A.L.R.3rd 590 (1970).

[10] Such an inquiry, however, must be weighed very heavily in favor of an injunction when the injury alleged is a type of public nuisance that endangers public health. *Board of Commissioners v. Elm Grove Mining Co.*, 122 W.Va. 442, 452, 9 S.E.2d 813, 817 (1940). In matters of public health, by their very nature, monetary damages are usually incapable of compensating those who

39. 33 U.S.C. § 1160.

are, or who will be, injured by the nuisance. In a situation where the scope of the health risk is great, therefore, the harm which would be caused by the issuance of an injunction abating the nuisance must be of an overwhelming magnitude.

These general principles are consistent with the laws of Minnesota and Wisconsin. According to Minnesota statutes, any conduct which "unreasonably annoys, injures or endangers the safety, health, morals, comfort, or repose of any considerable number of members of the public" is a public nuisance. 40A M.S.A. § 609.74. Such conduct is not only punishable by criminal sanctions, but may also be subject to an injunction. *Olson v. Guilford*, 174 Minn. 457, 459, 219 N.W. 770, 771 (1928). Similarly, although Wisconsin does not appear to have a statutory definition of a public nuisance, repeated violation of a public law is a public nuisance and can be abated by an injunction.⁴⁰ *Cowie v. La-Crosse Theaters Co.*, 232 Wis. 153, 159-163, 286 N.W. 707, 710-712 (Sup.Ct. 1939). In addition, in Michigan a public nuisance is an activity "harmful to the public health" *Township of Garfield v. Young*, 348 Mich. 337, 342, 82 N.W.2d 876, 879 (Sup.Ct.1957) which may be

abated by an injunction whether or not it is also a violation of public laws. *Id.* at 341, 82 N.W.2d at 878.

[11] In that Reserve's discharge into the air and water substantially endangers the health of those exposed to it in Minnesota, Wisconsin, and Michigan, it constitutes a common law nuisance that is subject to abatement pursuant to both federal and state law. In order to determine the appropriate remedy the Court must balance the harm or inconvenience to those injured by the nuisance with the overall harm which would occur if the injunction would be granted. In this area it should be noted that the presence of these fibrous particles in the air of Silver Bay is sufficient in and of itself to call for the closing of the plant.

[12] As for the specific claims of the state of Minnesota that Reserve's discharge into the air and water violates state regulations, the Court finds that the discharge into the water is in violation of WPC 15(c)(6); (c)(6)(c); (d)(1); (c)(2); (a)(4) as well as WPC 26. Further the discharge into the air is in violation of APC 1, 5, 6, and 17. As to whether proof of such violations entitles the state of Minnesota to injunctive relief remains in the equitable discretion of the Court.⁴¹

40. Reserve's discharge repeatedly violates Wisconsin Crim.Stat. 29.29 which provides:
29.29 Noxious substances:

(3) *Deleterious substances.* No person may cast, deposit or throw overboard from any boat, vessel or other craft into any waters within the jurisdiction of the state, or deposit or leave upon the ice thereof until it melts, any fish offal; or throw or deposit, or permit to be thrown or deposited, into any waters within the jurisdiction of the state any lime, oil, tar, garbage, refuse, debris, tanbark, ship ballast, stone, sand, except where permitted by s. 30.12(2)(b), slabs, decayed wood, sawdust, sawmill refuse, planing mill shavings or waste material of any kind, or any acids or chemicals or waste or refuse arising from the manufacture of any article of commerce, or any other substance deleterious to game or fish life other than authorized drainage and sewage from municipalities and industrial or other wastes discharged from mines or

commercial or industrial or ore processing plants or operations, through treatment and disposal facilities installed and operated in accordance with plans submitted to and approved by the Department of Natural Resources under ch. 144, or in compliance with orders of that department. Any such order shall be subject to modification by subsequent orders. Any person violating this subsection may be fined not less than \$10 nor more than \$200 or imprisoned not more than 30 days or both. Each day of a continuing violation is a separate offense. The Court does not decide at this time whether or not Reserve's discharge violates the Wisconsin Public Trust Doctrine.

41. The Court is not prepared to rule at this time as to whether or not Reserve's discharge into the air and water violates Minn.Reg. APC 3(a)(2), and Minn.Stat. §§ 116.081(1) and 115.07. These matters are taken under advisement and if necessary will be decided at a later date.

Under the Minnesota Environmental Rights Act it is provided:

116B.04 Burden of Proof

In any action maintained under section 116B.03, where the subject of the action is conduct governed by any environmental quality standard, limitation, regulation, rule, order, license, stipulation agreement, or permit promulgated or issued by the pollution control agency, department of natural resources, department of health, or department of agriculture, whenever the plaintiff shall have made a prima facie showing that the conduct of the defendant violates or is likely to violate said environmental quality standard, limitation, regulation, rule, order, license, stipulation agreement, or permit, the defendant may rebut the prima facie showing by the submission of evidence to the contrary; provided, however, that where the environmental quality standards, limitations, regulations, rules, orders, licenses, stipulation agreements, or permits of two or more of the aforementioned agencies are inconsistent, the most stringent shall control.

In any other action maintained under section 116B.03, whenever the plaintiff shall have made a prima facie showing that the conduct of the defendant has, or is likely to cause the pollution, impairment, or destruction of the air, water, land or other natural resources located within the state, the defendant may rebut the prima facie showing by the submission of evidence to the contrary. The defendant may also show, by way of an affirmative defense, that there is no feasible and prudent alternative and the conduct at issue is consistent with and reasonably required for promotion of the public health, safety, and welfare in light of the state's paramount concern for the protection of its air, water, land and other natural resources from pollution, impairment, or destruction. Economic considerations

alone shall not constitute a defense hereunder.

M.S.A. 116B.04.

The state legislature has required the Court to take into consideration the feasibility and prudence of an alternative as well as the promotion of the public health, safety and welfare in determining whether a remedy is justified. The legislature in the last sentence of the provision does give an indication of the lesser weight to be given any economic testimony. Again the Court is left with the issue of balancing the various equities involved.

A consideration of the claims that Reserve's discharge violates the Refuse Act is not so easily resolved. From the very beginning of the litigation, the Court has heard lengthy arguments to the effect that Reserve operates under right, license, and authority of the federal and state governments. The source of this argument stems from a permit from the United States Army Corps of Engineers issued initially in 1948 and extended in both 1950 and 1960. Although the permit explicitly states that it is issued pursuant to § 10 of the Rivers and Harbors Act (33 U.S.C. § 403), it is argued by Reserve that it serves also as a permit under § 13 of the act (Refuse Act). It is further argued that this permit immunizes Reserve from complying with the FWPCA and sanctions their creation of nuisance conditions in Lake Superior. In the Court's Order of November 30, 1972, it was determined that even if Reserve establishes that it has a permit, that permit could serve as a defense only to the claims based on Refuse Act violations and not on the claims based on the FWPCA and common law nuisance. This decision was based upon the statutory construction of the Refuse Act and the FWPCA and the explicit terms of the permit which provided:

NOTE—It is to be understood that this instrument does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any in-

jury to private property or invasion of private rights, or any infringement of Federal, State, or local laws or regulations, nor does it obviate the necessity of obtaining State assent to the work authorized. It merely EXPRESSES THE ASSENT OF THE FEDERAL GOVERNMENT SO FAR AS CONCERNS THE PUBLIC RIGHTS OF NAVIGATION (Emphasis in the original).

To take this permit which by its very terms deals only with the federal government's interest in navigability and maintain that it sanctions general pollution and poisoning of the lake as well as the people who use the lake is to grossly misrepresent the intent, purpose and language of the original permit.

The Court ruled that if at trial it is established that the permit is a Refuse Act permit, that Reserve is acting in compliance with the terms of the permit, and the permit in fact has not been revoked, that the permit may serve as a defense only to the claim that Reserve is in violation of the Refuse Act. It was Reserve's intention to call several governmental witnesses to present evidence as to the effect and scope of the permit. In that the effect of the permit only concerned one of the alternative theories of relief available to the plaintiffs and the resolution of the factual issues concerning public health was a pressing matter, the Court did not permit Reserve to bring forth these witnesses for what might have become lengthy cross examination. Hence the Court cannot rule on the issue of whether or not Reserve's discharge is in violation of the Refuse Act. The matter is taken under advisement to be considered if necessary after more testimony and argument.

Reserve also claims right, license, and authority to continue its discharge by reason of permission granted by the State of Minnesota. In the Order of November 30, the Court ruled that the

state permits could not serve as a defense to claims brought by the federal government under federal statutes and the federal common law, nor was it a defense to the claims brought by the neighboring states of Wisconsin and Michigan. Even if the State of Minnesota had the authority to grant such an encompassing permit it is clear from the terms of the permit that they did not intend to do so. As a condition to the original permit, it is stated:

(f) The granting of this permit shall not impose any liability upon the State of Minnesota, its officers or agents, for any damage to any person or property resulting from the operations of the permittee hereunder. This permit shall be permissive only and shall not be construed as estopping or limiting any legal claims against the permittee, its agents or contractors, for any damage or injury to any person or property or to any public water supply resulting from such operations.

[13] Furthermore, after hearing testimony for over nine months, the Court concludes that the state permits⁴² cannot serve as a defense to the claims set forth by the State of Minnesota. In the first place Judge Eckman, a Minnesota District Court Judge ordered that permits notwithstanding, Reserve should be required to make substantial modifications in its present form of discharge. Secondly it has been clearly established that the terms of the permits are being violated. Both permits set out a nine square mile zone of discharge. However, the evidence in this case is that the discharge is not confined to this nine mile zone of discharge and is dispersed throughout the western arm of the lake. In particular the discharge is in violation of subdivision (d) of the permits which provide:

(d) Such tailings shall not be discharged so as to result in any material clouding or discoloration of the water

42. There are two state permits with essentially identical terms. The Minnesota Water Pollution Control Commission and the Min-

nesota Department of Conservation issued permits to Reserve in December of 1947.

at the surface outside of said zone except during such time as turbidity from natural conditions in the adjacent portions of the lake outside of said zone may be caused by storms, nor shall any material adverse effects on fish life or public water supplies or in any other material unlawful pollution or the waters of the lake or in any material interference with navigation or in any public nuisance outside of said zone.

The discharge causes discoloration of the surface water outside of the zone of discharge, causes an increase in turbidity, and adversely affects the public water supplies of several communities resulting in unlawful pollution of the lake.

B. Economic Feasibility of Abatement

[14] The Congress in its mandate to the judiciary in cases of this type has instructed the Court to give due consideration to the economic feasibility of securing abatement of the pollution. 33 U.S.C. § 1160(h). The legislature of Minnesota in Minn.Stat. 116B.04 and the common law requires the same. This means that a Court must look at what modifications must be made by the polluter to abate the problem, how much they will cost both in capital expenditures and increased operating costs, and whether or not the owners can afford such expenditures. The Court hereinafter makes its finding on the question of "economics" but withholds in this part of the opinion its decision on how such economic considerations will be weighed as against the public health considerations. The United States Court of Appeals for the District of Co-

lumbia Circuit, when called upon to interpret similar language in the Occupational Safety and Health Act of 1970, 29 U.S.C. § 651 et seq., in the case of Industrial Union Department, AFL-CIO, et al. v. Hodgson, 499 F.2d 467 (D.C.Cir. No. 72-1713, 1974), ruled:

This qualification is not intended to provide a route by which recalcitrant employers or industries may avoid the reforms contemplated by the Act. Standards may be economically feasible even though, from the standpoint of employers, they are financially burdensome and affect profit margins adversely. Nor does the concept of economic feasibility necessarily guarantee the continued existence of individual employers. It would appear to be consistent with the purposes of the Act to envisage the economic demise of an employer who has lagged behind the rest of the industry in protecting the health and safety of employees and is consequently financially unable to comply with new standards as quickly as other employers.

Initially, it must be pointed out that the Reserve Mining Co. division of Armco and Republic has been a profitable venture for the parents.⁴³ The testimony of plaintiff in this case has conclusively shown that Reserve passes through a substantial profit to its parents. Its after tax income from 1956 to 1973 was \$241,735,000. The profit in 1973 was \$1.94 per ton on 10,878,000 tons of ore shipped. This converts to a rate of return on funds furnished by participants of 57.17% and on assets of 11.10%.⁴⁴ While it is obvious that the

43. Due to the fact that Reserve exists as a cost company under Revenue Ruling 56-542, income and cost figures are netted out, with all profit and losses being passed through to the parents. To ascertain Reserve's true "profitability" it is necessary to view the company as a free-standing corporation. The analysis by Dr. R. Glenn Berryman, in which his major assumptions were Federal income tax liability and a pellet price equal to the Lake Erie price, was not rebutted in any way by defendants' experts and is adopted as fact by this Court.

44. The Court notes that the rate of return on funds furnished by the participants is the most helpful ratio in determining the profitability of Reserve to Armco and Republic. The others that have been discussed during the trial, rate of return on assets and rate of return on capital, are too highly affected by the "odd" debt structure of Reserve. Armco and Republic have utilized the profits from Reserve in other areas instead of using it to retire the heavy debt. Reserve's debt-equity ratio of 3.0 indicates this, being much higher than a normal free-standing corporation, and

1973 figures are only for one year, after reviewing the figures from other years, this Court notes that 1973 was a fairly typical year.

