OPERATION OF THE NEWBURGH LOCK AND DAM, NEWBURGH, INDIANA

(92-51)

JOINT HEARING

BEFORE THE

SUBCOMMITTEE ON RIVERS AND HARBORS

AND THE

SUBCOMMITTEE ON FLOOD CONTROL AND INTERNAL DEVELOPMENT

OF THE

COMMITTEE ON PUBLIC WORKS
HOUSE OF REPRESENTATIVES

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MATERIAL RECEIVED FOR THE RECORD

OPERATION OF THE NEWBURGH LOCK AND DAM, NEWBURGH, IND.

WEDNESDAY, SEPTEMBER 20, 1972

House of Representatives,
Joint Subcommittees on Rivers and Harbors,
and Flood Control and Internal Development,
of the Committee on Public Works,
Washington, D.C.

The Joint Subcommittees on Rivers and Harbors, and Flood Control and Internal Development, met in room 2253, Rayburn House Office Building, pursuant to notice, at 2 p.m., Hon. Ray Roberts presiding.

Mr. Roberts. The subcommittee will come to order. This afternoon the Joint Subcommittee on Rivers and Harbors, and Flood Control and Internal Development, is holding a hearing on the operation of the Newburgh lock and dam.

Congressman Zion has brought to the attention of the committee the many complaints that he has had from citizens who have reason to believe that stream-bank erosion problems at Newburgh have been caused or, at least, assisted by the operation of the lock and dam.

This afternoon we want to get the facts from both sides. We hope to get to the bottom of the problem.

I am real pleased to have Congressman Zion on the subcommittee. He is a very able Member. He looks after people well.

Before I recognize him, I would just like to thank the people who have come all the way from Newburgh who will testify on this matter.

And I hope that whatever transpires this afternoon will be helpful to the committee, to the subcommittee, to the corps and to the citizens of Newburgh.

As is our usual custom we will recognize the Corps of Engineers and General Cooper.

General Cooper?

STATEMENT OF BRIG. GEN. KENNETH B. COOPER, DEPUTY DIRECTOR OF CIVIL WORKS, OFFICE OF THE CHIEF OF ENGINEERS

General Cooper. Mr. Chairman and members of the committee, I am Brig. Gen. Kenneth B. Cooper, Deputy Director of Civil Works, Office of the Chief of Engineers. I am pleased to appear before you this afternoon to discuss the problems of bank erosion in the area of Newburgh, Ind.

I would first like to introduce members of my staff with me today: Mr. Forrest Swiggart from our planning division; Mr. Jake Douma from our engineering division here in Washington; and we have Mr.

Roy Karlen and Mr. Leo Wilsbacher from the Louisville District.

I will provide brief background information on the erosion problem at Newburgh, the Newburgh lock and dam, the relationship between the lock and dam and the erosion at Newburgh, our authority for erosion protection, and then briefly discuss the problem of stream bank erosion.

The Newburgh area has a long history of caving bank problems. The WPA riprapped portions of the bank in the late 1930's. Under authority of section 14 of the Flood Control Act of 1946, we riprapped about 300 feet in 1957 and about 350 feet—in two different sections—in 1970.

On June 9, 1972 we approved another section 14 project of about 250 feet which would provide protection to the bank area between our two previous placements. We have not started this work that was approved this year, since we have not received the required local assurances.

The Newburgh lock and dam project was authorized by the Secretary of the Army, under authority of section 6 of the Rivers and Harbors Act of 1909, as a part of the program for modernization of the Ohio River navigation system and this will replace lock and dams 46 and 47.

Construction was initiated in fiscal year 1965 and is scheduled for completion in fiscal year 1975. Total estimated cost is $86,483,000. The lock and dam is 2 to 2½ miles upstream from Newburgh, Ind. The contract for the cofferdam for the first stage of the dam was started in June of 1970. The cofferdam extends from the new lock, on the right bank, to about midstream.

With regard to relationships of the Newburgh lock and dam and caving banks, the problem of caving banks is not confined to Newburgh but is general along the Ohio River in this area. The river banks consist of clay overburden underlain by a stratum of silty fine sand. During periods of high water, the banks become saturated. The rapid drawdown of the water surface that follows the spring high water causes the silty sand to flow, which triggers slides of the overlying clay banks. Construction of the cofferdam has no influence on water levels and consequently does not affect the caving mechanism just described.

