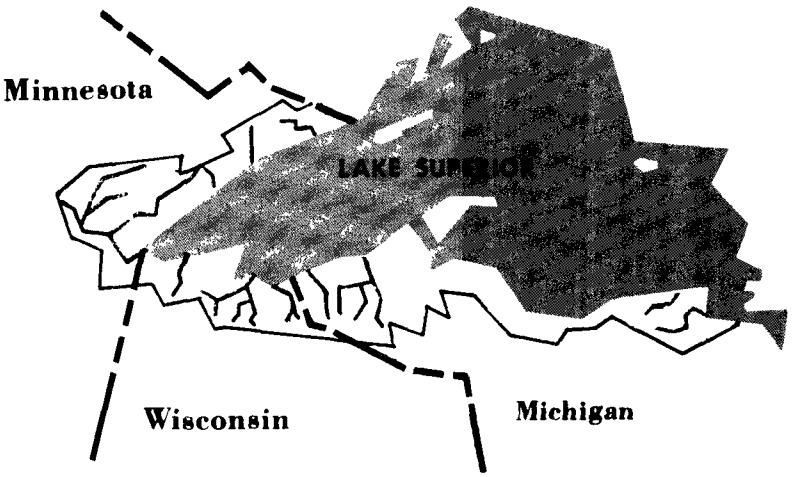
PROCEEDINGS



Duluth, Minnesota
May 13-14-15, 1969
Executive Session
Sept. 30, Oct. 1, 1969

CONFERENCE

Pollution of Lake Superior and its Tributary Basin Minnesota--Wisconsin--Michigan

U.S. DEPARTMENT OF THE INTERIOR • FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

C O N F E R E N C E

IN THE

MATTER OF POLLUTION OF

LAKE SUPERIOR AND ITS TRIBUTARY BASIN

IN THE STATES OF

MINNESOTA, WISCONSIN, AND MICHIGAN

held in

Duluth, Minnesota

September 30 - October 1, 1969

EXECUTIVE SESSION

TRANSCRIPT OF PROCEEDINGS

C O N T E N T S

C O N T E N T S

(Continued)

C O N T E N T S

(Continued)

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The Executive Session for the conference in the matter of pollution of Lake Superior and its tributary basin in the States of Minnesota, Wisconsin, and Michigan, was held Tuesday, September 30, 1969, and Wednesday, October 1, 1969, in the Ballroom of the Duluth Hotel, Duluth, Minnesota.

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P R O C E E D I N G S

OPENING STATEMENT

BY

MR. MURRAY STEIN

MR. STEIN: The conference is open.

This is a very unusual session of a conference, because I have never seen an Executive Session having this many people. The reason we took a little extra time was to adjust the tables in front. The Executive Session, as you know, will have the conferees talking to each other, because we have to hopefully come to determinations on where we are going to move.

The audience is, of course, welcome to observe what the conferees are doing. But it was the unanimous belief of all the conferees that while we were to have an Executive Session--we like doing business in the open--since we are all public agencies doing the public business, w e a r e doing this in a public manner. The conference, of course, will be conducted in the form that we usually conduct the Executive Session--with the conferees talking to each other.

Opening Statement - Mr. Stein

We do have one request, though, from the audience. It would be helpful if you slanted your name plates toward the audience so that they can get the names of the ballplayers if their eyesight is good.

Again, because of the nature of the last conference, we have had a request from a conferee or so to make a fairly full statement of the purpose of the conference.

This Executive Session for the conference in the matter of pollution of Lake Superior and its tributary basin in the States of Wisconsin, Michigan and Minnesota, is being held under the provisions of Section 10 of the Federal Water Pollution Control Act, as amended. The conference first met on May 13 to 15, 1969. The conference recessed on May 15, 1969, to allow the conferees sufficient time for evaluation of the extensive data developed by the conference. Under the provisions of the Act, the Secretary of the Interior is authorized to initiate a conference of this type when on the basis of reports, surveys, or studies he has reason to believe that pollution subject to abatement under the Federal Act is occurring.

Opening Statement - Mr. Stein

As specified in Section 10 of the Act, the Secretary of the Interior has notified the official State water pollution control agencies of this conference. These agencies are the Minnesota Pollution Control Agency, the Wisconsin Department of Natural Resources, and the Michigan Water Resources Commission.

Both the State and Federal Governments have responsibilities in dealing with water pollution control problems. The Federal Water Pollution Control Act declares that the States have primary responsibilities and rights for taking action to abate and control water pollution. Consistent with this, we are charged by law to encourage the States in these activities.

At the same time, the Secretary of the Interior is charged by law with specific responsibilities in the field of water pollution control in connection with pollution of interstate and navigable waters. The Federal Water Pollution Control Act provides that pollution of interstate or navigable waters which endangers the health or welfare of any persons shall be subject to abatement. This applies whether the matter causing or contributing to the pollution is discharged directly into such waters

or reaches such waters after discharge into a tributary.

In addition to this, the Secretary of the Interior can initiate an action of this type on his own initiative when on the basis of reports, surveys, or studies he has reason to believe that pollution originating in one State is endangering the health or welfare of persons in another State. In the case of intrastate pollution that is endangering health or welfare of persons in the same State, a conference of this type can only be initiated on the request of the Governor of that State. This conference was called by the Secretary of the Interior on his own initiative, and that means what we are going to concentrate on is pollution of one State which may or may not endanger health or welfare of persons in another State.

The purpose of the conference is to bring together the State water pollution control agencies, representatives of the United States Department of the Interior, and other interested parties to review the existing situation, the progress which has been made, to lay a basis for future action by all parties concerned, and to give the States, localities and industries an

opportunity to take any indicated remedial action under State and local law.

Under the Federal law, the Secretary of the Interior is required at the conclusion of the conference to prepare a summary of it which will be sent to the conferees. The summary, according to law, must include the following points:

1. Occurrence of pollution of interstate waters subject to abatement under the Federal Act;

2. Adequacy of measures taken toward abatement of pollution;

3. Nature of delays, if any, being encountered in abating the pollution.

The Secretary is also required to make recommendations for remedial action if such recommendations are indicated.

We will make copies of the transcript and the summary available to the State agencies, and any persons wishing to obtain them can obtain these from the State agencies.

Now, I would like the conferees here, if they would, to introduce themselves.

Opening Statement - Mr. Stein

First we will call on Minnesota. Mr. Badalich, would you and your colleagues stand up and introduce yourselves, please.

MR. BADALICH: My name is John Badalich, Executive Director of the Minnesota Pollution Control Agency.

MR. TUVESON: Robert Tuveson, member of the Agency.

DR. ANDERSEN: Howard Andersen, member of the Agency.

MR. STEIN: Wisconsin Department of Natural Resources.

MR. MACKIE: I am Donald Mackie, an Executive Assistant of the Department of Natural Resources.

MR. FRANGOS: Thomas Frangos, Administrator of the Division of Environmental Protection.

MR. STEIN: Michigan Water Resource Commission.

MR. PURDY: Ralph Purdy, Executive Secretary, Michigan Water Resources Commission.

MR. STEIN: The Federal conferees.

MR. POSTON: H. W. Poston, Regional Director, Federal Water Pollution Control Administration.

MR. BRYSON: Dale Bryson, Federal Water

Pollution Control Administration.

MR. STEIN: My name is Murray Stein. I am from headquarters of the Department of the Interior and the representative of Secretary Hickel.

And to my right--will you stand up--is Mrs. Rheta Piere, who is the National Conference and Hearing Coordinator for the Department.

Because of the large audience, if the press, or any of you, would like any information to find out what the procedure is or have a problem, I would suggest that you get in contact with Mrs. Piere. She will either answer your question or direct you, hopefully, to the appropriate person who can provide that answer.

On the basis of the record last time, I think we have several areas which need clarification, and any other of the areas, of course, that the conferees may wish to bring up for clarification will be considered. By going over the record I think I have the areas identified as:

1. The distribution of taconite and where it comes from and where it goes.

The second area is whether the materials in the taconite are soluble and leach out into the water.

And do these materials have an effect, biological or otherwise.

And the last one, water quality requirements for the open waters of Lake Superior.

There very well may be other areas which need clarification. I think there are many other issues that the conferees will have to take up, but on the basis of sitting through many of these cases, I think the issues have been pretty fairly laid out in these other areas and we can enter directly into a discussion on that.

Are there any problems or questions?

MR. PURDY: Mr. Stein, in the opening of the conference you were designated as the Federal conferee. Do I understand now that Mr. Poston has been designated as the Federal conferee?

MR. STEIN: That is correct. Mr. Poston is the Federal conferee and I have been shifted to Chairman. I am working my way up. (Laughter.)

With that, let us see if possibly we can call on Mr. Poston.

Do you have any comments on the first question or first area of distribution of taconite?

Mr. Poston.

MR. POSTON: Mr. Chairman and conferees, we have our technical people who have looked at the record, reviewed the record, and are prepared to give their interpretation of the transcript on the distribution of taconite area.

MR. STEIN: I hope it is clarification, but you proceed in your own way.

MR. POSTON: Well, I would like to ask Dr. Mount and his staff to give us their presentation and clarification of this matter of the distribution of taconite.

MR. STEIN: Why don't you call on the staff.

MR. POSTON: Dr. Mount.

Dr. Mount is Director of our regional National Water Quality Laboratory or the National Water Quality Laboratory.

MR. STEIN: It might be advisable, if you are going to call on someone, to introduce him by his full name for the record or let him identify himself.

Dr. D. Mount

Will anyone who is called on by the conferees come to the lectern, if you please.

MR. POSTON: Would you introduce yourself, then, Dr. Mount?

DR. DONALD I. MOUNT, DIRECTOR
NATIONAL WATER QUALITY LABORATORY
FWPCA, DULUTH, MINNESOTA

DR. MOUNT: My name is Donald I. Mount, Director of the National Water Quality Laboratory, FWPCA, Duluth, Minnesota.

Mr. Chairman and conferees, because these questions become highly technical and involved, I find that it is pretty difficult to keep on top of all of them, so with your permission I would like to call on Mr. Robert Andrew to present the technical data on the distribution of tailings and clarification of points raised in the main conference.

MR. STEIN: Go right ahead.

DR. MOUNT: Particularly regarding the samples that were reported at that time as preliminary.

R. W. Andrew

ROBERT W. ANDREW, RESEARCH CHEMIST
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MR. ANDREW: Thank you. I am Robert W. Andrew. I am a Research Chemist with the National Water Quality Laboratory.

The information that I wish to present this morning is the results of the bottom sediment core sampling program that was carried out by the FWPCA in July of this year.

This information is being introduced and is pertinent at this time, I believe, as a confirmation of the question that was raised in the earlier conference with regard to the distribution in the bottom sediments, both in Minnesota and in Wisconsin waters. We had preliminary data that was introduced into the record at the earlier conference, and the present data now, although it is a different sampling, we believe confirms the earlier results.

For the purposes of discussion here, I would like for each of the conferees to refer to the handout

that was sent to you, including a map showing the distribution in the bottom sediments. It is titled "Results of Mineralogical Analysis of Bottom Sediment Cores."

MR. STEIN: Do you have extra copies available?

MR. ANDREW: There are extra copies here that can be distributed.

MR. STEIN: Let's have the distribution to the conferees now and not assume that they have one.

I think we should do that with all material that you are going to refer to. Do not assume that anyone has it with him, but make a distribution.

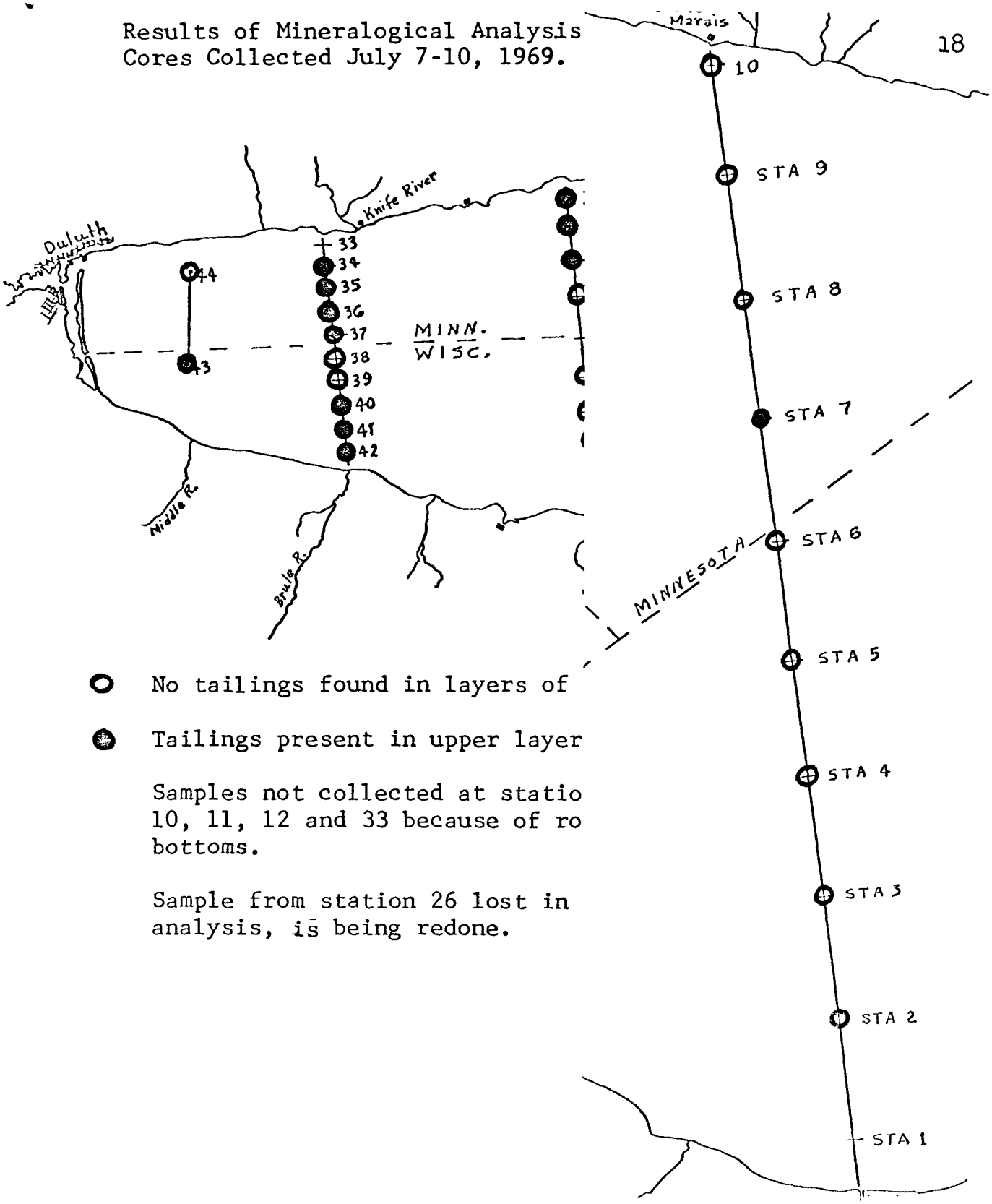
MR. ANDREW: Right.

To proceed with the discussion of this map, the map is of the western basin of Lake Superior and shows the core sediment stations on four transects and an additional two samples collected in the western tip of the lake. These were, as I said, collected in July of this year, and the points that are plotted now are the positive, in this case the presence of taconite tailings using our cummingtonite mineral as a tracer as we defined in the earlier conference, with a solid circle

on the map, and the negative, that is the absence of taconite tailings, with an open circle on the map. I think this is fairly clear.

(Which said map is as follows:)

Results of Mineralogical Analysis
Cores Collected July 7-10, 1969.



○ No tailings found in layers of

● Tailings present in upper layer

Samples not collected at statio 10, 11, 12 and 33 because of ro bottoms.

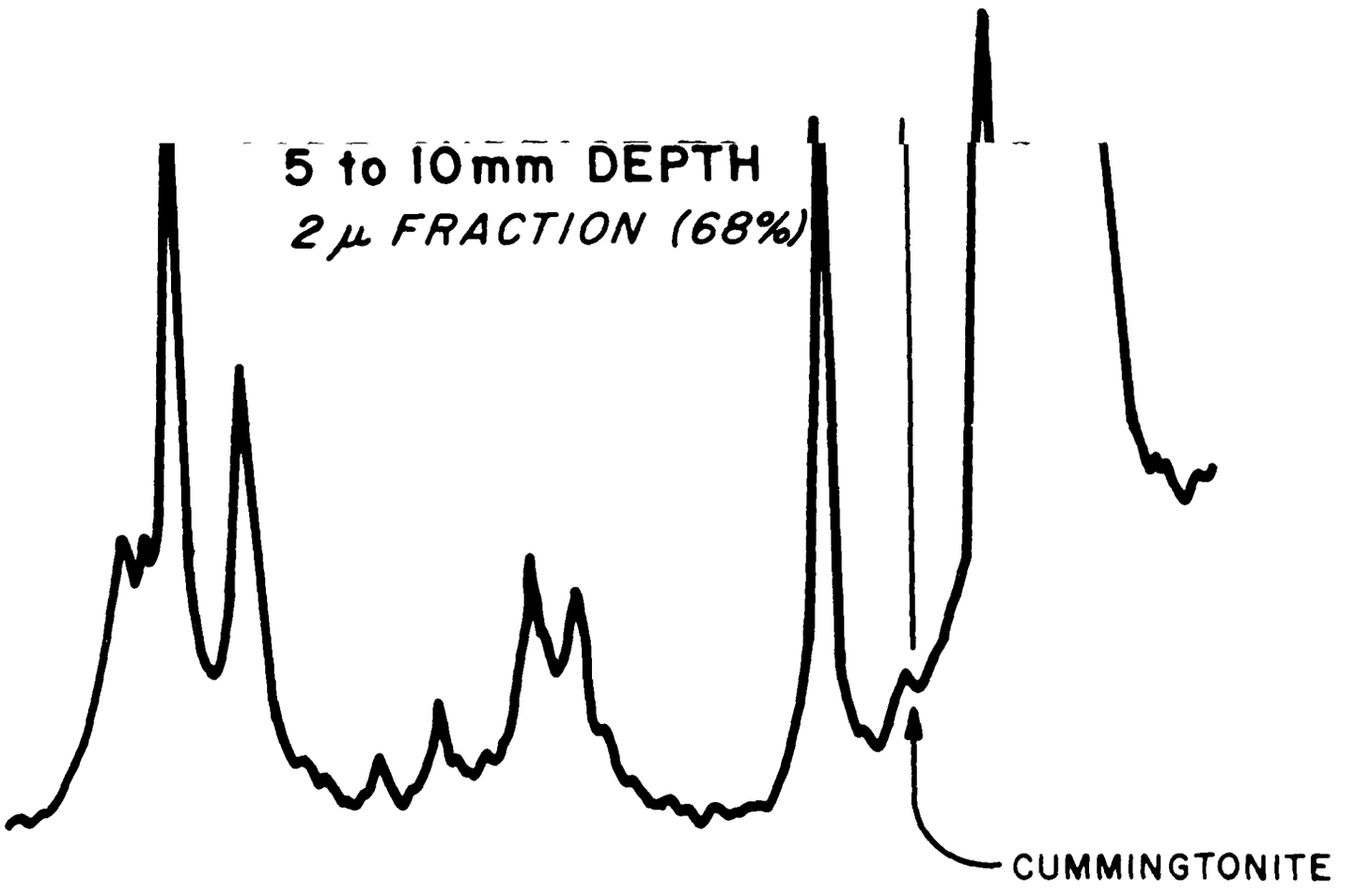
Sample from station 26 lost in analysis, is being redone.

R. W. Andrew

MR. ANDREW: These results are of the initial part of the survey or the initial part of the studies that are described in the study outline that was also sent to the conferees. I don't think we need to pass out additional copies of this. But these are initial x-ray scans of the core sediments collected of the bottom sediments.

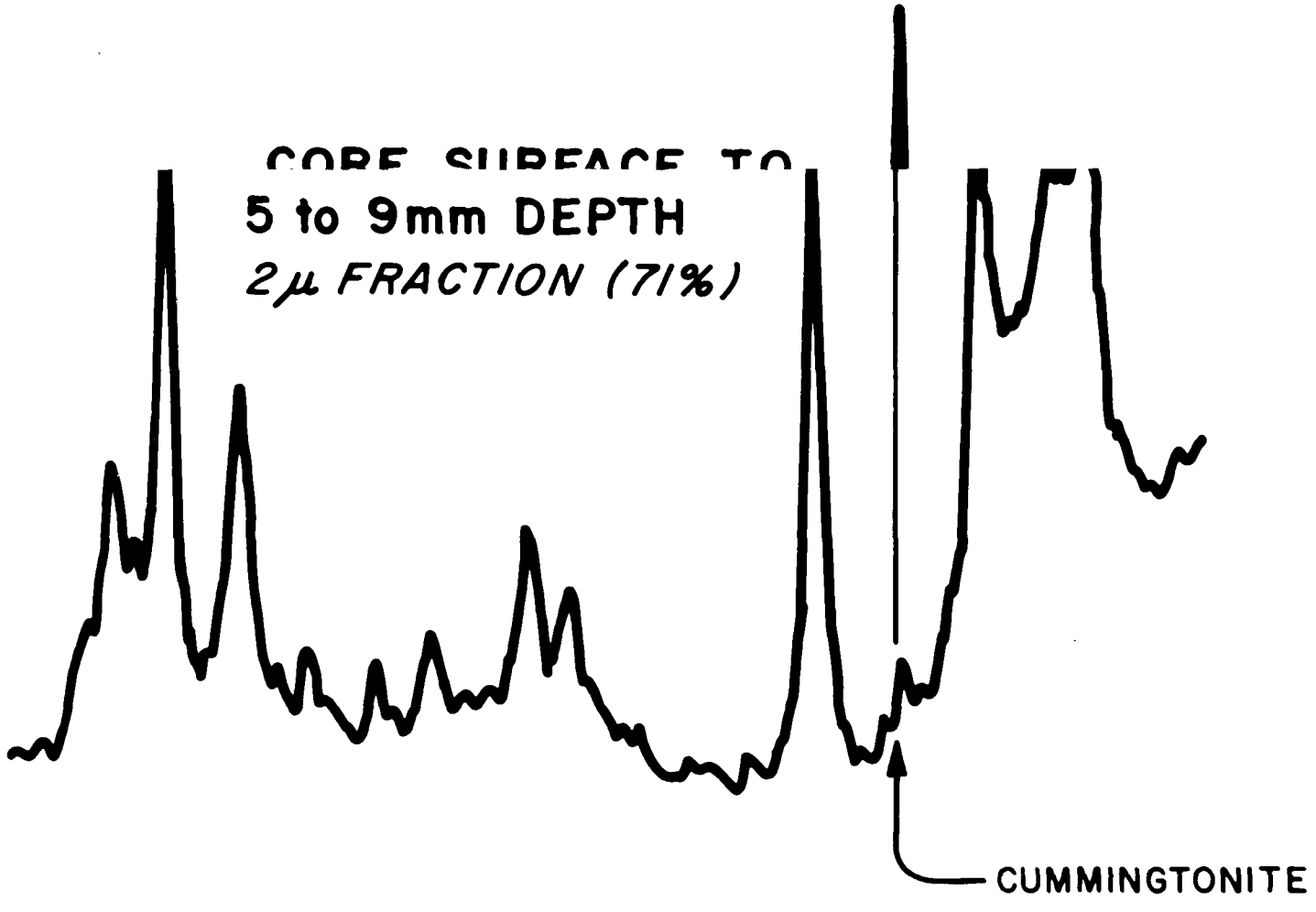
LAKE SUPERIOR BOTTOM SEDIMENTS

CORE SAMPLE - STATION 18



LAKE SUPERIOR BOTTOM SEDIMENTS

CORE SAMPLE - STATION 29



MR. ANDREW: The final results, that is a rescanning of those showing the presence of cummingtonite, are in process at the present time and we have completed approximately half of the cores on the final analysis. You will note sample for station number 26 right on the Minnesota-Wisconsin line is blank on your map at the present, and I wish to have you insert on your own a positive there for taconite tailings, that is you make it a solid circle on this point now. We have finished that analysis.

In addition, in the final analysis station number 25 is also now positive, whereas it shows negative on the map. The reason for this is that in the final analysis we go through a rather detailed, rigorous chemical separation and procedure to identify the cummingtonite and we have a much better or much clearer idea of presence or absence of the cummingtonite in these samples, so that there is a likelihood that some of the open circles or the negatives that show on the map now could eventually, in a detailed analysis, be positive. However, the reverse is not true. Where we once find the cummingtonite we will, of course, find even better definition of it and

be able to quantitate it more closely in the final analysis.

The general feature of the deposition pattern we believe follows the circular counterclockwise current pattern in the lake. That is the current pattern circulates westward along the north shore, across the western end of the lake, and then eastward along the south shore of the lake, depositing and distributing the taconite tailings as it goes. The large area of negative findings, that is stations number 21 throuth 24 on the south shore, the Wisconsin shore, in that particular area, we believe is due to the large dilution of the sediments coming from the taconite tailings by the red clay sediments coming out of the south shore streams. That is, it is actually diluted, the taconite tailings are more dispersed in this area; they are much more difficult to find because they are at much lower concentrations.

At this time I would like to help you just a little bit understand what we did and see how we actually defined these particular patterns. I would like to show just a few slides of the x-ray diffraction patterns.

Could we have the slides at this time, please.

R. W. Andrew

This first pattern is a repeat slide that was shown at the earlier conference and is slide number 1 in my earlier presentation, I believe. It shows the x-ray diffraction pattern of a sample of taconite tailings collected right from Reserve's delta and right below this an x-ray diffraction pattern of solids from the green water collected near the tailings delta.

Next slide, please.

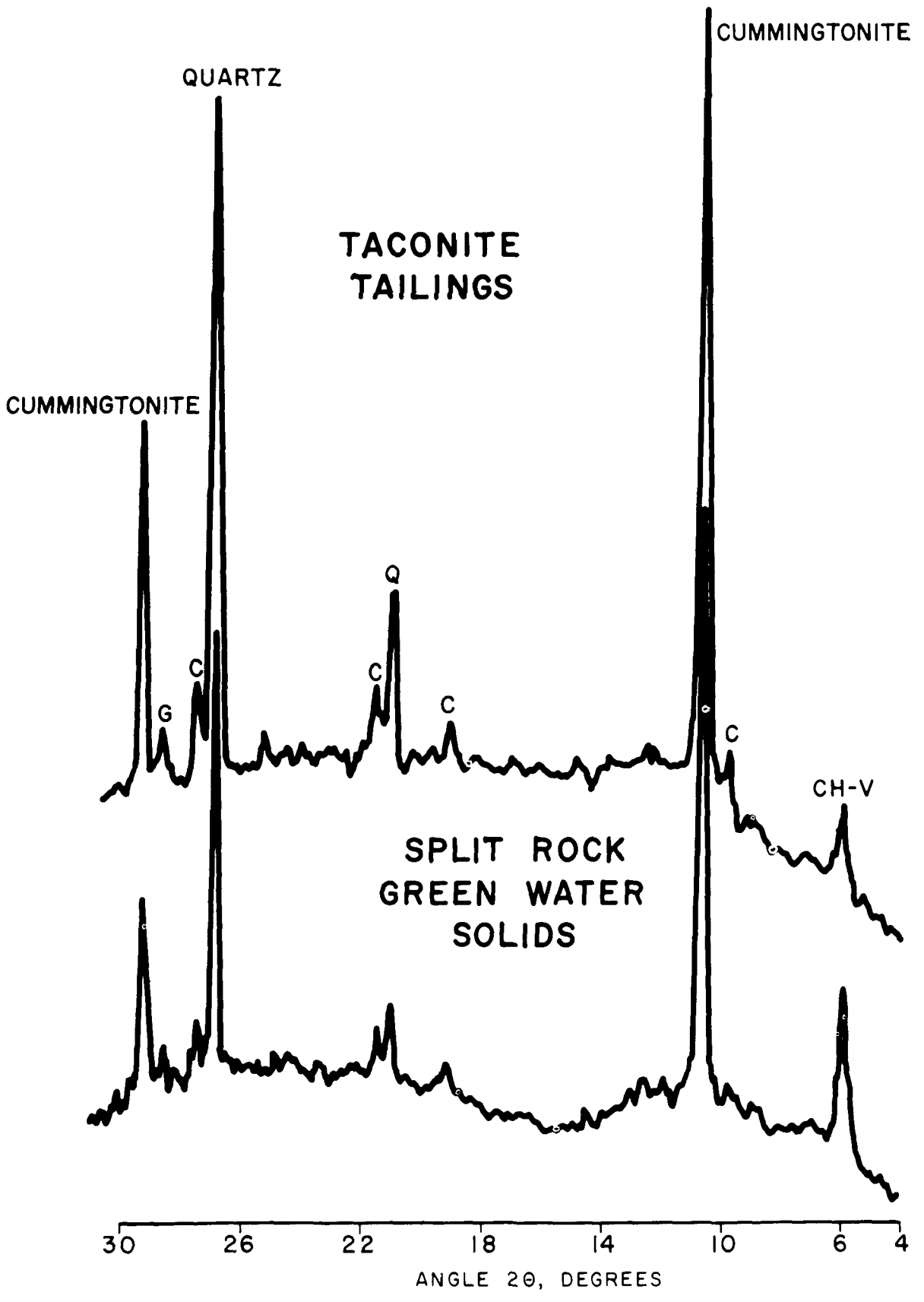
This is a similar x-ray slide from the Beaver Bay Water Treatment Plant, again showing the presence of a large peak of taconite, the Two Harbors, Minnesota, water treatment plant, a smaller amount of cummingtonite decreasing as we go away from the taconite tailings delta.