The daily profit for the parents on the Reserve operation ranges between \$55,000 and \$60,000 per day. Dr. Berryman in his analysis and projections made assumptions which this Court deems to be valid, that in the future with product improvement the rate of return on owners' equity will be as high as 90¢ on every dollar invested.⁴⁵

An important concept in the area of economic considerations that plaintiffs proposed, Reserve attempted to rebut (although it was later validated by Armco and Republic documents), and the Court now adopts is that a decrease in the silica content of the taconite pellet is an economic advantage to Reserve, Armco and Republic of approximately \$.77 per percentage decrease per ton of pellets and, therefore, must be taken into account when discussing the true economic effect of any alternate tailings disposal proposal. Plaintiff's witness Dr. Bramer explained to this Court's satisfaction the economic advantages that flow from a pellet with less silica. The defendants steadfastly retained the posture that the only relevant criteria for price and, therefore, profit was the so-called Lake Erie price of pellets and that in no way should the Court consider the increase in the value of the pellets above and beyond the Lake Erie price. But plans found in the files of Armco and Republic indicate just such a savings.⁴⁶ One plan called for a capital investment of \$87,926,000, a major portion of which was for product improvement through silica reduction, and projected an increased pro forma profit from Reserve to its parents of \$37,496,000 over a ten year period.

therefore this Court looks primarily at the rate of return on funds furnished by the participants.

45. This corrects the statement made at page 19, line 2 of the Order of April 20, 1974.

There is a difficult conceptual problem when one attempts to look at the overall benefit provided by two independent improvements: increased iron (Fe) content and decreased silica (Si) content. It is the defendants' contention that witnesses for the plaintiffs calculated economic benefits for both these improvements and that this constitutes an improper duplication. This contention is incorrect. There is a double savings on these improvements. First, there are the economies due to the reduction in silica proffered by Dr. Braemer, reduced coke cost and reduction in blast furnace lining wear for example. Second, there are the economies due to the parents being able to get more iron from one operation of the blast furnace. If they were to charge the furnace with ore that was 60% iron, they would get less usable hot metal than if the ore was 63% iron. (This was conceded by the defendants who admitted that they could sell the improved ore for a price higher than total Fe units times Lake Erie price per iron unit—the standard pricing method.) There can be no doubt that the proposed product improvement would deliver that double benefit hypothesized by Dr. Bramer and Dr. Berryman. The defendants themselves were found to use this approach.

Dr. Howard Thompson, a witness for the State of Wisconsin, provided the Court with the keys to the question of economic feasibility. Through a graphic presentation he enlightened the Court on the true results of certain capital expenditures, with concomitant operating costs, on Armco and Republic.

Plaintiffs commissioned the International Engineering Co. (I. E. Co.) to study the pollution problem at Reserve and to propose an alternative method of tailings disposal that would correct the

46. The related finding of these documents which go to the heart of the economics of the case and refute the prior allegations of defendants is another instance that indicated the propriety of joinder and/or the refusal of the defendant Reserve to cooperate with the Court.

situation. Reserve, instead of providing the Court with its best estimate of the costs to abate the pollution, chose to spend its time and money pointing out what it considered to be weaknesses in the I. E. Co. report. The I. E. Co. proposal and the criticism of it were not given much weight. But further testimony has shown that the costs computed in it are on the high side of what the Court assumes the true price of pollution abatement would be. Therefore, it will be used as a so-called "worst case" analysis: I. E. Co. with silica reduction \$188,728,102. capital cost, \$16,323,738. operating cost *saving* per year; I. E. Co. without silica reduction \$188,728,102. capital cost, \$8,571,556. operating cost increase per year.

In Wisconsin Exhibit 42, Dr. Thompson illustrated that with the capital expenditure of the I. E. Co. proposal with silica reduction, Armco would not change its intra-industry position. Republic would change its position with respect to U. S. Steel but to no other.

Wisconsin Exhibit 40 shows graphically that the I. E. Co. proposal of \$188 million capital expense with either the increase or decrease of operating expense (with or without silica reduction) would not affect the current interest coverage ratio of either Armco or Republic.

Wisconsin Exhibit 43 indicates that if Reserve were to adopt the I. E. Co. proposal with silica reduction the rate of return on Reserve assets would drop from its present rate of 14.7% to between 10 and 11%. While this would seem to be a large drop, it would still remain higher than Republic's average rate of return on other assets (4.1%); and Armco's average rate of return on other assets (6.7%); Republic's re-

quired rate of return (8.4%) and Armco's required rate of return (9.1%).

State of Wisconsin Exhibit 37 was a compilation of many factors in an attempt to analyze the pull-out propensity (under what set of capital expenditures and operating costs would it be economically less advantageous to the parents to stay at Reserve rather than to buy on the open market at the Lake Erie price).⁴⁷ The results were startling. Under no set of costs, even I. E. Co. without silica reduction (\$188,000,000 capital plus \$8,571,556 operating), would it have been more profitable for the parent companies to leave Reserve and buy on the open market. Professor Thompson concluded and this Court agrees that it is in the economic best interest of Armco and Republic to make substantial expenditures toward on land disposal at Reserve rather than terminate operations and purchase an equivalent quantity of pellets on the open market.

Dr. Soldofsky of the University of Iowa was called by Reserve to refute the foregoing argument. It became apparent that his testimony was not based on any company records, contained within it no information as to what the actual facts were, and relied principally on second hand economic reports. Consistent with the Court's efforts to get to the best evidence, the objection to his testimony was sustained with a view toward attempting to obtain testimony from Armco, Republic and Reserve as to what the actual interest rates, etc. were at the time.

The Court has reviewed the exhibits and witness statements of Dr. Soldofsky (Reserve Exhibits 452-458 and 540) for the purpose of ascertaining what if any help they might have been to the Court in arriving at its ultimate resolution of

47. The following assumptions were made by Dr. Thompson which the Court rules now to be proper: the total iron units shipped, one-half to each parent, over the next fifteen years would be 567,181,211; 48% tax rate on marginal income; at least a fifteen year continued operation; straight line depreciation for both tax and book purposes with a de-

preciation life of 20 years; pollution expenditures to be financed entirely with debt; 8% interest on new debt, 10% discount rate; and a zero salvage value. It must be noted that no depletion allowance was contemplated which, if it had been used, would have made the incentive to stay greater.

the economic questions herein involved. Having made this review, the Court concludes that the exhibits and witness statement of Dr. Soldofsky are of no help to the Court because they are not the best evidence available on the economic issues involved and also because they are based upon hypotheses as to economic analyses which were contradicted by the records of Armco, Republic and Reserve.

Professor Soldofsky assumed that Republic refunded its sinking fund obligations annually with new long term debt. It appears, however, that this is strictly an assumption on his part, which cannot be supported from Republic's financial reports.

The best evidence of Republic's behavior, in Professor Soldofsky's own words, would have been from the "controller" of Republic. In fact, however, Professor Soldofsky had received absolutely no help from that company or from Armco. He had, for example, no access to Armco and Republic records other than those generally available to the public. Incredibly, an Armco witness, a Dr. Singhvi, reviewed Dr. Soldofsky's work but provided no guidance or information to Dr. Soldofsky as to how Armco actually refunded its debt. Thus Armco and Republic would have this Court hear a witness whose work they reviewed but did not comment upon and which was made without the benefit of the documents which they could have provided.

When Republic finally did provide Dr. Soldofsky with the financial statement for the year 1973, it developed that Dr. Soldofsky's assumptions were completely erroneous. Utilizing publicly available data for the year 1972 Dr. Soldofsky predicted that Republic's additional interest expenses for 1973 due to refunding would have been \$888,000. In fact, this prediction was in error by \$600,000., or about 76%. In actuality, the additional interest on refunding in 1973 was only \$216,000. This error represents a *difference* between predicted and actual refunding of \$20,000,000., an error of extraordinary proportions.

Hypothetical and estimated information is simply not helpful to the Court when it is offered by a party who has access to the best evidence, which in this case is the actual data as to refunding, interest payments, etc. In this regard, it is as unfair to Dr. Soldofsky as it is unhelpful to the Court to deprive him of the very evidence he needs as foundation for his opinions.

The Court gave Reserve ample opportunity to correct these foundational difficulties by providing Dr. Soldofsky with the records he needed from Armco and Republic. While Reserve did not take advantage of this offer, the Court has nevertheless received a considerable amount of economic testimony from executives of Armco and Republic who were called adversely by the plaintiff. There is nothing in the testimony from Reserve's executives that supports Dr. Soldofsky or his proffered exhibits. On the contrary, the best evidence from Armco and Republic wholly supports the testimony of Dr. Thompson.

Dr. Thompson, for example, testified that the parent companies would have to finance any new investments at Reserve with 100% debt. Mr. Waldo, Senior Vice President of Republic, concurred.

Dr. Thompson testified that the costs of debt for new investment at Reserve would be approximately 8%. Mr. Waldo produced documents from Republic which assessed the cost of pollution investment at Reserve using a method of analysis strikingly similar to Dr. Thompson. Among the assumptions therein was an estimated cost of debt of 7.5% which, if anything, made Dr. Thompson's analysis an *over-estimation* of the cost of pollution abatement at Reserve.

Dr. Thompson testified while he estimated Armco and Republic to have a cost of equity of approximately 10%, that a 12% cost of equity would not change his analysis of the economic feasibility of pollution control expenditure at Reserve and that, in fact, his analysis assumed a cost of equity of 12%. This is fully supported by Mr. Waldo who tes-

tified that whereas Republic is currently earning less than 10% on its equity, it's "shooting for" a return of 12%.

With this evidentiary background in mind, and turning to Dr. Soldofsky, a review of his proffered documents⁴⁸ indicates:

1) Dr. Soldofsky is not and never has been an employee of Armco, Republic or Reserve, a controller of any corporation, or an employee of an investment banking house.

2) Dr. Soldofsky apparently hypothesized a cost of debt of 8.5% whereas Republic was using the figure of 7.5% for the same kinds of analyses.

3) In spite of the fact that Dr. Thompson and Mr. Waldo were in complete agreement on the cost of equity to Reserve of 10-12%, Dr. Soldofsky was nevertheless called by Reserve to disagree. The defendants stated:

Dr. Soldofsky is expected to testify that the 'cost of capital' for Armco and Republic is significantly higher than the cost of capital projected by Professor Howard Thompson and Professor Robert Haugen, University of Wisconsin School of Business.

4) This "higher" cost of capital is explored extensively by Dr. Soldofsky in Reserve Exhibit 540 which discussed the discounted cash flow technique utilized by Dr. Thompson to confirm the figure of 10-12%. A close reading of Reserve Exhibit 540 would lead us to conclude that Republic's cost of equity capital is 29.74%. This figure is preposterous in view of the testimony of Mr. Waldo as to the same 8% figure arrived at by Dr. Thompson. There is no point in this Court considering an exhibit which seeks only to undermine testimony which has already been confirmed by Republic's own data.

5) Reserve Exhibit 540 is an extensive critique of the (D/MP + g) method of analysis utilized by Dr. Thompson. Strictly speaking, the sum and substance

of this Exhibit is to the effect that Armco and Republic will not invest in any projects in which they do not earn a return on equity capital of at least 20% and 29.7% respectively. In addition to being grossly in error as discussed above, this conclusion is largely irrelevant herein since the unrebutted and uncontroverted testimony and evidence is to the effect that Armco and Republic will finance any additional investment for pollution control at Reserve with 100% debt. There is not even an offer of proof from Dr. Soldofsky to rebut this contention and, thus, the question as to cost of equity capital is of secondary importance at best. Very simply, nothing in Reserve Exhibit 540 rebuts or controverts the plaintiffs' contention that Reserve, Armco and Republic can raise \$200,000,000 in increased *debt*, as distinct from equity, and continue their operations indefinitely.

6) Reserve Exhibit 458, being illustrative of one hypothetical example in Reserve Exhibit 540 (p. 9), is just as irrelevant and, therefore, of no potential help to the Court.

7) Reserve Exhibits 455-457 are generally expressions related to the funding and interest rate aspects of Dr. Soldofsky's proffered testimony discussed above. Since there has been no offer of proof which purports in any fashion to describe how these Exhibits might be helpful to this Court, these must be disregarded. The Court does note, however, that to the extent that these general exhibits portray the general relationship between interest coverage, leverage and rate of return on common stock, they are in complete accord with Dr. Thompson's testimony.

8) The remaining portions of Reserve Exhibits 453 and 454 utilize the specious rates of return derived from Reserve Exhibit 540 and are, therefore, of no potential help to the Court.

Consistent with the posture they have taken throughout the case, the defend-

48. The Court saw Reserve Exhibit 540 for the first time on May 1, 1974. Prior thereto, it

had not been marked, offered, or referred to in any way.

ants have failed to come forward with the best evidence available on the matter of economics. The economic testimony proffered by the plaintiffs stands un rebutted by the defendants and the basic premises which underly the testimony of Dr. Thompson and Dr. Haugen were actually confirmed by the records of the defendant's parent companies once they were obtained. By the same token, these same records from the parent companies totally discredited the proffered testimony of Dr. Soldofsky. For these reasons, the Court finds that Dr. Soldofsky's Exhibits would have been of no help to the Court in resolving the economic issues herein.

The Court has found and Mr. Delancy, President of Republic, has effectively agreed that the true cost for the necessary changes at Reserve that would bring them in compliance with all applicable state and federal regulations is approximately \$120,000,000. The following is a calculation of the rate of return on funds furnished by participants with such an expenditure. The calculation is based on the testimony of Berryman, Waldo and Olin.

Earnings for the ten year period, 1975-1984, using Plan 1-C, Alt. II, five year, (Palisades Plan) shown in U. S. Exhibit 567, are \$223,000,000. For a one year period, this would be \$22,300,000. If we subtract from this figure the additional yearly cost associated with the "bag house" filtering (\$1,998,000 from Minnesota Exhibit 59) and a return water pipe from the impoundment area (assumed to be 10% of the \$6,500,000 capital cost which Mr. Delancy agreed was reasonable), the additional yearly operating expense would be \$2,650,000.