Construction of the cofferdam did narrow the hydraulic cross section and thereby cause local increases in stream velocity. The magnitude and extent of these local increases have not been measured but it is unlikely that currents 2 miles downstream, which is where the critical area is right now, are affected. At any rate, as the erosion is not current induced, the cofferdam effect on currents at Newburgh is not relevant to the problem at hand.

Our authority stems from several sources. The first one, which I have already referred to, is under section 14 of Public Law 526, Flood Control Act of 1946.

Our authority to provide bank-protection works is, except for a few specifically authorized locations, limited to that in section 14 of the 1946 Flood Control Act, which authorized the Secretary of the Army—and I quote—"* * * to construct emergency bank-protection works to prevent flood damage to highways, bridge approaches, and public works, when in the opinion of the Chief of Engineers such work is advisable * * *." The amount of work at any single locality for any one fiscal year is limited to $50,000.

I might add a comment that is not in my prepared statement. Since this $50,000 limitation was set back in 1946, we have suggested that the level might be increased to $200,000 or $250,000.

Under section 219 of Public Law 91–611, Flood Control Act of 1970—this section of the Flood Control Act of 1970 authorizes the Secretary of the Army, through the Chief of Engineers, "* * * to provide bank revetment works along the Ohio River at Newburgh, Ind., to protect public and private property and facilities threatened by erosion." The fiscal year 1973 budget, which has been passed by Congress and signed by the President, includes $60,000 to start the advanced engineering and design. We have not yet received the apportionment of those funds from the Office of Management and Budget.

Under section 9 of Public Law 526, Flood Control Act of 1946, we have a section that provides that "* * * whenever the Chief of Engineers shall find that any highway, railway, or utility has been or is being damaged or destroyed by reason of the operation of any dam or reservoir project under the control of the War Department, he may utilize any funds available * * * for repair, relocation, restoration, or protection of such * * *." This is generally used where we have found that conditions were different than for which we designed or constructed the project.

With regard to the nationwide problem, caving banks are not a new problem. Three years ago we, in cooperation with other Federal agencies, completed a general assessment of the stream bank erosion problem across the country. This was done in response to section 120 of Public Law 90–483, Rivers and Harbors Act of 1968.

This study revealed that of the 3½ million miles of streams—7 million bank-miles—about 8 percent, or over a half million bank-miles, are experiencing erosion to some degree, of which 148,000 bank-miles were classified as severe.

Average annual damages to this 148,000 bank-miles were estimated to be $90 million. The annual cost of treatment to prevent this damage was estimated to be $420 million.

The biggest problem is that very few single-purpose—bank protection only—projects can be economically justified. Effective stream-bank protection measures are costly to install and also to maintain.

In summary, the erosion of the banks at Newburgh, in our opinion, is a longstanding problem that has plagued the area for years, and has been recognized by Public Law 91–611, section 219.

Further, this bank erosion has not been caused or aggravated by the construction of the lock and dam approximately 2 miles upstream. As a consequence, we do not feel that any special legislative action, other than already exists, concerning the problem is appropriate.

This completes my statement, Mr. Chairman.

Mr. ROBERTS. Thank you, General Cooper. This problem is probably aggravated more along the Ohio and Mississippi than any other area, is this correct?

General COOPER. Yes, sir. But it exists all over.

Mr. ROBERTS. Mr. Zion?

Mr. ZION. Thank you, Mr. Chairman. First, I want to thank the chairman for convening this special meeting of the two subcommittees, thank the Members who are in attendance and thank General Cooper and his staff for his presentation.

This is somewhat unprecedented at a time when the chairman has five very important bills that are pending. And so I particularly appreciate his indulgence and that of Members of the committee, because we recognize the pressure of the work that is upon us.

General Cooper, you described this unique soil that we have down our way, the clay overburden and the substructure of silt and sand that is easily washable. And you described what I guess you might call the usual procedure, the caving mechanism that results when high water saturates the land, and as it goes down the caving results.