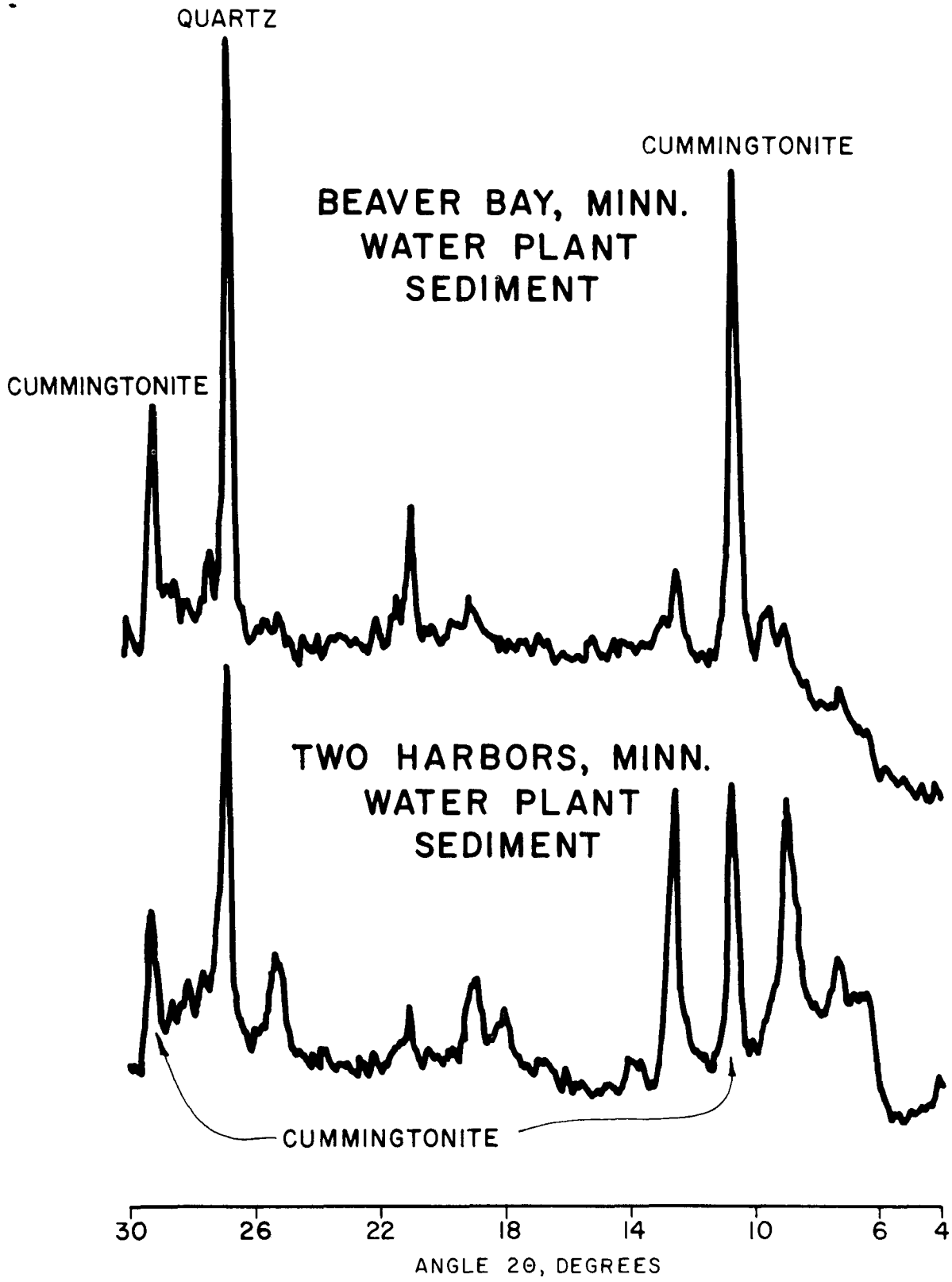
Next slide, please.

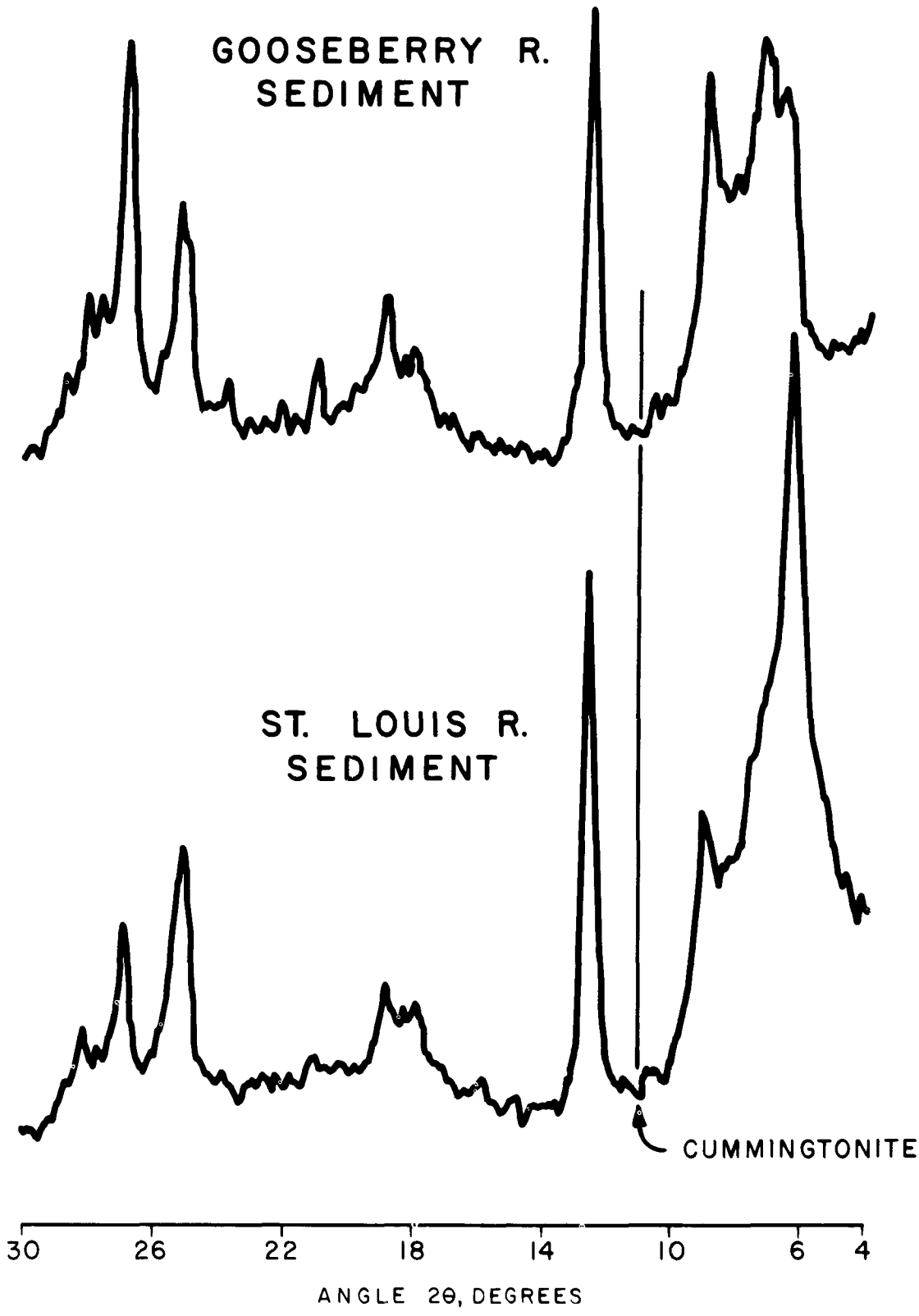
This is two typical river sediments, again, in this case, showing the absence of cummingtonite, and I show this just to refresh your memories as to what the typical sediments from the streams look like in comparison with the taconite tailings x-ray patterns.

The next slide, please.

This is the x-ray patterns that we have obtained from the core sample at station number 29, if you would

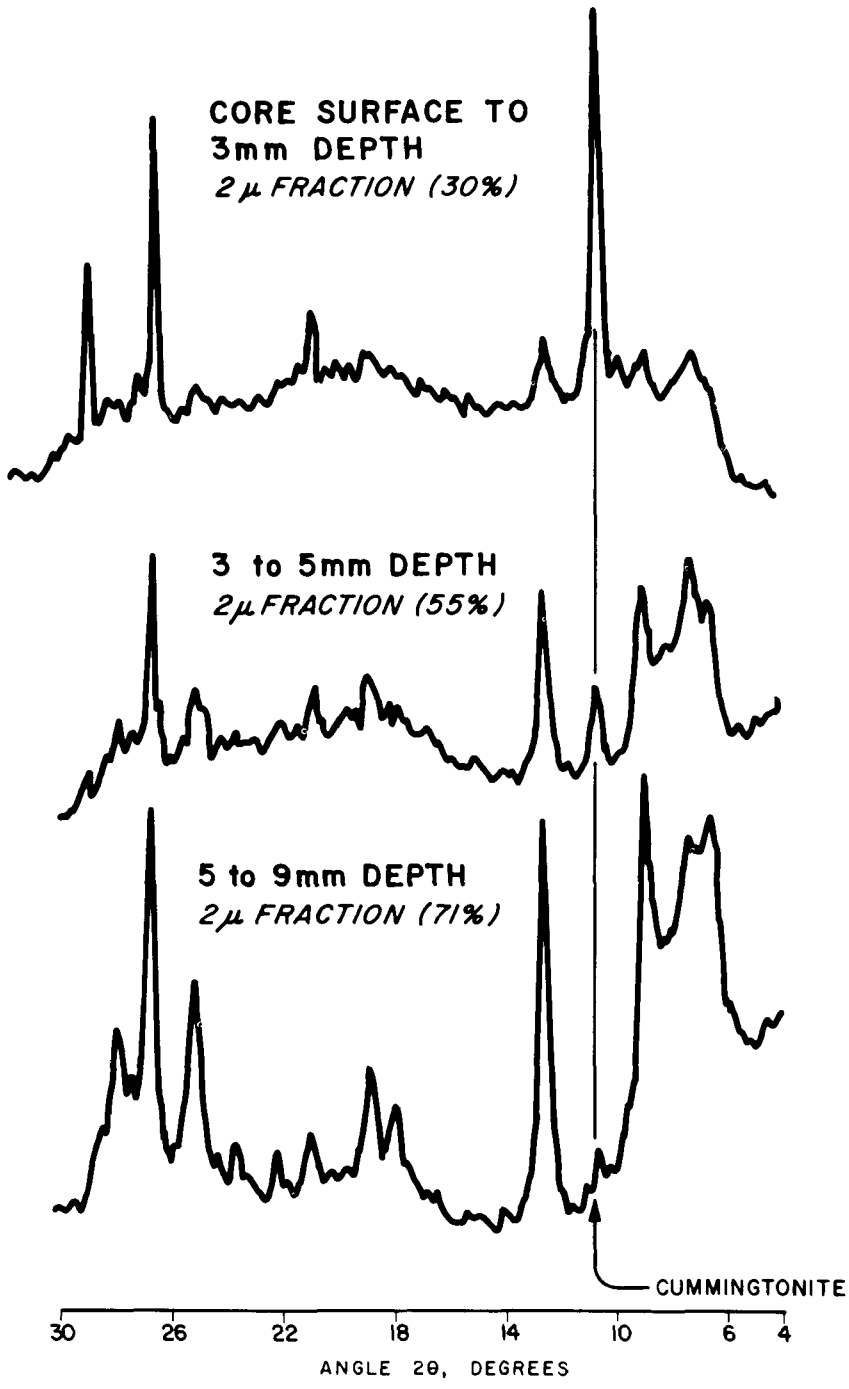

CUMMINGTONITE
QUARTZ
TACONITE
TAILINGS
CUMMINGTONITE
G
C
C
Q
C
C
CH-V
SPLIT ROCK
GREEN WATER
SOLIDS
30
26
22
18
14
10
6
4
ANGLE 2θ, DEGREES


QUARTZ
CUMMINGTONITE
BEAVER BAY, MINN.
WATER PLANT
SEDIMENT
CUMMINGTONITE
TWO HARBORS, MINN.
WATER PLANT
SEDIMENT
CUMMINGTONITE
30
26
22
18
14
10
6
4
ANGLE 2θ, DEGREES


GOOSEBERRY R.
SEDIMENT
ST. LOUIS R.
SEDIMENT
CUMMINGTONITE
30
26
22
18
14
10
6
4
ANGLE 2θ, DEGREES

LAKE SUPERIOR BOTTOM SEDIMENTS

CORE SAMPLE - STATION 29



like to refer to your maps now for the location on that one. Now, these are arranged in their order as to depth collected within the core, that is the upper x-ray pattern is of the surface sediment layer from the core samples taken at station number 29. And you will notice the presence of the large cummingtonite peak there and also this particular sample is from the surface to three millimeters in depth. For those of you who are probably not familiar with the three millimeter, this is about an eighth of an inch thick.

The next layer, three to five millimeter depth you will notice a grossly decreased presence of cummingtonite and the bottom curve there, the five to nine millimeter depth, almost a total absence of cummingtonite. Now, this sharp stratification is probably one of our best pieces of evidence that the cummingtonite arises from the taconite tailings and not from a natural source. If it were from a natural source, we would expect to see it distributed rather uniformly throughout the core and not be limited to the upper layers of deposition only.

An additional point that we would like to make

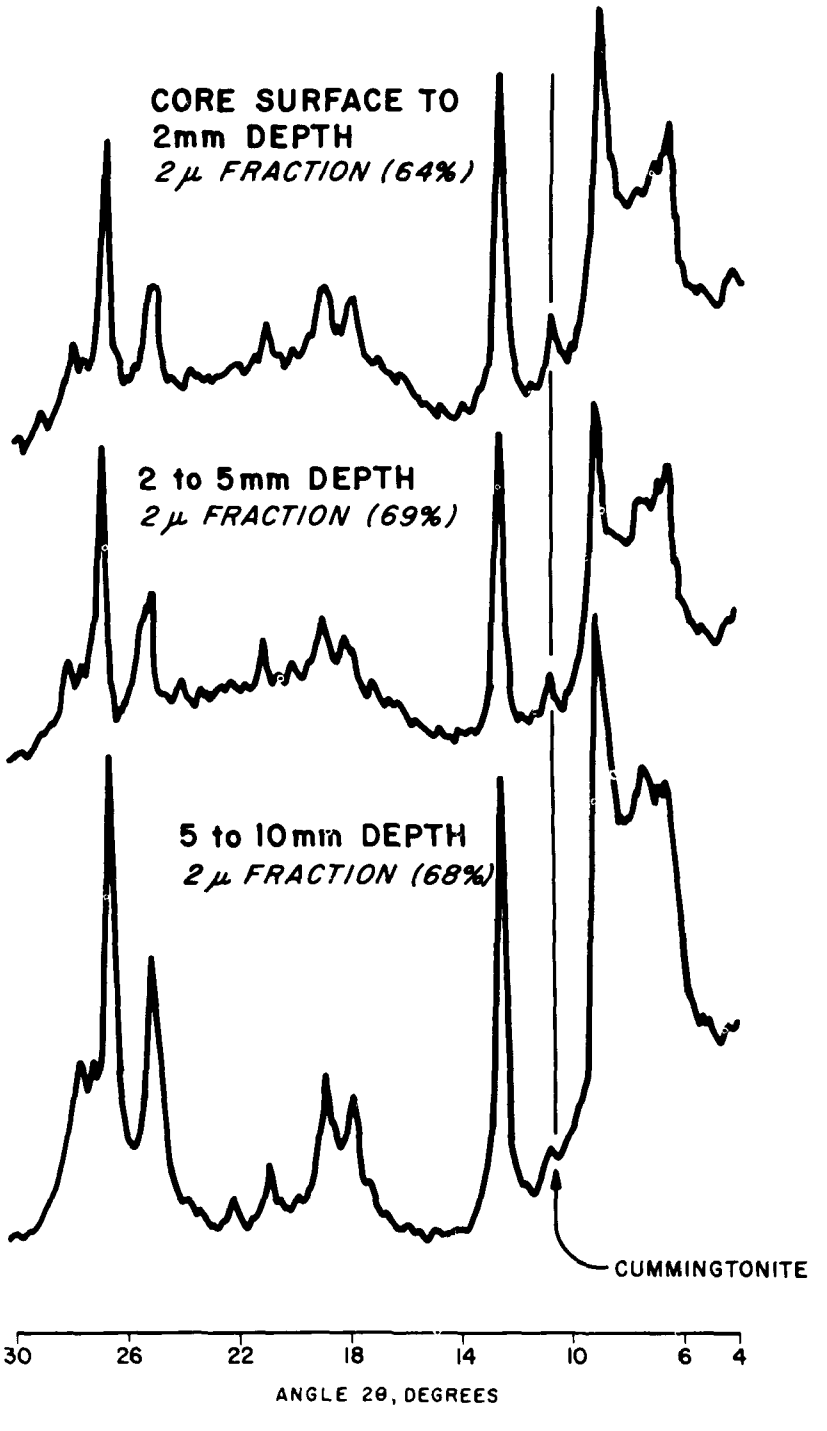
on this curve is that station 29 is located within the area of deposition as delineated by Mr. Kenneth Haley in Reserve Mining Company's statement in the proceedings of the original hearing on page 54 of his written statement, which is in the appendix of this statement. Now, what I am saying is, this is in the westernmost end of the tailings deposited as defined by Reserve, and the thickness of the tailings deposit in this particular core is in nearly excellent agreement with Reserve's own data, and I think this is a strong point, that we do agree with Reserve's definition of the deposit zone in this particular area.

Could we have the next slide, please.

This is the x-ray patterns from core samples at station number 18, which, if you will note on the map, is in Wisconsin waters. I use this slide in particular as representative of those samples collected in Wisconsin waters. You will note a very, very small cummingtonite peak, a large peak for each of the clay minerals on either side, but the cummingtonite, as with the deposit immediately downlake of the delta, does decrease with depth in the core, showing that it is a

LAKE SUPERIOR BOTTOM SEDIMENTS

CORE SAMPLE - STATION 18



recent deposition. This particular cummingtonite peak, by the way, would probably represent one or two percent cummingtonite or taconite tailings, they are defined by, in the surface, the two millimeter depth in that particular core. In other words, the taconite tailings in circulating through the current pattern through the western basin of the lake and reaching this particular deposition spot have been grossly diluted, dispersed and mixed with clay minerals from the south shore streams. The layer as such is not 100 percent tailings by any stretch of the imagination, but it is mixed with the natural sediments.

At this particular point, before I go any further, I would like to ask the conferees for questions, since I realize this is a totally new presentation to you and this conference, as I understand, is to clear up questions of the record.

MR. STEIN: By the way, have you completed your slides?

MR. ANDREW: Yes, that is all the slides.

MR. STEIN: Let's have the lights.

Mr. Frangos.

MR. FRANGOS: Yes.

Mr. Andrew, I wonder if you would repeat for me your statement as to the quantification of taconite in the sample examined--the last one in Wisconsin waters.

MR. ANDREW: Yes, sir. The percentage taconite tailings as defined here is based on a comparison I make visually with a series of standard cummingtonite mixtures mixed with a mixture of the natural clay minerals. Admittedly this visual comparison has its weaknesses and its limitations, but it is the best that can be done with x-ray diffractions at the present time. There are limitations because of the crystallography of the various minerals.

MR. FRANGOS: But would you repeat for me the numbers that you come up with--

MR. ANDREW: The percentages?

MR. FRANGOS: Yes.

MR. ANDREW: Yes, sir. That was approximately two percent, I believe I said, in that particular clay mineral fraction, that is the less than two micron fraction, from that core at the surface of the core.

Does that answer your question, sir?

MR. FRANGOS: Yes, thank you. I am wondering if we could follow up on this a little bit.

Could you describe briefly your sampling techniques? In other words, how do you get this core and retrieve it?

MR. ANDREW: The actual core itself?

The core itself is collected with a **Phleger** core sampler. It is lowered on cable from the boat or vessel into the surface of the sediment, it is lowered at a fairly fast rate so that the **hollow** tube part of the core sampler penetrates into the bottom sediment, there is a check valve in the core sampler that prevents the sediment part of the core from dropping out again as it is retrieved to the surface. Once it is brought to the surface, the liner of the core sampler is removed with the core in it and we froze it on board with dry ice and then brought it back to the laboratory in sections for the analysis.

MR. FRANGOS: So in essence this is an undisturbed sample?

MR. ANDREW: Yes, sir, as nearly as we can possibly make it.

R. W. Andrew

MR. FRANGOS: I am wondering if you can tell me, is there anything visually that you can observe from these samples, particularly the surface area, that would indicate the presence of a powdery material or what would strike you immediately without going through this analysis?

MR. ANDREW: There is a visual indication of a taconite layering or a taconite layer only in the immediate deposition zone. It follows almost precisely, as nearly as I can tell, Reserve's outline as shown in Mr. Haley's map. Once you are outside of this area, the gray color of the taconite tailings are so diluted by the brownish iron color of the natural sediments that it is impossible to define visually.

MR. FRANGOS: Another question. I am wondering, are you in a position at this time to make any kind of an estimate to quantify the amount of tailings found in the other positive samples in the Wisconsin waters?

MR. ANDREW: I didn't quite hear that question. Would you repeat it?

MR. FRANGOS: I will put it to you another way. Would it be correct to say that in all of the positive samples in Wisconsin waters that the percentage of taconite

would be in the range of two percent?

MR. ANDREW: To answer that, I would say the percentage varies fairly regularly with distance around the perimeter of the lake in the western basin. That is, we have a fairly high percentage in the sample in the westernmost tip of the lake, that is at station 43, I would estimate roughly ten percent in that area, and decreasing in samples 40 to 42 and much, much less, of course, at 18 and 20. It decreases in a fairly regular way.

Now, the total thickness, in any cases, is not more than about three millimeters or an eighth of an inch or so, so that we are talking about a very small percentage and a very thin veneer on the surface in the Wisconsin waters.

Does that answer your question?

MR. FRANGOS: Yes.

MR. STEIN: Let me see if I understand this, because it seems a little significant to me.

You mean that there is a fairly regular rate of decrease of the fragments of taconite in these core samples as you get away from the discharge of Reserve

Mining?

MR. ANDREW: Yes, that is true, yes. I can't give you precise quantitative numbers because the x-ray method itself is not that precise. However, in just a visual look at the x-ray patterns from these cores, they decrease in a regular way in traveling around the perimeter of the lake in a counterclockwise direction.

MR. STEIN: Thank you.

Are there any other questions or comments?

Mr. Purdy.

MR. PURDY: At the May meeting there was testimony put into the record on the presence of cummingtonite in certain samples from Minnesota waters, and I carried on a line of questioning with respect to sampling in waters other than Minnesota waters and received the reply that the information that was available only represented data from preliminary studies.

Now, I noticed in this report that has been furnished to the conferees that it states preliminary studies. Can you describe to me how the data that you have now presented differs from the preliminary studies that were not presented at the last conference?

MR. ANDREW: Yes, sir. The initial samples that we talked about in the May conference were collected with a dredge sampler rather than a core sampler and they were not in any sense of the word undisturbed samples. The only way we had from the dredge samples of defining the upper layer of deposition was to just scoop some out of the top of the dredge and hope that that represented the surface of the sediment deposited in that particular area.

Now, we did separate those dredge samples into two layers, an upper layer about a half an inch thick, a rather gross separation, and a composite of the lower material out of the dredge. Now, those results confirm--let's say they don't disagree with the results that we presented here at all. They gave us a clue as to where to look for these samples and where to take these samples, and the dredge samples that were collected in the same areas as these core samples agreed very closely, as closely as could be expected with dredge samples, let's put it this way. They showed presence or absence, but they were much less quantitative than the method we have now of taking an undisturbed core sample and separating the

individual layers.

Does that answer your question?

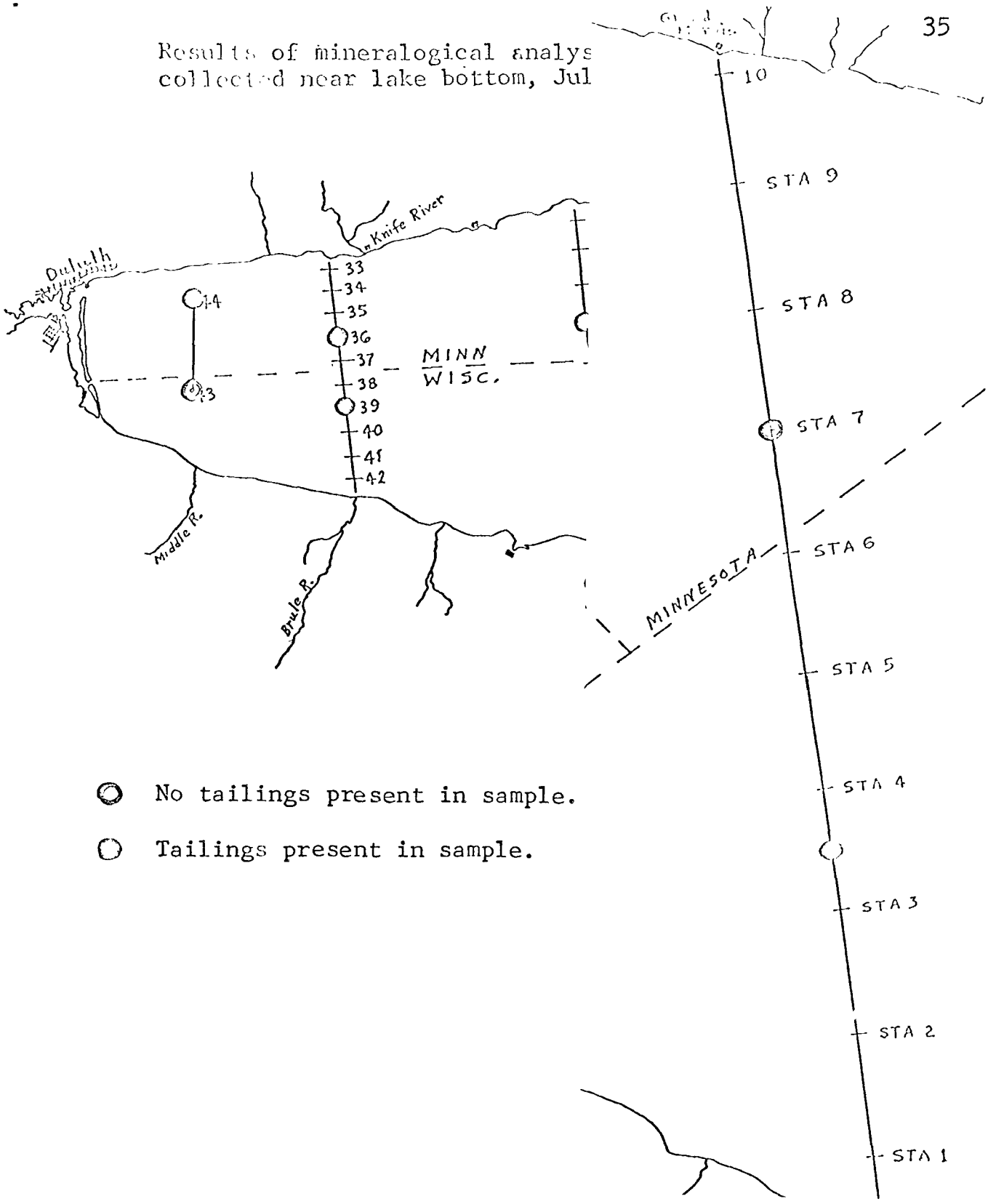
MR. PURDY: Yes.

MR. STEIN: Proceed.

MR. ANDREW: Before I quit up here, there might be some question arise, I think, as to the map that was also sent out with regard to the water samples that were collected at the same time. Could we turn to the second map, please, now? This has across the top of it "Results of mineralogical analysis of water samples collected near lake bottom, July 7-10, 1969." And there are extra copies of this also.