If this \$120,000,000 capital expenditure was financed completely by 20 year 8% bonds (a method Mr. Waldo of Republic said would be correct), there would be an average yearly interest expense of \$7,200,000. This would be added to the \$2,650,000 added operating expense to give us a \$9,850,000 added expense. This must be reduced however

by the tax savings (figured at 24%) to give us a net added expense of \$7,486,000.

The net profit per year assuming 100% debt financing would be \$14,814,000. The rate of return on funds furnished by participants, therefore, is \$14,814,000 divided by \$35,906,000, or 41.3%.

C. *Technological Feasibility of Abatement*

In considering the technological feasibility of an alternate method of disposing of the tailings from Reserve's operations it should be pointed out that of the several taconite companies located in Minnesota, Reserve is the only one that disposes of its tailings into Lake Superior. In essence Reserve has had a competitive advantage for a number of years in that it has not been required to create and maintain an on land tailings depository. Nonetheless, in this litigation defendants steadfastly maintained that there was no feasible way for them to put the tailings on land. They claimed that the costs of such a system would be prohibitive and that furthermore such a system was technologically infeasible. It is the Court's conclusion that this position was taken by defendants in bad faith, that it was contrary to the facts as they knew them, and was pursued for the sole purpose of delaying the final resolution of the controversy.

Throughout this opinion the Court has frequently referred to the credibility or lack thereof of particular witnesses. After listening to testimony for over nine months the Court has formed the opinion that the credibility of the defendants collectively in this case is seriously lacking. They have misrepresented matters to the Court, they have produced studies and reports with obvious built-in bias, they have been particularly evasive when officers and agents were cross examined.

The Court has already described in its Memorandum of April 20, 1974 how Reserve represented to the Court that its best alternative method for the disposal

of the tailings involved a plan to pipe the tailings to the bottom of the Lake. After hearing Reserve witness Mr. Haley, Vice President in Charge of Research and Development, testify about this plan, the Court determined that this plan would not be effective in abating the health threat and would result in a continuing dispersal of the fine tailings throughout the lake. Furthermore, the plan contemplated the addition of toxic flocculants and toxic flotation reagents which would independently create additional problems concerning public health. It was revealed in later testimony that a task force consisting of representatives of Armco, Republic and Reserve and chaired by Mr. Haley had rejected this underwater disposal system in 1972 on the grounds that it was technologically infeasible. There is no engineering work to indicate that there has been a technological breakthrough and that the plan is now feasible, yet it was represented to the Court as it had been previously represented to the various regulatory agencies and the Minnesota State Courts that this is a feasible alternative. Mr. Holiday, newly elected president of Armco and the last witness in this case, under extensive cross examination by the Court admitted that at present there was no known way to dispose of tailings underwater. Furthermore, when confronted with his own documents, he admitted that this plan if it could be effectuated would result in lost profits of up to 3 million dollars per year. He therefore concluded that it was not economically nor technologically feasible and that further if the Court had gone along with Reserve's proposal and ordered the implementation of the deep pipe system, the end result would have been months and years of further delay without any assurance that there would ever be a satisfactory resolution of the problem.

It has been Reserve's insistence on this plan for underwater disposal as the only feasible alternative and its accompanying claim that on land disposal was not feasible or practical that led to the extensive administrative and court pro-

ceedings which began in 1968 and culminate with this trial. The Court has previously referred to the finding of Judge Eckman in Reserve Mining Company v. Minnesota Pollution Control Agency, to the effect that continuance of the present method of discharge is intolerable and that substantial modification must be put into effect. Judge Eckman remanded the matter to the Minnesota Pollution Control Agency to determine what the modifications would be. It is clear that Judge Eckman had in mind an underwater disposal system much like the one proposed by Reserve in this case. In his Memorandum at p. 8 he states:

In the judgment of this Court, any modification must insure the flocculation of the fine tailings and the deposit of all the tailings by conduit to the floor of the great trough, where they will remain, eliminating thereby their dispersion to other parts of the Lake Superior, and elimination of complaints of aesthetic loss, net or shore slime, drinking water contamination, or eutrophication by increased algal growth.

What Judge Eckman did not know was that no such alternative was feasible. In negotiations with the Minnesota Pollution Control Agency, Reserve continued its insistence that on land disposal was out of the question and advocated the implementation of the deep piping system. In the early stages of this litigation, Reserve stuck to the bad faith position that the underwater disposal system was the best alternative, and that on land disposal was too expensive and technologically infeasible. Prior to trial, by way of interrogatory, and several times during the trial plaintiffs requested and defendants were ordered to produce all documents relating to possible alternatives for disposing of taconite wastes. The development of the events which led to the discovery of the existence of fully engineered plans for on land disposal of tailings justifies a detailed summarization.

On January 11, 1974, plaintiffs offered Donald McDonald of the Interna-

tional Engineering Company for the purpose of proving the contents of the I. E. Co. report dealing with moving Reserve's concentrator to Babbitt. The Court refused this offer of proof and instead asked Reserve to answer three questions:

First of all, what the Court is asking you is whether or not in the event the discharge is stopped, Reserve has any plan for on land disposal.

Now, this is a hypothetical situation that there would be no discharge into Lake Superior, does Reserve have a plan for on land disposal? What is their cost of that plan?

The next one is assuming that you have no plan which can provide for leaving the plant where it is and moving the tailings up and on to the land, do you have a plan for building a new plant at some other location? then after you've given those two answers, you are in a position to quarrel with your own answers by saying that we can't afford it or that we can only afford certain modifications of it. But in essence, by doing so, you will answer the question as to whether or not it is your intention to close the plant in the event the Court requires on land disposal of the tailings.

On January 18, Mr. Vogel, an attorney for the plaintiffs, repeated the question:

In the event that this Court orders some form of on land disposal, will Reserve Mining Company entertain that as an alternative, or would they shut down their operation?

Mr. Fride's response begins at page 13,211 of the transcript and ends at 13,226. Mr. Vogel, commenting on Mr. Fride's failure to answer the questions asked by the Court observed:

It seems to me that Reserve is simply trying to frustrate the question which we have posed and in so doing it's frustrating the expeditious handling of this matter and delaying it beyond the point where we ought to have some kind of decision.

Mr. Fride did not use the opportunity given him on January 18, 1974 to purge his client of its failure to respond in full to earlier discovery requests.

On February 5, 1974, Mr. Fride was again given the opportunity by the Court to reveal the existence of previously withheld documents related to on land deposition of tailings. Mr. Fride then presented a memorandum repeating the arguments made on January 18, 1974 and stated:

Your honor, we have as a result of extensive consideration of possible engineering changes, I think insofar as Reserve is concerned, arrived at a plan which reference has been made so far in this record, which is in fact an underwater discharge plan.

Thereafter, beginning on February 6, 1974, Mr. Kenneth Haley, testifying as the representative of Reserve Mining Company, proffered a "deep pipe" plan which he stated was the best viable alternative to Reserve's present method of discharge. Haley testified in generalities about existing plans showing what Reserve would do in the event it was ordered to dispose of its tailings on land. He stated that Reserve was "endeavor[ing] to put ourselves in this type of position"; that he had received no written memoranda from Armco Steel Company or Republic Steel Company concerning complete on land disposal of Reserve Mining Company's tailings; and that discussions with people at the policy making level regarding on land disposal plans was limited to "fine, fine, we have so many plans."

On March 1, 1974, the testimony of designees of the Presidents of Armco and Republic was taken in open court. Mr. Ward Browning and Mr. Ralph Waldo of Armco, also members of the Boards of Directors of Reserve, testified for Armco. Mr. Harry Eisengrein testified for Republic. These high officers of Armco and Republic were represented by their own attorneys. They appeared in response to the *subpoena duces tecum* of the United States to produce all documents in their possession

related to on land disposal of tailings. They produced a flood of documents, 255 of which are now exhibits in the case, many of which bore the Reserve stamp, and were admitted at a later time by Reserve President Mr. Furness to be in Reserve's files.

Notwithstanding Haley's denials under oath, there was a plan in existence which provided for total on land disposal of tailings in the Palisades Creek area. Reserve had contracted for engineering with Ripley, Klohn and Associates and the plan was delivered on January 15, 1973. This plan was in both Armco's and Republic's files.

Records provided during the testimony showed that the "deep pipe" system presented by Mr. Haley to this Court had in fact been rejected by Mr. Haley's Task Force in 1972. This rejection was embodied in a memo dated July 12, 1972 and was based upon technical considerations. There was no authorization given to Reserve by Armco to represent to any Court or authority that the best plan was the underwater plan. Likewise, Republic did not authorize presentation of the underwater plan.

The on land disposal plan discovered in the files of Armco and Republic, which had previously been withheld from Court and counsel by Reserve, provided for a capital investment of \$87,926,000 a major portion of which involved product improvement through dry cobbing, silica reduction, and rolling screens. The plan would result in a net profit to Armco and Republic over a ten year period of \$223,000,000. This would be \$37,496,000 profit above and beyond Reserve's current profit as projected over a 10 year period.

After the depositions of March 1 and 2, 1974, Reserve supplemented its answers to questions 15 and 16 of Plaintiffs' first wave of interrogatories. These answers have been marked as follows:

U. S. Exhibit 710, dated March 19, 1974, unsworn, signed by attorneys;

U. S. Exhibit 711, dated March 22, 1974, unsworn, signed by attorneys;

U. S. Exhibit 709, dated March 28, 1974, unsworn, signed by attorneys.

Literally hundreds of previously undisclosed documents related to on land disposal of tailings are listed in these exhibits. During the testimony of Merlyn Woodle, Vice President of Operations of Reserve Mining Company, called to the stand by the United States, numerous documents tendered with the supplemental answers were identified and entered into evidence. Among these is P-6199 which is a fully engineered plan for total on land disposal of tailings in the Palisades Creek area. Accompanying this plan were numerous engineering documents which Mr. Woodle stated took thousands of man hours to prepare. U. S. Exhibits numbered 719 through 818 are documents pertaining to Reserve's plans for on land disposal of tailings, all of which were tendered to the United States with supplementary answers to plaintiffs' interrogatories 15 and 16, marked as U. S. Exhibits 709, 710 and 711.

Mr. Furness, President of Reserve Mining Company, testified that he knew that the on land disposal plans existed; knew that Reserve had many of the same documents in its files that were produced by Messrs. Browning, Eisenrein and Waldo on March 1, 1974, and that Reserve had not previously produced them; admitted to receiving extensive memoranda from Haley on the Palisades on land concept; admitted that if the underwater pipe wouldn't sell then the Palisades (plan) would be the fall-back position; but that it was not pursuant to his authority that Mr. Haley withheld knowledge from the Court on the Palisades scheme.

To the question:

Did you at any time direct Mr. Haley, Mr. Woodle, or your attorneys in the case to withhold information from the Court?

He replied:

Certainly not.

The records showed that Mr. Fride, attorney for Reserve, attended Task Force meetings when the on land disposal plan was discussed and was lead counsel for defendants when the Court unsuccessfully called for those very plans.

Traditionally Reserve maintained that there were two technological problems with converting to an on land disposal system of discharge. First it was claimed that substantial amounts of water were required to cool the power plant machinery at the Silver Bay operation. At present the pumps that are used to pump water into the processing plant are also used to carry water to the electrical power plant and cool the machinery there. It was alleged that if the water coming into those pumps had been recirculated then the water going into the power plant would be unsuitable for cooling purposes. It was claimed that defendants' engineers knew of no way in which to accomplish the necessary cooling process if it was required to recirculate the water and deposit the tailings on land. During Mr. Haley's testimony, when confronted with the problem in Court, this Judge made the obvious suggestion that all the defendants needed to do to solve the problem was simply circulate water from the lake to cool the system and return the water to the lake. Defendants would have this Court believe that it was only after the Court's suggestion that the engineers were able to overcome the problem that had been plaguing them for years. The claim is incredible. If in fact defendants had not previously considered the alternative of recirculating the power plant water, it could only be because they did not wish to solve the problem.

The second technological obstacle to on land disposal claimed by Reserve concerned the presence and accumulation in any on land system of calcium, which in the form of calcium chloride is added to the ore to keep it from freezing during the winter months as it is transported from Babbitt. It is interesting to note that although the defendants claimed that the calcium situation was a problem

that precluded them from developing an on land system of disposal and although they had at their disposal over 400 chemists, they had conducted no engineering studies in an effort to solve the problem. This problem of calcium removal was, according to the testimony of Mr. Furness, resolved by a midnight phone call from Mr. Haley to Mr. Furness on March 3. As with the breakthrough with the recirculating water system the defendants have only recently discovered that the calcium can be precipitated by the addition of soda ash and thus the problem of clogging the system can be solved. It is interesting to note that within three days of March 1, when Reserve's hidden secret documents were exposed in open Court, they were able to develop a completely recirculating on land disposal system for the tailings. The Court finds that Reserve had developed a fully engineered plan for total on land disposal of tailings before the trial began on August 1, 1973. If this plan did not then provide for total recirculation of process water with no discharge into Lake Superior it was because the company so desired. The Court finds that the plan could have been turned into a "no discharge" plan prior to the time the trial began, just as it was between the dates of March 1 and March 4, 1974. The Court further finds that the defendants intentionally withheld this plan in order to delay the ultimate resolution of the in lake dumping problem.