In your opinion, sir, wouldn't this be exaggerated or increased as a result of high currents as well as just the normal caving mechanism? Wouldn't an increase in river flow exaggerate, increase, this caving action?

General Cooper. The main problem is really saturating that particular layer, that then flows, and the clay sloughs off is what it amounts to. The higher stream velocity will cause on any bank greater erosion.

It is our opinion, in this particular area, there isn't any higher stream velocity caused by the construction of the Newburgh lock and dam.

Now, right around the cofferdam which is built we have had scouring because of the higher velocity. We have narrowed the width of the river there by about one-third and we have increased the velocity quite a bit.

Mr. Zion. Sort of a Venturi effect, where you have the same amount of water on both sides of a narrow area, same amount of water going through a smaller lumen, and therefore the velocity is increased.

General Cooper. Yes, sir. That did cause erosion there and the result you know better than I—we did have to dredge the channel down there to get rid of this material that was scoured.

But the velocity down where the bank caving problem is occurring is even below lock and dam 47, so——

Mr. Zion. But there are other factors other than just this normal caving mechanism that could result in increased erosion?

General Cooper. Yes, sir.

Mr. Clausen. Will the gentleman yield?

Mr. Zion. Please.

Mr. Clausen. On that point, do you have any historical hydrological data as to the volume and velocity, the possible meandering, of this stream that could be incorporated into the hearing record?

General Cooper. I asked that same question of my people this morning. We don't have any good data right at this particular location.

We do have some general hydrology data, but with regard to this particular area——

Mr. Clausen. Are there substantial variations in the volume and velocity, depending upon precipitation?

General Cooper. Yes, sir. You have the high water period. In 1972 it was particularly bad.

We have the general data, but if you said did I measure the stream velocity at this point where we are having the bad erosion now, the answer to that is "No."

It does vary tremendously. We had tropical storm Agnes which dumped a lot more water in this general area this year, so that the

high water was worse this year than it has been in the past. And this occurs periodically.

Mr. CLAUSEN. Well, I think that this is the sort of information that not only would be helpful to the consideration of this problem, but certainly you, as an engineer, know that the problem of erosion is one that has needed attention for a long, long time.

And I think it is something, regrettably, the Congress, in my judgment, has established priorities wherein we have had a commitment of dollars to other programs and were not able to take care of problems like this that you and I both know need to be advanced in order to maintain the security for the economic base, the tax base, and everything there.

And I think that we need to have supporting data. And you district engineers would be well advised to start incorporating some of this information into the hearing record. Certainly you can work with the Weather Bureau people out there, a lot of the local people could give us at least basic information.

I am very sympathetic to this problem, because I have seen it wherever we have been in floods throughout the country; we have this problem, and now you have got people who don't want to build the dams for flood protective works, and you say this doesn't meet the economic justification—and we run up against those problems of the benefit-cost ratio, the discount rate, all of these things.

But at some point we are going to have to come up with a head-on attack not only on this problem, but, hopefully, this will be a catalyst to resolve some of the problems. I have got some of them in my own area—excuse me for getting wound up in this thing—but I think we have got to get some more supporting data in order to someday quantify on the benefit side of the change criteria some of these factors to justify them economically.

Mr. ROBERTS. The Chair is particularly pleased to have the distinguished regular chairman of the Flood Control Subcommittee and the acting chairman of the full committee, the gentleman from Alabama, Mr. Jones.

Mr. JONES. Thank you very much, Mr. Chairman. I am pleased to be here.

I would like to say just what Mr. Clausen had to say—we are going to have to take into account a larger scope than we have before, the value of our waterways. If it is possible, I would like to see all the things that effect our evaluation of rivers quantified.

The methods of the past will not meet the requirements of the future.

I agree with Mr. Clausen that the secondary benefits that accrue as a direct result of the stream flow should also be included.

We are using, I think, now, about 27 trillion gallons a day for our total requirements, which is approximately one-fourth of the total rainfall we have in this country.

We certainly have got to make more deposits in our reservoirs than we have in the past. We have got to take into account the exchange of one stream flow to another. We set that up in this committee some years ago. It hasn't been done properly.