(Which said map is as follows:)

Results of mineralogical analys
collected near lake bottom, Jul



◎ No tailings present in sample.

○ Tailings present in sample.

R. W. Andrew

MR. ANDREW: The only points that I would like to make at this time with regard to this map, these are water samples that were collected at the exact same time as the core samples presented in the other map, and the water sampler was suspended from the same cable that was used to lower the dredge sample and collected approximately 15 or 20 feet from the bottom of the lake. They represent an instantaneous, you might say, sample of what was suspended near the lake at that particular time. The general pattern is roughly the same. As you will notice, the positives fall in about the same places, with negatives on the Wisconsin shore in about the same places that we had negatives with the bottom sediment samples.

The one positive that we have in the Michigan waters, located near station 4, has been reconfirmed as having a very, very small cummingtonite peak in that sample. However, the total suspended solids in that particular sample was on the order of a tenth of a milligram per liter, which is an extremely small amount. We have very, very little sample for x-ray analysis there.

In general, the suspended solids found in

these water samples was on the order of one-tenth to one-half milligram per liter with the exception of that at station 31, which is within the area affected by the heavy density current from the delta, and that one measured eight milligrams per liter. That is at station 31.

That particular sample, with eight milligrams per liter, gave an x-ray diffraction pattern that was, for all intents and purposes, pure taconite tailings.

The one other point that I would like to make now, with regard to the total possible deposition of tailings over the bottom sediments of the lake, has to do with the estimates made by Mr. Kenneth Haley in his statement of the total tonnage of taconite tailings going into the lake.

Would you like some additional time or some questions on the water samples?

MR. STEIN: Do I understand that you really can't make any firm conclusions on the basis of these water samples?

MR. ANDREW: Well, the point that I am trying to make is that the amounts that we are measuring there

at this time are so terribly small that it is really difficult to make any type of a quantitative measure of what is there. Qualitatively I think we are on solid ground. That sample is positive and there is no way to change it. But what it represents in the total picture as circulation within the lake, and so forth, it would be pure speculation at this time.

MR. STEIN: All right.

Any comments or questions?

Mr. Frangos.

MR. FRANGOS: Yes.

Mr. Andrew, on page 2 of the material that you sent to us last week when you talk about methods of identification, you say additional checks of Wisconsin stream sediments are being made to be doubly certain that there are no significant natural sources of cummingtonite The particle shapes are being studied to further verify the source as being from Reserve and not from natural sediments.

Has that been done?

MR. ANDREW: Yes, sir. We have collected and analyzed now samples from the Brule River, the Nemadji

has been resampled, the Iron River and the Bad River, which I believe are the streams with the greatest watershed in those areas having the highest sediment load. Those were negative. No cummingtonite was found whatsoever.

We have additional samples from the smaller streams that haven't been analyzed at the present time, but the major streams have shown negative with respect to the cummingtonite.

MR. FRANGOS: Well, on the basis of these investigations, what do you conclude?

MR. ANDREW: I conclude that Reserve's tailings discharge is the only source of the cummingtonite that we have found in the bottom sediments. There just seems no alternative to me.

MR. FRANGOS: Thank you.

MR. STEIN: Are there any other comments or questions?

If not, does that conclude your--

MR. ANDREW: I have just one additional small point that I would like to make here again and then I will call it quits.

MR. STEIN: Go right ahead.

MR. ANDREW: And this has to do with the possibility or the quantities necessary to show the distribution that we have in the bottom sediments.

Mr. Haley estimates that there were 95.9 million long tons carried into the lake by the heavy density currents as of November 19, 1968. This is taken directly from his written statement. Now, estimating conservatively, I say conservatively in the favor of Reserve Mining, this is equivalent to 1.72 billion cubic feet based on a packing density of 125 pounds per cubic foot.

Now, if this figure is correct, it would be sufficient to cover the entire bottom of the western basin of the lake, that is between the Sand Island there and Silver Bay, from there on west, to a depth of .7 of an inch. And I say this is conservative. Even if we deduct the amount of sediment that is accumulated in the immediate deposition area near the delta, this still allows sufficient material to cover the western basin of the lake to a depth of approximately 0.58 inches or .6 of an inch roughly.

R. W. Andrew

Using our own more recent core data, that is the data that we have shown here, the average thickness, and I am using an average over the whole area that we sampled, can be at most .1 of an inch thick. And the total tailings volume that would be contained therein is approximately 238 million cubic feet.

Now, adding this up, the deposit as we measured it, plus the tailings deposited as measured by Mr. Haley, still accounts for only approximately one-third of the total amount as estimated by Mr. Haley going into the lake.

From this, two obvious conclusions follow, I think. Number one, Mr. Haley's engineering estimates of the size of the delta underneath the water must be grossly underestimated, and I say grossly by a factor of two or more possibly. That is, there are actually more tailings deposited in the immediate delta area than what they have estimated.

The second conclusion, and I think the most important one, is that there can be and there is most likely being a tremendous quantity of the tailings going into solution or going into suspension in the entire body of the lake.

MR. STEIN: Mr. Mackie.

MR. MACKIE: Mr. Andrew, could you comment on whether or not cummingtonite is susceptible to being picked up and detected by magnetic means? We have had reports of fishermen picking up taconite by the use of suspended magnets. Could you comment on this, please?

MR. ANDREW: To my knowledge, cummingtonite itself cannot be picked up by a magnet. If there are large clumps or a rock with cummingtonite in it plus magnetite, it is capable of being picked up by a magnet, but not cummingtonite by itself. In other words, the cummingtonite that is in the bottom sediments of this area could not be picked up by magnet, especially in these very f i n e particle sizes that we are talking about here in the bottom sediments. The magnetic material that was collected by the fishermen on the south shore, it is almost pure magnetite, and it is also very, very coarse particle sizes and couldn't possibly have been carried into the Wisconsin waters by the currents. It is just too gross.

MR. MACKIE: Thank you.

MR. ANDREW: Does that answer your question, sir?

MR. MACKIE: Thank you.

MR. STEIN: Mr. Frangos.

MR. FRANGOS: Mr. Chairman, I am wondering if we might have some kind of a summary of those figures from the Federal conferee? We have had this report, but I have not seen any of the data on the last portion of Mr. Andrew's testimony here.

MR. POSTON: I would like to ask--

MR. STEIN: Let's handle one at a time.

Would you care to respond to that, Mr. Andrew?

MR. ANDREW: We will do this as soon as we possibly can, yes, sir.

MR. STEIN: How soon is "possibly can"?

MR. ANDREW: Well, as I mentioned earlier, the detailed analysis of the cores has been completed on approximately half of the cores, and we estimate another month and a half to two months to finish the other half.

MR. STEIN: But you have the figures--

MR. ANDREW: We do have the figures on those that have been done. We also have the data that pertains to the suspended solids in the water.

MR. STEIN: Where are those figures, Mr. Andrew?

MR. ANDREW: The x-ray diffraction patterns?

MR. STEIN: Yes.

MR. ANDREW: I have those that have been done right here in a folder.

MR. STEIN: But you just have one or two copies, don't you?

MR. ANDREW: I just have the original, yes, sir.

MR. STEIN: Why don't you have pictures made for the conferees? We probably could have it for them by noon, couldn't we?

MR. ANDREW: Yes. We could have copies of the x-ray diffraction patterns made, yes.

MR. STEIN: All right, let's do that.

MR. ANDREW: I am afraid they would be rather difficult to interpret because of the fact that they have sampling numbers only and this sort of thing.

MR. STEIN: Well, if they have questions on that, you can do that. Can't you give them a key to the sample number?

MR. ANDREW: Yes. Yes.

MR. STEIN: Why don't we try that?

MR. ANDREW: It might be better, I think, if we could just copy these and send them out in the mail in the next week or so with the complete designations as to the station numbers.

MR. STEIN: Why don't we try both?

MR. ANDREW: O. K. I am willing.

MR. FRANGOS: Mr. Chairman, I was interested not so much in the details of the sample results and their interpretation, but I would like to see the mathematics or calculations involved with Mr. Andrew's last testimony which attempts to quantify where these tailings are eventually ending up in the lake.

MR. STEIN: Yes.

MR. ANDREW: Those quantities are quoted directly in Mr. Haley's statement in the earlier record, that is the gross quantities on the 95.9 million tons, et cetera. I can show you how the calculations were made if you wish that.

MR. FRANGOS: Well, your comment regarding the amount that goes into solution, was that in fact part of the testimony presented by Mr. Haley?

MR. ANDREW: No, no. I say this is an obvious

conclusion if you follow through on the calculations.

MR. STEIN: While we are not restricting the statements of anyone, I think the next real big problem we are going to take up, is to ask about the solubility question. So let's just leave that.

Mr. Poston.

MR. POSTON: I think Mr. Andrew has given a good technical discussion of this problem of distribution of taconite in the core samples. I would like Dr. Mount to summarize this in a capsule form to tell us in lay terms some of their conclusions in a summary of this, as suggested by Mr. Frangos.

MR. STEIN: Well, let's see if there are any more questions of Mr. Andrew before we do that. But we will take that up if there are no more questions.

Are there any more?

MR. BADALICH: Mr. Chairman.

MR. STEIN: Yes.

MR. BADALICH: To pursue the quantitative analysis of the taconite tailings and the distribution over the lake, to follow up what Mr. Frangos said, I believe it is desirable to have this information at this

time. But he made an assumption, even though all of these samples have not been analyzed. He said it will be another month and a half or two months, and he is already averaging out the samples that have already been taken to a certain amount or a certain quantity being deposited in the lake. I think these figures should be brought forth now on the basis of this assumption. He is already saying that the material that is not accounted for is in solution and he has made his observation and stands behind it. So I think these figures are very important to be brought forth.

MR. STEIN: Again, I think this whole question of solution will be handled in the next question when we will call on Dr. Mount. Now, the only reason I didn't stop this is because we are in Executive Session. I did not raise this question of the solution now.

The question that we are talking about now is the distribution of taconite. I think your question is very well taken and Mr. Frangos' line is well taken. But I think the question of: Is the material soluble? is such an important question in itself that for the purposes of the record let us just, if you don't mind, forget that

and hold that discussion until we deal with that question directly.

Would that be all right?

MR. ANDREW: Yes, sir.

MR. STEIN: All right.

MR. BADALICH: Will this be verified by Dr. Mount how these calculations were made and his reasoning--

MR. STEIN: Yes.

MR. BADALICH: --to believe that these are in solution, the so-called missing quantity of tailings?

MR. STEIN: I hope it will be clarified, but we will give Dr. Mount an opportunity to talk to the question. As I recall Mr. Andrew's statement, he said he was just going to bring up one other small point, and, of course, we backed our way into a major point.

Let's hold that and recognize that we are going to call on Dr. Mount for this question.

MR. ANDREW: Any other questions?

MR. STEIN: If not, thank you.

MR. POSTON: I would like to ask Dr. Mount to summarize this.

MR. STEIN: All right.

(Applause.)

DR. DONALD I. MOUNT

(CONTINUED)

DR. MOUNT: In layman's terms, Mr. Poston.

MR. STEIN: That is great; call on a scientist to do something in layman's terms. You know, it always amuses me the kind of testimony we get and the kind of language we use when we call for a clarification. (Laughter.)

DR. MOUNT: I think there is a point of confusion about these calculations which Mr. Frangos asked about and then Mr. Badalich, and I think that the conferees may have missed one word which Mr. Andrew said. He did not say this was all in solution. He said solution and suspension. It shook me at first too until he said suspension as well.

So what he simply did was to take the information which Dr. Baumgartner did present at the May conference in which he too was unable to account for a large percentage of the tailings being in the delta or on the pile at the bottom.

In regard to summarizing the presentation on cummingtonite, I think that essentially this is where

we stood at the May conference. We had found cummingtonite in dredge samples in Wisconsin. I believe that I indicated to the record at that time that we were not able to say whether or not this cummingtonite truly represented tailings, because we had not checked the sediments in the Wisconsin streams, as well as in other areas, to make sure that there were no significant sources of natural cummingtonite. And I think now we have presented to the conferees these facts:

Number 1, that the cummingtonite was stratified and confined to the very topmost layer of the core samples, suggesting that this material has not been coming in over long periods of time but rather during a recent period.

Secondly, we checked the important south shore streams starting from east of Ashland and working westward and we did not find any cummingtonite in these sediments. We have not found it in the Minnesota streams either and this was presented in the May conference.

Third, we have shown that the amount of cummingtonite, and, therefore, indicating the amount of tailings, decreases in the core samples as we proceed in a

counterclockwise fashion from the point of discharge and following the current pattern that has been established previously in the May conference.

I think that these are the key points which establish in our own mind beyond a shadow of a doubt that this cummingtonite is representing tailings and is a true tracer of them.

MR. STEIN: Are there any comments or questions?

By the way, I want to thank Mr. Andrew for his presentation and thank you, Dr. Mount.

I wonder if we can proceed to the second problem, Mr. Poston: Is the material soluble?

MR. POSTON: Dr. Gary Glass is prepared to clarify the record as to solubility of taconite tailings in the Lake Superior waters.

MR. STEIN: I can't think of a more poetic name for a man to clarify the record than Dr. Glass.

(Laughter.)

MR. STEIN: Dr. Glass.

Dr. G. Glass

DR. GARY GLASS, RESEARCH CHEMIST

NATIONAL WATER QUALITY LABORATORY

FWPCA, DULUTH, MINNESOTA

DR. GLASS: My name is Gary Glass. I am a Research Chemist at the Water Laboratory.

I have been given the task of looking over the transcript to determine whether the solubility of tailings is indeed some subject which has to be discussed. The particular subject is a very difficult one because there is very little data in the transcript which pertained to this subject.

The two bits of information which were given by Reserve Mining were presented by Dr. Bright and Dr. Lee. Dr. Bright stated, and I will quote from his transcript--

MR. STEIN: Can you people hear back there?

AUDIENCE: No.

MR. STEIN: Try to speak up just a little.

DR. GLASS: Yes, sir.

Dr. Bright stated in summary that data showed that metal such as copper, zinc and nickel are not

leached from the tailings in Lake Superior water as to become toxic to aquatic life. This is the statement he made.

I presume this is the result of preliminary data because no data is given on this particular point. I did indeed call Dr. Bright and ask him, and he said that no tests were conducted on aquatic animals for this solution which had been leached from the tailings. So actually no aquatic life was tested. However, he concluded that this material could not be leached from tailings.

Dr. Lee also summarized these preliminary studies, did not report any data, and he in fact said that the sorption test showed that the taconite tailings actually removed trace metals from the Lake Superior water. But again no numbers were given; no way for one to analyze the data.

The only concrete data that one has is from Mr. Haley's report, where, in Appendix D, he summarized 11 years of reports, which were submitted to the Minnesota Pollution Control Agency, from 1957 through 1968. In this report he lists the parameters of the intake

water and from the discharge water. From these parameters one can see that various metals have increased in their concentrations.

As an example, I will just run down a few. Magnesium increases 25 percent from intake to discharge. Sodium increases 43 percent, potassium 250 percent, sulfate goes up 33 percent, chloride increases 31 percent, silica increases 48 percent, phosphorus 20 percent, iron 43 percent, manganese 1,800 percent, copper remains the same, nickel remains the same, lead increases a total of 20 percent. These are mainly rather large increases percentagewise from the intake to the discharge water.

Now, this particular information pertains to the plant as the water comes in, mixes with the process and is discharged. The time involved here represents a mere instant in ecological time, so that with these increases one would suggest that in, say, a period of 100 years this material is definitely soluble if these percentage increases are constant throughout that period. That is, the only data that can be summarized that is in the transcript pertaining to solubilities is the data submitted to the Minnesota Pollution Control Agency over

the 11-year period showing the increase in all but one item and that is zinc. That decreases 75 percent as listed in these tables.

Zinc is a particularly difficult metal to analyze, especially when you are pumping from a lake and presumably you have a galvanized pipe containing zinc and such. Other places in the data they list the zinc in Lake Superior water as 5 parts per million and the discharge as 3. The zinc analysis should be in question because of the fact that you are pumping through pipes which are galvanized, containing zinc, to prevent leaching. In the lab we have trouble using zinc analysis because of the same facts. The piping is galvanized and anything that comes through the tap contains a higher point of zinc than is in Lake Superior water.

But the other metals have increased to a maximum--manganese, of 1,800 percent. To me it shows that, in this very short period of time that the material is subjected to the lake water, some solubility has taken place and the material is not inert sand. It does dissolve.

We have preliminary studies which we did not

give data on which show the same thing. These studies were indeed preliminary. We did not draw conclusions from them, but it indicated the same thing that this data from Haley's transcript does show.

MR. STEIN: Are there any comments or questions?

MR. PURDY: Yes. Mr. Stein, I have one question of Dr. Glass.

I don't happen to have Mr. Haley's report here, but have you examined it to swear the report indicates that these results represent soluble material in the intake--

DR. GLASS: Yes.

MR. PURDY: Over this period of time and do not include an increase due to a suspended solids increase in the intake water?

DR. GLASS: The way I understand Reserve's samples is an accepted way by most water chemists. Immediately after taking the sample, you filter it, in all cases, and you analyze the filtrate.

MR. STEIN: But your answer is yes, isn't it?

DR. GLASS: Yes.

MR. STEIN: We want to do this as informally

as possible, but I recommend that for the purposes of the record you wait until the question is completed before giving an answer, because this won't show up.

MR. PURDY: I need another answer, then.

DR. GLASS: About this table in Appendix D, it said the samples were filtered through a 0.45 membrane filter and analyzed.

MR. PURDY: Would you say that that filtering process was such that it would take out the fines that we are discussing in this conference or would they pass through that filter?

DR. GLASS: Approximately, very approximately, I would say that probably 99 percent plus are removed by this filter.

MR. PURDY: Thank you.

DR. GLASS: Of the fines.

MR. STEIN: Are there any other comments or questions?

Yes, Mr. Frangos.

MR. FRANGOS: Dr. Glass, as I gather the substance of your comments here this morning, it is that indeed these materials are soluble. Can you tell us

how soluble they are?

DR. GLASS: We have done a few experiments indicating that the materials are not immediately soluble I have not done rate studies on the particular material. These have been planned. But the actual rate of solubility, these studies, to my knowledge, have not been done.

MR. FRANGOS: But over the long haul, at least, there are some indications that these would go into solution?

DR. GLASS: Yes, this is what this data indicates. I am sure that the turnover time in the plant, which pumps approximately a billion gallons a day, is that of a few hours, and probably the most soluble things are represented here in this increase in the discharge over the intake. So these would certainly show up with further tests.

MR. FRANGOS: Thank you.

MR. STEIN: Are there any other comments or questions?

Mr. Poston.

MR. POSTON: Dr. Glass, you would probably get

greater amounts of material going into solution when the particles are finely divided and in intimate contact throughout the water than if it were lying on the bottom?

DR. GLASS: That is correct.

MR. POSTON: And, therefore, the reason that you would get apparently higher solution rates in the plant in the process as compared to that material that is lying on the bottom of the lake is because of its greater contact surface with the water?

DR. GLASS: Yes. The fine fractions are our greatest concern. Approximately three to five percent of the tailings are less than two microns in size and these are the materials which I would study to determine the solution rates because of the fact they are so finely divided. And a rule of thumb in chemistry is that the smaller the particle the more rapid the solution. If you want to dissolve something, you grind it up.

MR. STEIN: Any other comments?

MR. PURDY: I am not sure, Dr. Glass, that you--

Did you, Mr. Poston, in your question say that the solution rate is greater, say, when this material is

in transit through the process within the plant or is the solubility taking place out in Lake Superior after the fines have been deposited?

MR. POSTON: Well, I got the point that Dr. Glass had indicated that there is more material dissolved while it is in this plant and in the process because of the churning in the water and the intimate contact with all particles of solids as compared to a pile that is lying out on the bottom of the lake.

MR. PURDY: That is what I thought I heard.

MR. STEIN: Are there any other comments or questions?

If not, again, Dr. Mount, do you want to summarize this or not? I think this is pretty clear, unless anyone feels the need for that.

If not, thank you very much, Dr. Glass.

You know, I was interested in one thing you said. You said that it is a rule of thumb in chemistry that the smaller the particle the more rapid the solution. And I remember, oh, it must have been at least over 30 years ago when I took chemistry, that wasn't it. A guy like me, when you had a rule of thumb, I was all

thumbs, and when you had a real small particle I just couldn't find any solution. (Laughter.)

Let's stand recessed for ten minutes.

(RECESS)

MR. STEIN: Mr. Poston, do you want to proceed with the next question?

MR. POSTON: There seems to be some question as to--

MR. BADALICH: Mr. Chairman.

MR. POSTON: --the trend--

MR. STEIN: Mr. Badalich.

MR. BADALICH: Is is possible to bring back the last witness, Dr. Glass?

MR. STEIN: Yes. Dr. Glass, will you come back? I hope he is still here.

I have had repeated requests from the audience, for the conferees to speak up. They can hear some of us, that is Mr. Frangos and me. Maybe that is because we both grew up in the same area of the country where we are used to shouting. But they are having a little difficulty in hearing the conferees' questions and some of the responses. I would ask that all the conferees make an

effort to speak slowly and with enough force so they can be heard.

Dr. Glass?

MR. POSTON: Dr. Glass will be here in a minute. Here he is.

DR. GLASS: Yes, sir.

MR. BADALICH: Mr. Chairman.

Dr. Glass, you spoke of these trace elements between the intake water and the discharge water being a certain percentage of certain trace elements.

DR. GLASS: Yes, sir.

MR. BADALICH: Could you equate this also in the figures, relating their significance in parts per billion or parts per million, and so on, and also how they affect the water quality?

DR. GLASS: The percentage rates--

MR. STEIN: Dr. Glass, did you hear me while I was talking?

DR. GLASS: No.

MR. STEIN: The people really can't hear in the back.

DR. GLASS: They cannot?

MR. STEIN: We would appreciate it if you spoke slowly and spoke up.

DR. GLASS: All right.

MR. STEIN: Thank you.

DR. GLASS: My judgment as to how this affects the water quality would only be as a layman. I am a chemist by training and not a public health person, so that my observations are mainly chemical in nature. I cannot relate this to aquatic life. This should be done by a biologist.

The particular increases that I cited are probably the maximum rates that one would expect to see for these tailings. That is, the water is taken into the plant; it is crushed; intimately ground with these materials and is spewed out again probably anywhere from three to ten minutes after taken in, depending upon the plant volume. I have no idea what it would be. If the intake is 300,000 gallons a minute, the plant volume contains 300,000 gallons and every minute the water is changed in the plant. So that if this represents 5 to 10 minutes of contact with those tailings, this would indicate the maximum rate of solubility that

one would see, because the most soluble materials would dissolve first and the less soluble materials would take more time to dissolve. It is a rate of solubility. When we have a heterogeneous mixture, you see this type of separation.

MR. BADALICH: Well, Dr. Glass, I understand that. But when you speak in terms like, as an example, potassium 250 percent, now, this is a voluminous or a tremendous increase. What does this actually mean in chemical terms insofar as in milligrams per liter, let me say, or parts per billion, or so on?

DR. GLASS: The intake of water in this table to your agency is .6 of a milligram per liter.

MR. BADALICH: Right.

DR. GLASS: And this increases to 1.5 milligrams per liter, which is approximately a 250 percent increase.

MR. BADALICH: I wanted that brought out so that we could get an understanding how it relates to our particular parameters that we have designated in the water quality standards.

DR. GLASS: This is, I believe, far below the water quality standards, yes. This rate of increase

represents approximately ten minutes or very approximately ten minutes of contact of the lake water in term of tailings. Now, whether or not this is going to go up tremendously as the tailings remain in contact with the water remains to be seen. I can't say. I will have to test it.

MR. BADALICH: Let's take another example like copper, which is very important.

DR. GLASS: Copper, according to Mr. Lee, was supposed to be removed from the water, absorbed in the tailings removed, so that he states that, if it is correct, "The sorption test showed that the taconite tailings would tend to remove trace metals from Lake Superior water and indicate that some of the toxic metals such as copper present in the surface waters of Lake Superior in areas of taconite tailings discharged would be removed from the water and carried to the sediments by the tailings."

So this says that the copper in the water in the area of the discharge would be removed from the water. This is what his very preliminary experiments show. However, the 11-year average you have indicates that this is not the case. The copper comes in at .003,

3 parts per billion, and is excreted at 3 parts per billion, and if any was going to be absorbed this would be its greatest chance because it is most concentrated when it is coming out of the plant. As it goes out of the plant into the lake water, it is diluted, so the possibility of absorbing that copper already present, certainly its chances will decrease.

And it is not absorbed; it remains the same. Nickel also remains the same. I don't know what happens out of the plant; I haven't made that study.

MR. BADALICH: All right.

MR. STEIN: Are there any other questions or comments?

If not, thank you again, Dr. Glass.

Mr. Poston.

MR. POSTON: Thank you, Dr. Glass.

Mr. Badalich raised a question on the amount of tailings that are in suspension and on the bottom of the lake. Dr. Baumgartner, oceanographer from our Northwest Laboratory in Corvallis, Oregon, is here, and he could discuss his calculations on the tailings that are unaccounted for. I would like to ask Dr. Baumgartner to

review some of the presentations that he made and how it was made which would clarify for the conferees the dispersal of taconite tailings over the bottom.

MR. STEIN: All right.

Will Dr. Baumgartner come up.

I might indicate that Dr. Baumgartner may be located in Corvallis, but he is our national oceanographer and our senior expert on this matter.

Dr. Baumgartner.

Look at him, a senior expert. I remember him when he got out of engineers school. (Laughter.)

DR. D. J. BAUMGARTNER, OCEANOGRAPHER
NORTHWEST WATER QUALITY LABORATORY
FWPCA, CORVALLIS, OREGON

DR. BAUMGARTNER: My name is D. J. Baumgartner, and I wish to review some of my testimony which I presented in May. At that time I discussed the possibility of a stable density flow from Reserve's discharge down to the bottom of the lake, and I think I showed that this was highly unlikely--that there would be, certainly, a density flow, but it would be with an unstable interface

and there would be some mixing of the material with the lake water and some transport of suspended material.

Then we looked at a report from Mr. Collier of the U. S. Geological Survey, who also testified in May, and that contained a diagram of the bottom sediments near the Reserve discharge site which was prepared by Reserve Mining Corporation.

We then calculated how much material was in the area surveyed on the bottom, which extended about 12 to 13 miles offshore and 20 miles along shore where the sediment layer ranged from .1 of an inch to as much as 6 inches. We calculated the volume in this deposit as 445 million cubic feet, which represented about 33 million long tons of material, assuming that it was completely solid. If we assume that the void ratio was about 40 percent, in other words only 60 percent of this was solid material, it would only represent 20 million long tons.

We calculated from Reserve's data that 71 million long tons of material were retained near shore on the delta, which gave us a total of 91 million long tons accounted for. Since the beginning of operations, the reported figure for total tailings production was 156

million long tons, which to me meant that 65 million long tons were not accounted for, either on the delta or the immediate area of discharge.

This could mean that the material is deposited elsewhere in the lake bottom, which we today have some evidence of, or that some of it could be distributed in the water mass of the lake as finely divided particulates, which we also have some evidence of today from Dr. Andrews testimony.

MR. STEIN: Are there any comments or questions?

Mr. Poston?

MR. POSTON: Another clarification that we would like to make is on the adverse effect of the taconite tailings on the lake, and I have Mr. Jack Arthur, who can talk to this point.

JOHN ARTHUR, BIOLOGIST
NATIONAL WATER QUALITY LABORATORY
FWPCA, DULUTH, MINNESOTA

MR. ARTHUR: My name is John Arthur. I am a biologist with the National Water Quality Laboratory here in Duluth.

J. Arthur

There have been two recent biological bottom surveys off Lake Superior's north shore in connection with determining if taconite tailings have an effect on bottom-associated organisms. One of these studies was done by the State of Minnesota during the summer of 1968 and the other by Reserve Mining Company during the spring of 1969. In both of these reports, the collecting and biological preparative procedures are very similar and warrant comment and comparison.

It is known that Lake Superior has a comparative low fish productivity and the State of Minnesota reports that water depths of between 100 to 400 feet are the regions primarily inhabited by fish along the north shore. After sampling the presence of fish food organisms, or animals, living at these depths, the State of Minnesota in their report concluded, in part, that the numbers of Pontoporeia, these are freshwater shrimp, per square meter were significantly lower at depths of 175 to 400 feet in the lake reach below or southwest from Reserve Mining Company than in the reach that they sampled northeast or above the plant. However, the populations of Oligochaetes (these are aquatic earthworms), Chironomids (we call these

midges) and Sphaeriids (these are fingernail clams) were the same or higher in this downshore reach. Of the four groups of animals found, the lake shrimp, or Pontoporeia, were concluded by this State as being by far the most important fish food animal. For comparison, the State in their report referred to their 1949 study where no significant differences in lake shrimp were found in two transect lines, one above and one below the plant site.