Such action in the defense of any law suit is a serious matter. In light of the issues in the instant case dealing with health and safety of thousands such action is intolerable. The obvious misrepresentations centered mainly in the economic and technological areas of the law suit. Certainly such misconduct can have nothing to do with the Court's resolution of the public health issues, the evidence in the case must speak for itself in this regard. However, the nature of the defendants' conduct causes the Court to closely examine every statement made by the defendants as well as

every representation to assure the Court of the factual basis to support such statement or representation.

D. *Injunctive Relief*

This controversy has been in one forum or another for many years, during which time defendants continue the present method of discharge. Based on the record in this case, this Court has given its conclusion as to why there has been no real solution to the problem. Whereas the actions of the defendants may give rise to various claims for sanctions, penalties, etc. they bear only indirectly, if at all on the question of whether or not injunctive relief is appropriate. At the culmination of the trial, after all of the discoveries of the actual ability of defendants to implement an on land disposal system, the chief executives of Armco and Republic were directly asked by the Court if they would abate the public health problem, and implement a program for on land disposal consistent with applicable state and federal regulations. The response under oath by Mr. Verrity and Mr. Delancy is dealt with in some detail in the Court's Memorandum of April 20. Essentially the reply was that they would not comply with applicable air regulations, and that they would not abate the discharge into the water for at least five years. Even this offer to abate the discharge into the water in five years was conditioned on defendant's receipt of public assistance and the Court's issuing of an opinion contrary to its true findings that the discharge created a public health threat. The answer to the question posed by the Court was no, they would not comply. Defendants would continue exposing thousands to the carcinogenic effects of its discharge until such time as ordered to stay by this Court, or some other Court. The company can afford to abate the health threat, has the technological ability to

abate the health threat, yet refuses to do so in order to extract the last dollar of profit, even at the risk of injury to thousands. At this point the Court has only two alternatives. It can allow the corporations to continue the present method of discharge into the air and water indefinitely at the risk of continuing injury to many or it can order that the discharge be abated. Defendants' answer to the Court's inquiry shows that there is no middle ground.

E. *Balance of Equities*

This long and complex case had its genesis in environmental law and the violation thereof. It narrows down to a consideration of those aspects of the environmental laws that are designed to protect the health and the very survival of the people. The determinative issue is a simple one. A commercial industry is daily exposing thousands of people to significant quantities of a known human carcinogen and plans to continue doing so unless halted by this Court. If a local food processor was injecting a known human carcinogen into the food it processes there would be no question that any regulatory authority which did not order it stopped would be in dereliction of its duty.⁴⁹ In this case, however, we are not dealing with a local food processor but a mammoth industry. The risk to those exposed to the human carcinogen may be the same in both instances. Should the size of the polluter involved be the determinative factor in the Court's decision as to whether or not to protect the exposed population.⁵⁰

If the discharge could be abated for one dollar, again there would be no question but that the discharge should be immediately abated to reduce the risk to the health of those exposed. However, in that a curtailment of the exposure is expensive, it is argued that the Company should not be called upon to make such

49. See Federal Food, Drug, and Cosmetic Act, 21 U.S.C. § 301, at § 348 (Delaney Amendment).

50. To accept such a rationale would effectively immunize the large corporate entities in this

Country from any review by a Court of law and leave the populace at the mercy of the corporate will.

an expenditure. Perhaps the real question to be asked is at what price to the corporation does it become too expensive to protect against the risks to public health. Apparently defendants seek a balancing of corporate profits against human life. The Court uses the term corporate profit as opposed to corporate existence to emphasize the fact that defendants could well afford to make the necessary improvements without sacrificing their economic position in the market, but refuses to make the necessary expenditures. If the implementation of the necessary devices to eliminate the exposure would be so expensive as to force the industry out of business the balance between public health vs. corporation existence becomes a tougher balance, but one that would be resolved in this Court in favor of public health. However, such is not the question in that defendants do have the means to abate the problem and still remain a highly profitable entity. The question now becomes can a company be permit-

ted to expose thousands of people to a known human carcinogen when they could well afford to abate the risk.

Defendants interject another aspect to the problem. Their refusal to make the necessary alterations to their present mode of discharge threatens the jobs of its work force if the Court orders the discharge abated.⁵¹ The Court would be the first to agree that the work force of Reserve would suffer immensely if the plant is shut down and they are thrown out of work.⁵² Any environmental litigation must involve a balancing of economic dislocation with the environmental benefits. Jobs are always an important consideration and the Court has given them due consideration in the instant case. However, the number of jobs at stake has nothing to do with the extent of the risk caused by the discharge. Defendants have the means to abate the risk, refuse to do so, yet ask the Court not to abate the risk because defendants' employees may be put out of work. In essence, defendants are using

51. Defendants' work force is in a particularly unhappy position. Living in a company town their sole source of employment is bound up in Reserve's operations. Unfortunately, of all the people endangered by Reserve's discharge these people run the greatest risk of contracting an asbestos related disease in accordance with the past experience of populations exposed to asbestos fibers in the ambient air. Peculiarly enough, judging from the position of the defendant intervenors these individuals as a group if given the choice would choose to continue the present exposure to themselves, their family, and friends in order to continue their present job status. If in fact the people of Silver Bay were the only ones exposed to the health risk there might be some weight to be given their conscious choice to take the associated risk involved to continue at their jobs. Even then, however, the Court would have to take a broader view of the matter. In the first place, the Court would be concerned with those who were unable to make a real choice, particularly the children who must abide by the choice made by their parents. Secondly, this Court would have to answer the question, "can this Court permit a commercial industry to require its work force to make such a choice that endangers their lives and the lives of their families, when in fact the commercial industry has the economic and technological means to

eliminate any real health risk?" Consistent with governmental regulation of industrial safety and health conditions, the obvious answer is NO. In that Reserve's discharge largely endangers the lives of thousands in other communities unrelated to the activity of the company it becomes even more clear that the discharge must stop.

52. If defendants chose to abate the nuisance and come into compliance with applicable regulations, the effect on the work force would be minimal.

The defendants' work force includes machinists, welders, electricians, engineers, and laborers whose services could be utilized in additional pipe and plant construction. The plight of the work force at Silver Bay could be effectively eliminated by the simple expedient of doing the work with their own work force. The savings in workmen's compensation and supplementary unemployment compensation would inure to the benefit of the defendants and would substantially reduce the overall costs.

Thus, the closing of the plant during the construction period, given cooperation by the defendants, would not entail the dire consequences now seen by the employees at Silver Bay and Babbitt. Their services could merely be utilized in another fashion.

the work force at Reserve's plants as hostages. In order to free the work force of Reserve, the Court must permit the continued exposure of known human carcinogens to the citizens of Duluth and other North Shore communities. The Court will have no part of this form of economic blackmail. The defendants are daily endangering the lives of thousands of people, have the engineering and economic capability to obviate the risk and choose not to do so in order to continue with profitability of the present mode of operation. This Court cannot honor profit over human life and therefore has no other choice but abate the discharge.

ADDITIONAL MEMORANDUM AFT- ER REMAND

This matter is before the Court pursuant to an Order of Remand by the Court of Appeals for the Eighth Circuit dated June 4, 1974, 498 F.2d 1073. The trial of this matter began in August of 1973. After a nine-month trial this Court on April 20, 1974, entered an injunction halting defendants' discharge of waste materials into Lake Superior, and amphibole fibers into the ambient air of Silver Bay. The Court specifically found that defendants' discharge into the air and water was in violation of state permits, various state and federal laws and regulations, and created a common law nuisance under both the federal and state law in that it substantially endangered the health of the thousands of people whose drinking water and air was contaminated by defendants' wastes.

On April 22 the Court of Appeals entered an Order staying the effect of the injunction until the merits of the motion for stay could be heard in full on May 15. The stay of the injunction was continued at the hearing on May 15 until the Court of Appeals filed its Order of June 4. In this Order the Court of Appeals granted a 70-day continuation of the stay and conditioned a continuation of that stay "upon Reserve taking prompt steps to abate its discharge into the air and water".

The Court of Appeals' Order remanded the case to the District Court and set out a procedure by which Reserve was to submit plans for abating its discharges into the air and water and the plaintiffs were to offer their comments on the plan. Finally, this Court was to make its recommendation to the Court of Appeals as to whether or not the stay of the injunction should be continued pending the appeal on the merits. The Court of Appeals stated that this Court's "recommendation should rest on whether Reserve and its parent companies have evidenced good faith efforts and a reasonable plan in the public's interest to abate the pollution of air and water, taking into account the views expressed in this opinion".

Pursuant to the Court of Appeals' Order this Court held hearings on the proposed plans for abatement. The inquiry at this hearing was limited to the environmental aspects of the proposed plan. The Court deemed any testimony as to the economics involved as being irrelevant to the inquiry. At the trial on the merits a substantial amount of economic testimony was heard. In the Supplemental Memorandum the Court made detailed findings as to the economics involved which supported the conclusion that on land disposal was an economically feasible alternative to the present mode of discharge. These findings are supported by the testimony and the exhibits in the record and there is no need to reiterate them at this point.

The Court hereby makes its recommendations which shall become part of the Court's Findings of Fact and Conclusions of Law in this matter.

I

This Court is somewhat uncertain as to its role in the proceedings set forth by the Court of Appeals. It is thrust into the midst of what appears to be a settlement procedure, absent any real power to impose a settlement. In compliance with the Order of the Court of Appeals, defendants have submitted a plan for depositing their tailings at the

Palisades Creek area. This plan is conceptually the same plan that was present in defendants' files since February, 1973, improperly withheld in violation of this Court's discovery orders and proposed and rejected in negotiating sessions with the plaintiffs in the waning moments of the trial for the injunction.

The question is what is this Court to do with this "plan" at this stage. Initially the Court is unclear as to defendants' position as to their own plan in that it is based on the condition that it will be approved by the "Board of Directors of Reserve and its shareholders," as well as several assumptions, two of which have no basis in fact and law. These two assumptions are:

1) that the Order of June 4, 1974, by the Eighth Circuit Court of Appeals on the narrow issue of whether the injunction ordered by this Court on April 20, 1974, should be stayed constitutes a resolution of the merits of the claims presented in this case;

2) that necessary permits will be issued by appropriate agencies.

This Court has been caught up in the corporate shell game before in this case. At one time it was represented to this Court that even though the plan for depositing the tailings on the floor of the lake was technically and economically infeasible in that it was the only plan authorized by the Board of Directors of Reserve, it was the only plan that could be used by the defendants' agents and attorneys in negotiations and in framing its litigating posture in this lawsuit. Now it is claimed that the Palisades plan can be proposed by defendants and if approved by those who have the power to grant such approval, then it will be submitted to the Board of Directors and its shareholders (Armco and Republic) to see if they will go along with it. Counsel for Reserve has stated in court that officers of the various defendants have approved the plan, yet the language in the plan itself states that it is subject to approval by Reserve's Board of Directors and its shareholders. In light of

the past history of this case and counsel's inability to explain to the Court's satisfaction what "authorized" means, the Court is somewhat unclear as to the status of this plan with respect to Armco and Republic. It is the Court's thought that if defendants were serious about proposing an alternative to the Court that they would propose it without such a qualification stating firmly that this is the plan they will initiate if permitted to do so. Absent any such statement, it is as if no plan at all has been submitted, but merely more talk, more evidence, more delay.

Furthermore, in light of the fact that two of the assumptions on which the plan is based are erroneous, the Court is left with no plan at all to consider.

[15] 1) The assumption that the Court of Appeals resolved the merits of this dispute in its Order on whether this Court's injunction should be stayed is incredible. It is clear to this Court that defendants are attempting to limit the *res judicata* effect of this Court's findings to protect against future liability if everybody's worst fears are realized and a substantial number of people along the North Shore contract fatal diseases resulting from their exposure to the asbestos from Reserve's discharge. Absent the *res judicata* effect of the detailed findings of this Court as to the identity of the fibers, their transport and their lethal potential, the representatives of those whose deaths resulted from Reserve's discharge would effectively be precluded from receiving compensation from defendants. The trial on these issues lasted nearly an entire year at a cost of millions of dollars to both parties. No private individual could muster sufficient resources to duplicate the evidence in this case on these issues. It is the Court's duty to resolve issues. After devoting nine months of court time to this case, listening to hundreds of witnesses, reviewing thousands of pages of exhibits, this Court resolved these issues. Surely the government agencies that brought these actions for the ben-

efit of their citizens are entitled to a clear resolution of the issues.

The issue before the Court of Appeals was whether or not a stay of this Court's injunction shall issue pending the appeal on the merits of the case. In dealing with this issue the Court of Appeals found it necessary to give a preliminary forecast of their views on the merits of the issues. From their preliminary examination of portions of the record the Court of Appeals concluded that whether or not Reserve's discharge of asbestos fibers into the air and water constituted any danger to the people exposed to it was incapable of proof at this time and that this Court's resolution of the doubts in the case in favor of public health instead of in favor of the defendants marked a decision by a federal court that should have been left to the legislature. Hence, the Court of Appeals concluded that for the purposes of whether or not a stay of the injunction should issue, that defendants have established a likelihood of succeeding on the merits on the issue concerning public health. In no way does the Court of Appeals intimate that when considering the merits of the appeal with the full record and with the Court exhibits before them that they will feel bound by their preliminary forecast given in the context of the motion for a stay of the injunction. Nor have they indicated disagreement with the trial court's factual determinations on such issues as identity, transport, ingestion, etc. as opposed to the inferences that can be drawn from those facts.