So that is the situation. I think that the total scope of our endeavors must be accelerated, taking into account all the utilizations of water.

Now, rivers are an amenity, and the amenities of that river mean that every aspect of its use must be accorded a useful purpose—and no one can pollute it, no one can divert it, no one can disabuse it.

So, every person that lives along the shores of the stream can be denied of its proper use. Those amenities, I think, are things that we have got to enlarge our scope or utilization.

I have taken too much time.

Mr. CLAUSEN. Well, I appreciate the chairman's responding. I would be of the opinion that the general would certainly not be in disagreement with what both Mr. Jones and I have stated.

If we could expand the project purposes so that some of these things can be quantified and the overall methodology of the evaluation of the projects, you certainly would not be in disagreement with this in the Corps?

General COOPER. That is correct, sir. But under our present guidelines and the way we operate, we come out somewhat different.

Mr. CLAUSEN. I think they are way out of date, as you know.

Mr. JONES. But, Mr. Chairman, in justification of the general's position, I think he is stating that he is doing all he can within his legal limitation.

What he would like to have—and I am not putting words in your mouth—he would like to have liberalization to consider all the aspects beyond his present legal limitation.

General COOPER. Under the NEPA, 1969, preparing the environmental impact statement, we are in a position to discuss these consequences.

As a matter of fact, we have to discuss them, to do our job properly. But it is another step before you can then request funds to do something specifically about it.

Mr. ROBERTS. I hope we can give him that authority.

The Chair recognizes the ranking minority member.

Mr. HARSHA. Thank you, Mr. Chairman. Mr. Chairman, I merely want to say that this is a very serious problem. I know Mr. Zion has discussed it with me on a number of occasions.

And, inasmuch as I live on the Ohio River, and my district abuts on about 200 miles of that river, I have had to cope with the same general problem the gentleman from Indiana has confronting him.

He has spoken to me a number of times about what is to be done, and I realize that the Corps of Engineers is limited under present authority in what they can do with bank erosion under circumstances such as have been outlined here.

But I certainly pledge to the gentleman from Indiana my support in trying to meet this problem.

And I think it is indicative of the high regard we hold for the gentleman from Indiana that the ranking majority Member is here and other majority and minority Members of the full committee are here, as well as the chairman of the subcommittee.

And certainly I wanted to be here to offer what assistance I could to Mr. Zion, who is a very valuable member of this committee, and has made a great contribution.

We are engaged in the water pollution conference involving some 24 billions of dollars. We are engaged in writing a new Highway Act involving some $18 billions more. We have three or four other bills that we are working on in conference.

We have a very busy schedule. But aside from that, we took time from that to come here and be with Mr. Zion.

General, I am concerned about one statement you made and that is that the construction of the cofferdam has no influence on water level and consequently it does not affect the caving mechanism that you described in your testimony.

It was my impression, at least, that these cofferdams were constructed to raise the water level, were they not, so you would have a 90-mile pool along the Ohio River from dam to dam?

General COOPER. The specific cofferdam is designed so that you can build the dam itself. Now, when you build the dam that clearly does affect the water level during the low flow period, but during the high flow period, which is the time when you get the problem of the saturation of the sandy silty layer, the water is falling right over the tops of those dams, so it does affect the velocity right at this particular place.

But the basic water levels, other than the flood control projects which we have way upstream, are not significantly affected by the locks and dams during the critical period that erosion is caused.

Mr. HARSHA. If a dam were closed in holding in a sufficient level of water to maintain a 90-mile pool, then additional water comes in through Hurricane Agnes or whatever, that helps raise the water level and saturate the shores along it, doesn't it?

Is there any way you could lower these dams, open the dams, so the water could go out?

General COOPER. Well, we in essence during the high flow period don't really use the dams and the locks, that is, all of the gates are opened and we have open river navigation. Just at that particular location it would cause a slight jump, but basically the total volume of water is not affected significantly by what we have constructed there.

It does affect slightly the time, but according to our best judgment it doesn't affect this particular case.

Mr. HARSHA. Well, isn't another problem created by the inordinate amount of river traffic, the washing or waving action of the boat traffic?