In Reserve Mining Company's report, the author, Dr. David W. Anderson, did not make any real conclusions as to the effect on lake shrimp within the zone of tailing deposition. In addition, this report also failed to discuss and compare the State's report, although the State's report was cited in their introduction and bibliography. Some conclusions can be made from the excellent data presented in Reserve's report. Before proceeding to my conclusions, I would like to mention one important variable and that is the nature of the bottom sediment where this animal lives, that is the Pontoporeia.

Lake shrimp are known to be a burrowing type of animal and they restrict themselves mainly to living on the bottom of the lake rather than in the mass of water

above the bottom. They are also common along the north shore at depths of 100 to 400 feet, and this animal seems to have a preference for an organic type of substrate. With these known biological requirements and habits in mind, I only evaluated two of the four transect lines in which the substrate consisted of an organic or silty sand or clay sediment. That is, only two of the first four transect lines had this type of sediment that they have been known to prefer. When I made this comparison, I found a 40 percent decrease in Pontoporeia numbers,in lake shrimp numbers.

Concerning Reserve's sampling line 5 at a uniform depth of 200 feet at 9 stations, I was only able to compare 6 of these, 3 above and 3 below the plant, since again only these 6 stations had an organic or silt nature to their bottoms. This fifth sampling line revealed a 50 percent decrease in lake shrimp numbers.

Thus the data from both Reserve Mining and the State of Minnesota show an approximate twofold or 50 percent decrease in lake shrimp numbers in zones where tailing deposition is found. Both reports show that the total biological productivity in reaches studied above and below the plant site are essentially the same, and this is because of the increased numbers of aquatic earthworms

and midges.

The aquatic earthworms and midges have been thought by many people in the biological field to play very minor roles in the food of north shore commercial and sport fish. It has been shown in Lake Michigan that lake shrimp, together with aquatic earthworms, fingernail clams and midges, completely dominate the bottom fauna, the bottom animals, in Lake Michigan. In fact, in Lake Michigan the lake shrimp are dominant of these four animals and comprise 60 percent of the total mass.

I feel that the situation is also true for the stations sampled northeast from Reserve Mining Company, but at the stations sampled southwest by both Reserve and the State there has been a shift in species composition and this is nicely shown in figure 2 of Reserve's report. Reserve's report, incidentally, is found in the hearing minutes during the main conference. It is found in Appendix G.

The approximate twofold decrease in lake shrimp numbers shown in both reports in those samples collected southwest from Reserve Mining Company represent a substantial food loss to lake trout, smelt and whitefish

living in this north shore area.

Any questions?

MR. STEIN: Mr. Purdy.

MR. PURDY: To save my time in getting out the reports, is all this biological data restricted to Minnesota waters?

MR. ARTHUR: That is correct. Both of these reports were pertaining to Minnesota waters and Lake Superior.

MR. PURDY: What percent of the total lake area would this represent?

MR. ARTHUR: All right. Now, with what I just presented, I will just give you the mile reaches. This represents approximately from 9 miles northeast of Reserve Mining Company along the shore to 10 to 15 miles southwest along the shore at depths of between 100 and 400 feet. I can't give you the square surface area, but I did give you the mileage and the depths.

MR. PURDY: The detrimental effect, though, is limited to southwest?

MR. ARTHUR: This is correct, this is what both

reports show. This is where the tailings deposition is found, in these reaches.

MR. BADALICH: Mr. Chairman.

MR. STEIN: Mr. Badalich.

MR. BADALICH: Mr. Arthur, this so-called changing in the biota of the bottom of the lake, and we are talking about Lake Superior now, is this also prevalent in other lakes? Can this change in the type of fish food organism occur in other lakes? It is not just unique to Lake Superior?

MR. ARTHUR: This is correct. But you have to realize that with these reports I am restricting this to a definite type of bottom sediment. These animal numbers can change if the bottom sediment changes, if we are talking about bottom animals, but in what I was just talking about I was talking about a more or less uniform type of bottom sediment. If you are talking about that at a definite depth, then we are talking about that there should be uniform numbers.

MR. BADALICH: What I am trying to say, this also can happen in other lakes, not just unique to Lake Superior, where the biota does change with time and other

elements, and so on?

MR. ARTHUR: This can happen, yes.

MR. BADALICH: And also can you state what percentage the freshwater shrimp are of the diet of the trout or the fish fauna in Lake Superior?

MR. ARTHUR: I will take the State of Minnesota's--what they have in their bibliography. They state that lake trout within the size range of 4 to 10 inches, 50 percent of their diet consists of lake shrimp, in that size range of lake trout.

As far as smelt are concerned, they will subsist to approximately 16 to 20 percent on lake shrimp, evidently all size ranges of smelt.

Now, for whitefish, all I can say there is that there are several reports stating that whitefish are known to eat lake shrimp, but I can't give you any percentages.

MR. STEIN: Any other comment or question?

MR. Frangos.

MR. FRANGOS: Mr. Arthur, is there any correlation in terms of the amount of taconite deposited in that area to the reduction in shrimp population that you are

talking about?

MR. ARTHUR: I have tried to make this calculation based on Reserve's data where they show the amount of tailings deposited on the bottom and these animals, but I was unable to do this because I lacked a good map showing the depth distribution along the lake, an accurate map. So, in other words, I can't tell you, for example, if there are approximately four inches of tailings on the bottom, how much this would affect the lake shrimp. All I can tell you is that where the tailings are found, both reports show that the lake shrimp, numberwise, are reduced.

MR. FRANGOS: But these tailings have been identified previously, prior to the use of this tracer technique?

MR. ARTHUR: Yes. With both these reports, I think Reserve Mining Company did the analysis and they used the titanium method.

MR. FRANGOS: Thank you.

MR. STEIN: Are there any other questions?

I think we have two basic problems here that we may indicate, and possibly you may want to comment on

this, your opinion based on the material in the record, Mr. Arthur.

One, is there a causal relationship between the taconite discharges from Reserve Mining and the loss of the biota which affects the food chain of the fish?

And the second question--

Well, do that first.

MR. ARTHUR: As far as the numbers of Pontoporeia or lake shrimp only, both reports show where there are tailings--

MR. STEIN: Is the answer yes?

MR. ARTHUR: The answer is yes, yes.

MR. STEIN: All right.

Now, the next point I have to make is if a fishery--and we have had the same problem in the other lakes--if a fishery or a portion of a fishery is impaired in one portion of the lake within a State boundary or possibly a province's boundary, will that diminution affect the fishlife in the lake as a whole or do those fish just recognize the State and provincial boundaries and stay there?

MR. ARTHUR: Here I'm afraid I am going to have

to defer opinion. I am an invertebrate biologist, not a fish biologist.

Dr. Mount, do you have any statement on that question?

DR. MOUNT: I was coughing, Mr. Chairman. Would you ask the question again?

MR. STEIN: Yes. The question is--I know we have had this problem and we have raised the same question in, say, Lake Michigan and Lake Erie, to be specific on two--but if a fishery resource is depleted in an area of a lake, such as a Great Lake and take Lake Superior, which lies within the boundaries of either a State or a province in Canada, will the affect of this depletion have an effect on the fishery resource of that lake as a whole?

DR. MOUNT: Well, I think that it is impossible to divide an ecological situation like Lake Superior into State boundaries. There is no question that fishing in one State has produced--I mean the removal of fish by fishing in one State has produced a serious depletion of stock in the lake as a whole. I think the answer to your question lies in how much reduction there is, and I don't

think at this point we have any information telling us how much of a reduction in terms of the total lake this effect on the invertebrate organisms represents.

I think it is important to point out this, that as near as I can tell--and Mr. Arthur can correct me if I am wrong--the studies that were done were still showing a reduction in bottom organisms at the limits of the study; and I think that it is very definitely an important point as to how much further this reduction might occur.

Now, Mr. Arthur in his presentation tried to remove the variables which were attributed by the company to refute the conclusion that the State arrived at; namely, they said that the decline was due to a change in bottom type. Now, Mr. Arthur in his analysis has removed water depth as a variable, he has removed bottom type as a variable, and he has looked at the most valuable food organism that we have in the lake for fish food supply; and the only conclusion that we can come to is that there is a reduction related to the distance from the plant.

I think furthermore it is important to recognize that there could be, I think, two kinds of effects on bottom organisms. One is a physical due to the

smothering effect, or whatever it might be, of the particles and the second is a chemical effect. If we are trying to measure the effect of a discharge in the river, we don't look immediately opposite the discharge on the other bank to find the effect, we look downstream. And so it is in Lake Superior, we have got to look downstream with the prevailing current from the discharge in order to find these effects. The data, both of Reserve and the State, show that the decline of organisms is greater downstream from the plant, where you have one of two things happening, I believe--either it is the physical effect of fine materials producing the change that we see or it is the solution and leaching of tailings. I think these are the only two logical conclusions I can see that would account for the decline in organisms.

MR. STEIN: Let me again pursue that. And just stay there, Dr. Mount. I recognize the problem that we always have when we deal with the experts in striving for quantitative data. I recognize from Mr. Arthur's statement and your own that on the basis of the material in the record certainly we haven't been able to arrive at definitive conclusions on quantitative data. But in

descriptive or qualitative terms, as I understand your statement and Mr. Arthur's statement, is that there is a causal relation, you believe, from the taconite discharges and the interruption of the biota, the fish food chain, near the plant and diminishing away from the plant--that that affects the fish and affecting the fishes in this way cannot be divorced from the ecology and the fish population in the lake as a whole.

I just have one further question on this, and I wonder if you can give us an opinion on this. In the law we have something we call the minimals. Do you think this is a significant effect or is it so minimal that we shouldn't take account of it?

DR. MOUNT: I don't think that we can discount this effect at all at this time. I don't think we can put a percentage on it either as to how much it affects it.

MR. STEIN: I recognize that.

Are there any other comments?

Mr. Purdy.

MR. PURDY: Yes. In this causal relationship now, can you state at this point in time whether this is

due to deposition of solids or by an increase in dissolved solids?

DR. MOUNT: No. I think there is another possibility, too, and that is the suspended solids. I think there are three effects that may be important here.

MR. STEIN: I don't want to confine this or pursue it, but I think this might lead to some conclusions. I thought I heard you say that this may have had several effects and one effect was the blanketing of the bottom. Well, if we deal with the blanketing of the bottom, then we are dealing with--come to the conclusion that at least partially this is due to deposition of solids, or do I misinterpret it?

DR. MOUNT: You will have to ask that question again. I don't think I got the point.

MR. STEIN: O. K. If we are not dealing with material leaching out or in suspension,which may affect it and which logically can do this, you make a definite statement that the settling on the bottom of the solids covers up certain areas necessary for the biota to grow in a food chain. Now, if you have come to that conclusion,

then the question here is not whether any of the three are done, they may be all three, but you have made a definite conclusion about one, that the settling and deposition of solids on the bottom is affecting the food chain and the biota of the lake.

DR. MOUNT: I don't think there is any question that the blanketing by fine material on the bottom has an adverse effect on the bottom organisms. I think perhaps in this lake even more important is that the primary species, commercially important species in the lake, the lake trout and the lake herring, are species which disperse their eggs on the bottom, scatter them on the bottom, and they lie there for a long period of time before hatching, on the order of two to three months, I believe, because of the cold temperatures, and these eggs are not cared for by the adults at this time. I think if I would have to check the most important effect of the blanketing, I suspect it would be on fish eggs.

MR. STEIN: Are there any other comments or questions?

MR. BADALICH: Mr. Chairman.

MR. STEIN: Mr. Badalich.

Dr. D. Mount

MR. BADALICH: Dr. Mount, to your knowledge or has your laboratory undertaken any studies of this magnitude in any other portion of the lake? The reason I ask this, now, we do have sediments coming in from all of the tributary rivers, and so on. Has there been any study, do you know of any study that has been made, to see what the effect of these sediments might have to the bottom organisms and the fish food?

DR. MOUNT: I know of no specific studies; we have not made any. I would not be surprised if there are such studies in the lake, and I am certain that if there is enough heavy natural sediment deposition there will be adverse effect there too. I wouldn't make any distinguishing effect in the terms of the blanketing.

MR. STEIN: Are there any other comments or questions?

If not, thank you, Dr. Mount.

Do you have anything, Mr. Poston?

MR. POSTON: No.

MR. STEIN: Advance information indicates that the next question will take a little time, so we will recess for lunch now and reconvene at 1:30.

(NOON RECESS)

AFTERNOON SESSION

TUESDAY, SEPTEMBER 30, 1969

1:30 o'clock

MR. STEIN: Let's reconvene.

Mr. Poston. I think we are up to the last question we had, water quality requirements for open waters of Lake Superior.

MR. POSTON: One of the key issues facing the conferees is the proposed water quality criteria, and Dr. Mount is prepared to discuss the specific criteria and their application to Lake Superior waters.

Dr. Mount.

DR. DONALD I. MOUNT

(CONTINUED)

DR. MOUNT: This information that is being passed around is nothing more than a summary of data presented in the report that was presented by FWPCA at the May conference.

As I see it, there are two major points to be clarified about these criteria, and I think that I would like to ask, if at all possible, that the conferees consider my discussion of this and my comments about these

criteria as relating to the requirements for the use as separate and apart from standards, which, of course, involve legal aspects as well.

The National Water Quality Laboratory was asked by the Great Lakes Region to prepare a set of proposed water quality criteria appropriate to Lake Superior, taking into account the very low dissolved solids content of the lake water, the rather unique organisms in the lake, particularly lake trout and lake herring, and especially its deep cold characteristics.

One of the two considerations, I think, which has to go into any final decision on water quality standards is, first of all, what is required for the particular use, be it drinking water, drinking water supplies, or be it producing aquatic life or swimming.

And the second consideration which must be looked at carefully is what are the existing conditions in the lake and how do the proposed criteria relate to the existing conditions.

I would like to take up the second question first or the second consideration first, and that is the existing conditions, because I think that there was a

considerable amount of, I believe, misinterpretation of what the situation really is in the presentations that were made in May.

I would like to first refer you to the long sheet that I passed out entitled "Table 3, Proposed Water Quality Criteria for the Open Waters of Lake Michigan," and you will note that this is essentially the same--

MR. STEIN: Isn't that Lake Superior?

DR. MOUNT: Did I not say Lake Superior? Yes, I meant Lake Superior.

And this is the same table that you will find on page 44 of the FWPCA conference report.

What I have done is to list, first of all, the proposed criteria in two columns, column 1, 90 percent of the values not to be exceeded, and the second column, the maximum values. These are the proposed criteria.

Then in the next six columns there are three columns devoted to Lake Superior at Duluth, minimum, maximum, and mean, and then St. Mary's River at Sault Ste Marie, minimum, maximum, and mean. This is the information that is contained in Appendix B, I believe it is, of the conference report and this was prepared simply to

help the conferees look at the proposed criteria as they relate to the existing conditions in the lake. Most of the information which is given here for existing conditions in Lake Superior at Duluth and Sault Ste. Marie is found in these appendices under the appropriate parameters, such as detergents, phenols, or whatever it may be.

I have tried to add some additional data, which we should have put into the appendix where it was available. We just failed to give the mean. We might have given the range instead of the mean or something. And I believe it was one of the Michigan representatives in particular who asked about this at the conference, and this is the reason for preparing it.

I think it is important to point out that we believe that these two sampling stations--which, by the way, are those of the National Water Quality Network; it has had various names, now called the Pollution Surveillance System, I believe, and represents data from 1958 until the present time, at least through 1968--we believe that these stations reasonably well represent open lake water. And I wish to emphasize again that they are proposing these criteria for the open lake and recognize that

Parameter	River at . Marie ax.	Mean
Dissolved Oxygen	6.40	12.2
Turbidity Ju	9.0	-
Color		
Wavelength A[4]-absorbance units	-	-
Wavelength B[5]-absorbance units	-	-
PT-CO - Color	0.0	1.31
Total Dissolved Solids	-	-
Total Coliform Bacteria No/100 ml	000	5
Fecal Coliform Bacteria No/100 ml	-	-
Detergents (MBAS)	-	-
Phenol	<.002	-
Ammonia Nitrogen	.100	.0348
Phosphorus	-	-
Sol. PO 4 - T as PO 4	0.5	0.0017
Phosphorus T as P	-	-
Iron	-	-
Cadmium	N.D.	-
Chromium	.007	-
Copper	.028	.005
Lead	.012	-
Nickel	.028	-
Zinc	.406	.041
Cyanide	-	-
Hydrogen Sulfide (as total sulfide measured at bottom-water interface)	-	-
Taste and Odor - Chloroform Extracts	-	-
Threshold Odor	-	-
Temperature (Surface in top meter)		
January, February, March	2.3	.7
April, May, June	4.9	5.5
July, August, September	0.4	16.0
October, November, December	3.8	7.0
pH- Should remain between 6.8 to 8.5 u	8.50	7.76

1, 2, 3, 4 & 5 - See Page 44 Original

there will be areas around the shore, either from shore erosion or tributary input, which will alter the appropriateness of these criteria in those areas.

I think also another point which is very often not considered when establishing criteria or standards is that very often different uses will have different tolerance levels or permissible concentrations, and I need not go into that any further. I think it is quite obvious that this is true.

But what I do want to point out to you is something about the reasons for proposing different parameters on this list.

MR. STEIN: For the record to make any sense, I think we had better put all these three items, your tables and your charts, in the record.

DR. MOUNT: There are only two tables that I am talking about.

MR. STEIN: Yes. We had better put them in at the beginning of your remarks.

(Which said tables are as follows:)

RESERVE'S LAKE SUPERIOR DATA ("OPEN LAKE") -
APPROXIMATE MEAN VALUES OF 10 REPORTS:

	Reserve's Data	Proposed Standards
Phosphorus	≤.002	<.010, maximum
Iron	.008	<.030, 90% of time, max. 0.100
Copper	.003	<.008, 90% of time, max. 0.012
Zinc	.005	<.010, 90% of time, max. 0.015
Nickel	.005	<.015, 90% of time, max.0.030
Ammonia	≤.010	<.050, 90% of time, max. 0.10
Lead	<.001	<.030, 90% of time, max. 0.050
Cadmium	<.001	<.002, 90% of time, max. 0.005
Turbidity(JTU)	0.4-0.5	<.50 (JTU), 90% of time, max. 5.0
Dissolved Oxygen	13	>9. (at all times)
pH	7.8	6.8-8.5 inclusive
Dissolved Solids	57	<65, 90% of time

Concentrations shown above are in milligrams per liter (parts per million, ppm).

< , less than

> , greater than

≤ , less than - or equal to

Dr. D. Mount

DR. MOUNT: The dissolved oxygen recommended criteria, the bacteria limits, the color--no, I am sorry, not the color--the ammonia, and perhaps one or two others, which sulfide can be one of them, are presented at these levels, principally because we believe that these are very important indicators of the overall condition, particularly in regard to the decomposition of organic matter. The oxygen values, as you can see, at Lake Superior--excuse me--at Duluth average 12.6 milligrams per liter on an annual basis with a minimum value of 9.4. Now, we believe that if the oxygen were to be permitted to go down to 7 or 5, numbers which are very often used in standards, that this would represent a tremendous amount of organic decomposition and oxygen demand, which in turn would release a number of highly undesirable materials into the water, such as ammonia if it were aerobic in composition.

Bacterial numbers at 1,000 per 100 millileters or higher would also represent a substantial amount of activity on organic matter which is not now in the lake, and we believe that if these values were adopted as the goals on the lake that we would be able to inhibit, stop,

the development of organic decomposition situations like we have, for example, in Lake Erie. I am not trying to say that Lake Superior is soon going to be in that stage, but I think this is a way to keep a handle on what is happening in the lake.

There are other values, parameters, proposed such as turbidity, color, and temperature I think we should include in here too, which are sort of related to the esthetic considerations in the lake. For example, you will recall, perhaps, at the May conference I presented the slides showing the Lester River entering Lake Superior with a turbidity of 25 Jackson Units, and it looked like a muddy mess coming into a clean body of water. The turbidity values here proposed we are not suggesting have to exist in order to allow photosynthetic activity, but rather to maintain the present appearance of the lake.

And you will also recall that I showed slides of green water and clear water where the suspended solids content was about twice as high in the green water, it was about a half, as I recall, or perhaps a quarter--three-quarters of a part per million of solids in the

clear water and perhaps one and a half parts per million in the green water, quite obviously different and with light penetrations reduced by at least 50 percent or more.

I am simply using this to point out that a very small change in suspended solids in the lake will show up drastically because the lake is clear now. This change would not even be partly measurable in a much more turbid water. For example, in the St. Louis River I don't think we would be able to see this change at all. My point is simply that small changes in Lake Superior are going to show up a great deal more than we customarily think about them in other types of water.

Several of these, particularly phenol, iron, and taste and odor are aimed principally at municipal water supplies, the tainting problem. The chromium values, for example, and the lead values are based on PHS recommended criteria for drinking water supplies. Now, PHS recommended a maximum permissible concentration, which you will find under the maximum values, and our position is that we should not and cannot allow the lake to reach the very limit for drinking water most of the time. We have not that good a control on it. And so that

the most of the values should be less than that threshold limit.

Several of these, such as zinc in particular and copper and cadmium, the recommended criteria are based principally on the requirements of aquatic organisms. We feel, as indicated in the appendix of the report, that zinc is high enough now in the lower end of the lake, as indicated by the Sault Ste. Marie data, to have an inhibitory effect on fishery production, and we have cited some of the evidence that we use for that. That, by the way, has been published, I believe, since the conference in May and is available now as reference.

Hydrogen sulfide again has been proposed to be measured where it is ecologically important right at the bottom water interface, and we have a very fine piece of work at the University of Minnesota under Dr. Lloyd Smith which shows that sulfide kills fish eggs and embryos in concentrations only slightly higher than those given in the proposed criteria. These are lethal exposures of short-term duration, and so quite obviously, again, we must hold the mean situation or mean conditions below that.

Dr. D. Mount

The temperature criteria I realize are quite different than we are normally thinking of them, but we believe that these are realistic numbers if we are to maintain especially the lake herring and the lake trout in the lake.

Now, if you would for a moment turn to--well I am assuming that you can make your own comparisons between what we find to be the existing conditions as indicated in the network data, which is under the other columns, and if you have any questions we can cover those in a minute.

I wish now that you would turn to the other table we passed out, which is entitled "Reserve's Lake Superior Data - Approximate Mean Values of 10 Reports." This is data contained in the conference report of May and has been treated by their consultant to remove the values which they believe are from the heavy density current area, and so we are suggesting and agreeing with Reserve that the values they have reported do represent open lake water. And I might add that we place complete reliance on these analyses and we believe them to be very accurate and consistent with the ones that we have made on open

Dr. D. Mount

Lake Superior water.

I want to underline again the importance of the statement I made that the sample values which were taken out of the heavy density current, that is where the turbidity or I believe the iron was high, have been removed out of this table--that what we are looking at are those values which Reserve believes and we believe do represent open lake water. And you can see for the parameters listed--phosphorus, iron, copper, zinc, nickel, ammonia, lead, cadmium, turbidity, dissolved oxygen, pH, dissolved solids--all are less in the samples measured by Reserve than any of the proposed standards. And we believe that this is additional evidence, along with the first table; that tne criteria that we are proposing are clearly not higher or of higher quality than existing conditions in the lake; that in fact in almost every case the existing values are much lower than the proposed criteria; and that this is the reason we feel that they are realistic. And furthermore, we believe that they have been proposed at levels which will not impose any undue hardship on any known present discharge in terms of meeting these. There is not attached with the adoption of

these criteria and the standards any massive treatment program required, and this is why we feel that these are realistic values and should be used as guides in establishing our goals on Lake Superior.

I believe this pretty well summarizes the salient points that I wanted to make. I don't know if you have any questions or not.

MR. STEIN: Are there any questions?

MR. PURDY: Yes.

MR. STEIN: Mr. Purdy.

MR. PURDY: Dr. Mount, how do you relate this last statement now to the parameter zinc, your recommendation of a maximum value of .015, to the mean value of the St. Mary's River at Sault Ste. Marie of .041? This is about three times your recommended maximum value. Are you saying now that this does not represent open lake waters for Lake Superior?

DR. MOUNT: I think that this may be partially true. There are, as you know, base metal deposits all down the shore, and I think it is quite reasonable to expect some leaching of these materials into the lake water. It is my feeling from looking at the current

patterns in the lake that that water does move on down the south shore and out the end of the lake. I believe that this is an undesirable condition where it exists. I am not suggesting and I have no information as to the source of this, but I think this is a logical place to look.

MR. PURDY: Well--

DR. MOUNT: I am sorry, I did not answer your question. I think that this does not represent the open water of the lake, and I think--yes, open water for zinc is represented in the data presented by Reserve where you see the concentrations for their values are around 5 micrograms per liter, 5 parts per billion.

MR. PURDY: Now, you think the zinc has been contributed, you say, from leachings or from point sources and is it something that is controllable?

DR. MOUNT: I have no specific information on its source, but I cannot believe that--well, I believe that there is a substantial contribution from leaching simply because there are mineral deposits on the shore.

MR. PURDY: Which would not be controllable?

DR. MOUNT: Right. I think what this says, then, in terms of any type of program is that we have to be

especially careful about anything added from a controllable source.

MR. PURDY: You also have to be careful when you set a standard. Why don't you take action now to meet that standard?

DR. MOUNT: I don't think the problem is any different with zinc than it is with temperature. Every natural water has a temperature too and natural waters in one place, due to no activity of man, may not be suitable for a particular fish or a type of use, and so we have to recognize that.

MR. PURDY: I thought we recognized this when we set the standards.

DR. MOUNT: Zinc is a tough problem. I am not trying to say I have the answer to it. But neither can we back away from what we believe to be the requirements of these animals.

Now, I would like to also mention, by the way, in addition that this is not one of the toxicants and it is one of the few, by the way, that we have studied in which there is a broad range of rate of response. You don't suddenly get death or stoppage of reproduction or

something like this with zinc. There is a broad range where you just have less and less egg production when you have these tons of concentrations.

And so we are not saying that lake trout cannot reproduce under the existing conditions as represented by the Sault Ste. Marie data, but we are saying they are detrimental to reproduction and will reduce the amount.

MR. STEIN: Any other questions?

Yes, Mr. Frangos.

MR. FRANGOS: Dr. Mount, this chart that you have just given us, is this just a recasting of the recommended values that occur in Table 3 of the report or are there some changes that have been made?

DR. MOUNT: The recommended criteria are supposed to be the same as occur on page 44, and also our page 44 has that table referred to in the recommendations.

MR. FRANGOS: But these numbers have not been changed thereof?

DR. MOUNT: I don't think there have been any changes. It is unintentional if there are. What has changed is the data for existing conditions, and in some

cases we failed to put it in the appendix and we have tried to add it here. However, most of the data contained in the last six columns is in Appendix B.

MR. STEIN: Are there any other comments or questions?

Let me try to understand you. When you compare Reserve's data in the open lake with the proposed standards, how come these standards are so much higher than the existing conditions? Have all these States signed the nondegradation clause? For example, phosphorus, how many times have you gone up over that?

DR. MOUNT: Well, that would depend on--

MR. STEIN: Well, look at the maximum and what you have now.

DR. MOUNT: As I indicated when I started out, these recommendations were written based on the requirements of the use, and we believe our--

MR. STEIN: Well, for example, how many times is that phosphorus maximum over the Reserve's data that you agree with?

DR. MOUNT: Well, in this case it is five times higher, but there are many other cases where it is probably

five times lower than what has been measured too.

MR. STEIN: Well, I don't see any case that is lower here.

DR. MOUNT: This is in Reserve's data, but, of course--

MR. STEIN: What I am getting at, Dr. Mount, is why do we want to set up a standard that is five times more phosphorus than is in the lake now?

DR. MOUNT: Well, if you look at the Table 3, the long page, you will see that the maximum values measured in Duluth are .076, which is seven times higher than the proposed standard. Phosphorus seems to vary considerably, depending on who measures it and where they measured it. Perhaps Dr. Bartsch would be better prepared to answer the question as to what we should accept as a reasonable number. I think he should respond to that if you have further questions on phosphorus.

MR. STEIN: Yes. Well, I think phosphorus is a critical point here.

Dr. Bartsch, would you come up, please. If we are talking about a fivefold increase in phosphorus, we might have a problem, I don't know.

Dr. A. Bartsch

This is Dr. Alfred Bartsch, our national expert on the eutrophication of lakes. I have worked with Dr. Bartsch ever since I have been in the program. I suspect that you people who have been in the field know that his reputation is international and he generally has the experience not only in this country but throughout the world.

What is the situation with phosphorus?

DR. ALFRED F. BARTSCH, DIRECTOR
PACIFIC NORTHWEST WATER LABORATORY
FWPCA, CORVALLIS, OREGON

DR. BARTSCH: Have you properly identified me, Murray, or do you want me to say my name is A. F. Bartsch; I am Director of Pacific Northwest Water Laboratory of the FWPCA in Corvallis, Oregon.