For the defendants to assume that the Court of Appeals' decision in this preliminary context marks a resolution of the factual issues in the case is contrary to fundamental principles of law, and the attorneys for defendants should and must know better. This assumption is such a distortion of the applicable law and the language in the opinion itself, that it brings into question the good faith of the defendants when they present a plan that is based on such an assumption.

2) The second assumption referred to above is equally troublesome. The plan is based on the assumption that applicable permits will be issued by the appropriate agencies. It has consistently been the State of Minnesota's position that they will be willing to consider favorably permit applications for on land disposal at Babbitt and possibly other areas but that it would oppose any disposal site at the Palisades area proposed by Reserve. Hence, there is no basis in fact to believe that applicable permits will be granted. In fact, it appears that the permits will not be granted. The matter is complicated by the fact that despite the pronouncements of Judge Eckman in 1970 that the present mode of discharge cannot continue and this Court's urgings at the beginning of this year that defendants should consider the likely possibility that they will not be permitted to continue dumping into Lake Superior, that defendants have made no applications for permits to deposit tailings on land at any location.

[16] Apparently it is Reserve's position that this Court or perhaps the Court of Appeals has the power to bypass state laws, thrust itself in the midst of state administrative proceedings, and decide whether or not such permits should issue, and which state laws should not be applied to Reserve. Initially defendants argue that the Federal Court has such power under the Federal Water Pollution Control Act, 33 U.S.C. § 1151 et seq., which provides in part:

(h) * * * The court, giving due consideration to the practicability and to the physical and economic feasibility of securing abatement of any pollution proved, shall have jurisdiction to enter such judgment and orders enforcing such judgment, as the public interest and the equities of the case may require. 33 U.S.C. § 1160(h)

Identical language appears in Section 1160(c)(5).

Defendants' reliance on this provision as granting broad powers to the Court

to resolve pollution problems is rather curious in that it is this same language in the Act that formed the basis for this Court's decision to enter an injunction. However, in light of the opinion of the Court of Appeals on the issue of whether or not the injunction should be stayed, there may be some question as to how much power Congress intended to vest in the Court. Although not explicitly referred to in the opinion, the statement that this Court's resolution of doubt in favor of public health marked a legislative decision and was improper would seem to indicate that the legislature held back some authority from the courts despite the language in this provision. Naturally, it is still this Court's view that the provision grants broad sweeping powers to the courts in these matters until such a time as the Court of Appeals gives a direct decision to the contrary. However, even under this Court's view of the Act, the argument by the defendants that it gives the federal Court power to disregard applicable state laws and administrative procedures, and require the State to grant its land and powers to a private citizen is untenable. There is no indication in the Act to indicate that Congress had the power or inclination to vest the federal judiciary with such authority over the sovereign state governments.

Secondly it is argued by defendants that inherent in the equitable powers of the Court rests the authority to order the State to convey necessary state lands and to grant necessary permits for defendants to use the Palisades area as a receptacle for its wastes. Defendants urge that since plaintiffs have come before the Court seeking equitable relief they have voluntarily submitted themselves to the Court's equity jurisdiction.

[17, 18] In the first place the argument advanced by Reserve misstates the factual history of this proceeding. The

State of Minnesota did not voluntarily submit to the jurisdiction of this Court. They were joined only after defendant Reserve's motion to compel joinder of the State was granted by this Court and in that sense the State is an involuntary plaintiff. The argument that by entering the case pursuant to an Order of this Court the State voluntarily submitted to the Court's jurisdiction is absurd. Even if the State had entered the case voluntarily, this Court would still lack the power to ignore state law and administrative procedure in order to provide Reserve Mining Company with an economical depository for its refuse. In a situation where a state agency or officer is acting contrary to law or unconstitutionally, a federal Court may have some jurisdiction to review this action in an appropriate case.¹ In the instant case there is no improper action on the part of the State. The State is simply trying to enforce its laws, regulations, permits and to protect its citizens. By seeking to enforce the laws of the State, the State does not turn over the administration of State government to the Court. The question comes down to who decides what priorities should be established in resource management, the State, the defendants, or the federal Court. It is this Court's view that these matters should be decided by the State.²

Extensive and specific statutory procedures have been established by the Minnesota Legislature for the issuance of permits, particularly under Minnesota Statutes, Chapter 105, in regard to permits for a large taconite tailings disposal system. These statutory procedures clearly delineate the administrative procedures and functions and the functions of the Courts in relation to such permit issuance. These statutory procedures preclude a Court from interfering in advance with decisions which in the first instance are within the discretion of the

1. U. S. v. Douglass County, 5 E.R.C. 1577 (D.Nev.1973).

2. If the Court were to order that permits be granted, who should decide the scope of

these permits, the limitations, the specifications; who should inspect the dams to see that they are built and cared for properly.

agency. The following are relevant portions of Minnesota law relating to water permits:

Minn.Stat. § 105.38(1): Subject to existing rights all waters of the state which serve a beneficial public purpose are public waters *subject to the control of the state*. (Emphasis added.)

Minn.Stat. § 105.64, relating to permits for taconite and certain other mining operations, requires that the provisions of §§ 105.37 to 105.55 be followed in permit issuance.

Minn.Stat. § 105.41 requires a permit from the Commissioner of Natural Resources before any entity can appropriate or use any waters of the State:

The commissioner may give such permit subject to such conditions *as he may find advisable or necessary in the public interest*. (Emphasis added.)

Similar language is found in § 105.64(5).

Under § 105.64(3), the Commissioner is required to impose the following conditions:

(1) That the proposed drainage, diversion, control, or use of waters will be necessary for the mining of substantial deposits of iron ore, taconite, copper, copper-nickel or nickel, and *that no other feasible and economical method therefor is reasonably available*;

(2) That the proposed drainage, diversion, control, or use of waters *will not substantially impair the interests of the public in lands or waters or the substantial beneficial public use thereof* except as expressly authorized in the permit, *and will not endanger public health or safety*;

(3) That the proposed mining operations will be in the public interest, and that the public benefits resulting therefrom will be sufficient to warrant the proposed drainage, diversion, or control of waters.

Minn.Stat. § 105.42 requires a permit from the Commissioner of Natural Resources before any entity may build

dams or in any manner change the course, current or cross section of public waters.

Minn.Stat. § 105.44 contains specific procedures which the Commissioner is to follow when making permit decisions, including provisions for public hearings and evidence taking. The decision making power and discretion of the Commissioner is set forth in Minn.Stat. § 105.45, which reads as follows:

The commissioner shall make findings of fact upon all issues necessary for determination of the applications heard by him. All orders made by the commissioner shall be based upon findings of fact made on substantial evidence. He may cause investigations to be made, and in such event the facts disclosed thereby shall be put in evidence at the hearing or any adjournment thereof.

If the commissioner concludes that the plans of the applicant are reasonable, practical, and will adequately protect public safety and promote the public welfare, he shall grant the permit, and, if that be in issue, fix the control levels of public waters accordingly. In all other cases the commissioner shall reject the application or he may require such modification of the plan as he deems proper to protect the public interest. In all permit applications the applicant has the burden of proving that the proposed project is reasonable, practical, and will adequately protect public safety and promote the public welfare.

In granting a permit the commissioner may include therein such terms and reservations with respect to the amount and manner of such use or appropriation or method of construction or operation of controls as appears reasonably necessary for the safety and welfare of the people of the state.

. . . (Emphasis added.)

The relationship of the Courts to the permit issuing process is described in Minn.Stat. § 105.47:

Except where otherwise prohibited, *any party in interest may appeal from*

any determination of the commissioner to the district court of the county in which the project is wholly or partly located, at any time within 30 days after notice of the commissioner's order. Notice by publication shall be sufficient.

Upon such appeal being perfected, it may be brought on for trial as other civil actions, and shall then be tried by the court without a jury, and determined upon the record. At such trial the findings of fact made by the commissioner shall be prima facie evidence of the matters therein stated, and his orders shall be deemed prima facie reasonable. If the court finds that the order appealed from is lawful and reasonable, it shall be affirmed. If the court finds that the order appealed from is unjust, unreasonable, or not supported by the evidence, it shall make such order to take the place of the order appealed from as is justified by the record before it.

[19] The statutory procedures established by the legislature have thus not given the courts original jurisdiction in water permit matters but have limited the courts to appellate review of action by the commissioner. This also appears to be the case for necessary permits issued by the Pollution Control Agency. The statutory procedures prescribed by the legislature for water permit matters may be summarized as follows: The Commissioner is delegated specific authority to use his discretion, within broadly defined statutory guidelines, to utilize the state's police power to protect the public interests. The Commissioner must take certain factors such as public safety and welfare into consideration and if he has doubts that they will be protected he can deny the permit.

In addition, other state statutes, such as Minn.Stat. § 116D.04, require him to deny permits if the environment will be impaired as a result of the issuance of a permit. For example, the Environmental Policy Act, at § 116D.04(6), provides as follows in regard to permits:

No state action significantly affecting the quality of the environment shall be allowed, nor shall any permit for natural resources management and development be granted, where such action or permit has caused or is likely to cause pollution, impairment, or destruction of the air, water, land or other natural resources located within the state, so long as there is a feasible and prudent alternative consistent with the reasonable requirements of the public health, safety, and welfare and the state's paramount concern for the protection of its air, water, land and other natural resources from pollution, impairment, or destruction. *Economic considerations alone shall not justify such conduct.*

Other environmental policy guidelines are prescribed by §§ 116D.02 and 116D.-03. Furthermore, the provisions relating to environmental impact statements contained in Chapter 116D would apply to any new tailings dump site. All of these factors must be considered by the Pollution Control Agency and any other state agency which might have regulatory functions relating to an on land site.

The Court's role in these administrative determinations is solely that of a review body, reviewing the Commissioner's decisions under the "substantial evidence" rule. The legislature, which is the source of the state's police power, can surely set up such a system for its utilization and preclude the Courts from obtaining original jurisdiction in such matters. Minnesota Court decisions unanimously share the judgment that the judiciary has extremely limited review authority in permit matters delegated to state agencies, and that the judiciary will not assume the functions of the agencies. *State, Department of Conservation v. Sheriff*, 296 Minn. 177, 207 N.W.2d 358 (1973); *Reserve Mining Co. v. Minnesota Pollution Control Agency*, 294 Minn. 300, 200 N.W.2d 142 (1972); *In re Lake Elysian High Water Level*, 208 Minn. 158, 293 N.W. 140 (1940); *Application of Nicollet County Board of County Commissioners, District Court,*

Fifth Judicial District, Clerk's File No. 18089, March 4, 1974.

[20] Federal decisions also support the propositions that the judiciary performs very limited review functions in relation to the duties of administrative agencies, cannot usurp the agencies' functions, and cannot force agency discretion to be exercised in any particular manner. *Fagan v. Schroeder*, 284 F.2d 666 (7th Cir. 1960); *Huntt v. Government of Virgin Islands*, 382 F.2d 38 (3rd Cir. 1967); *Spanish International Broadcasting Corp. v. Federal Communications Commission*, 128 U.S.App.D.C. 93, 385 F.2d 615 (1967); *Soo Line R.R. v. United States*, 271 F.Supp. 869 (D. Minn.1967); *Midwest Truck Lines, Ltd. v. Interstate Commerce Commission*, 269 F.Supp. 554 (D.D.C.1967); *Delaware River Joint Toll Bridge Commission v. Resor*, 273 F.Supp. 215 (E.D.Pa.1967).

[21] To some extent defendants tried to use the procedure set out by the Court of Appeals as the equivalent of administrative proceedings required under state law. The Commissioner of Natural Resources for the State of Minnesota, Robert Herbst, was called as a witness for the State. In cross examination, defendants tried to elicit his position as to the granting of permits in the Palisades Creek area, apparently hoping to get some statement that could be treated as a final agency action subject to the Court's review. He did state that he was disposed not to grant permits in the Palisades area, based on the State's long range land use plans and the unique character of the area. He did qualify his answer to the extent that it was not to be construed as a denial of a permit application, in that no permit was applied for and he did not have the opportunity to hold the necessary hearings with the public participation required by law. His position was taken in response to the posture of this litigation, in an effort to expedite a resolution of the problem of the deposition of defendants' wastes. His position as Commissioner was that he would consid-

er the merits of any permit application pursuant to his statutory authority, but that it was his position that applications for permits in the Babbitt area would be looked upon favorably based upon his preliminary review of the matter. Furthermore, it was the Commissioner's position that pursuant to M.S.A. § 116D.04(6) that he would be precluded from granting a permit in the Palisades area so long as there was a feasible and prudent alternative consistent with the reasonable requirements of the public health, safety, and welfare and the State's paramount concern for the protection of its air, water, land and other natural resources from pollution, impairment, or destruction. In that no permit application has been filed, this Court cannot treat the position of the Commissioner of Natural Resources as a final agency action that is now subject to review. The action of the Commissioner is not before this Court for review.

[22] Assuming this Court did have concurrent jurisdiction with the Department of Natural Resources to consider the issue of whether or not permits should be issued and state land given to defendants, it is the view of the State that this Court would be bound by the decision of the Court of Appeals for the Eighth Circuit in *Izaak Walton League of America v. St. Clair*, 497 F.2d 849 (8th Cir. 1974). In that case the District Court ruled on the extent of the mineral rights possessed by an individual and the validity of his attempted exercise of those rights within the Boundary Waters Canoe Area. The Circuit Court reversed and remanded saying that the applicable agency, in that case the Forest Service, should be allowed to initially determine, upon proper application, whether a permit should be granted for the exercise of the rights in question. It was the Circuit Court's opinion that the question of whether or not these activities would adversely affect the wilderness quality of the BWCA was peculiarly within the competence of the agency. Only after such a determination and the record thereof, should the

Court reach the legal issue of the proper construction of the federal and state regulatory statutes. The language in this decision gives the Court some problems as to the propriety of reviewing a matter that should properly be submitted to a state administrative agency. However, since the Court of Appeals solicited this Court's opinion as to the reasonableness of the plan, the Court shall comply with that request.