General COOPER. Well, the wave action of the boat traffic could affect particularly at the high water level and particularly when the boats come close to the right bank, which they have to, to go through the lock and dam 47.

That could cause additional problems when the high water level is close to that sandy silty layer. Now, that occurs—the distance of boats and the speed of boats in channels affects bank erosion almost everyplace. It affects it less in very wide rivers than it does in narrow rivers.

Mr. HARSHA. Well, I know, that along the section of the Ohio River I represent, the houses are on the verge of falling over the brink into the water because of the erosion that is created by either the velocity of the river at certain stages or the waving action from the inordinate amount of traffic we have.

General COOPER. Yes, there is no question but what the traffic does—we don't think that the traffic in this particular case at this location is a primary cause. It is the fact that you have the very high water levels when you have the spring, the high water period, that raises it up,

saturates it, and then drops it down, and then the sand and silt start sliding out and then the clay doesn't have anything to support it and it slips down.

So our only solution on these short stretches that we know of—and one of the things that we try to look forward to are less expensive ways to accomplish this—in essence to weight the bottom of that slope of the bank with a large amount of rock, so that the clay won't slide against that.

Mr. HARSHA. Well, have you done that in this case?

General COOPER. We have done that only in three different locations, but it is a relatively small stretch. We have an authorization, as I mentioned, in an omnibus bill of 1970 to do it over a 1.1-mile stretch of the river.

Mr. HARSHA. Well, can you do it, then?

General COOPER. We can do it over that stretch; yes, sir.

Mr. HARSHA. Will you do it?

General COOPER. $60,000 is in the budget for 1973, that is to start the A.E. & D. advanced engineering and design. This was an unusual project in that we didn't go through the normal study phase and get it authorized, which you Members are much better aware than I.

Mr. ROBERTS. We put in a $1,200,000 that I remember from Mr. Zion. This is what we are talking about, in the 1970 act?

General COOPER. Yes, sir.

Mr. ROBERTS. Are there other questions of General Cooper? If not, we have six witnesses here from Newburgh.

Mr. HARSHA. That is all I have, Mr. Chairman.

Mr. ROBERTS. Are there other questions? Mr. Miller.

Mr. MILLER. If I may, Mr. Chairman. General, I think the stream bank erosion is a real problem we have had along the Ohio River—as Mr. Harsha said, he represents an area some 200 miles up river from Cincinnati, as I recall—then I have a section approximately 200 miles north, northeast.

I have talked to Mr. Zion about this problem. But, to show the interest in it, I have also talked to Senator Jennings Randolph of West Virginia and Bob Taft and Bill Saxbe of Ohio, John Slack of West Virginia, Ken Hechler of West Virginia.

And we had a meeting not too long ago on the same problem, but it was a little upriver from Mr. Zion's area that he represents.

Now, one of the big problems, it seems—that seems to have come up at the time—is the fact that the Coast Guard does have the authority for navigation on the river.

Is that true? You would not have the authority for navigation?

General COOPER. No; we have authority for navigation. The Coast Guard has authority for safety and navigational aids, but the navigation itself is a Corps of Engineers responsibility.

We have the general authority also to do anything that is not specifically given to somebody else.

Mr. MILLER. Then are you able—now, it did not come out at the other meeting that you have the authority to truly stop tugboats going close to the shoreline. There is where they seem to create a problem.

As Mr. Harsha has said, the wake that comes from the more powerful tugboats—because they are now hauling a longer load and a heavier

load. And they have more powerful engines, and therefore the wake that hits the bank and creates the problem, especially where there may be some sand, that it could wash it back out into the stream.

Out of that meeting we did not understand that you had a jurisdiction over those tugboats.

General COOPER. We have the jurisdiction to the extent that if the tugboat operation interferes with the total navigation project we can issue, in the Federal Register, regulations to restrict the velocity of the boats.

We have that general authority. Normally, with regard to speed, that is handled by the Coast Guard. So, to that extent, if it really affects the navigation as such—in other words, if the boats by speeding through were causing the banks to erode and interfering with the navigation channel, we have a general authority to restrict the speed of those boats.

Mr. MILLER. And the location as to how close they may be able to go to the bank?