I want to call attention to the fact that on page 93 of the FWPCA report, the page that deals with phosphorus, and under IV let me read, for what I hope will be some clarification, the recommended criteria there, and it says:

"The total phosphorus levels should not be

permitted to exceed existing values."

I interpret this to be overriding with respect to the following sentence, which then says:

"Where background data are not available the maximum value should not exceed 0.01 mg/l total phosphorus."

MR. STEIN: That is quite a bit different than--well, that is the same as they have here.

DR. BARTSCH: Yes. I presume that what I have just read is the standard as it is still proposed, and it removes the objection that I understood implying that there would be an intent to permit phosphorus to go higher than the current levels, as this statement now says. This is not to be permitted under the standard and that we will maintain the phosphorus levels as they are now, the only proviso being that where there are no data spacially in the lake, then the 0.01 becomes the allowable limit.

MR. STEIN: We don't have data for most of the lake, do we?

DR. BARTSCH: Well, then, this means that we need to focus on the 0.01 as to whether or not it is

reasonable, and if you wish for me to comment in this vein, I will be glad to do that.

MR. STEIN: I will be glad to hear what you have to say.

DR. BARTSCH: I think there are several points that might be made and I may have said these same points in May. If I did or did not, let me repeat them.

In the first place, I think there is a fundamental point that ought to be made and that is that if we go back to scientific logic, then we know that phosphorus is one of the key elements involved in the physiological process. And I tell people that 100 years ago, in fact 130 years ago, which was the time of the existence of a scientist whose name was Leibig, he already pointed out to us that the size of the crop of plants--and in this case the plant is the algae we can grow in a given lake--is determined by the required nutrient element among some major 10 which is present in the least amount in relation to its requirement. Now, it turns out that in most lakes, and especially those lakes that have not yet gone down the eutrophication path, phosphorus is the element that occupies this critical position.

Dr. A. Bartsch

The second point is that if we look at the information that has come from the studies of lakes from the point of view of what makes them become eutrophic--and I am using the term here in the sense of the principal symptom of the process--which is objectionable blooms of algae, then we will find that phosphorus again as it increases seems to be the element that triggers off these objectionable blooms.

If we go back to the year 1942 or 1943, Clair Sawyer, who worked in the State of Wisconsin, studied some lakes and came to the conclusion that if at the beginning of the growing season the amount of phosphorus turned out to be, curiously enough, equal to the standard that we are talking about, 0.01 milligrams per liter, that this was enough in those lakes to produce blooms of algae that people would find objectionable.

Well, subsequent to that, in fact just recently, there has been an appraisal of essentially all of the world's literature that impinges on this point. And I would like to call the document that grew out of it to the attention of this group, because if you are really seriously interested in this standard and in this problem,

this is the Bible that you had better look to. The title of this, which I would like to read into the record, is "Water Management Research, Scientific Fundamentals of Eutrophication of Lakes and Flowing Waters, with Particular Reference to Nitrogen and Phosphorus as Factors in Eutrophication." This document was not available in May except in German and in French. It has now become available in this English version, and if any of you wish to have a copy, you might also want to copy down that, it is available from the Organization for Economic Cooperation and Development, which has its headquarters in Paris.

The reason I identified this that precisely is because the critical examination of all of this experience indicates that this number 0.01 is still a fairly valid number. And if we are to think, as we apply it to Lake Superior, of preserving this lake in its present condition, then certainly this is the maximum that we should ever consider letting this lake go.

And as long as I have the floor, I want to bring up another point, because someone is going to ask this--in fact, it was asked the last time, I think, by you, Mr. Frangos; correct me if I am wrong--would I be

disturbed if we didn't get around to limiting the input of phosphorus for seven years. And at the time I said if I were absolutely certain in my own mind that we would get around to that accomplishment in seven years I would feel fairly comfortable, but we have seen many of these good intentions come and go and sometimes we don't make the deadline.

And so I brought with me the October issue of Field and Stream, and with the permission of the Chairman I want to read two paragraphs in it which will help me answer this question, and I turn to page 36. The title of this,which is a popular subject now, "Man's Damage to the Environment," is expressed here in the question, which is also the title of the article, "From Here to Oblivion?" and these opening two paragraphs say:

"The question before the House, and not only the House but the Senate as well, and the President and his Cabinet too,"--and I want to add to this, for those of us who are assembled here--"is how to get the reins on a headstrong, runaway national environment and turn it in the right direction before it goes completely, everlastingly, irreversibly haywire.

Dr. A. Bartsch

"The answer may be difficult to come by, but the facts of the case are now clearly known. I hear them stated again and again in sundry Washington quarters. The nation is always catching up with crises after the damage is done, they say, whether from pesticides, pollution, oil slicks, or other abuses of the once beautiful earth God bestowed upon us. Unless we can get out front, with long-range plans, including firm restraints and disciplines over industrial production, resource use, and human population growth, then the country will prove unworthy of its natural blessings; it will pass the point of no return on the course of ecological disaster before we know it."

MR. PURDY: Who is the author?

MR. STEIN: Who wrote that?

DR. BARTSCH: Frome.

MR. PURDY: Who?

MR. STEIN: Frome.

DR. BARTSCH: The author's name is Michael Frome, F-r-o-m-e.

MR. PURDY: Who is he with?

DR. BARTSCH: I didn't hear you.

MR. PURDY: Who is he with?

DR. BARTSCH: He is one of the editors of Field and Stream.

MR. PURDY: Thank you.

DR. BARTSCH: If you would like to see this, I will loan this copy to you. (Laughter.)

I think, Murray, that this expresses as best I can the kind of urgency that I think we ought to have with respect to keeping the phosphorus out of Lake Superior.

MR. STEIN: Right. Thank you.

Are there any questions here?

Gentlemen, I really do think when we have looked at the other Great Lakes, the critical point in eutrophication that we found is phosphorus. We have a chance now, a real chance, in Lake Superior to control the phosphorus. I think this is evident. You don't need a scientific study. And I don't mean this really as an advertisement, because I stayed at the Edgewater at the other end of town, but now I am at the Holiday Inn, and you can just get on the balcony and look at that water and you can see the clarity of it.

The point is, if you are going to maintain it

this way, the numbers that Dr. Bartsch has given--and in my opinion there is no one better than Dr. Bartsch in this field--if you are going to maintain this we have to keep that magic number of the phosphorus in our minds.

By the way, not to disillusion you all, I don't think that Reserve Mining is a significant contributor of phosphorus. Is that right?

DR. BARTSCH: As nearly as I can tell from the data that I have seen, I would say that is correct.

MR. STEIN: That is right. In other words, this largely comes from organic wastes. But this is the critical element that we have to look at. If you are going to look at this lake and maintain it the way it is and maintain the clarity, I think the essence is to really try to have the conferees look at what Dr. Bartsch has said about the limits we can keep the phosphates to in Lake Superior. I think we have a tremendously good opportunity to do it, because presumably the phosphates are five times below this right now and you have a tremendous amount of leeway and cushion, and this is obvious. But these things become insidious and creep up little by little by little.

Dr. A. Bartsch

While Dr. Bartsch is here I want to indicate the problems we have had in the other Great Lakes. When we began having problems on Lake Erie and Lake Michigan these problems were not great lakewide problems at first. At first they were these little niggling local problems that were proliferating around the lake. Gradually these problems became so great in the aggregate that the lake began to go.

If we are going to preserve a resource like Lake Superior, the present state of our science and our technical knowhow indicates that the level of phosphorus is probably the most critical indicator we have and this is the one we have to keep in mind. If anyone else has a different view on that, I would like to hear it.

MR. PURDY: Mr. Chairman.

MR. STEIN: Yes.

MR. PURDY: Dr. Bartsch, we have heard discussions of the so-called natural rate of aging and then how man's activities in the basin have added to the natural rate. Now, when we say control input of nutrients from point sources to a lake, will we still continue to have, say, some change in the characteristic of the lake

due to a natural aging process?

DR. BARTSCH: I think the only way I can answer that is to point out that there is no pat answer to it and that every lake and its watershed are different from every other one. If one were to raise this question with respect to Lake Michigan--and I may not recall the numbers exactly, but my recollection is that an estimated two-thirds, roughly, of the phosphorus comes from point sources and the other third comes from diffused sources off the land--I would say there that in the long run once we control the point sources, if we are to preserve this lake for the next 12,000 years, if we wish to occupy this planet that long as human beings, I think we are going to have to devise some means also of curtailing the input from natural sources. This may be a heretical thing to say and many people will disagree with it, but I think that in those lands which are fertile we are going to have to find some way to control that source of input.

Now, if we think of this in relation to Lake Superior--again I am in foreign territory here--but I do recall something in this FWPCA report that says that the land

around here for the most part is not very fertile, and we have a rule of thumb here which is logical that the drainage from fertile land is fertile water. One could anticipate, then, that with respect to Lake Superior the major source of input is going to be people, and as the population grows then this sort of input potentially will grow too.

MR. STEIN: Fritz, you know, the land may not be fertile here, but if the major source of input is going to be people, the people up here are surely fertile. (Laughter.)

Are there any other comments or questions?

MR. FRANGOS: Yes.

MR. STEIN: Mr. Frangos.

MR. FRANGOS: Let me quickly say that we share the sentiments of Dr. Bartsch's statement and also yours, Murray, and I think we will just get down to the matter of whether we are selecting the right numbers. We have some data that indicates that these phosphorus levels are now being exceeded far out into the lake off the Apostle Islands, and our assessment of those reports is that we really can't see a causal effect and result why we are

getting those numbers. And so we are just a bit concerned that perhaps we are exceeding these numbers already and can we really practically come back to the 0.01?

The other point, it seems to me where you are talking about background data not available, well, that means because you don't know you set a number, but you may get out there and find the number higher.

MR. STEIN: That is right.

What have you got to say about that, Dr. Bartsch?

DR. BARTSCH: I don't think there is any real response except that this is a fact of life. I think superimposed on it is the point that while we talk about this so appearing magic number of 0.01, it is significant in the sense that this is the level at which you begin to have a definite factor on the part of people that we now have this much algae that we find objectionable. If we add more phosphorus we are going to have more frequent occurrences of this objectionable type of growth. If we drop below that number, all other things being equal, which they aren't always, we will have less frequency of such conditions or they may never reach the point that people find them objectionable. This is a sort of sliding

scale sort of thing.

And so one might say, well, if we want to keep this lake at roughly the level of production it now has, let's stop it at this point in terms of concentration of phosphorus.

MR. STEIN: Thank you.

Dr. Mount.

DR. DONALD I. MOUNT

(CONTINUED)

DR. MOUNT: Now that the Mighty Oak has spoken, the clinging vine would like to say something too. (Laughter.)

I think we have a tendency at times to close our eyes to the multiple-use concept of water as well, and I don't really think that we want a distilled water basin in Lake Superior either. We have to have some phosphorus in the water in order to provide nutrients for the necessary amount of algal growth that must take place in the lake in order to sustain a commercial fish crop. I am thankful that I am not in the shoes of you conferees of having to decide where you draw the line

between clarity in the water and good fish production; but a line will have to be drawn and it is, I think, just an inverse relationship to each other. There is no question about it that in Lake Erie there are more pounds of fish in a square mile than there are in quite a few square miles in Lake Superior and this is not coincidental.

The point I am making is that our goal is not zero phosphorus but some appropriate value which will permit sufficient plant growth and still maintain the esthetic appearance of the lake. And we believe that this value lies somewhere between what it is now and 0.01.

I don't know whether I have clarified the issue at all or not, but what I am trying to say is there is a tendency to think that anything in this water is bad beyond H_2O and this is clearly not the case. As a matter of fact, many of the parameters that are listed in this table are very necessary for growth and were they not there we would not have a desirable condition either.

So we must shoot for some compromise, and in the case of phosphorus it is a particularly touchy one because

it would appear that we are playing within the range of 10 parts per million.

MR. STEIN: Any other question?

If not, thank you.

Mr. Poston.

MR. POSTON: That is the extent of discussions on some of the issues that I think are important. I don't intend to portray the idea that these are the only things that the conferees will have to discuss, but I think at this time this is all we have to present.

MR. STEIN: Thank you.

Mr. Badalich, do you want to put in--

MR. BADALICH: No comments.

MR. STEIN: Do you want to put any presentation in or do you want a recess?

MR. BADALICH: Mr. Chairman, at this time I don't believe we have any witnesses or that there is any additional testimony to be brought forth. We were going under the pretense that we would evaluate the data as presented. And I think this morning we were given a lot of additional data, new testimony. I still maintain it is new testimony, and I certainly would like to have time

to evaluate this information with my experts and also with possibly some of our consultants, I am referring to the Conservation Department and others in State government that have the expertise to make an evaluation.

So I am not prepared to make any rebuttal of any of this information. But we certainly would like to have time to study it and probably come up with some conclusions or recommendations of our own, based upon the testimony brought forth this morning.

MR. STEIN: Do any of the other conferees have anything to add to this point?

Well, the point is we do have proposed conclusions and recommendations. Do you people think it might be profitable to run through these and see how far we can get with them?

It might be worthwhile to go through this and see how far we can get in an agreement on this. Unless you have another proposal it might be advantageous to try to see how close together or how far apart you are on these.

Who developed these, Mr. Bryson?

MR. BRYSON: Yes, sir.

Summary and Conclusions

MR. STEIN: I wonder, Mr. Bryson, if you would come up and read Summary and Conclusion No. 1 and let's try to go through these and see how far we can move and what the reaction is.

SUMMARY AND CONCLUSIONS

MR. BRYSON: "Summary and Conclusion No. 1. Lake Superior is a priceless natural heritage which the present generation holds in trust for posterity, with an obligation to pass it on in the best possible condition."

MR. FRANGOS: We have no objection to that statement. (Laughter.)

MR. BRYSON: I have one on motherhood and apple pie coming up soon. (Laughter.)

"2. The esthetic value of Lake Superior is of major importance. The lake's deep blue appearance is a significant tourist attraction."

MR. STEIN: All right, wait a minute. Are there any comments there?

If not, let's go on to No. 3.

MR. BRYSON: "3. Because of the low mineral content of Lake Superior's waters, increases in the range of 2 to 50 parts per billion of heavy metals such as copper, chromium, zinc, and cadmium will have lasting

deleterious effects upon the lake."

MR. STEIN: Are there any objections to that?

MR. BADALICH: Well, Mr. Chairman, has it been proven by all testimony that there will be a deleterious effect from these metals, and so on? I suggest possibly as a revision there, before the word "increases" put in there "unnatural increases," eliminating that part"in the range of 2 to 50,"I think you are being very specific there, and in turn certain minerals or metals may have lasting deleterious effects upon the lake. So then the paragraph would read:

"Because of the low mineral content of Lake Superior's waters, unnatural increases in minerals or metals may have lasting deleterious effects upon the lake."

MR. STEIN: I don't know, let's work on that. What do you mean by this "unnatural"?

MR. BADALICH: Well, I think we are restricting or at least we are talking about now point source of discharge and other discharge other than actual, so here we are talking about ranges of 2 to 50 parts per billion for--

MR. STEIN: By natural do you mean manmade?

MR. BADALICH: Yes.

MR. STEIN: Well--

MR. BADALICH: By unnatural I mean manmade.

MR. STEIN: Yes. By the way, I am not arguing with your concept. I am talking about would you accept "manmade" instead? The point is the word "unnatural" may not have the kind of meaning--

MR. BADALICH: I think we would, because we have no control over nature.

MR. STEIN: I know, I recognize that. But if we say "manmade," we are saying the--in other words, I would not like to call the activities of a city or a steel company or a lead company or anything else an unnatural activity.

MR. BADALICH: That is fair enough.

MR. STEIN: Yes. (Laughter.) But I think if we say "manmade increases," what do you fellows think of "may" or "will"? Is there any comment on that or do you want to buy it?

MR. BADALICH: Well, Mr. Chairman, in my own mind I don't feel that it has actually been pinpointed

that there will be.

MR. STEIN: I understand your point. I just want to elicit comment, if there is any, or is this acceptable to change "will" to "may"?

MR. POSTON: I think the biologists have told us this morning, in my understanding, that concentrations of copper, for example, chromium, are going to have a definitely adverse effect on fishery in the lake if you get into those concentrations.

MR. STEIN: Do any of the other States want to comment on that?

MR. PURDY: Well, Mr. Stein, as to whether something has a deleterious effect, for example the zinc that was questioned, I would expect whether it is from natural or manmade sources that the effect would be deleterious. So that to some extent even an increase from natural sources would have a deleterious effect but it would not be subject to control.

MR. STEIN: That is right.

MR. PURDY: And later on if we go into the recommendations, why, we could take care of that part. So I guess to be correct, why, any increase could have

a deleterious effect.

From the standpoint of the "may" or "can," when you talk about a range of 2 to 50 parts per billion, this is quite a range. I am not sure that we have demonstrated "can" in all cases. I don't see where "may" hurts us in any way.

MR. STEIN: Your view is we strike the "manmade" and just leave "increases" and go to "may"?

MR. PURDY: As long as we recognize that later on there may be some natural sources that we will not recommend programs for control--

MR. STEIN: I don't know. Now, again I would hope you could get together on this, because if we are dealing at this conference with controls, we have zeroed in on the manmade source--

MR. PURDY: That would be perfectly agreeable--

MR. STEIN: --maybe we can leave the "manmade."

Now, does anyone really have a strong feeling on this "may" or "will"?

MR. POSTON: Dr. Mount indicates that 50 parts per billion of copper would kill fish, well, trout for example, lake trout, in less than--or in 24 hours, let's

say two days.

MR. STEIN: Yes. Mr. Poston, in dealing with the maximum part of the range, the question is will 2 parts per billion of copper kill fish. If it won't, then I think "may" may be preferable. If you are going to put the whole range in, then you have to have your verb relating to the whole subject and not just part of it.

MR. BADALICH: Well, Mr. Chairman, I believe that is the point. Dr. Mount and Dr. Bartsch testified about phosphorus. We are talking about the number 0.01 of one part. There again we are saying here that we are also including minerals that might have some effect, not numbers low in minerals.

MR. STEIN: Does anybody have any objection to "may" here with the range?

MR. POSTON: How about "changes in the order of magnitude of parts per billion may have lasting deleterious effects"?

MR. STEIN: "Manmade changes in the order--in the range." What do you mean "order"?

MR. POSTON: This doesn't have to be manmade necessarily.

MR. STEIN: We understand that. The point is, presumably here we are not dealing with the natural changes. If we are laying the groundwork for a control program, we are dealing with the manmade ones.

Let me try this:

"Because of the low mineral content of Lake Superior's waters, manmade changes in the range of parts per billion"--strike out "2 to 50"--"of heavy metals, such as copper, **chromium**, zinc, and cadmium, may have lasting deleterious effects on the lake."

Is that an acceptable statement?

MR. POSTON: I think so. You might want to add phosphorus **in** there.

MR. STEIN: Is that a heavy metal? You know, I am a rudimentary scientist. I am just asking.

MR. PURDY: What was your suggestion now?

MR. STEIN: Here, let me run this this way:

"Because of the low"--let me check with you people. I hope we don't have a non **sequitur**. I hope that "Because of the low mineral content of Lake Superior's waters" tracks --"manmade changes in the range of parts per billion of heavy metals such as copper,

chromium, zinc, and cadmium, may have lasting deleterious effects upon the lake."

Is that all right?

All right. Will you go to the next one, please?

MR. BRYSON: "4. The extreme clarity and cold temperature of the waters of Lake Superior are a necessity to support its present ecology. A reduction in light penetration will significantly alter the types of life therein. The clarity of the lake is extremely susceptible to being reduced by pollutants."

MR. STEIN: Are there any comments on that one?

Mr. Badalich.

MR. BADALICH: Mr. Chairman, there again I wonder if in the second sentence we might change the "will" to "may"?

MR. STEIN: How do you people feel about that?

Any other comments?

MR. POSTON: I think one of the reasons that we might want to leave "will" in there is that we have seen this occur in some of the other Great Lakes, the changes in life as you change penetrations.

MR. STEIN: How about, and I just throw this

out, how about striking "significant" and say "will alter"--

MR. POSTON: O. K.

MR. STEIN: --as a flat statement?

MR. PURDY: That is all right.

MR. STEIN: All right?

All right. Are we all set on 4?

Let's go to 5.

MR. BRYSON: "5. The portion of Lake Superior shallow enough to provide suitable fish spawning areas is limited to a small band around the shoreline. This area is most susceptible to the influence of natural and man-made sediments. Deposition on the bottom of fine particles discharged to Lake Superior is a threat to the inshore food producing area and to the incubation of important fish species."

MR. STEIN: Any problem with that one?

If not, let's go to 6.

MR. BRYSON: "6. Water quality criteria can be established to protect the esthetic value, recreational uses and the unique aquatic life of the lake and yet such that reasonable allowance is made for future municipal

and industrial expansion."

MR. BADALICH: Mr. Chairman.

MR. STEIN: Yes.

MR. BADALICH: I seem to be getting all the discussion here.

I believe water quality criteria have been established to protect the esthetic value, recreational uses and unique aquatic life of the lake and reasonable allowance is made for future municipal and industrial expansion.

I believe we have interstate water quality criteria standards that have been approved by the Federal Government, although we have not the final word from the Secretary of the Interior, But I believe as stated in this document that the water quality criteria established by the three States is of the highest water quality criteria of any place in the Nation, and so I believe that water quality criteria have been established to protect these particular uses.

MR. PURDY: Mr. Stein, when you take into consideration the so-called antidegradation statement that has been included as a part, I believe, of all three

States' approved water quality standards, I think I would have to take the same position as Mr. Badalich, that they have been established.

MR. STEIN: Do you people agree with that? You don't?

MR. POSTON: I think there is a definition in some of the--or one of the standards that calls a trace of copper 50 parts per billion, and this is one of the values that we think is--

MR. STEIN: You mean the values are--

MR. POSTON: It is listed as a trace. And the trace is--

MR. STEIN: Let me try this, because I--

By the way, I don't know anything about this. I haven't been working on the processing of these.

But your view is that the standards as proposed may not go through as they are, it isn't just a pro forma approval by the Secretary of the Interior to add substantive questions.

If this is the case, let's hear it.

MR. PURDY: They have been approved essentially, except in Michigan's case the temperature standards have

not been approved, but outside of that they have been approved, including the anti-degradation statement.

MR. POSTON: It is my understanding that in the case of Michigan those standards have been approved.

MR. STEIN: With the copper part?

MR. POSTON: No, I don't think this applies to Michigan, the copper part.

MR. STEIN: We had better put this in the record if we are going to come to an agreement. Let's get down to specifics. Who are you talking about?

MR. BADALICH: Well, Mr. Chairman, in the case of the State of Minnesota, we submitted our standards as required in June of 1967. In June of 1968 we received word from Secretary of the Interior Udall that the standards were approved except for certain exceptions, and nothing, certainly, pertaining to the Lake Superior Basin, other than one stream where we did not set the standards, on the St. Louis River. But since then, subsequently, we have had meetings with the FWPCA. The former Commissioner of the FWPCA, Commissioner Moore, approved the standards and recommended approval to the Department of the Interior, and likewise Commissioner Dominick has.

But we feel that they are on the way and that they will be approved momentarily.

DR. MOUNT: Mr. Chairman, if I may comment on this, I think perhaps we have a problem of definition here more than the approval of inappropriate standards, and I feel that we got trapped in the same trap which the United States Food and Drug Administration has been in with their pesticide zero tolerance levels. It is my understanding that in several instances limitations were placed on certain materials, such as copper, which is a very good example, saying that no more than a trace shall be present. I would have defined a trace as being that amount which would not be detectable or barely detectable by the currently used methods. However, it is my understanding that this value, a trace, has been defined by some of the States as 50 parts per billion.

Now, it is a matter of what is a trace and what isn't, and I think what we need to do is to put down the number rather than some word which doesn't tell us anything.

MR. STEIN: O. K. If this is the problem, let me just take a second to talk about the zero tolerance

operation and the problem that we had in this field. Food and Drug has had this for many, many years. If we can we will try to work it out here.

The problem is this. If you say you have a trace of copper or no copper or no oil or no anything or a trace of anything, what this generally means is whether you can find that with the usual technique of measurement. Now, what happens is, say, if the usual technique of measurement is that you are going to find something with a zero tolerance, just for sake of argument, rather than talk about trace, we will give you the characteristic situation.

Let's say there is to be no copper or no anything, no X, in a food or water or anything. What this means is that they will use the usual technique to trace that element. Maybe it is 5 parts per billion that they find. If anything is below 5 parts per billion, the normal testing that States and the Federal and the municipal laboratories do don't find it and they go home free.

Pretty soon when you operate like that you get a bright young boy who comes up--and you have seen them

all, our parade of them here--they have got bright young boys running these computers and test these in a new way, and instead of parts per million they can find this in parts per billion. Suddenly everyone who was in compliance, without changing something, finds himself in noncompliance because they have a new test and everyone begins checking for parts per billion. Well, that happens for a while and then maybe they scurry around and work it out and they meet that parts per billion test and they all feel comfortable again. Then even a newer boy and perhaps a brighter boy comes up with a technique to find parts per trillion and everyone is in violation again.

If this is the problem that we are getting in and we equate trace with zero, because the notion is if the standard is a trace of copper and some people think--what is it, 50 parts per million or billion?

DR. MOUNT: Billion.

MR. STEIN: --50 parts per billion is a trace and that is all right, and some other people think that 50 parts per billion is more than a trace and it is not all right, then we are in the soup.

MR. PURDY: Mr. Chairman, it seems to me that

the anti-degradation statement that protects the waters that are of a quality better than the numbers that have been adopted by any particular State as a standard protect this area.

MR. STEIN: What do you think of that?

MR. FRANGOS: Mr. Chairman, can I interject here or comment?

I would note that our standards have been approved in toto by the Department of the Interior, but let me read a sentence from these standards. It says:

"The standards and water use designation are subject to revision as data become available that permit objectives to be stated by methods which define the variation of distribution of values in quantitative and statistically valid terms."

I think we recognize precisely the problem that we are dealing with here. I think we ought to have some recognition in this summary statement that these have been adopted, but the insertion of the word "have" would not, in my opinion, preclude us from considering changing these standards as the result of this conference.

MR. STEIN: Let me ask you, can we use this

first sentence, that water quality criteria have been adopted? And maybe we will want to qualify that by the States.

MR. POSTON: I think that would--

MR. STEIN: "Have been adopted by the States to protect the esthetic value, recreational uses and the unique aquatic life of the lake."

I don't know that we need the second half of that sentence unless you feel it is necessary.

MR. BADALICH: Mr. Chairman, have you been stating that the FWPCA is absolved of any responsibility for these standards?

MR. STEIN: No. As far as I know, the FWPCA has not adopted these standards. If you want to say that--in other words, do you want to say that water quality criteria have been adopted by Minnesota, Wisconsin, and Michigan for water quality, and so forth, values of the State, and the Federal Government has approved the standards of Michigan and Wisconsin but has not yet approved the standards of Minnesota? Is that what you want to say? (Laughter.)

MR. BADALICH: No. I think very simply just

put in here have been established."

MR. STEIN: But the point is, the Federal Government has not adopted the Minnesota standards, as far as I know.

MR. BADALICH: Well, Mr. Chairman, getting back to a statement made by Dr. Mount, we have in our standards also trace indicated for some elements. But there again we clarify that, as Mr. Frangos pointed out of Wisconsin, also by a statement that the samples shall be preserved and analyzed in accordance with procedures given in the 1965 edition of the Standard Methods for Examination of Water & Wastewater by the American Public Health Association, American Water Works Association, and the Water Pollution Control Federation, and any revisions or amendments thereto.

So we try to follow the latest techniques on water analysis.

MR. STEIN: Mr. Badalich, I am not trying to argue with the validity about those standards. As a matter of fact, I had nothing to do with them and don't know what the controversy, if any, is.

What we do know is that presumably all the States have adopted

standards. We can state that as a factual matter. We cannot say that the Secretary of the Interior has approved the standards for all the States. Can we? Because he hasn't. And I don't really know what the issue is.

MR. POSTON: The standards for quality on lake water from the State of Minnesota have been accepted.

MR. STEIN: For Lake Superior?

MR. POSTON: For Lake Superior.

MR. STEIN: Well, then, let's put that down. This is great. Is this right?

MR. BADALICH: Would you repeat that?

MR. POSTON: That is right.

MR. STEIN: Are we all in agreement with that?

MR. BADALICH: Sure.

MR. STEIN: All right. Then why can't we say that:

"Water quality standards criteria have been established by the States and approved by the Secretary of the Interior to protect the esthetic values, recreational uses, and unique aquatic life of the lake."