II

[23] Prior to an analysis of the reasonableness of Reserve's Palisades Plan, as to its technical soundness it must be noted that what was presented to this Court as a preliminary plan of what Reserve would do if given official sanction is in reality a preliminary conceptualization of what Reserve would like to do. It was obvious that the proposal was being fashioned before the Court's very eyes as Reserve's witnesses testified in Court. Mr. Leif Jacobsen of Kaiser Engineers, who participated heavily in the preparation of "A Proposal for Engineering Procurement and Construction," one of the plan's building blocks, testified that he was basing his testimony on what could be considered conceptual drawings from which arrangement drawings, detailed design drawings and construction drawings would have to be made before he could estimate manpower requirements accurately. He fortified this Court's estimate of the conceptual nature of his plans by testifying that he had done no field work with respect to dam construction, a task he admitted would be critical.

He admitted that he had not run any test to study the stability of the dam construction material on a 6:1 slope and he admitted that he did not know whether the run off from the haul road would go beyond the toe of the fill because he did not know the grain size of the material he was going to use.

Mr. Earle J. Klohn, Reserve's expert in dam engineering testified on July 11, 1974 that the positions for the dams had

not been finalized. He testified that no test drillings or detailed geological surveys or anything of that nature had been done, all of which would be critical to a final design. In his testimony of July 15, 1974, Mr. Klohn admitted under cross examination that the dam drawings were merely conceptual and would be modified by what would be found after a more detailed investigation.

Merlin K. Woodle, Executive Vice President of Reserve, was similarly vague in his conception of just how many trucks would be used and admitted that Reserve had done nothing more than eye-ball the area to determine whether the tailings would be visible from Highway 61. Mr. Woodle testified as to the lack of final designs, plans or drawings for such things as seepage collection, the haul crossing off Highway 61, as well as most aspects of the diversion of Cedar Creek which in one concept is to run under the tailings dam and then out again and thence into Lake Superior. The other proposed concept would require a considerable diversion of Cedar Creek entailing some cuts of up to 50 feet in depth through rock and soils with the incumbent sedimentation problems and disruption of the stream as a trout stream.

Dr. Gerald A. Place, Reserve's expert on revegetation of the dam after it is built, testified that without doing any type of preliminary investigation he would recommend a type of fescue but the details of this revegetation program, the refinements, would have to be worked out as he would have a chance to observe the growth of grass on the delta at Reserve and on the downstream end of the dam. Dr. Place also testified that although he recommended that the vegetable humus surface material that was stripped for dam construction be used to face the portion of the dam he was to revegetate, he had no idea whether there would be enough material for this task. It is doubtful that it will be since this is the same material that is to be used for the upstream facing of the dam.

As the foregoing attests, Reserve's plan is conceptual at best. It is all but an impossible task to determine the reasonableness of the plan on the evidence proffered since the plan as it now stands does not describe with sufficient specificity the development, construction, implementation, operation and conclusion of operation of this facility. This Court or any other Court would be engaging in conjecture and speculation if it were to make final determinations based on such sketchy information.

As further evidence of this problem, one need only note the changes that have occurred in the Palisades plan just in the short time that this Court has been considering it. The volume of tailings needed for dam construction has changed from 125,000,000 tons to 376,000,000 tons. The slopes of the dams have ranged from 1.75:1 to 2.5:1 to, and most recently, 4:1 and 6:1, averaging out at 6:1. The heights of the dams have changed as a function of mine life, a concept that is affected by numerous variables. The center lines of the dams have been moved up to 1000 feet. The needed number of waste piles has changed from three to one to zero.

The Court is aware of the engineering problems involved in this undertaking. But defendant has been considering this site for at least 18 months. It is not unreasonable to expect more specificity. In any event, the task of adjudicating the reasonableness of this plan is practically made impossible by the fluidity of the engineering concepts.

The Court of Appeals, however, has sought this Court's consideration and therefore it will be given. Essentially, the plan contemplates the deposition of tailings in a basin located one and one-half miles northeast of Silver Bay. The topography of the area provides several high ridges which will serve to contain the tailings in conjunction with various dams which will have to be constructed. The tailings basin would eventually cover an area of between 3.2 and 4.6 square miles and would be surrounded by a

buffer zone totaling about 12.5 square miles.

About half of the tailings will be transported to the tailings basin by truck while the remainder will be carried by pipeline. Both the pipeline and the truck haul route will be about three miles in length.

Much attention was given that aspect of the plan which calls for attempted revegetation of all portions of the dams which slope away from the tailings basin. Only after the starter dam is built and the operation is stabilized, is it planned to build the dams and embankments to their full designed width as each increment of height is built. This will then permit the attempted revegetation of the downstream slopes.

In the area of air quality improvement, Reserve proposes to install fabric filters on its pollution emission sources with the exception of the stacks in the pelletizer, where they propose to install wet-scrubbers. It is ironic to note that the worst source of airborne asbestos is the pelletizing plant. In effect they have stated that they will put baghouse filters on everything but the most offending aspect of their operation. The failure to install the fabric filters on the pelletizer stacks is in direct violation of the applicable state law, APC 17, and this Court's Order of April 20, 1974.

Initially the plan must be considered as to its reasonableness on engineering grounds. Reserve's proposal to contain 40 to 60 years' production of fine wet taconite tailings depends upon the construction and perpetual existence of a number of huge dams. These dams are proposed to be built, not of concrete, but of other tailings material, coarser than the fine tailings, some of which will be 450 feet high, higher than any other tailings dam now existing in the world. Only one other dam in Minnesota, a concrete dam, is over 100 feet in height. In addition, the largest tailings dam will be 7000 feet long and will be uphill about 1½ miles from Lake Superior, the place from which tailings deposition is

to be removed. Another dam will be located above the community of Silver Bay. Failure of these two dams would release millions of tons of tailings and would directly endanger residents living below the dams. Those tailings would ultimately pour into Lake Superior.

The defendants' expert on dams, Earle Klohn, testified that comprehensive site investigations are required to provide the data necessary to develop a safe design for a dam. Mr. Klohn further testified, without having made such required site investigation at Palisades that it is conceptually possible that the tailings can be contained at this location.³

His hypothesis was based upon the following assumptions:

1) There must be a geologically sound foundation for the dams. The main dam and a secondary dam proposed by Reserve would rest on North Shore lava flows which tilt toward Lake Superior at a 12 to 15 degree angle and which are known to be extensively faulted. Mr. Klohn testified that faulting in the rock at the foundation or abutments of a tailings dam can cause the dam to fail, and that faulting can be so extensive as to render infeasible any corrective procedures such as grouting. None of the necessary geologic field investigation has been done by Reserve, according to Mr. Klohn.

2) Although taconite tailings of the proper size are expected by Mr. Klohn to be a satisfactory building material for the dams, safe tailings dam design on this site requires an investigation of the mineral stability of the tailings. Minerals in the cummingtonite-grunerite series, a principal component of Reserve's tailings, are known to be unstable over geologic time, but have not been investigated as to mineral stability by Reserve, according to Mr. Klohn.

3) Taconite tailings are not ideal dam building material unless grain sizes are

properly separated. Mr. Klohn testified that separation is under the control of the mine operator during the 40 or more years of dam construction, and that mine operators do not always follow ideal engineering procedures in the construction of their tailings dams.

4) It is important that the dams be built in conformance to the design engineer's specifications. Mr. Klohn testified that most of the tailings' dams construction would be accomplished under the supervision of the mine operator and that no one could guarantee that the dams would be built according to Mr. Klohn's design during the 40 or more years of construction.

5) Earth dams, such as the tailings dams proposed by Reserve, should never be overtopped by water, because overtopping creates a great risk of failure. Mr. Klohn testified that overtopping can be prevented by adequate freeboard, but decisions as to the nature of the freeboard are in the hands of the mine operator. Should the milling system be shut down for any reason so that water is not being reclaimed from the tailings pond, the danger could become acute.

The dams are designed to handle three consecutive wet years without overtopping, according to Mr. Klohn. A fourth consecutive wet year could, therefore, create a great risk of dam failure. Construction of spillways to prevent the risk of dam failure, if milling should stop, also would require the construction and perpetual operation of control structures and water treatment plants, according to Mr. Klohn. Reserve's present plans contain no provisions for spillways, control structures, and treatment plants.

6) It is essential that tailings dams be inspected, monitored and maintained during construction and periodically forever after the tailings pond is filled or the operation is shut down. Witness Klohn testified repeatedly as to the importance of this.

3. Mr. Klohn testified that he had never heard of an instance where a dam designer stated, prior to construction of a dam, that

he expected the dam to fail, or that it was unsafe.

In the absence of the comprehensive site investigation declared necessary by Mr. Klohn to design a safe dam, his conclusions as to safety of the tailings containment concept advanced by Reserve were not based upon proved facts but on speculation as to what the facts might be. Evidence, if any, produced in support of Reserve's concept leads to the conclusion that it is unlikely that the tailings will be contained under Reserve's concept. In fact, Reserve's own officials and consultants have stated that safe dams and secure tailings containment are not possible in this region.

For example, Reserve Vice President Haley testified to the Lake Superior Enforcement Conference that:

A tailings basin built in the rugged terrain of the North Shore region would involve a huge system of dams and dikes, one of the largest in the world, and would represent a constant threat of leaks and rupture, thus residents of the North Shore area would be exposed to this serious safety hazard.

See also, (Reserve Mining Company's Response to Inquiry From Lake Superior Enforcement Technical Committee, an exhibit submitted to the Committee by Reserve Attorney Edward Fride.)

Mr. Haley also stated therein:

After Reserve's mine is exhausted, surface waters would continue to erode any on-land tailings deposit until it would finally be washed into Lake Superior.

Mr. Haley continued:

Any on-land tailings disposal method that is available to Reserve will present a very serious blowing dust problem. A sizeable portion of any tailings basin of necessity will be above waterline or dry or partially dry, a good part of the year. Thus, fine tailings from the air, borne by wind and dust clouds, will be carried over large areas adjacent to such a tailings basin. This would be a very serious nuisance to many residents and tourists of the North Shore area.

Reserve's above-mentioned document contains an appendix entitled "Summary of Potential Adverse Effects of Land Disposal of Tailings by Russell Plumb, University of Wisconsin, Water Chemistry Program." This summary states:

The potential for tailings getting into surface water despite the use of a tailings basin can be supported by the fact that over 70% of larger mining operations have had tailings dam failure of some kind.

On page 79 of the appendix of the document, the following statement appears under the letterhead of Parsons-Jurden Corporation, consultants to Reserve:

Inland impoundment will pose a constant threat to life and property of all downstream residential and commercial areas in spite of the most conservative dam design. Not all natural phenomena can possibly be anticipated and designed for, as was evidenced by the collapse of the coal waste piles at Aberfan, Wales.

Even if a safe engineering design can be developed for the Palisades site, proper construction and adequate perpetual maintenance cannot be guaranteed. Many critical elements have been left in the hands of the mining company, Reserve. In light of the past bad faith of Reserve, as well as its history of ignoring or being unaware of engineering recommendations, such factors weigh against Reserve's proposal. Furthermore, there has been no showing as to how the dams would be maintained if Reserve should go out of business or otherwise shut down. In the absence of either a perpetual maintenance plan by Reserve or a perpetual funding plan by Reserve, the ultimate result of Reserve's proposal would be to shift the in-lake disposal problem from this generation to future generations.

Defendant has introduced a model of what the proposed tailings area will look like at the end of operations. Reserve has stated that the area will not only be revegetated but it will be restored to its

original state. There are numerous problems in this area too. It is obvious that there has to be slippage when one attempts either to put stripped soil or six inches of fine tailings over twelve inches of coarse tailings that cannot be stabilized by compaction. Reserve itself has had little success in growing anything but grass on its tailings delta. It should be noted that although Reserve has had an ongoing research project in the area of revegetation of tailings, no one associated with that project was called to testify. Instead Dr. Place, who had not developed a revegetation plan and who had been hired only two weeks prior to his testimony, testified. One cannot escape from the conclusion that growing any type of vegetation on tailings is a difficult if not impossible proposition. This Court has witnessed firsthand the fruitless efforts of the mining corporations to plant grass, shrubs, or trees in the tailings that make up these dams. They have been to no avail and serve only to demonstrate that dams so constituted and so constructed offer no hope for environmental accommodation. In my view of the matter, Dr. Place is over-optimistic in his prospects and unduly encouraged by looking at the identical situation which this Court viewed as a failure.

The engineering feasibility of the Palisades plan is one-half of the criteria that this Court must consider when it adjudicates the "reasonableness" of the plan. The second half is its effect on the environment. Is the Reserve plan ecologically reasonable? The answer is "No"!

It should be noted at the outset that this is a question of prospective application. This company has merely proposed one location for the dumping of their waste. To deny them this location is of much less consequence than if they had already made significant capital expenditures. Therefore, Reserve's burden of persuasion on the question of reasonableness is that much greater.

Having heard the testimony and more importantly having walked and seen the area myself, there can be no doubt that this is a unique environmental treasure that must be jealously guarded. It is difficult to capsule the Palisades Creek area, to reduce this unique natural resource to paper. Sigurd Olson, a world renowned environmentalist, said of it:

I could also picture myself alone on that little bald knob looking across the valley, or sitting by the little waterfall at the head of the Cascade Creek, or walking along those beautiful little bogs full of bog flowers at various times, full of all kinds of vegetation. I could hear the bird songs. I knew it was there. Some day I will go in there when it is quiet, at dusk or early in the morning, before dawn, and just catch these things.

You can experience wilderness in this area. It has everything. It has got the possibilities. It has got the beauty.

The Palisades Creek area does indeed have everything and that is what makes it unique among other North Shore areas. It has high hills, bluffs, bogs, mountain lakes, steep slopes, rock outcroppings and waterfalls. The area contains virgin timber including 200 year old white pine. The area is unique in that it contains the entire realm of arboreal vegetation from conifers to hardwoods. There are trout streams in the area. The area is the natural habitat for white tailed deer, moose, beaver, grouse, fishes, pine marten and wolves; the last two being species of animals that are in danger of extinction. The very fact that the area is semi-mountainous with high hills, clustered lakes, with bogs in between, gives the land a significance that cannot be found anywhere else on the North Shore.

The State of Minnesota has taken a firm position that this area is unique and should not be used as a waste dump. This is not a position that is taken merely in the adversary context. The

records of the Department of Natural Resources indicate interest in this area as a state park since 1962. During 1967 and 1968 there was correspondence between the State and the landowner concerning acquisition of the area for a park. In 1969 a report entitled "Geomorphological Analysis of Potential Park Sites" noted this region as part of the best probable sites for a state park. The Project 80 report, a report commissioned by the legislature on land use management, noted the Palisades Creek area as one of the seven best park potentials in the State.

Reserve's evidence on the uniqueness of the area in question was from a local school teacher, a Reserve Mining Co. welder, and an employee of a county which is a defendant party to the suit and which is dependent on Reserve for its tax base. All have an interest in the continuation of Reserve and a fear of it closing if it doesn't get its way. None have looked at the broad ecological impact of the Palisades plan.

The Court cannot view the ecology with their "tunnel vision." The Palisades area provides a place upon which to roam, to be free, to enjoy the opulence of the scenic wonders that have been provided by nature. This Court cannot allow the present greed of a few to deny priceless treasures to many. It cannot allow the immediate problems of some to cheat others of their environmental birthright.

III

[24, 25] The proposed plan submitted by the defendants presents additional problems in that it does not provide for compliance with Minnesota Regulation APC 17. It was defendants' failure to comply with this regulation that served as one of the legal bases for the Court's injunction. Defendants have tried to argue that this regulation should not be applied as to them. In essence it is seeking a variance from this regulation from the federal Court. In *Reserve Mining Co. v. Minnesota Pollu-*

tion Control Agency, 294 Minn. 300, 200 N.W.2d 142 (1972), the Supreme Court of Minnesota held that the state Courts lacked the power even to order that the PCA and Reserve should negotiate as to a possible variance from water quality standards. The Supreme Court of Minnesota held that the proper place to determine standards, regulations, and variances is before the appropriate agency. Apparently, the state Courts lack the power to order an agency to grant variances to a regulation, yet defendants seek such an order from this federal Court. The regulation is reasonable, constitutional and this Court lacks the power and the inclination to grant a variance from this state regulation.

Additionally the Court is concerned with the time period in which the plant is to continue its hazardous emissions into the air and water. It is true that in the past, this Court has given indications on the record that it might countenance some reasonable turn around time if defendants would quickly implement an environmentally sound plan to abate the present mode of discharge. The Court is aware that such statements by the Court may appear to run against the Court's findings that there is a potential health hazard created by the present mode of discharge. The Court has explained its position on the record, but finds it necessary to reiterate its rationale for this apparent discrepancy. As the evidence as to the public health threat came before the Court it became apparent that the asbestos fibers in the drinking water and air of the people in the North Shore could in no way be doing these people any good and in fact may be setting the stage for a real disaster in the years to come.

As a Judge and as a citizen of the State of Minnesota, this Court became extremely concerned about this very real possibility. It was the thought of this Court that the officers and agents of the defendants were concerned about this possibility also. As a Judge, I felt it necessary to listen to all of the evidence before I gave my decision, but this Court,

like the Court of Appeals and the Minnesota state courts, was of the opinion that the fastest, most efficient solution to the problem would not be through Court resolution, which with appeals and remands, might last four to five more years, but through the good faith efforts of the parties to reach a settlement. If such an agreement could have been reached at an early stage in the proceedings, much of the work necessary to stop the present mode of discharge could have been completed and the health threat would by now be substantially alleviated. Instead we are in the same position as we were several months ago and several years ago with the chance that the continued mode of discharge may be continued for several more years while this matter is decided in the appellate courts. It was in this context that the Court was willing to accept a settlement that would establish a definite schedule and might contemplate some turn around time on behalf of defendants. However, when the possibility for settlement was never consummated even when the highest officials of the defendant corporations were before the Court, the Court was called upon to make its decision as a judge. Based on the evidence in this case that Reserve was violating numerous federal and state laws, regulations and permits, and that their waste material containing a known human carcinogen was being ingested and inhaled by thousands, the Court felt obligated to stop these violations of law and stop a threat that the legislature and the administrative agencies had tried to protect against.

If at the beginning of the trial defendants had come up with an abatement proposal which included a reasonable amount of turn around time, the Court might have looked at it differently. But after nearly a year of trial and several months into the appeal, this Court finds the time period alone too long in light of the evidence of the public health problems associated with the

present mode of discharge, defendants' withholding of plans for on land disposal, and their constant, blatant, intransigent violation of antipollution regulations. The Court has given its ruling on the law and equity of the matter, and its ruling speaks for itself, as to this Court's opinion in that regard.

IV

[26] According to the Order of the Court of Appeals, one of the factors that should be considered in this Court's recommendations is the good faith of the respective parties. In its opinion this Court made several specific findings of bad faith on the part of the defendants as well as several findings going to the credibility of Reserve Mining and its witnesses. The finding that a litigant in federal Court has acted in bad faith is an extremely serious matter and not taken lightly by this Court. The Court is aware that repeated findings of bad faith against one side of the law suit may give the appearance of uneven justice, or bias on the part of the trier of fact. It was for this reason that the Court in its opinion went into great detail as to the factual basis for the specific findings of bad faith. The record is there for all to see, and the findings of bad faith as set forth in the record were justified. Nonetheless, in the argument before the Court of Appeals it appears that there was some misunderstanding as to the findings of this Court in that regard. The Court specifically found that defendant Reserve Mining Company acted in bad faith in three areas and that the impact of these activities was of considerable importance.⁴

1) Reserve Mining Company represented to this Court that its underwater disposal system was a feasible alternative to the present mode of discharge when in fact the plan had been rejected as technically and economically infeasible.

2) Reserve Mining Company represented to this Court that it was techno-

4. See, Supplemental Memorandum, May 11, 1974, pp. 64-69.

logically and economically infeasible for them to dispose of their tailings on land, when in fact their own documents indicated that such was not the case.

3) Reserve Mining Company withheld existing documents as to their plans and concepts for on land disposal systems in violation of plaintiffs' discovery requests and this Court's Order.

The misrepresentations and failure to reveal existing plans gave the appearance to the Court that if the present mode of discharge were abated Reserve would have no alternative but to close down the plant with great loss to its work force and the economy of the North Shore. Reserve's actions made it necessary for the plaintiffs to expend hundreds of thousands of dollars and many man hours in establishing that it was in fact economically and technically feasible for Reserve to deposit its tailings in an environmentally sound on land site. It resulted in considerable delay and waste of the Court's time and frustrated the good faith efforts of the plaintiffs to reach a settlement in this case. All of these matters were specific findings of fact in the Court's Supplemental Memorandum of May 11, 1974.

There is some question in the Court's mind as to what weight should be given this past history of bad faith in accordance with the Court of Appeals' Order. There is no evidence since the remand to indicate that the Court's findings as to bad faith were erroneous; in fact, the new evidence upon remand strengthens the finding that when Reserve represented that it was technologically and economically infeasible to deposit its tailings on land that such representations were made in bad faith. In that the specific findings of bad faith were in the Supplemental Memorandum reviewed by the Court of Appeals prior to its decision, it would appear that their inquiry as to the good faith of the parties was not to include the past history of this case. Assuming that such was the intent of the Court of Appeals' Order, it is necessary to review the conduct of the

parties subsequent to the remand. In that respect the inquiry is difficult in that there is some question among the parties and the Court as to the scope and intent of the Court of Appeals' Order. The procedure set forth by that Court, although a reasonable and thoughtful approach to resolving and/or narrowing the issues in dispute, is somewhat unprecedented and there are few guidelines to look to.

Apparently it was defendants' view of the Court of Appeals' Order that it was a specific mandate and that the Court of Appeals wanted to know more about its Palisades plan which in Reserve's opinion would be the cheapest and best alternative to in lake deposition of the tailings. The Order of the Court of Appeals called for a plan and in compliance Reserve put substantially all of its time and effort in revising its Palisades plan to present to the Court. Unfortunately some of the land they chose to use for a dump happened to belong to the State of Minnesota, and furthermore the State of Minnesota made it clear from the outset that they would oppose the granting of state permits in this area and that they would not give up state lands for the tailings dump. The State's position in this matter has been clear from the outset in that this is substantially the same plan that was proposed and rejected by the State in negotiation sessions prior to this Court's Order of April 20, 1974.

This Court viewed the Order of the Court of Appeals more broadly and construed it as an attempt to resolve or perhaps settle the issues in this case. It was for this reason that after remand it called the parties together and ordered that they negotiate in an effort to reach an agreement as to the site for an on land deposition of Reserve's tailings. In the context of this litigation it appeared like an effort in futility for Reserve to devote its full time and efforts in perfecting a plan that in no way could help to resolve its dispute with the State of Minnesota. Nonetheless Reserve chose to devote substantially all of its time and efforts in revising its Palisades

plan. It was only after repeated orders of this District Court that Reserve dispatched some of its work force to the consideration of other possible sites for the on land deposition of the tailings.

If the thrust of the Order of the Court of Appeals was to merely come up with a hypothetical plan that if they had their way they would like to implement, then defendants did exactly that. If the thrust of the Order was for defendants to come up with a realistic plan that might lead to a solution of the dispute, then there may be a serious question as to defendants' good faith efforts in spending their time and efforts on a plan that had little or no possibility of being implemented. One could easily infer from this a hope on the part of the defendants that the plan would be rejected but enough "good faith" would be demonstrated to allow for yet more time to develop an on land plan.

Furthermore, in considering the good faith of the defendants in their efforts to reach a resolution of this problem, they have failed to make the first application for a permit at any site for the deposition of their tailings on land. They were told by Judge Eckman in 1970 that they must modify their discharge, their internal documents indicate that they forecast that they would have to deposit their tailings on land, this Court warned them that they may have to stop dumping in the lake, and the Court of Appeals has now stated that they may eventually have to come out of the lake. Nonetheless, defendants refuse to take the first step toward trying to resolve the problem by making the appropriate inquiries to the proper administrative agencies.

It is contended by defendants that the State's rejection of the Palisades plan prior to its full presentation and its refusal to allow defendants to enter state lands in the area and take drill samples evidences bad faith on their behalf. In the litigation posture of this case, the Court has observed no bad faith on the part of the state. In an effort to make

their position clear so as to facilitate a resolution of the matter, the State flatly rejected any use of the Palisades area for a tailings dump. However, the State has proposed several other sites that it would consider favorably, in which in their opinion it would be feasible for defendants to deposit their tailings. Furthermore, the State is willing to look at other sites that might be proposed by Reserve. The rejection of the Palisades site was the result of long range land use planning by the State administrative agencies which included plans for a park in the area desired by defendants. This policy of the State was nothing new or unknown to defendants in that the State's views on this site were given in the negotiating sessions in which the State rejected a similar plan for depositing tailings in the area. The rejection of the plan by the State at the beginning of this proceeding on remand was apparently given in the hopes that defendants would not waste their time and efforts in devising a plan that would not be endorsed by the State when permits were applied for. It was the State's apparent hope that defendants would be willing to investigate in more detail other possible sites for the tailings dump. The State's expectations were not fulfilled. The Court finds that the State's long range plans for land use in this area and its rejection of the Palisades plan in this litigation are both reasonable and in good faith.

V

Finally the Court of Appeals has asked that this Court give its recommendation as to whether or not the injunction should be stayed pending the appeal of the matter. It is suggested that this recommendation should rest on whether Reserve and its parent companies have evidenced good faith efforts and a reasonable plan in the public interest to abate the pollution of air and water. No such reasonable plan has been submitted and pursuant to the Court of Appeals' Order this Court cannot recommend a continuation of the stay. How-

ever, this recommendation goes beyond defendants' recent efforts to come up with a compromise proposal.

In considering this Court's recommendation as to whether the injunction should be continued, this Court again considered the effect on the parties and the public interest of such an order.