And I would put a period after that. Why do you need the rest of that sentence? In the first place,

it isn't English from there on out. But the second thing, it seems to be self-serving and it weakens the operation. Presumably any kind of standard you adopt makes reasonable allowance for future municipal and industrial expansion or else it is dead the day you adopt it. Why can't we put a period after "lake" and leave the rest of that sentence out? O. K.?

MR. POSTON: One question.

MR. STEIN: All right.

MR. POSTON: What are the copper and zinc values for the lake in the Minnesota standards?

MR. BADALICH: Mr. Poston, I would refer this to the staff, but I believe copper is 100 parts per million or 100 milligrams per liter.

Mr. Joiner?

MR. STEIN: I will tell you what we will do. And this seems a real technical matter. Let us recess for 10 minutes. I hope you can resolve this when we resume.

(RECESS)

MR. STEIN: Let's reconvene.

I get some reports from the audience, that conferees

were weakening badly. And I said, "Who is weakening, all of us or one of the conferees?" And they said, "All of you." And I said, "What do you mean?" And they said, "We can't hear you in the back." So let's try to talk up. I do think we have an obligation.

Let's see if we can get to that No. 6 again. Does anyone have a suggestion?

MR. POSTON: I might suggest, Mr. Chairman, that it read:

"Water quality criteria, including nondegradation provisions, have been established by the States and approved by the Secretary of the Interior to protect the esthetic value, recreational uses, and the unique aquatic life of the lake."

MR. STEIN: All right?

MR. PURDY: Right.

MR. BADALICH: Right.

MR. FRANGOS: Right.

MR. STEIN: Let's read No. 7.

MR. BRYSON: "7. Lake Superior is an oligotrophic lake. Nutrient values in some areas of the lake have been reported at levels approaching those commonly

associated with nuisance algal growths. However, other factors, such as temperature, are limiting."

MR. STEIN: Are there any comments or questions?

MR. FRANGOS: Mr. Chairman, I have a question about the purpose of the last sentence.

MR. STEIN: Would there be any objection to striking that? Is there any objection?

I think that is a good suggestion. Some of these statements look like they try to get everything possible in them. Let's strike the last sentence because I don't think that really is related. This reads:

"Lake Superior"--

Do you want to read that again, Mr. Bryson?

MR. BRYSON: "Lake Superior is an oligotrophic lake. Nutrient values in some areas of the lake have been reported at levels approaching those commonly associated with nuisance algal growths."

MR. STEIN: All right, No. 8.

MR. BRYSON: "8. Outflow from Lake Superior passes through Lakes Huron, Erie and Ontario. Dissolved chemicals in this outflow contribute to the levels found in these downstream lakes."

Summary and Conclusions

MR. POSTON: Mr. Chairman, I think this is a very significant summary and conclusion because the waters in Lakes Huron, Erie and Ontario can be no better than those waters which are feeding those other lakes, and, therefore, Lake Superior quality governs, to some extent, the quality that you can have in the downstream lakes.

MR. STEIN: There is no objection to this sentence?

MR. POSTON: No objection.

MR. STEIN: All right.

MR. BADALICH: Mr. Chairman.

MR. STEIN: Yes, sir.

MR. BADALICH: Does this mean from No. 8 that the high quality of waters of Lake Superior are actually harming Lakes Huron, Erie and Ontario?

MR. POSTON: I don't think it does.

MR. BADALICH: I read it that way.

MR. PURDY: Mr. Chairman, I think if we had distilled water coming out of the lake we would contribute something in the way of--I mean anything other than distilled water would contribute something to the

remainder of the lakes. Certainly it shouldn't say it is harming the rest of the lakes.

MR. STEIN: Does it say it is harming?

MR. POSTON: What you are saying is that the word "contribute" means to harm? I hadn't interpreted it in that way.

MR. STEIN: Certainly this is true of chemicals, aren't they?

MR. BADALICH: I think it has been stated that chemicals are harmful.

MR. STEIN: Yes. And it is cumulative. You know, every time I go down to Louisiana, believe it or not, the thing they always complain about is the stuff they get in the Mississippi from Minnesota, and sometimes I am a little startled. But presumably they get a strong fix on this kind of stuff.

How do you suggest that we word this in a factual way that will be acceptable to everybody?

MR. POSTON: All right, "Dissolved minerals in this outflow become a part of"--

MR. STEIN: Dissolved minerals? All right, let's try this.

MR. POSTON: Materials?

MR. STEIN: No, no, dissolved minerals. I am not sure all materials do, because the organics will be stabilized or dissipated, won't they? Become a part.

MR. POSTON: How about persistent dissolved materials?

MR. STEIN: Let's try this. If you want to get fancy, let's do this:

"Dissolved minerals in this outflow become a part of the levels found in these downstream lakes."

DR. MOUNT: I don't think minerals is technically correct. We are talking about various kinds of materials, of which minerals are only one.

MR. STEIN: What would you say?

DR. MOUNT: I think "materials" is better.

MR. STEIN: Dissolved materials?

DR. MOUNT: Yes.

MR. STEIN: Or dissolved inorganic materials or just materials?

MR. POSTON: Materials.

MR. STEIN: Materials? The difficulty I have with that, Dr. Mount, is to a nonscientist, dissolved

materials, instead of being a precise term, is a very vague one.

DR. MOUNT: Would "substances" fit any better?

MR. STEIN: Well, it is really the inorganics that you are talking about, isn't it?

DR. MOUNT: No, DDT is not an inorganic. It is an organic, but it is persistent. It is the persistence characteristic that is important and not whether it is organic or inorganic.

MR. STEIN: Why don't we say:

"Dissolved persistent substances"-- All right? --"in this outflow become a part of the levels found in these downstream lakes."

MR. POSTON: "Become a part of the waters of these downstream lakes."

MR. STEIN: "Of these waters"? All right.

MR. BADALICH: Mr. Stein, would you read that now?

MR. STEIN: The first sentence remains the same:

"Outflow from Lake Superior passes through Lakes Huron, Erie and Ontario. Dissolved persistent substances in this outflow become a part of the waters of these

downstream lakes."

O. K.?

MR. POSTON: O. K. with me.

MR. STEIN: Let's go on to 9.

I will be back in a minute. Mr. Poston, will you assist in taking over the discussion.

MR. POSTON: All right, let's read No. 9.

MR. BRYSON: "9. The discharge of taconite tailings to Lake Superior from the Reserve Mining Company, E.W. Davis Works, has a deleterious effect on the ecology of a portion of the lake by reducing organisms necessary to support fish life."

MR. POSTON: John, do you want to comment?

MR. PURDY: Did he say to hold the discussion?

MR. POSTON: Well, he said go ahead.

MR. BADALICH: No, I would prefer to have the Chairman here.

MR. POSTON: O. K. Would you go ahead with No. 11 or No. 10, Dale?

MR. BADALICH: We have no objection to 10.

MR. POSTON: Read No. 10, Mr. Bryson.

MR. BRYSON: "10. The quantity of oxygen

normally dissolved in water is one of the more important ingredients necessary for a healthy balanced aquatic life. The discharge of treated and untreated municipal and industrial wastes with high concentrations of biochemical oxygen demand has caused oxygen depletion in the St. Louis River, Duluth-Superior harbor, and Montreal River."

MR. POSTON: Any comments?

MR. FRANGOS: Wally, I would suggest the insertion of the word in the last line "caused oxygen depletion in portions of." For example, that condition does not exist for the whole extent of the Montreal.

MR. POSTON: Yes. Well, I think that is good. Any other comment?

MR. BADALICH: What was that change, Mr. Poston?

MR. POSTON: Read it there.

MR. BRYSON: The change is, the second sentence would now read:

"The discharge of treated and untreated municipal and industrial wastes with high concentrations of biochemical oxygen demand has caused oxygen depletion in portions of the St. Louis River, Duluth-Superior harbor, and Montreal River."

MR. POSTON: Is that acceptable?

MR. BADALICH: Yes.

MR. POSTON: Can we move to No. 11?

MR. BRYSON: "11. Watercraft plying the waters of Lake Superior are contributors of both untreated and inadequately treated wastes in local harbors and in the open lake, and intensify local pollution problems."

MR. POSTON: No comment?

MR. BADALICH: No objection.

MR. POSTON: Tom Frangos, do you have anything?

Ralph, do you care to comment on that?

MR. PURDY: It is all right.

MR. POSTON: No. 12.

MR. BRYSON: "12. Oil discharges from industrial plants, commercial ships and careless loading and unloading of cargoes despoil beaches and other recreational areas, coat the hulls of boats and are deleterious to fish and aquatic life."

MR. POSTON: Mr. Purdy.

MR. PURDY: I think we could strengthen this if you put in, say, in the second line "the unloading of cargoes have despoiled beaches and other recreational

areas, coated the hulls of boats and are deleterious to fish and aquatic life."

MR. POSTON: Have you got that?

MR. BRYSON: You are changing the tense?

MR. PURDY: Yes.

MR. POSTON: Has despoiled.

MR. PURDY: These problems have occurred.

MR. POSTON: Have you got that?

MR. BRYSON: Yes.

MR. POSTON: Any other comment on this? And then we will read it.

All right, Dale, read it.

MR. BRYSON: As I have it:

"Oil discharges from industrial plants, commercial ships and careless loading and unloading of cargoes has despoiled beaches"--

MR. PURDY: Have.

MR. BRYSON: Excuse me, "have", all right.

--"have despoiled beaches and other recreational areas, coated the hulls of boats, and are deleterious to fish and aquatic life."

MR. PURDY: Right.

MR. POSTON: Any comments? Is that satisfactory?

MR. BADALICH: Yes.

MR. POSTON: No. 13.

MR. BRYSON: "13. Evidence of bacterial pollution has been reported in the St. Louis River, and Duluth-Superior harbor area in Minnesota; and Superior harbor area, Ashland inshore area and reaches of the Montreal River in Wisconsin."

MR. POSTON: Mr. Purdy?

Mr. Badalich?

MR. BADALICH: I see you added the word "Superior."

MR. POSTON: Yes.

MR. BRYSON: They are both, Duluth Harbor in Minnesota and Superior Harbor in Wisconsin.

MR. POSTON: Do you want to add the--

MR. BADALICH: No.

MR. POSTON: All right, then, it will remain as it is.

MR. BRYSON: It will remain as is.

MR. POSTON: Mr. Frangos, do you have anything? Is that acceptable?

Summary and Conclusions

Mr. Stein, we were stopped by summary and conclusion No. 9 and if you would take up from there, Nos. 10, 11, 12 and 13 have been--

MR. STEIN: Approved?

MR. POSTON: --approved.

MR. STEIN: What is the problem with 9?

MR. POSTON: If you open it up, you will find out. (Laughter.)

MR. STEIN: All right.

MR. BRYSON: No. 9 reads--

MR. STEIN: I guess you have read it.

MR. POSTON: No.

MR. STEIN: You haven't read it yet?

MR. POSTON: He read it, but they preferred that the Chairman be here.

MR. STEIN: All right.

MR. BADALICH: Mr. Chairman, if I may comment, if we accept the testimony this morning as factual and as not needing further clarification or substantiation, and as that is apparently the position of the conference, then we heartily endorse No. 9.

MR. STEIN: Well, do you have any question on

this 9 as it stands?

MR. BADALICH: No. I believe the testimony brought forth this morning certainly substantiates it. But there again I believe this is new testimony; we have had no chance to evaluate this information; and we would certainly like to substantiate this material.

MR. POSTON: Let me comment. The State of Minnesota in the report entitled "Bottom Fauna of the Minnesota North Shore of Lake Superior as Related to Deposition of Taconite Tailings and Fish Production," it is in the bibliography reference number 54, reported a reduction in abundance of fish food organisms associated with the deposition of taconite tailings in the bottom of Lake Superior. It was estimated that the reduction in fish food organisms could be expected to result in a reduction of the total annual fish catch of 5 percent or less for the area having tailings on the bottom.

MR. BADALICH: I believe in testimony this morning, Mr. Poston, there were percentages of 19 to 20 and 40 to 50 depending on the size of the trout. But we go along with the recommendation.

MR. STEIN: In other words, we will accept 9 as it stands, is that correct?

All right.

You are through 10, 11 and 12?

MR. BRYSON: Yes.

MR. POSTON: Yes, and 13.

MR. BRYSON: There were some changes made in a couple of those. Would you like to have them read?

MR. STEIN: Yes.

MR. BRYSON: No. 10 was changed to, the last sentence after "oxygen depletion" add the words "in portions of."

MR. STEIN: All right.

MR. BRYSON: No. 11 is unchanged.

No. 12 reads as follows:

"Oil discharges from industrial plants, commercial ships and careless loading and unloading of cargoes have despoiled beaches and other recreational areas, coated the hulls of boats, and are deleterious to fish and aquatic life."

MR. STEIN: All right.

MR. BRYSON: No. 13 was unchanged.

Summary and Conclusions

"14. The maintenance of waterways for commerical and recreational use is a necessary activity. The deposition of polluted dredgings contributes to the degradation in quality of Lake Superior."

MR. PURDY: No objection.

MR. BADALICH: No objection.

MR. STEIN: All right.

MR. FRANGOS: All right.

MR. STEIN: Let's go.

MR. BRYSON: "15. Adverse effects upon water quality and water uses of streams in the red clay area of northwestern Wisconsin is occurring as a result of land runoff from poor land management practices. The sediment contained in the discharges from streams in this area has an adverse effect on Lake Superior."

MR. STEIN: All right. Are there any comments or questions?

Go on.

MR. BRYSON: "16--

MR. STEIN: Are there any comments?

You can come back.

MR. BADALICH: There should be a change in the

verb, I believe, in the first sentence.

MR. STEIN: What?

MR. BADALICH: We are talking about "adverse effects is;" I believe it should be "adverse effects are.

MR. STEIN: "Adverse effects"--

DR. ANDERSEN: -"are occurring."

MR. STEIN:-"are occurring." All right. O.K.

MR. BRYSON: "16. A persistent pollutant entering directly into the waters of Lake Superior or dissolved in the water that feeds the lake mixes with and becomes an integral part of a significant portion of the lake water."

MR. PURDY: No objection.

MR. BADALICH: No objection.

MR. STEIN: All right, let's go.

MR. BRYSON: "17. Discharges of wastes originating in Michigan and Wisconsin cause pollution of the interstate Montreal River. Discharges of wastes originating in Minnesota and Wisconsin cause pollution in the interstate St. Louis River and Duluth-Superior harbor. Discharges of inadequately treated wastes originating in Michigan, Minnesota and Wisconsin cause

pollution of Lake Superior. This pollution results from nutrients which fertilize"--

Let me start again from "Duluth-Superior harbor."

"These discharges endanger the health or welfare of persons in States other than those in which such discharges originate. This pollution is subject to abatement under the provisions of the Federal Water Pollution Control Act, as amended."

MR. STEIN: Any comments or questions?

MR. PURDY: I have an objection. The first sentence, unless this relates to, say, nutrients discharged into the interstate waters of the Montreal River, why, I would object.

MR. POSTON: We struck in the first sentence "Michigan and" and we added one sentence, the fourth sentence down, we have added "This pollution results from nutrients which fertilize the lake."

MR. STEIN: How does that read now?

MR. BRYSON: The way it would read now is:

"Discharges of wastes originating in Wisconsin cause pollution of the interstate Montreal River. Discharges of wastes originating in Minnesota and Wisconsin

cause pollution of the interstate St. Louis River and Duluth-Superior harbor."

MR. STEIN: The only thing you struck was "and Michigan"?

MR. BRYSON: "Michigan and."

MR. STEIN: All right, are there any other problems?

MR. BRYSON: I am going to continue. "Discharges of inadequately treated wastes originating in Michigan, Minnesota and Wisconsin cause pollution of Lake Superior. This pollution results from nutrients which fertilizes the lake."

MR. STEIN: Where do you have that sentence?

MR. BRYSON: Two sentences were added. "Discharges of inadequately treated wastes originating in Michigan, Minnesota and Wisconsin cause pollution of Lake Superior. This pollution results from nutrients which fertilize the lake." Then we continue, "These discharges endanger the health and welfare," and so forth.

MR. PURDY: I have one question with respect to this particular section, and it, as I would see it, **does not** address itself to the question of whether

the discharges from Reserve Mining Company are of interstate nature. And on the basis of the additional material placed in the record this morning, it would seem as though the conferees could possibly reach the conclusion that there is presumptive evidence in the record to indicate that the discharges from the Reserve Mining Company endanger the health or welfare of persons in States other than those in which such discharges originate and that this pollution is subject to abatement under the provisions of the Federal Water Pollution Control Act.

MR. STEIN: How are we on that? Do you want to handle that now or not?

MR. POSTON: Do you have specific wording that you would like to propose, Mr. Purdy?

MR. PURDY: Well, I am not sure that I could repeat what I stated earlier.

MR. POSTON: Maybe our reporter could repeat it.

MR. PURDY: Yes.

(Record read as follows:)

There is presumptive evidence in the record to indicate that the discharges from the Reserve Mining

Company endanger the health or welfare of persons in States other than those in which such discharges originate and that this pollution is subject to abatement under the provisions of the Federal Water Pollution Control Act.

MR. PURDY: What I mean by presumptive evidence is that, as I understand it, these will be continuing, there will be continuing analytical work on samples already collected, and that this may at some later point in time--or that this at some later point in time should be reviewed by the conferees to make a determination whether there is such a pollution occurring or whether there is not such a pollution occurring.

MR. POSTON: You propose this for recommendation No. 18?

MR. PURDY: Well, or include it in 17, one way or the other. I don't care.

MR. MACKIE: Mr. Chairman.

MR. STEIN: Yes.

MR. MACKIE: We would feel that this is a logical conclusion of the conference and would support Mr. Purdy's position that this should be included at

this point.

MR. STEIN: How does Minnesota feel about this?

MR. BADALICH: Mr. Chairman, we will concur in the recommendation.

MR. STEIN: All right.

MR. BADALICH: This conclusion.

MR. POSTON: I will concur in this.

MR. STEIN: Let's have a sentence and wording on this based on the--

MR. POSTON: It is all worded there.

MR. STEIN: Let me have it back.

(Record read as follows:)

"There is presumptive evidence in the record to indicate that the discharges from the Reserve Mining Company endanger the health or welfare of persons in States other than those in which such discharges originate and that this pollution is subject to abatement under the provisions of the Federal Water Pollution Control Act."

MR. STEIN: Is that a statement that we want to put in just as it stands?

If there is no objection, let's go on.

MR. BRYSON: That concludes the summary and conclusions.

MR. STEIN: All right.

Now, do you want to try to tackle these recommendations or wait until tomorrow?

MR. POSTON: I would just as soon start.

MR. PURDY: If it is felt that we can move through these recommendations in the morning, I would prefer to postpone it until tomorrow.

MR. STEIN: What is your view?

MR. MACKIE: This is satisfactory to the State of Wisconsin.

MR. STEIN: Is this satisfactory?

MR. BADALICH: Mr. Chairman, I think we agree with that.

MR. STEIN: All right.

MR. POSTON: Are there other presentations to make in the morning that would take--

MR. STEIN: I hope this is all we have to do in the morning.

MR. POSTON: That would be satisfactory with me.

MR. PURDY: I came on the basis of this being

an Executive Session. No presentation to make on behalf of Michigan.

MR. STEIN: What time do you want to meet in the morning? 9:30 or 9?

We will stand recessed until 9:30 tomorrow morning.

Wait a moment. Wait a moment. Let's hold this. We are going to start at 9 o'clock tomorrow morning.

(Whereupon, an adjournment was taken until 9 o'clock, Wednesday, October 1, 1969.)

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MORNING SESSION

WEDNESDAY, OCTOBER 1, 1969

(9 o'clock.)

MR. STEIN: The conference is reconvened.

Mr. Bryson, I wonder if you could come up and start reading the recommendations.

RECOMMENDATIONS

MR. BRYSON: "It is recommended that:

"1. Water quality criteria as shown in Table 3 (page 44) be included as part of the interstate water quality standards on Lake Superior to reflect more appropriately the uniqueness of the lake."

MR. STEIN: Are there any questions on that?

If not, I have one. I am not sure, as I understood the discussions of the conferees, that we reached unanimity on the proposed water quality criteria in Table 3 with the discussion we had here. This raises some very interesting technical questions. I wonder if it wouldn't be appropriate to use the same technique that we used in Lake Michigan and some other places and a s k the Federal conferees and the State conferees to constitute a technical committee and in six months see if

they can come up with recommendations agreed upon by the staff.

Now, in Lake Michigan we also included in some of these advisory groups on the committee representatives of industry. What has occurred there is that we do have a water quality criteria requirement that has been accepted by all concerned. I think in the long run this facilitates a program for pollution abatement in keeping the lake clean.

Are there any comments on that?

Mr. Purdy?

MR. PURDY: I would support your suggestion, Mr. Chairman, that this be referred to a technical committee to report back to the conferees.

MR. STEIN: All right.

MR. POSTON: The idea of this would be that certain numbers agreeable to all of the States concerned or the States concerned, their government, would provide in the standards these particular criteria?

MR. STEIN: Yes, numbers. They may want to get zones. Any time you can get a number it is easier for us than just descriptive terminology. But I think for this

to have meaning, unless we are really going to do some other things, unanimity on this is pretty important.

MR. PURDY: I think it also needs to be understood that, at least I believe, all that this conference can do is recommend these as guidelines back to the States and that the States must adopt them, then, through their appropriate means, which in our case means a public hearing and then a decision by my Commission, not me, as to whether this new criteria will be adopted.

MR. BADALICH: Mr. Chairman, we would have to follow the same procedure in Minnesota also. It would be adopted as interim guidelines, and in turn we would have to have the necessary public hearings, and so on.

But your idea would be consistent with our No. 6 that we just completed yesterday on the summary and conclusions whereby we say that water quality criteria have been developed, so we have to have it consistent.

MR. STEIN: Right.

MR. POSTON: I think it is important that these standards, quality standards, be updated from time to time.

MR. STEIN: Let me--

MR. POSTON: There are changes that will be made from some of the existing criteria, probably.

MR. STEIN: I think this technical committee can consider that. And again,I think both Mr. Purdy and Mr. Badalich indicated what the situation was. If we were going to change the standards, we would have to hold the hearing under our Act too and do that, and you know, in one State we had a Federal hearing of that type to set standards.

I know all you people have had experience with this. However, I really think in going through this that, in dealing with something as technical as standards, without the groundwork of the States and Federal people getting together at the technical level in a technical committee, we are apt to get bogged down in controversy and in differences which may be of interest just to another technician and no one else. I think that the fastest way to do this would be to try to get all the technical people together and see if we can come up with an agreed-upon statement.

MR. BADALICH: Mr. Chairman, as a matter of discussion, another matter we thought of was that possibly

any revisions to the existing water quality criteria which may be developed in the future to develop research by the National Water Quality Laboratory--I am talking about Dr. Mount's organization--that this may be referred to the National Technical Advisory Committee of the FWPCA also for their suggestions, recommendations, and so on.

MR. STEIN: Yes. Well, I think--

MR. BADALICH: So that these could be not only adopted for Lake Superior but also possibly adopted for all interstate waters throughout the Nation.

MR. STEIN: Right. I think that the committee should have liaison with that nationwide committee to see if they will do that.

If this is agreeable, can we ask the Federal conferee to do the secretarial work and set up this committee? And within a week or two, the States should put their nominees on the committee and see if we can get to work on that and have a report to the conference within six months to see where we are going.

MR. POSTON: Very good.

MR. BADALICH: Mr. Chairman, is it possible to recap this now on what is going to be done?

MR. STEIN: Yes.

That a technical committee will be formed of the conferees and such representation as the conferees wish to have on this; that the responsibility will be that of Mr. Poston to provide the secretarial work for the committee; and that the nominees will be provided by the States and the Federal Government to serve on this committee within two weeks; and within six months the committee will report back to the conferees to see if they have any recommendations for changing existing water quality criteria or modifying existing water quality criteria to reflect the conditions that everyone wants in Lake Superior.

MR. BADALICH: Will there also be coordination with the National Technical Advisory Committee?

MR. STEIN: Yes, and there will be coordination with the National Technical Advisory Committee. We will leave that up to the committee to decide how they want to get it done. We have utilized this device in the past, and I think these committees generally become self-operating and define the lines pretty clear.

If that is agreeable--

MR. POSTON: This national committee is not a functioning committee at this time and we should not tie ourselves to something that--

MR. STEIN: That is right, get a report. But if you can, you do want liaison with these national bodies. Now, you may in addition to this--and this technical committee decided to do this in Lake Michigan--wish to have industrial consultants in with you. Now, this is a determination that the technical committee will have to make for itself at its first meeting. If we go through this procedure, it should be a tremendous service to all of us. When you are dealing with a small telephone book of numbers and two or three groups come in with them, the permutations and combinations are such that it is unlikely that they will be identical in all respects. Unless you do this joint groundwork you are apt to bog down when it comes before a group of this kind to make a determination. Therefore, I believe this might be the fastest way to handle it.

If that is agreeable, let's go on to recommendation No. 2.

Recommendations

RECOMMENDATIONS NOS. 2 AND 3

MR. BRYSON: Recommendation No. 2:

"The FWPCA and the States keep the discharge of taconite tailings to Lake Superior from the Reserve Mining Company, E. W. Davis Works, under continuing surveillance and report to the conferees at six month intervals on any findings that interstate pollution is occurring or is likely to occur, and the State of Minnesota is urged to take such regulatory actions as necessary to control the intrastate pollution resulting from these discharges, if any."

MR. STEIN: Are there any comments or questions on that one?

I will comment on this. In view of the situation that we have, I think that the surveillance part of it is all right. But the next operation that we have, "and the State of Minnesota is urged to take such regulatory actions as necessary to control the intrastate pollution resulting from these discharges, if any," may be too vague a charge to give to the State, with the notion of what they were going to do and whether that was going to be satisfactory

or not. I think we possibly have come to a more definite resolution of the problem. If we could just take that first part and put a period after "is likely to occur," and add a second sentence to that to recommend that Reserve Mining Company, either by its own work force or by the retention of consulting engineers, within six months come up with a plan for reducing the fines which seem to travel across the lake and to prevent this kind of travel. These fines, it seems, can be reduced in one or two possible ways and maybe others, because there should be no limitation if you get objective. One way is to keep a certain measure of them out of the lake and deposit them somewhere else. The other measure would be to provide a method of coagulation or other treatment which would cause the fines to be heavy enough to drop and not drift.

Now, I know, to be specific on this, in talking to our technical staff, and in particular Dr. Mount, just as an advisory thing to give a notion of what kind of ball park we are talking about,

they indicate that if there is an objective to keep fines of 40 microns or less out, or 325 mesh, and have all the deposits drop within three miles radius of the outfall, this might be a program which would, for the time being, protect the ecology of the lake from deleterious effects from discharges from Reserve Mining, and then the lake would be kept under surveillance.

I recognize there are many problems here--one whether this can be done; whether there is a feasible method; whether these requirements or objectives as indicated to me by our technical staff are the appropriate ones;or there should be variations. But the recommendation is that we should make a start and ask the industry to engage these firms or do this themselves and come up with a definite report on this in six months.

MR. POSTON: Do you want me to comment?

MR. STEIN: Yes.

MR. POSTON: Well, I think this Recommendation No. 2 is kind of obsolete in terms of the discussions that went on yesterday, and I think that there are two or three things that I would like to see accomplished by a recommendation to replace the Recommendation No. 2.

Recommendations

I think there should be plans for elimination of pollution and these should be worked out cooperatively with the State of Minnesota and these plans should be for the elimination of this problem, not something short term, but a long-term elimination. I see that we become increasingly more rigid in our requirements for waste discharged into our lakes, and I think perhaps that these plans should have alternatives that would show that more than one procedure for elimination of this pollution has been investigated and studied.

And the second thing that I think this--

MR. STEIN: I am not sure I quite understand you, Mr. Poston. What do you mean--

MR. BADALICH: Mr. Chairman, I have a recommendation that I would like to bring forth too, when Mr. Poston is through.

MR. POSTON: O. K.

Well, the second thing that I am interested in is that also at this time they come up with a timetable for abatement of this problem.

And the third, as I mentioned there, was that they would work with the State of Minnesota in the

preparation of this.

I would be willing to listen to recommendations specifically.

MR. BADALICH: Mr. Chairman, as far as your second point there on the timetable, I think we had better have a study first on it.

But we would like to recommend the following. We will strike out your recommendation in the Lake Superior report and in turn substitute that the Reserve Mining Company be requested to undertake further engineering and economic studies relating to possible ways and means of reducing to the maximum practicable extent the discharge of tailings to Lake Superior and submit a report on progress to the Minnesota Pollution Control Agency and the conferees within six months of the date of release of these recommendations.

Then also lake sampling and effluent data and operational information shall be furnished monthly by Reserve Mining Company to the Minnesota Pollution Control Agency.

That would be our recommendation.