This Court has already found that the effect of making the defendant companies come into compliance with applicable state and federal laws would be minimal. Of course it would require a substantial sum of money but the evidence clearly indicates that Armco and Republic can well afford to take the necessary economic steps to comply with the law and like the other taconite industries in Minnesota continue to reap substantial profit. Due to the limitations which are inherent in the writing of any opinion, it is necessary in order to validate this finding to go to the record and to study closely the testimony of Dr. Thompson of the University of Wisconsin whose testimony this Court adopted. He placed into evidence charts showing the effect of any combination of capital investment and operating cost on the resultant profitability. This evidence, along with the other evidence in the record, clearly indicates that defendants are reaping very large profits from this operation and the only effect on the company of securing abatement would be a short term slight decrease in profit which in the long run may be more than compensated by the increased quality of the product that modification would produce. Furthermore, the ability to use Lake Superior as a tailings dump has resulted in substantial savings for Reserve. Testimony in this case indicates that the operating costs for tailings disposal at Erie Mining Company, a similar taconite mining operation, are 27 cents per ton of pellets. The record reveals that Reserve has produced approximately 140 million tons of pellets during the period 1956-1973; 5 million tons per year for the eight-year period 1956-1963; ten million tons per year for the

ten-year period 1964-1973. Using these two figures, Reserve has saved 38 million dollars in operating costs during this period (140 million tons of pellets times 27 cents per ton). Additionally, the testimony in this case establishes that Erie Mining Company which had approximately the same production rate for substantially the same period of time as Reserve has spent 13 million dollars in capital costs for its tailings disposal system. The total capital and operating cost savings for Reserve thus amounts to over 50 million dollars. Furthermore, this figure is conservative since it does not take into account the present value of expenditures saved in prior years. Reserve's only expense in this regard has been the minimal cost involved in building and operating its launders which rely upon gravity to transport the tailings into the lake.

The evidence is overwhelming that abatement in compliance with the law is technologically and economically feasible. Defendants can abate and continue to make substantial profits. Since such is the case the argument that this Court's injunction may result in economic ruin to defendants' work force and others who rely economically on defendants' business cannot stand. The decision whether or not to permanently close down the operation is clearly a management decision of Armco and Republic, not a decision of this Court. All evidence indicates that the ore is much in demand and that someone will operate the mine. If the defendants decide to comply with state and federal law they, like the other taconite industries, can continue their profitable operations in Minnesota. If Armco and Republic choose to invest their money elsewhere at the expense of their work force in Minnesota, there is little this Court can do about this decision. Such has been the history of the mining industry.

Furthermore, if defendants chose to comply with the applicable laws and regulations there could be minimal impact on its work force. The evidence is that a conservative estimate of the work

force needed to construct new facilities is 1,000 men for a 3-year period. There is no evidence that these shifts could not be run around the clock and thus employing two to three thousand men and completing the facility in one to two years. It would be possible and necessary to employ many of the men in Reserve's present work force, many of whom are already trained to undertake construction work. Unless the present work force is utilized it would be necessary to go outside Minnesota to recruit workers, as concluded by Reserve's Kaiser Engineering Company. In terms of the economy of the area, the merchants and the work force would care little whether the money earned came about as a result of construction or production of taconite pellets.

This Court's review of the evidence indicates that there is an upwelling of prosperity in the taconite industry in northern Minnesota. Several thousand new construction jobs will be started before January 15th. Literally thousands of production workers will be employed shortly thereafter. No one need be out of a job. It is this Court's finding and conclusion that the dimensions of the economic dislocation to the Reserve work force will be nowhere in the order of 3,000 unemployed and in fact may be minimal.

This Court has directed a survey of the employees to see which ones might be suitable for construction work and this survey is not yet completed. If it appears to be dispositive of many of the questions herein involved, these findings will be supplemented by such observations as are appropriate in the light of the material obtained in that survey.

Insofar as the economic dislocation to the company is concerned, both parent companies have adequate supplies of alternative ores and they will not unduly

suffer in their other operations as a result of the closing of Reserve.

In short the spectre of tremendous economic hardship to northeastern Minnesota and the work force is just that—a spectre. As do other spectres, this disappears in the light of the facts and reason. It is simply not there. The most important single economic incident of the closing of this plant will be that defendants lose 20 million dollars in profit for one year, a figure which is almost exactly the amount that they have earned during the year's litigation, two-thirds of which was necessitated by their litigation of issues which in the light of the procedural history of this case and the evidence should have been admitted, conceded and stipulated to.

Secondly, this Court's recommendation that the injunction not be stayed is based upon the facts and law concerning Reserve's discharge as found by this Court after dealing with the problem and reflecting on it during the nine-month trial.

This Court made specific findings of fact that:

1) Defendants' waste material contains significant quantities of amosite asbestos as well as substantial quantities of material similar to amosite asbestos;

2) Exposure to amosite asbestos and material similar to amosite asbestos has resulted in a substantial increase in human fatalities due to mesothelioma and various cancers. This includes a three-fold increase in fatalities due to gastrointestinal cancer;

3) There is no known level of exposure that is free from increased fatalities. Many scientists speculate that there is a threshold level of exposure below which no detectable increase in fatalities will occur, however, no one could testify with any authority as to what that level of exposure was;⁵

5. In its Supplemental Memorandum this Court clearly pointed out that the industrial levels were enacted to prevent asbestosis

which requires a higher level than cancer which occurs at much lower levels of exposure. This Court found that industrial

4) The waste materials from defendants' processing plant are dispersed throughout much of Lake Superior and significant quantities of this material ends up in the drinking water and is ingested and possibly inhaled by thousands of citizens of Minnesota and Wisconsin;

5) The emissions into the air from defendants' plant contain substantial quantities of amosite fibers and fibers similar to amosite and are spread over the area of Silver Bay and into Wisconsin;

6) The number of fibers from Reserve's discharge present in the drinking water of Duluth and in the ambient air of Silver Bay are comparable to the number of fibers present in other areas which have been studied and where asbestos-related disease has resulted. Due to limitations in technology, any count of the number of fibers is subject to a wide margin of error. Any count can only be used as an approximation within an order of magnitude.

Based in part upon these findings of fact the Court concluded that Reserve's discharge into the water violated the Federal Water Pollution Control Act, 33 U.S.C. § 1152 et seq.; specific Federal and Minnesota regulations WPC 15(c)(6), (c)(2), (a)(4), (d)(1) as well as WPC 26 and constituted a common law nuisance subject to abatement under the Federal common law and the laws of the States of Minnesota, Wisconsin and Michigan in that it substantially endangered the health of those exposed to it in those states. The Court further held that defendants' discharge into the air was in violation of Minnesota Regulation APC 1, 5, 6, and 17 as well as constituting a common law nuisance subject to abatement pursuant to both federal and state law in that it substantially endangered the lives of those exposed to it.

In finding that the discharge constituted a substantial health threat this

standards may be inadequate to protect even against asbestosis and in no way were considered by this Court to constitute a guide

Court considered the risk that any one person would contract a fatal disease resulting from his exposure to the discharge. The Court also considered the risk that if the discharge proves to be harmful at all due to the large number of people exposed, that it would result in the death of several thousand people over the next twenty years. In an effort to alleviate the risk, this Court ordered that the Corps of Engineers provide clean drinking water to the municipalities involved. At one time there was a plan for water filtration systems which hopefully would filter the asbestos fibers from the drinking water. The information available to this Court is that the plans have been changed since the Court of Appeals' decision and that a filtration system that would filter asbestos fibers from the water is now years away. Even if filters are installed there is still a great question based upon the evidence of how effective such filters would be. Finally, water filters in Duluth would do nothing to alleviate the risk imposed by asbestos fibers in the ambient air in Silver Bay. The only real answer to the problem is a cessation of the discharge into the air and water. Due to the overwhelming evidence that defendants' discharge is in violation of numerous state and federal laws and that a continuation of this discharge may substantially impair the health and welfare of thousands of people, it was this Court's judgment that the discharge be stopped immediately and it is this Court's recommendation that the exposure to asbestos fibers not be continued during the pendency of this litigation.

In granting the 70-day stay, the Court of Appeals stated that in their preliminary view the Court's findings that the discharge created a substantial health hazard was improper in that whether or not this discharge actually will kill anybody is incapable of being established

to a safe threshold limit for a 24-hour day environmental exposure which might result in cancer deaths.

one way or the other and that resolving all doubts in favor of public health this Court indulged in a decision that is better left to the legislature. In that the opinion of the Court of Appeals was issued on a preliminary basis, one subject to their own reconsideration, this Court does not view this opinion as establishing the law in this matter.

It is this Court's view that its finding of a health threat is supported by the law and the evidence and to the extent that doubts were resolved in favor of the public health, such was the proper and only course of conduct under existing law. The Court sitting in an equity suit brought by various sovereigns for the protection of the health and safety of these citizens, even absent specific legislation, must give great weight to the protection of the citizens.

Furthermore, to the extent that such a course of action is considered to be a legislative and not a judicial decision, it is this Court's view that the Congress of the United States and the Minnesota Legislature have acted in this area and the Court's Order was controlled by and in keeping with legislative action.

Under the Federal Water Pollution Control Act, 33 U.S.C. § 1152 et seq., the Congress gave the courts substantial authority to protect the public interest from violations of the Act. As stated previously in 33 U.S.C. § 1160, Congress provided that the Court "shall have jurisdiction to enter such judgment, and orders enforcing such judgment as the public interest and the equities of the case may require." It is this Court's reading of this language that Congress was vesting the Court with the broadest possible authority and power to protect the public interest when confronted with violations of the Act. The Minnesota Legislature has incorporated similar language granting the courts broad power in protecting the public interest. Minn. Stat. § 116D.04. Finally, assuming that this Court or another court believes there is some question as to whether en-

vironmental exposure to asbestos fibers can result in a health threat to a community and that a resolution of this type of problem is better left to the legislature, the Minnesota Legislature acting through its administrative arm has acted on this question and in promulgating Minnesota Regulation APC 17 has acted to protect the public health. This regulation requires that those industries discharging asbestos fibers into the air must use the best available means of pollution abatement which includes the use of fabric filters. The regulation is a reasonable exercise of legislative authority. It is my feeling that this Court does not have power to disregard this enactment but rather is compelled to enforce it as written.

The federal and state regulatory and legal proceedings aimed at seeking compliance with state and federal laws and regulations has been dragging on for over five years. During all of this time there have been administrative proceedings, court hearings and settlement conferences with the single purpose of seeking an abatement in Reserve's present mode of discharge. The fact that someday defendants would have to abate their present mode of discharge was apparent even to the company itself, yet they have refused to take any effective steps to abate the discharge, and the discharge has continued to date. Such may be the right of a corporate entity to refuse to come into compliance with laws and regulations until it is specifically ordered to by an appropriate authority. However, now defendants have had their day in court in the form of this nine-month trial. Based on the substantial evidence adduced at this trial, this Court found not only was defendants' discharge in violation of several state and federal laws and regulations, but also constituted a threat to the health of thousands. Due process requires that defendants be permitted the right to appeal this Court's decision. Due process does not require that defendants be permitted to violate the laws aimed at protecting the public and to continue expos-

Cite as 380 F.Supp. 91 (1974)

ing thousands of people to substantial quantities of a known human carcinogen during the several years remaining in which the appellate process continues.⁶



**RIVER DEFENSE COMMITTEE et al.,
Plaintiffs,**

v.

**Eberhard THIERMAN et al., Defendants.
No. 74 Civ. 159.**

United States District Court,
S. D. New York.
July 3, 1974.

In an action brought under the National Environmental Policy Act, the District Court, Stewart, J., held that the District Engineer of the United States Corps of Engineers should have held a public hearing before issuing a permit to a property owner in Grandview-on-

6. In response to the Court of Appeals' inquiry as to those matters that are still to be decided, this Court reiterates that which it stated in its Supplementary Memorandum of May 11 that it has severed for later resolution the issue of the biological effect of Reserve's discharge on the Lake itself. This is not to say that there were no findings in this general area. To the extent this Court made findings on the violation of state and federal laws, regulations, permits, etc., these were findings on that issue. These findings were based on issues that were fully litigated such as the mineral identity of the discharge, the quantity of the discharge, its transportation and dispersion through the Lake and the ambient air, its presence in the various public water supplies, and its potential adverse health effect to the people who drink or breathe it.

As to the purely legal issues and motions yet to be decided, the Court has under advisement whether Reserve's discharge is in violation of Minn.Reg. APC 3(a)(2), Minn.

Hudson, New York for construction of a bulkhead and placement of landfill shoreward for the purpose of building a family dwelling, that federal agencies must establish reviewable environmental records. Plaintiff established a substantial likelihood of success on the merits, and irreparable harm so as to warrant preliminary injunction.

Injunctive relief granted; bond continued.

1. Health and Environment \S 25.5

Jurisdiction of federal court in action under National Environmental Policy Act extends only to reviewing whether Corps of Engineers complied with congressional dictates as well as agency's own regulations; policy determinations are left to expertise of the agency. National Environmental Policy Act of 1969, \S 102, 42 U.S.C.A. \S 4332; 5 U.S.C.A. $\S\S$ 701-706; 28 U.S.C.A. $\S\S$ 1331 (a), 1337, 1361, 2201, 2202.

2. Navigable Waters \S 38

District Engineer of United States Corps of Engineers should have held public hearing before issuing permit to property owner in Grandview-on-Hudson, New York for construction of bulk-

Stat. $\S\S$ 116.081 and 115.07. The question of fines and penalties for failure to make discovery and violation of specific regulations and statutes such as Minn.Reg. MPCA 1 and 11 and Minn.Stat. \S 115.071(2)(b) is also under advisement. See Supplemental Memo. at page 26. Reserve's counterclaims are under advisement, as is Wisconsin's claim that Reserve's discharge is in violation of the Wisconsin Public Trust Doctrine and the claim that Reserve's discharge violates the Refuse Act, 33 U.S.C. \S 407. Before these matters can be resolved by the Court it will be necessary to have counsel rebrief and argue these specific points of law in light of the evidence of the case and findings of fact made by this Court. In that the attorneys in this case have pressing demands in other areas of this matter, and the fact that many of these pending issues are largely cumulative and may never require a resolution by this Court, this Court has not as yet required counsel to brief these points.