MR. STEIN: All right. Now, I don't think we

are far apart. Do you have any objection to that first sentence, that "continuing surveillance" business, in this recommendation?

MR. BADALICH: No, we haven't as such. The only thing, I think it would be a little redundant, because we are asking for lake sampling and so on. We go a little bit further.

MR. STEIN: No, this is presumably continuing surveillance by FWPCA, is the first sentence.

MR. BADALICH: Oh, you have got to have the States. See, this is a requirement under our discharge provision.

MR. STEIN: Yes. I think this is compatible. This is for the State and the Federal Government, the first sentence, to keep this under continuing surveillance. You are asking in the second--

I think if we make two points, I don't see that they are inconsistent. You are asking the industry to report every month to yours, right?

MR. BADALICH: Yes.

MR. STEIN: And the Federal Government and the States would then keep this under continuing surveillance

as well. Right?

MR. BADALICH: It is repetitious, is all.

MR. STEIN: I don't know. I don't think it is repetitious. Because, again, here is the issue we have: If we are going to program, at least through the Federal level for getting this thing done, and provide the men and the money to do it and if we have a recommendation from the conferees, I think that is a basis for doing it. However, if we just say the industry is going to provide this, then we have to start a new program. And I think this would be helpful, at least this first sentence, in stating the responsibility.

Now, the second sentence, the way you put it, I have no objection to that myself. But the notion is that I think as an advisory, not necessarily in the conclusions, that the kind of objective that our technical staff is thinking of is in the terms that I outlined. Presumably, then, unless there is a change--because of these studies--this is the kind of judgment our technical staff would make when these reports come in.

MR. POSTON: Mr. Chairman, I think it is

important that we have a timetable for the construction of the abatement facilities--

MR. STEIN: That is another point, right.

MR. POSTON: --at the time of the six months.

MR. STEIN: Right, that is another point. Can we hold that? Let's see if we can come to agreement.

We have as No. 2 what is in here up to the word "occur" with a period. No. 3 will be the wording Mr. Badalich has given. Right? If we can agree on that so far. Because there is nothing in there that settles this question of a time schedule one way or the other.

Could we agree on those two?

MR. PURDY: Yes.

MR. STEIN: Right? Are there any objections?

MR. POSTON: Could we have this again?

MR. BADALICH: Do you want me to repeat it?

MR. POSTON: Yes.

MR. BADALICH: "That the Reserve Mining Company be requested to undertake further engineering and economic studies relating to possible ways and means of reducing--"

We are not just talking about the fines; we are talking about the possibility of reducing them--

MR. STEIN: Right.

MR. BADALICH: --without any limitation or definition of type of material.

"--reducing to the maximum practicable extent the discharge of tailings to Lake Superior and submit a report on progress to the Minnesota Pollution Control Agency and the conferees within six months of the date of release of these recommendations."

And then the last sentence would be:

"Lake sampling and effluent data and operational information shall be furnished monthly by the Reserve Mining Company to the Minnesota Pollution Control Agency."

MR. POSTON: Do we request that?

MR. STEIN: No, this is-- Who do you request--

MR. POSTON: Well, submit a recommendation.

MR. STEIN: As far as I can see this, this is a conference recommendation to the State of Minnesota, and the conference believes it is always a State job to deal with its own constituents. Presumably, if the Secretary adopts this recommendation that you have heard--and I have seen him do it under many, many previous conferences,he would send a letter to Mr. Badalich and ask

him to do this under the appropriate State and local law and State procedures.

But the job and the day-to-day relationships, I would hope not only for the next six months but from here on out, will be between Minnesota and Reserve Mining and whatever other industries they have in the State.

MR. POSTON: I think what I am looking for at the end of this six months' period would be a plan of the Reserve Mining Company for abatement of their pollution with a schedule as to when this can be done.

MR. STEIN: I understand that point. That is part of this procedure. If we have the first sentence, No. 2 will read:

"The FWPCA and the States keep the discharge of taconite tailings to Lake Superior from the Reserve Mining Company, E.W. Davis Works, under continuing surveillance and report to the conferees at six-month intervals on any findings that interstate pollution is occurring or likely to occur."

That is No. 2.

No. 3 will be what Mr. Badalich indicated.

Now, if we go into your point, and this is

adopted, it can follow, but I think let's square 2 and 3 away first if we are agreed on that.

In other words, do you object to what we have said so far?

MR. BADALICH: Mr. Chairman.

MR. STEIN: Yes.

MR. BADALICH: I would be hopeful that in engineering studies that a timetable would be set forth and possibly some methods would be set forth and after the first submission of the six-month report, then the conferees and our agency make an evaluation and I certainly think that we would set up a timetable, depending on the feasibility of these studies now.

MR. POSTON: Well, I--

MR. MACKIE: Mr. Chairman.

MR. STEIN: Yes.

MR. MACKIE: I would think that those studies should indicate at least a tentative timetable of the time to come back to the conferees. I wouldn't like the idea that we simply come in with an engineering report and then at that time develop a timetable. There should be at that point, I think, a tentative timetable for the

conferees to consider.

MR. STEIN: Are there any comments?

MR. BADALICH: Well, on that, Mr. Chairman, I think that might be a little hard to do, because my understanding is this will be the first approach to try to do something with the method or process of taconite identification, so whether you can say that this will be done on a timetable basis, we don't know. We would certainly like the feasibility and practicability of doing this type of an operation, so I think this would be brought forth in the first technical report that they will submit. And I think we would have to make an evaluation on this to see whether they could proceed any further or consider possibly how we could proceed and then there might be a possibility that maybe we could just reduce the fines or something like this.

MR. STEIN: Here, let me try to--I am not doing this; I am just giving this as a view. I am just trying, hopefully, to resolve the issues so we--

MR. MACKIE: Mr. Chairman, I indicated that the timetable at that time would be a tentative timetable. We wouldn't expect them to come up with a definite

timetable at that time, but I think it is important that we have a time span to consider.

MR. POSTON: I can't see any difference between this particular problem and the abatement of pollution from all of the municipal works around where they have established definite timetables, and I think what is fair for one is fair for the other.

MR. STEIN: Well, I am not sure you have a reasonable analogy. When we are dealing with a lot of industries and municipalities, you have a reasonable idea of the alternative methods available and they are fairly standard. I suspect if you come up with a remedial program here, it very possibly may be reached or may be a new technique. I am not sure these are comparable.

MR. BADALICH: Mr. Chairman, we will go along with Mr. Mackie's suggestion, if they will submit a tentative timetable, and in turn we will make a ground-works review of this. This will probably be the best procedure.

MR. STEIN: Right. Is that satisfactory?

MR. POSTON: O. K.

MR. STEIN: I think that will take care of this

We will put that in between your two sentences, that the report will include a tentative timetable, before that sentence that you have on monthly reporting. O. K.? Is that agreeable?

Let's go on, and from now on we are one number behind. In other words, now 3 becomes 4, and from there on in we move down.

MR. POSTON: Is this the total of this recommendation, then?

MR. STEIN: Yes. You have 2 and 3, that is right. Do you want any more?

MR. POSTON: I wonder if it isn't possible to define what kind of studies we might want them to make other than economic studies. The matter of whether or not this material ought to be put out on the ground or on land disposal, I think this ought to be considered.

MR. BADALICH: Mr. Chairman, I believe the statement as we presented this is all-encompassing. It says undertake further engineering and economic studies relating to possible ways and means of reducing to the maximum practicable extent the discharge of tailings.

MR. STEIN: You know, you engineers always have

that bias. I don't see how you do this with Bob Tuveson sitting next to you. As long as you say you are going to cover economics and engineering fields, it is all-encompassing. We figure if you leave out legal studies, it is not complete. (Laughter.)

MR. BADALICH: I think under law under our statutory authority we have to have economic and other studies to make the evaluation.

MR. STEIN: Right.

Have you got this resolved, Mr. Poston, or do you have a specific recommendation you want to make?

MR. MACKIE: Mr. Chairman, I wonder if it would be possible, as an alternative in here, for the company to indicate the line that tney intend to pursue in advance of the six months' period? Getting back to Mr. Poston's question.

MR. STEIN: All right. I think--

MR. MACKIE: In general terms, the lines of investigation that the company intends to pursue.

MR. STEIN: How about that? I think that if the company is going to meet the 6 months deadline, they will have to either set up a work schedule in-house

or have contracts with outside groups for the work. I wonder if it would be possible in general terms for the company to make a disclosure through Minnesota and this would be available to the other conferees for their information?

Now, if there were any progress where it was felt that a serious error was made or someone had some real problems, that this would be called to the attention of the Minnesota agency.

MR. BADALICH: Mr. Chairman, I think that is agreeable. We certainly would have close cooperation and liaison with the company, and anything that we do work out with them would certainly be disclosed to the conferees.

MR. STEIN: Right.

Would that be agreeable, Mr. Poston, as a solution?

MR. POSTON: I think so. My concern is that I would hate to see a less than satisfactory plan developed and for the conferees to have to pass on something that is not satisfactory and at a later date we come back and have to go at this problem again. I

think that there is great concern on the part of the public for disposal, dumping into the lake, and it just concerns me greatly that the type of abatement we get here might be less than satisfactory and I am just evidencing this concern.

MR. BADALICH: I believe we all have the same objectives here. I think our concern is just as great as the Federal Government's in this and I believe their companion States, so I think we have the same objectives in mind. Maybe you are phrasing it a little differently.

MR. STEIN: Right. Mr. Poston, and I don't want to keep working on this professional bias all the time, but the notion that you can necessarily have a satisfactory plan and say you are going to have one in advance and have it work I think based on the record is unduly optimistic. As a matter of fact, that is how guys like me make a living, when these plans are not satisfactory and we come in. This also cuts both ways.

As you know, Mr. Poston, we went up and down the Missouri River in the pollution abatement program. We made plans in the fifties, which we did very early, and we came up with the idea of primary treatment. Now we are

going up and down that river again on secondary treatment.

So I am not sure that in the long run just rushing in with a plan will give you the best solution to the problem. Sometimes it may be more than you need, but more often, in my experience, when we don't take our time, an adequate amount of time, we generally come up with something that doesn't work and we have to go back and do it again. I think this is so important that we can do this.

Now, again let me give you my view on this. And hearing the testimony of Dr. Mount and Dr. Bartsch both, and just looking at the water quality of the lake, I think while we have possibly alarming symptoms, we have a situation which will permit us to proceed in an orderly fashion and yet preserve the water quality of the lake. I think we are real lucky in Lake Superior and we should not forget that. And I also think that this may be a reasonable compromise on how to get this going.

MR. POSTON: Well, I think part of my thinking is that this problem has been building for many years, and I feel confident that the company has made many studies already and they should be and probably are a

long ways down the road at this time towards a specific solution on this. And I would like to see that this includes some consideration for land disposal as well as elimination of part of the wastes being dumped into the lake.

MR. BADALICH: Mr. Chairman, I am sure all of the alternate methods will certainly be studied. I think they want to come up with the best method and most feasible and also the most economical method, so if it is going to be land disposal or if it is going to be coagulation or the use of heavy density currents, or something or other, I am sure all of these things will be taken into consideration. They will surely look at all the alternatives.

MR.MACKIE: Mr. Poston's point, I think, has already been taken care of in the motion. Obviously if Minnesota is going to indicate the lines they intend to pursue, and if Mr. Poston feels that there are others that should be pursued, he certainly will let Minnesota know about it. So I think the point is covered.

MR. STEIN: Is that satisfactory, Mr. Poston?

MR. POSTON: Yes.

MR. STEIN: All right.

Again let me just say one thing--and if you want this, when I am through, off the record, Mr. Poston, you can have it off the record, because there is something here that I think may be possibly unduly optimistic--and that is I don't think it is any great secret that a lot of us have been working on this problem a long time and talking to industry representatives, State representatives, legal representatives, engineering representatives. To my best knowledge and belief, I do not think that the company is way down the road with a feasible plan to do this, that at the present time they are holding it in their back pocket. I think if they had that this would have come out.

I think we should recognize we are all approaching this in good faith. In other words, what we are doing here is we are recommending that the company now make a bona fide attempt from the present time to find alternate methods of disposal of these wastes and not go forward with any implication that this work has already been done. Because if I thought that, I would ask them to produce it today. I don't think it exists.

May we go on to the next point?

Recommendations

RECOMMENDATION NO. 4

MR. BRYSON: No. 3, which is now 4.

"The FWPCA and the States adjust or modify water quality surveillance plans for the Lake Superior Basin to insure that plans are sufficiently sensitive to monitor changes in water quality. The FWPCA and States are requested to report to the conferees within six months concerning their program."

MR. STEIN: Are there any questions on that?

MR. BADALICH: Mr. Chairman, I have one comment. I hope we are not optimistic with the six months. I thought I would like to scratch out the "within six months" and include "at the next session," whenever we reconvene again.

MR. STEIN: At the next session of the conference, right.

All right.

MR. MACKIE: Mr. Chairman.

MR. STEIN: Yes, sir.

MR. MACKIE: We are wondering if this No. 3 on page 48 couldn't be strengthened somewhat. Rather

than simply adjusting or modifying water quality surveillance plans, I wonder if that could be changed to indicate perhaps substantially strengthened?

MR. STEIN: Substantially strengthened, did you say?

MR. MACKIE: Yes. A simple modification might actually mean--could possibly mean a decrease. I think we are concerned about strengthening the surveillance here.

MR. STEIN: What do you think of that?

MR. POSTON: I think that is a good idea.

MR. STEIN: Do you want to strike "the States adjust"--

MR. BADALICH: Mr. Chairman.

MR. STEIN: Yes.

MR. BADALICH: Wouldn't a lot of this depend on the results of our No. 1 recommendation with regard to water quality criteria?

MR. STEIN: Yes, this may or may not, I am not sure.

You know, I have several points here. One, I think this deals with a monitoring program, and while

we can say that the technical people shall substantially strengthen it, I don't know if they have the people, the money or the techniques to do it. This may be a good objective, but I think we have two different things.

In order to develop that No. 1, the water quality criteria, we are going to have to have some good information and good monitoring data to help us develop this, and I think that possibly this almost comes first or works hand in hand with it.

Does anyone have any objection to that "significantly strengthen"?

If not, let's strike "adjust or modify" and say, "The FWPCA and the States significantly strengthen."

What is that word, what is it, "surveillance"--

MR. POSTON: Substantially strengthen.

MR. STEIN: Substantially strenthen? All right. What is that word after "surveillance," is that plants* or plans?

MR. BRYSON: It should be plans. There is a typographical error.

MR. STEIN: All right. O. K., go on.

* Recommendation 3, as originally printed, but later revised, was in error by use of the word plants.

Recommendations

RECOMMENDATION NO. 5

MR. BRYSON: No. 5. This is the old No. 4.

"Secondary biological waste treatment be provided by all municipalities in the Lake Superior basin. This action is to be accomplished by January 1973 or earlier if required by Federal-State water quality standards."

MR. STEIN: Any questions? Problems?

MR. PURDY: Yes.

MR. STEIN: Yes.

MR. PURDY: Again referring back to conclusions reached on the, for example, Lake Michigan enforcement conference, I think it would be appropriate to word these in the same fashion where secondary biological waste treatment or its equivalent be provided for all municipalities that discharge directly to or affect the quality of Lake Superior or its bays or harbors. That is, it seems to me that this conference deals with matters of interstate pollution out in the waters of Lake Superior, and the type of treatment that we require on our across-State waters is a matter of meeting the intrastate water quality

standards.

MR. STEIN: Except in this case I agree with you in principle. We may have to adjust it here because there are some streams, such as the St. Louis River, which in itself is interstate in this situation. We don't have that on the other lakes, I think, in that sense. In other words, if you have a stream that is a border between two States, you would want the same secondary treatment requirement affecting those.

MR. PURDY: It should be required to meet the interstate standards.

MR. STEIN: Yes, that is correct. So I think possibly to meet the geographical situation we have to adjust the language a little to meet Mr. Purdy's point.

MR. BADALICH: Mr. Chairman.

MR. STEIN: Yes.

MR. BADALICH: The only other recommendation I would have is on the date. We have a date of 1973 here, and to be consistent with our implementation plan, which we do have for all the interstate waters, we generally have been giving four years for compliance and so we would like to have that date changed to January 1974.

This is consistent with our interstate water quality standards now, is the reason I am saying this, where we did at the outset require four years for compliance.

MR. STEIN: Yes. Is there any objection to that?

MR. POSTON: Are you moving this date back one year?

MR. BADALICH: Right.

MR. STEIN: I am not holding it back, but someone sent these standards to Washington recommending it be moved back and it doesn't leave much of a choice.

MR. PURDY: As long as the wording remains in this "or earlier if required by Federal-State water quality standards," why, I think this would be satisfactory.

MR. STEIN: Do you have any objection to that?

MR. POSTON: I guess that is--

MR. STEIN: We have done it already.

MR. POSTON: Right.

MR. STEIN: All right.

Let's get the wording that you had. Do you have that?

MR. PURDY: No, I don't fully have it.

MR. STEIN: Can we modify Mr. Purdy's wording and where we talk about discharging directly into Lake Superior "or an interstate tributary stream," and I think that will take care of it.

Let's go on to the next point.

MR. FRANGOS: Mr. Chairman, just a comment on that statement. Are we including "or its equivalent"?

MR. PURDY: Yes.

MR. FRANGOS: Is that included in that?

MR. PURDY: Yes.

MR. FRANGOS: All right. Well, we have no problem with that recommendation. As you know, all of our communities are already under orders under the interstate standards and we are well within that date. We are talking about 1970.

MR. POSTON: Wisconsin will complete their abatement programs in communities by 1970?

MR. FRANGOS: That is the deadline we set, yes, which is well within the 1973.

MR. STEIN: 1974 now.

MR. FRANGOS: 1974.

MR. STEIN: All right.

Let's go on with the next one, Mr. Bryson.

RECOMMENDATION NO. 6

MR. BRYSON: No. 6, which is the old No. 5.

"Continuous disinfection be provided throughout the year for all municipal waste treatment plant effluents. This action should be accomplished as soon as possible and not later than May 1970."

MR. STEIN: Any comment on that?

MR. BADALICH: Mr. Chairman, to be consistent again with the preceding recommendation, I would like to include after the word "effluent" strike the period and state "which are discharged directly to or affect Lake Superior or its bays or harbors."

MR. STEIN: "or interstate tributaries"?

MR. BADALICH: "or interstate tributaries."

MR. STEIN: Right. Is there any objection to that?

If not, let's go on to the next number.

Recommendations

RECOMMENDATION NO. 7

MR. BRYSON: No. 7, which is the old No. 6, and there is a typographical error in this one also:

"Continuous disinfection be provided for industrial effluents containing pathogenic organisms or organisms which indicate the presence of such pathogens. This action should be accomplished as soon as possible and not later than May 1970."

MR. PURDY: I would think that this ought to be modified consistent with the modification just placed in the new No. 7--new No. 6? Yes, 6.

MR. STEIN: 6. If there is no objection, we will accept that.

Let's go on.

RECOMMENDATION NO. 8

MR. BRYSON: No. 8, old No. 7:

"Waste treatment be provided by municipalities to achieve at least 80 percent reduction of total phosphorus from each State. This action is to be accomplished by January 1973, or earlier if required by Federal-State

water quality standards."

MR. BADALICH: Mr. Chairman, here again, for No. 8 to be consistent with No. 7, after "municipalities" insert "which discharge directly to or affect Lake Superior"--

MR. STEIN: No, this is a different kind of recommendation, sir.

MR. BADALICH: Well, O. K. And then I--

MR. STEIN: In other words, we are doing this on a Statewide basis. If we were doing this on the cities, we would be up to 90 to get this. This does it anyway. In other words, you figure your total load that is going into Lake Superior and you cut this down by 80 percent. In other words--

MR. BADALICH: Yes, I realize that. But what I am saying is defining the municipalities that discharge directly to or affect Lake Superior to be consistent with the other paragraphs, and then again we wanted to insert after "State" because we do have a phosphorus removal criteria in our standards which indicates that the phosphorus concentration shall be 2 milligrams per liter in individual effluents. We don't go on about the 80 percent.

MR. STEIN: Well, we are talking about an 80 percent reduction on a Statewide basis. But the issue that we have had in the other States in dealing with phosphorus is that we have to keep it out of the basin or it will go in. I don't know that that modification applies here. Because what is meant, if we are doing this on a Statewide basis, is that everything that is going into the Lake Superior drainage basin is counted. This is what has been done in the other Great Lakes States, so if you are going to have this kind of protection you will have the flexibility to remove this on a Statewide-local basis.

MR. BADALICH: But aren't we concerned with the discharge from the municipalities that either affect Lake Superior, which is in the basin very definitely, but then again it also discharges directly to it? I am just trying to clarify to be consistent with the other recommendation.

MR. STEIN: You are not modifying, you are just cutting down the load by 80 percent. What this means is if you are dealing with a phosphate waste and you figure that if you are dealing with a big city, such as Duluth, and getting one percent more of the phosphates

out, you are going to get more phosphates than if you have a small town go into phosphate removal at all. So you may decide to concentrate on the big cities.

But the notion of giving you that 80 percent operation--we have worked that out in the other Great Lakes States--is to give the States flexibility dependent upon their entire loading that they make to the basin, not whether they go directly or indirectly into the lake.

MR. BADALICH: I know. But we are taking it one step farther. We are not concerned about the total loading. We are concerned about each individual effluent in our standards. We indicate that they shall reduce down to 2 milligrams per liter irrespective of big, little, small, or what you want to call it.

MR. STEIN: Now you are using a different--

MR. BADALICH: Well, this is our approach in our interstate standards.

MR. STEIN: Yes. But the point is that if they do that, you will be well within this 80 percent reduction, won't you?

MR. BADALICH: Yes, we will.

MR. STEIN: So I don't think this will affect

you. But the other States that have this can have this kind of program for the other States.

We have had this kind of problem with, for example, New York, which has a little different approach on the phosphate removal. The point is they bought this because their program clearly brings them within this reduction and should give them no problem. I think Michigan has this; I don't know about Wisconsin. Michigan has it and this will give them the flexibility they need in their approach to the program.

I really don't think this should give you any problem.

MR. BADALICH: I hope not.

MR. STEIN: I would like to ask you one question: What do you think of that 1973 date on this?

MR. PURDY: I have a problem there, Mr. Stein.

MR. STEIN: Yes.

MR. PURDY: Our interstate standards program that we have developed called for this to be accomplished by 1977 as an outside date. As you know, this has been moved up in the Lake Michigan Basin; it has been moved

up in the Lake Erie Basin. I am not sure that we can move this up to 1973 within our Lake Superior Basin and assure you that it will be accomplished within this time schedule. We do have a further requirement that any new plants or if any modifications are made to an existing plant that phosphorus removal facilities will be installed as a part of that construction.

So I would like to take this recommendation and then say that this action is to be substantially accomplished by January of 1975 and present back to the conferees a schedule of how we will be looking at this with our individual municipalities within the Lake Superior Basin at the next session of this conference.

MR. FRANGOS: Mr. Chairman.

MR. STEIN: Yes.

MR. FRANGOS: We would tend to concur with that recommendation on extending the deadline on phosphorus removal. Our reasoning for taking this position is somewhat akin to Michigan's. We face the realities of requiring our major communities in the basin to go to secondary treatment.

Additionally, one of the major problems we have

in the harbors, as we know, is the matter of combined overflows. And in terms of priorities, it seems to us that we ought to zero in on these first.

We would think of 1975 as a good date, but as these people come in with the detailed plans we can closely examine and make some decision on whether they ought to go now or defer it for two years.

MR. STEIN: Correct.

Mr. Poston, do you have any comment on this or is that agreeable?

MR.POSTON: That is agreeable.

MR. STEIN: All right.

Now, let me say, if we go with this, we will change "1973" to "1975." This action is to be substantially accomplished, Then, At the next session of the conference the conferees will present a detailed time schedule on the proposed program." Is that agreeable?

MR. POSTON: Are you going to leave the wording in there "or earlier if required by Federal-State water quality standards"?

MR. STEIN: That is right. So I don't think we have given anything away there. I hope not.

You know, we are getting to the end that Dr. Bartsch indicated to us would be the warning signal date on this phosphate removal. I think we have to recognize this and bend to it. In other words, he says if we can accomplish this within 7 years we might be all right. He didn't say what would happen if we lagged. And by sticking to this date we may be tempting fate. But I think we have to accept it in that sense.

All right?

MR. BADALICH: Well, Mr. Chairman, I will not go along with the recommendation if you say it will apply to municipalities in the basin. I would still like to say "that discharge directly to or affect Lake Superior." In our particular basin we are talking about towns like Aurora, Biwabik, Babbitt, and all the rest of them that are on intrastate waters within the basin, and we are certainly not going at this time to require phosphate removal when they are so remote from the lake.

MR. STEIN: Sir, I think this program as has been worked out with the other States in this wording precisely means that. This is why this was developed.

The same argument came up. The point is, we can make an adjustment if this doesn't accomplish that. But the purpose of language of this kind is to permit you to take towns like Aurora and not require any phosphate removal at all if your Statewide computation brings you within the 80 percent. I don't think you are going to have a bit of trouble. In other words, this was the formula that was developed by the other Great Lakes States for Lake Erie and Lake Michigan to accommodate the variety of State programs to do this. There is going to be no problem in your letting these intrastate--these little communities on an intrastate stream not have any phosphate removal if the total loading on the basis of the computation that you are putting in is reduced by 80 percent.

MR. BADALICH: If the municipality is on an interstate stream and it is tributary to Lake Superior, yes. But if it is on the intrastate streams, we will not go along with it and I will not go along with this recommendation on that basis. If you will change it to "which discharge directly to or affect Lake Superior or its interstate streams," fine.

MR. STEIN: What do the conferees think of that?

MR. FRANGOS: Let me make a comment. I think the distinction that we made in the other conferences--and we have been through this, John, in some other places--our thought was that phosphorus carries through the drainage system in that you don't have an assimilation phenomenon taking place as you do, for example, in BOD. You take a community on some small tributary and you are going to get a recovery and obviously there is not going to be any effect on Lake Superior or the interstate waters. But it was our concensus at these other conferences that phosphorus does not react this way and you do get this cumulative rundown down to the interstate streams and the lake itself. So this is why we have taken this approach of 80 percent.

Now, it seems to me this recommendation gives you the widest latitude for how to get it within the State. We were the ones who asked for this in the Lake Michigan conference. Ralph in Michigan proceeds one way, we are proceeding a little bit different, but the net result is that everyone on a Statewide basis is committing themselves to reducing it by 80 percent.

So this is some of the thinking that went into

this.

MR. BADALICH: Mr. Chairman, we do have an effluent standard for all of our intrastate and also our interstate streams and we require phosphorus removal to at least 2 milligrams per liter on all discharges to lakes, reservoirs, and so on. But on the streams, we still haven't got into this and we feel we would like to hold this in abeyance for some time.

So if you adopt this in the basin, go ahead and adopt it, but we certainly will not go along with the recommendation.

MR. STEIN: All right, we will take this and we will indicate that Minnesota has a program that does not go along with this.

I would just like to make one point on this. The language you have here is compromise language, as Mr. Frangos points out, that was put forward by the States to give them the widest latitude. I think the point is if we do not want this compromise language, maybe the Federal people will go back to their original position and ask 90 percent phosphate removal at all the sources.

But I think if we can, let's take this and

indicate that Minnesota objects to this; they have their own phosphate program; and we will get a reading. I think the answer will be affirmative that the Minnesota program in effect will comply with this. I think we are arguing about words and not about substances.

All right, let's go.

MR. PURDY: Mr. Chairman, I would just like to make one comment. I think it is understood that this 80 percent reduction is from point sources.

MR. STEIN: Point sources.

MR. PURDY: Yes.

MR. STEIN: That is correct.

MR. PURDY: And with that, why, it is consistent with the program that we have in Michigan.

MR. STEIN: Yes, thank you.

Let's go on to the next one.

RECOMMENDATION NO. 9

MR. BRYSON: No. 9, which is old No. 8.

"Industries not connected to municipal sewer systems provide treatment equivalent to that of municipalities so as not to cause the degradation of Lake

Superior water quality. This action is to be accomplished by January 1973 or earlier if required by Federal-State water quality standards."

MR. POSTON: Mr. Chairman.

MR. STEIN: Yes.

MR. POSTON: I would like to make the suggestion that we combine Recommendations No. 8 and No. 14. 14 pertains to connection of industrial wastes to municipal systems.

MR. STEIN: All right.

MR. POSTON: And I have some suggested wording, if you would care to hear it.

MR. STEIN: Let's get the substance of this one first, O. K.?

MR. POSTON: All right.

MR. STEIN: Let's keep that in mind, what Mr. Poston wants to do, but let's see if we agree with No. 9 now.

MR. FRANGOS: Can we strike "the" out in the first sentence?

MR. STEIN: Which, sir?

MR. FRANGOS: "The degradation."

MR. STEIN: You want the article stricken?

MR. FRANGOS: Yes, a grammatical suggestion.

MR. STEIN: Yes, all right. Strike the "the" before degradation.

MR. PURDY: Mr. Chairman.

MR. STEIN: Yes.

MR. PURDY: This would be industries whose waste has an effect upon Lake Superior or the interstate streams and not connected to a municipal sewer system to provide treatment equivalent to that of municipalities that discharge into lake water, wouldn't it?

MR. STEIN: Mr. Poston, do you have any--

MR. PURDY: Again up on the intrastate waters, I think there is a matter of the industries meeting the intrastate standards where they have been established by the State.

MR. STEIN: This is an abundance of caution. I don't believe they would degrade Lake Superior waters anyway; otherwise we would be adding them.

MR. POSTON: Are you ready for my suggestion?

MR. STEIN: Yes.

MR. POSTON: I would preface this recommendation

with the sentence that "Discharge of treatable industrial wastes to municipal sewer systems be encouraged," and then follow up with, "However, industries not connected to municipal sewer systems must provide treatment equivalent to that of the municipalities so as not to cause degradation of Lake Superior water quality."

MR. STEIN: Any comment on that? That means taking No. 14 and making it the first sentence of No. 9.

MR. BADALICH: Mr. Chairman.

Mr. Poston, you are saying that those industrial wastes that are conducive to biological treatment in the municipal treatment plant. Certainly those industries that have some sort of toxic waste, we wouldn't want to encourage them to go into a municipal treatment plant. Those are comparable with--

MR. POSTON: I said "Discharge of treatable industrial wastes," is the wording.

MR. PURDY: Toxic wastes are treatable.

MR. BADALICH: See, there again, Mr. Purdy says toxic wastes are treatable. We would like to have something compatible or that are biodegradable.

MR. POSTON: Well, we ask that this be encouraged,

and I think generally speaking--

MR. STEIN: Why don't we use that if he has a phrase. How about "Discharge of compatible industrial wastes"?

MR. POSTON: O. K.

MR. STEIN: Instead of "treatable"? O.K.?

MR. POSTON: O.K.

MR. STEIN: All right.

MR. PURDY: How did the rest of that read?

MR. STEIN: It is the same. We are taking "Discharges of compatible industrial wastes to municipal sewer systems be encouraged," and then you say, "Industries not connected," and so forth as we agreed.

MR. BRYSON: Would you like a rereading of that?

MR. STEIN: No. I think we are all right, unless anyone wants it.

MR. POSTON: That would eliminate No. 14 then.

MR. STEIN: Yes. 14 becomes the first sentence of 9.

Let's go on.

Recommendations

RECOMMENDATION NO. 10

MR. BRYSON: No. 10, old No. 9:

"Each State water pollution control agency make necessary corrections to the list in Appendix A of municipal and industrial waste discharges to the Lake Superior Basin. In addition, information should be provided on each source to indicate whether it discharges pollutants, including nutrients, that have a deleterious effect on Lake Superior water quality. Detailed action plans for treatment of all wastes having deleterious effects should be developed, where not already completed. Such plans shall identify the principal characteristics of the waste material now being discharged, the quantities, the proposed program for construction or modification of remedial facilities and a timetable for accomplishment, giving target dates in detail. This list shall be presented to the conferees within six months."

MR. BADALICH: Mr. Chairman.

MR. STEIN: Yes.

MR. BADALICH: I missed one point on No. 9 there, the date 1974 to be consistent with our Recommendation 5 and this also is consistent with our stipulation we

have with the paper and pulp industries in the Cloquet area.

MR. STEIN: Is that agreeable?

MR. POSTON: Yes.

MR. STEIN: All right. That will be changed. Thank you.

Any comments on 10 as read?

MR. BADALICH: Mr. Chairman, on this I think I brought this up at the May conference, but we have a listing in this Appendix A of many, many municipalities that certainly do not affect or discharge into any interstate waters that affect Lake Superior, and for clarity after the Appendix A would show those and then scratch off municipal and industrial waste sources and then include sources which discharge directly to or affect Lake Superior or interstate water quality.

MR. STEIN: Yes. All right. I think the purpose of this is not only to expand on this but to contract it. We have done that in many,many cases.

And again let me indicate to the people here what the name of the game is going to be after the conference. The object is going to be to reduce that

list as much as we possibly can, either because they don't affect the waters or because they have adequate treatment. The smaller we can make the list the better off we are going to be as to the water quality.

Is this agreeable, Mr. Poston?

MR. POSTON: Yes, sir.

MR. STEIN: All right.

Let's go on.

MR. FRANGOS: Mr. Chairman.

MR. STEIN: Yes.

MR. FRANGOS: I think perhaps it might be appropriate while we are discussing item now 10 to report to the conferees the status of one particular pollution source in Wisconsin that was an item of some interest at the last session, and this is the duPont facility at Barksdale on Chequamegon Bay. As we indicated at the last session, this facility was cited and appears in our implementation plan in the interstate water quality standards that have been adopted by the State and the Department of the Interior. Under the details of that particular implementation plan, the company is required to secure abatement by October 1, 1970.

Recommendations

Now, in following up on the State order that was issued against the company, we have been meeting with the company officials and they have submitted to us a proposal for abating the pollution which presently occurs in Boyd Creek. The company has sponsored a detailed current study to be carried on in Chequamegon Bay and now they have come up with some detailed engineering proposals to us.

The proposal generally calls for dispersion of these wastes, and they have indicated to us that there are either little or no other alternative ways of disposal. We have received that information and it is currently under review and consideration by our department. We have also made preliminary contacts with the staff of the FWPCA and it is our suggestion to Mr. Poston that we proceed currently to review this proposal to see whether in fact we are going to meet the water quality standards that have been set.

The reason I bring this up is because we talk about a 6-month period and we really need to resolve this matter before that time if we are in fact going to meet this deadline. And what I would suggest to you that

we are going to do as a matter of information, that we would like to work with the laboratory people up here and come up with an agreement, if that is possible, then inform all of the conferees exactly what steps were taken.

MR. STEIN: Right. How long do you anticipate that will take, less than 6 months?

MR. FRANGOS: Well, I would hope that we can get a firm decision in 3 months, because there is only one construction season left and, as you know, it is kind of short up here.

MR. STEIN: Well, I understand, and if I am wrong on this I wish someone would correct me--that there will be certainly no objection from the laboratory people here and full cooperation of the staff will be given to Mr. Frangos on this matter.

That is correct, isn't it?

Right.

MR. POSTON: I would like to make a comment on this. I note that--

MR. STEIN: We got that TNT plant set. Don't pull it up. (Laughter.)

MR. POSTON: This problem is one of long standing

and I am sure that eventually this will probably come in for a permit to the Corps of Engineers for a new discharge to the lake. I am particularly concerned by the nature of the proposal here which indicates dispersion as a treatment and I am sure that this can be worked out. But I am disturbed by this particular approach of dispersion because I am much of the opinion that dilution is not the solution, rather some treatment must be provided. And Mr. Frangos has indicated to me that he is anxious to work with us.

MR. STEIN: All right.

MR. FRANGOS: Mr. Poston, you would have disappointed me if you didn't say that. (Laughter.) We, too, have been very much concerned and we know that you are concerned,and this is why we do want to review this jointly so that we reach an understanding in all fairness to the company.

MR. STEIN: All right. Hopefully--

MR. POSTON: I would suggest, Mr. Frangos, that this work be done with Mr. Bryson, who will have the laboratory facilities available to him and also our standards activities so that he can get broad cooperation.

MR. FRANGOS: Fine, we will appreciate that.

MR. BADALICH: Mr. Chairman.

MR. STEIN: Yes.

MR. BADALICH: I would suggest it would probably be consistent with the previous recommendation that we change the last sentence there, that this shall be presented to the conferees at the next session instead of 6 months.

MR. STEIN: Yes, I think that would be appropriate, right.

All right.

RECOMMENDATION NO. 11

MR. BRYSON: No. 11, which is old No. 10:

"Unified collection systems serving contiguous urban areas be encouraged."

MR. STEIN: All right.

Next one.

MR. POSTON: Wait a minute. I would like to combine Nos. 10 and 11, and I have some suggested wording, because they try to--

MR. STEIN: The present 10 and 11?

MR. POSTON: Right.

MR. STEIN: Or you mean the new--

MR. POSTON: "Unified collection systems."

MR. STEIN: And the one after that?

MR. POSTON: And the one after that.

MR. STEIN: All right, go ahead, if you want to do that.

MR. POSTON: And I have a proposal.

MR. STEIN: Go ahead.

MR. POSTON: "The State water pollution control agencies accelerate programs that provide for maximum use of areawide sewerage facilities in contiguous areas by encouraging unified collection systems, by discouraging proliferation of small treatment plants, and by fostering replacement of septic tanks with adequate collection and treatment."

MR. STEIN: All right.

MR. FRANGOS: Mr. Chairman, I would agree that in terms of setting up some recommendation that those two are closely related. But by the same token, I don't think this really hurts us too much and we have adopted a nonproliferation policy. And you know, this is a tough

area to work with to get communities to act jointly. I like the idea about having a nice short sentence so when somebody comes into our office we say, "Here, this is what we agreed to and it is only one sentence, " and they will read it. If it is four or five, they won't.

So I would just as soon have that one sentence stand by itself.

MR. STEIN: How about that?

MR. POSTON: O. K.

MR. STEIN: Will you accept that?

I think we have all had this experience, except maybe Mr. Badalich. You know, down in the Twin Cities he really hasn't had that experience of trying to get the community together. (Laughter.)

MR. BADALICH: Mr. Chairman.

MR. STEIN: Yes.

MR. BADALICH: Mr. Poston, would you substitute "established" for "encouraged"?

MR. STEIN: No, we are going to leave it as it is.

MR. BADALICH: Oh.

MR. STEIN: Let's go to 12. We have accepted

11. Read the new 12.

RECOMMENDATION NO. 12

MR. BRYSON: 12, which is the old 11?

MR. STEIN: Yes.

MR. BRYSON: "Each of the State's water pollution control agencies accelerate programs to provide for the maximum use of areawide sewerage facilities to discourage the proliferation of small treatment plants in contiguous urbanized areas and foster the replacement of septic tanks with adequate collection and treatment."

MR. STEIN: Right.

Let's go on to 12.

You know, let me tell you one of the Nation's horror stories on this. I don't think we have that here, but in Kansas City, Kansas, and Kansas City, Missouri, we have two sewage plants right across the street from each other. Of course the State line runs in between, but it is just like being right across the street from the Hotel Duluth, and I hope we can do better stuff than that.

MR. PURDY: I would hope, though, Mr. Chairman, that on this replacement of septic tanks that where septic

tanks provide fully adequate treatment that we are not supposed to go out and discourage their use and require collection and treatment systems, because I think we should recognize that when we have a collection and treatment system we end up with an effluent at the surface stream.

MR. STEIN: Is that understood? Do you want it changed here?

MR. PURDY: No, as long as this is in the record and understood.

MR. STEIN: Let me go off the record for this.

(Off the record.)

MR. STEIN: Back on the record.

RECOMMENDATION NO. 13

MR. BRYSON: No. 13, old No. 12.

"Each State water pollution control agency list the municipalities or communities having combined sewers. The listing should include a proposed plan for minimizing bypassing so as to utilize to the fullest extent possible the capacity of interceptor sewers for conveying combined flow to treatment facilities. Construction of separate

sewers or other remedial action to prevent pollution from this source is to be completed by October 1977."

MR. STEIN: Any comment?

MR. BADALICH: Mr. Chairman, I have one comment as to the date. To be consistent with other Federal-State enforcement conference rules where we have had the pleasure of having you there. Mr. Stein, we have gone along with 10 years on this on the Red River, Rainy River and also the Mississippi River, so I would like to have the date changed to January 1980.

MR. STEIN: All right. Let me talk to that a minute.

Are there any other comments?

MR. PURDY: Well, yes. If we would change this to the 1980 date, I would like the additional wording "or earlier if required by Federal-State water quality standards."

MR. STEIN: Right.

All right, let me go off the record again.

(Off the record.)

MR. STEIN: Let's get back on the record.

How about December 31, 1979, instead of 1980?

Will you accept that?

MR. BADALICH: Yes.

MR. STEIN: All right.

I think we should have this listing if we can, I don't know if you can, at the next session of the conference. Is this possible?

MR. PURDY: I doubt if we could have the proposed plan for minimizing bypassing by then.

MR. STEIN: No, but the listing of the municipalities. Can we have a list by the next conference?

All right.

MR. FRANGOS: Just a comment on this recommendation just to give you at least one illustration of the difficulty of this particular problem.

It was pointed out to me yesterday that the city of Superior has the same geographical area as Milwaukee and they have a combined system, and I think you can appreciate the kinds of difficulties you are going to run into to try to get that in a community where you have got such a sparse density of population.

MR. STEIN: That is right. It says here, "Construction of separate sewers or other remedial action."

MR. FRANGOS: I have no quarrel with the recommendation.

MR. STEIN: Right.

All right, may we go to 14, sir.

RECOMMENDATION NO. 14

MR. BRYSON: No. 14: "Discharge of treatable industrial wastes to municipal sewer systems be encouraged."

MR. STEIN: No, no, no. You skipped one.

MR. BRYSON: I skipped one.

No. 14. "Existing combined sewers be separated in accordance with all urban reconstruction projects except where other techniques can be applied to control pollution from combined sewer overflows. Combined sewers should be prohibited in all new developments."

MR. STEIN: "Coordination" is the word, isn't it, as it is written?

MR. POSTON: Yes, "coordination."

MR. BRYSON: I am sorry.

MR. STEIN: All right.

Is there any problem with this?

All right. Do any communities now have combined

sewers in new developments in this area?

MR. BADALICH: Generally in Minnesota in the redevelopment areas they do separate the sewers.

MR. STEIN: Yes. But supposing there is a new subdivision?

MR. BADALICH: In fact we would not approve combined sewers there. We haven't since at least 1964.

MR. STEIN: Thank you.

May we go on to 15?

RECOMMENDATION NO. 15

MR. BRYSON: 15, which matches the old 15:

"The States institute necessary controls to ensure that the concentration of DDT in fish not exceed 1.0 micrograms per gram; DDD not exceed 0.5 micrograms per gram; Dieldrin not exceed 0.1 micrograms per gram and all other chlorinated hydrocarbon insecticides, singly or combined, should not exceed 0.1 micrograms per gram. Limits apply to both muscle and whole body and are expressed on the basis of wet weight of tissue."

MR. STEIN: Are there any comments?

MR. PURDY: Well, on this, I think this is

consistent with the recommendations of the Lake Michigan technical committee on pesticides, and I think they also spelled out in their recommendation that this is to protect the fish life and did not relate to, say, the public health implications of the consumption of fish that might contain the limits above this, and I would like this to be spelled out also in these recommendations.

MR. STEIN: Is that agreeable?

MR. POSTON: Very good.

MR. STEIN: All right, that will be done too.

MR. BADALICH: Mr. Chairman--

MR. POSTON: Who is going to do this?

MR. STEIN: You have the sentence, don't you?

MR. POSTON: Yes.

MR. STEIN: We will just add it.

MR. POSTON: I would just like that to be understood, is all.

MR. STEIN: What do you mean, who is going to do it? This will appear in the summary.

MR. POSTON: Draft it out?

MR. STEIN: I think it has been drafted, unless you have some specific language from the committee that

you want to use instead of what Mr. Purdy has just said.

MR. POSTON: What you want to do is use the language that has already been developed?

MR. PURDY: In the committee report.

MR. POSTON: O. K.

MR. PURDY: Yes.

MR. STEIN: All right.

MR. BADALICH: Mr. Chairman.

MR. STEIN: Mr. Badalich.

MR. BADALICH: I wanted to add, I will just put this out for discussion and the reason for it, at the end of the last sentence there after "tissue" put a comma, "or establish and enforce such other environmental standards for pesticides in the Lake Superior basin as may be agreed upon by the States and the FWPCA after establishing an intensive monitoring program."

This was added because of the five-State Governors conference on pesticides in the Great Lakes.

MR. STEIN: Is there any objection to that?

MR. PURDY: None.

MR. STEIN: If not, fine.

Let's go on to 16.

Recommendations

RECOMMENDATION NO. 16

MR. BRYSON: 16. "Uniform State rules and regulations for controlling wastes from watercraft should be adopted. These rules and regulations should generally conform with the rules and regulations approved by the conferees to the Lake Michigan - Four State Enforcement Conference. Commensurate interstate requirements controlling the discharge of wastes from commercial vessels should be the responsibility of the Federal Government."

MR. STEIN: I guess Mr. Frangos has left for a moment. Are we running smack into a controversy here, too, on the use of holding tanks and macerator/chlorinators or not?

MR. BADALICH: Mr. Chairman, I don't believe so, but I wanted to clarify this a little bit more, because we certainly do not have State laws regulating the federally-documented and licensed commercial crafts, so we are wondering if you could insert after the word "from" in the first sentence "noncommercial watercraft should be adopted," because we have no control over the

commercial activities of interstate boats, watercraft.

MR. STEIN: I have no objection to what you are saying, but I want to get the language.

"Uniform State rules and regulations for controlling wastes from watercraft under such State's jurisdiction," which will do the same thing, because the others may have a little different jurisdiction. In other words, if under your law this is what you can control, fine. No one is asking you to do more.

Now, can we get a report on that at the next session of the conference?

MR. PURDY: Mr. Chairman, of course we have adopted the rules and regulations or regulations that cover the full State and cover Lake Superior, so it is not really a problem. However, I wonder, in view of congressional activity and S-7 that would preempt the States and would postpone enforcement on existing watercraft for some 5 years, why we are addressing ourselves to this problem until after the congressional activity is terminated?

MR. STEIN: Well, I don't know, Mr. Purdy. I never like to anticipate a congressional action or a

State legislative action, whether a bill is going to pass or not. The question you raise can always be raised, because whether this bill passes or not it is going to come up again, and when is the cutoff time when you say that you feel that Congress is not going to act or the State is not going to act on this. I don't know whether they are going to pass that bill or not or when they are going to do it or if they don't. Let's assume they don't do it at this session, when is the appropriate time to take this up.

MR. PURDY: Frankly, the Federal consideration of such action has made it very difficult for the States to pursue the enforcement of their regulations evolved at an earlier date.

MR. STEIN: I recognize that. This doesn't mention the date here, but I do think that something like this--even if the Federal law does pass--can be helped a g r e a t deal by a uniform State requirement on certain waters. As a matter of fact, I think the action on Lake Erie and Lake Michigan has probably set the tone or the direction for Federal requirements if that law is passed now.

The reason, possibly, for the Federal proposal or the lack of a Federal proposal has been the lack of State action, and I am not talking about Great Lakes States but probably possibly some other States.

But again I would think that there is a useful purpose to be served even in the administration of this if we are going to have all the Great Lakes States have uniform substantive programs. So you can find that possibly reflected--

MR. PURDY: I will be optimistic with you, Murray.

MR. STEIN: O. K. If there is no objection, let's go on with this.

MR. BADALICH: Mr. Chairman.

MR. STEIN: Yes.

MR. BADALICH: I am just wondering, in place of "rules and regulations" if we could say "Uniform State policies"?

MR. STEIN: "Uniform State requirements" let's put it. O. K. "Requirements."

MR. POSTON: "Requirements"?

MR. STEIN: Yes. You know, a colorless word.

All right.

MR. BADALICH: In the second sentence also.

MR. STEIN: Yes. "Requirements," right.

17.

RECOMMENDATION NO. 17

MR. BRYSON: 17.

"The dumping of polluted dredged material into Lake Superior be prohibited."

MR. STEIN: Any question on that?

MR. PURDY: None.

MR. BADALICH: No.

MR. STEIN: 18.

MR. POSTON: How about striking the word "polluted," "dumping of dredged material into Lake Superior to be prohibited"? (Laughter.)

MR. PURDY: I like it the way it was read.

MR. BADALICH: Likewise.

MR. POSTON: You like "polluted"? (Laughter.)

MR. PURDY: I like it the way it was worded.

MR. STEIN: Do you want to pursue that or can we go on?

MR. MACKIE: Mr. Chairman, if he is really serious about this,this could mean that we would be prohibited or be in some problem as far as developing beaches or parks, and so forth and so on. I think this is going to have to be approved.

MR. POSTON: Well, I will withdraw it at this time.

MR. STEIN: Yes. This would also mean you couldn't put stuff in behind the dike either, and we have been encouraging that for sometime. But that is all right.

In other words, let me again say what the notion here is. In dealing with polluted material or any dredged material in a lake, you are not dealing with a simple problem, and you can't get a simple answer. We have worked on this many, many times and we have to think about this before we put in a regulation. Unless you get any notion, you people who have looked at the positions that we have taken and principally Mr. Poston and myself on the disposal of lake dredging, you know where we stand.

And I can give you my personal philosophy here.

I don't see any point in cleaning up these Great Lakes and making them free from pollution just to provide a dump. But I think that is very different than saying you can't put any dredged material in the lake.

May we go on to the next point.

RECOMMENDATION NO. 18

MR. BRYSON: 18, "Programs be developed by appropriate State and Federal agencies to control soil erosion in the basin. The action plan developed by the Red Clay Interagency Committee should become an integral part of the programs conducted by all appropriate agencies, groups and private individuals."

MR. PURDY: Mr. Chairman, I would like to see that end with the first sentence.

MR. STEIN: Right.

MR. PURDY: I don't know what the action plan is that has been developed by the Red Clay Interagency Committee at this point and time.

MR. STEIN: I get another reason for that. I don't know that we can speak as a recommendation here for all appropriate agencies, groups, and private

individuals.

MR. POSTON: I think it would be important that we do something about specifying somebody to look into this. Otherwise this recommendation has no real meaning and nobody else will look at it.

MR. STEIN: Well, I wonder if we could get a report from you people or the Red Clay Committee, if you think this is important, at the next session of the conference with sufficient prior notice so we can evaluate. We really don't have that in mind or in the record, do we?

MR. MACKIE: Mr. Chairman, between now and the next meeting we could circularize the conferees with a report on the activities of the Red Clay Interagency Committee. This could be done.

MR. STEIN: Right. Let us have that and let's schedule that for discussion at the next conference so we can deal with the specifics, and it very well may be that the conferees can endorse that program.

MR. BRYSON: No. 19?

MR. POSTON: How do we leave this, then?

MR. STEIN: We leave this that the programs

be developed by appropriate State and Federal agencies to control soil pollution. The Wisconsin conferees will report at the next session of the conference on the action plan developed by the Red Clay Interagency Committee and before the next conference will distribute information concerning these activities, and after this report the conferees will give this matter further consideration and see if we can come up with definite recommendations.

Let us stand recessed for 10 minutes.

(RECESS)

MR. STEIN: Let's reconvene.

Will you go on, Mr. Bryson.

RECOMMENDATION NO. 19

MR. BRYSON: No. 19.

"The discharge of visible oil from any source be eliminated."

MR. STEIN: Any question on that one?

MR. PURDY: No question.

MR. POSTON: Well, I think this was probably taken care of in other parts of our recommendations and

standards and that it is really redundant. However, I don't object to it.

MR. STEIN: All right. You know, we are not writing a novel. And we have redundancies. When I think about these redundancies, how much total dredging is going into Lake Superior?

MR. BRYSON: I believe it was about 300,000 yards, cubic yards, last year.

MR. POSTON: Yes.

MR. STEIN: How much is that?

MR. BRYSON: Mr. Ryder, of the Corps of Engineers, is over there. Maybe he can answer that.

MR. STEIN: That is all right. You know, if we say no--one of the suggestions is the dumping of any dredged material in Lake Superior be prohibited. Here we are talking to this conference in connection with 60,000 tons of stuff a day going in. Sometimes, when we talk about being consistent or redundant, maybe we should think of our own position on these matters. But I think this is all right for emphasis.

Let's have 20.

Recommendations

RECOMMENDATION NO. 20

MR. BRYSON: No. 20.

"The recommendations of this enforcement conference be adopted as part of the States' enforceable water quality standards."

MR. PURDY: This creates some problems to me. Again for something to be adopted as a part of our State's enforceable water quality standards, I have to go through a public hearing and it is not my decision as to whether they will be adopted, it is my Commission's decision.

MR. STEIN: Do you want to--go on.

MR. POSTON: I have no objection to deletion of this particular recommendation.

MR. STEIN: All right.

MR. POSTON: I think it is not important, since the action of the Secretary when he makes his summary would probably take precedence.

MR. PURDY: We fully anticipate that the Secretary will ask the States to develop appropriate programs under State and local law and we will do that.

MR. STEIN: This is all right.

Are there any other comments?

MR. POSTON: I would have a recommendation that the conference be reconvened in six months periodically after that at the call of the Chairman.

MR. STEIN: Yes. Is this agreeable?

MR. FRANGOS: Mr. Chairman, before we get to that, I have got one item which I think might be just a minor oversight, but we noted in the report that there was a detailed listing and assessment of progress being made at Federal installations. I thought that perhaps we ought to at least note this in our recommendations and I have a short sentence that I would offer.

Recommendation being that the Federal Water Pollution Control Administration will proceed in accordance with established Federal policies to secure abatement at Federal installations consistent with the recommendations of this conference.

MR. POSTON: That would be acceptable to me.

MR. STEIN: Then that last part, "reconvene at the call of the Chairman."

MR. FRANGOS: Yes.

MR. STEIN: All right.

MR. POSTON: I might suggest that we use seven months instead of six months, however.

MR. STEIN: Well, all right. Let's say--

MR. POSTON: Or approximately six months.

MR. STEIN: If you want to say approximately 6 months, that is all right. As you know, the advantage of doing this is that we have generally worked out the dates to our mutual satisfaction. Sometimes it pays to delay the holding of a conference 2 or 3 weeks or a month pending a certain development because you are going to move pollution control forward a lot faster rather than adhering to a mechanical date and then finding that some pertinent information or action is not taken and you can't make a decision.

So as you all know, in working out this process we try to keep this as flexible as possible. As far as I know, we have never called one, at least I have never called one, without consulting with the State administrators.

Are there any other comments?

MR. POSTON: We have a conclusion as developed yesterday, No. 17, and I think I could distribute this

to you. It is a little bit awkward. Perhaps the conferees would like to review and see if this is acceptable as it is written.

MR. STEIN: All right. Oh, well, this? Well, no, here, I tell you, we can be here all day with this. We will do an editing job. I don't think that we have any dissatisfaction with our summaries of the conference. When we adopt our function by summarizing, we are just reporters, and we don't say anything or put in anything that isn't so.

So I think on the basis of past experience, you can be pretty sure we are going to repeat what is said here. If we have any question, we will be in touch with you by phone as we have in the past.

Now, do you want to go off the record?

MR. POSTON: That is O. K.

MR. STEIN: Let my experienced editorial staff handle this rather than those engineers you have around here.

All right.

Do we have anything else before we adjourn?

If not, I would like to again thank you all

for coming. I do think that we have a program looking toward a solution to the problem. Now, as generally develops in programs of this type, I think the way this came out possibly was a little different than any of the parties or any of the participants at the first session had ever intended. And to my mind, this is possibly the best sign that progress is being made and we struck a balance under our system of government to move forward with the problem, because it usually is the case when a formula or a solution evolves itself where you have many different points of view that we may be on the right track.

Now, again I think that the time span we had between the conference and the Executive Session was put to good use. One, I know, and I have been involved in this myself, there has been a lot of concentration, talking about the problems, negotiations, kicking ideas around. At the same time, I think it really just takes time for ideas and notions to mature and get into people's minds.

So I think what we did have was a very useful gestation period, and I think what we have developed

here today is the blueprint for a program which can come up with an equitable evaluation and an equitable solution. The thing that is apparent about this, because we have developed possibly a new formula that is agreeable to all parties, is that the formula we have developed here and the program we have developed is not going to work automatically. What it is going to do is take good will on the part of the municipalities, the industries, the local governments, the State, the Federal people, and all participants concerned and at least a meeting of each other half way. I would hope we can have the same kind of good will and good sportsmanship from the citizens' groups and the other groups who have come here and patiently sat through the Executive Session and have contributed to the regular session of the conference. And I would ask all you people to at least give this program that we have to deal with the pollution problem of Lake Superior a chance to succeed.

I think we really achieved a breakthrough. We really have developed something in the very difficult field of Federal-State relations. Also we are dealing with the kind of resource where our responsibility is so

great that we can't permit ourselves a serious mistake. And in dealing with a problem of this kind and in looking at the whole problem, we are going to proceed in a way and in a manner where we feel we know what steps we are going to take and what action is going to be taken, because, again as you know, if you make a mistake in dealing with a lake you may for every day of that mistake have water quality loss forever, and we don't intend to do that in Lake Superior.

Again thank you all for coming. We hope you will get to work and we will see you in 6 months.

We stand adjourned.

(Whereupon, at 11:30 o'clock a.m., an adjournment was taken.)

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