General COOPER. Yes, sir; if it affects the navigation. Now, we have to put it in the Federal Register, we have to hold public hearings.

And I might add that the shipping interests are very reluctant for us to exercise this particular authority.

Mr. MILLER. That jurisdiction, if I may, would not affect the problem that we have today of erosion, which is separate from the navigation problem.

General COOPER. That is correct.

Mr. MILLER. So again would you have the authority to convey the message to the shipping interests that they must stay x amount of feet or yards or distance away from the bank?

General COOPER. Only—I might be obtuse here—only if it interfered with navigation. We would not have the authority just to prevent erosion of the lands themselves, if the erosion did not affect the navigation.

But if it dumps silt in that we would then have to dredge out, we would have the authority.

Mr. ROBERTS. The gentleman from Alabama.

Mr. JONES. General, since you are on the Ohio River, you are dealing with the act of 1909 and 1911, which is probably the most farreaching bills that had ever been presented to Congress up to that time.

Since that period of time, you haven't had any request from the public or private enterprise except to petition you to do patchwork on the Ohio River.

Now, the Ohio River is one of the best navigation projects we have had, even George Washington recommended it and acknowledged the fact that the Ohio River and the Monangahela were good arteries of transportation.

Now, since we have gone this far, don't you think it is necessary to make a complete study of the Ohio River and all of its problems and attributes?

General COOPER. Yes, sir. We did a preliminary study or did a study that hasn't yet got to Congress——

Mr. JONES. I mean, you parcel it out segment by segment. You remember that you made arrangements, say, the Kentucky area, that

you wouldn't permit zoning flood plains—you receded from that proposition, you got floods all over the flood plains.

You made no specific requirements of the municipalities or the State to exclude those people from the flood plains.

Now, why is it we can't come up here and take the whole Ohio River, all of its tributaries, which are so vital to this country today—that we can't have an overall study with all the benefits that Mr. Clausen is talking about—and we can take into account Mr. Zion's problem and all the rest of them with a unified approach to the river's problems.

Mr. CLAUSEN. Would the chairman yield? Going back to what Mr. Miller has said, and it ties in with what the chairman is conveying——

Mr. JONES. I am not the chairman now. I am just a Member here.

Mr. CLAUSEN. Chairman of the Flood Control Subcommittee; yes, sir, Chairman Jones. You have jurisdiction over the navigable streams.

Now, you state in your statement that the biggest problem is that very few single-purpose, bank-protection only, projects can be economically justified. You also expressed reservations over the fact that the boat owners, who are obviously contributing to the economy, would be concerned about you putting something like that into the Federal Register.

It seems to me that if there is a concern there and there is an economic factor associated with the shipping down that stream, is there some way that we can crank in some economic benefits to projects of this type that would enhance the justification?

Mr. JONES. Let me go a little bit further than Mr. Clausen. In pursuit of what his inquiry is, how much money do you think would it take to make a study of economic benefits? We are really rushing into this thing, with a population of 200 million people in this country—we have got the grain people in Mr. Schwengel's district out there and they want to get their grain out—you have got the steel people up in Pittsburgh that has some relationship to a growing community in the Southeast—you have got all the other ingredients.

You are shipping right today petroleum products from Galveston, Tex., to Chattanooga, Tenn. I saw one 3 weeks ago, one barge going through Wilson Dam that was equivalent to 360 freight cars moving petroleum products from Galveston, Tex., to Chattanooga, Tenn.

So you mean to tell me that Galveston has got to be divorced from the economic interest?

These are factors that have not been employed. Now, give us some estimate what you could make a study of the Ohio River in its contribution.

Now, it is the original river—you are now running, what, 90 million tons there?

General COOPER. I am not sure of the exact amount.

VOICE. 160 million tons.

Mr. JONES. 160 million tons. Now, that is equivalent to about 2,700 railroad trains with about 360 cars and you are moving them about 2 mills per mile per pound.

I just made a miscalculation—I am not good at arithmetic. That is the reason I am overdrawn in my bank account every month.

But anyway that is what I calculate, based on those premises.

General COOPER. I would say that to do the type of study that you are talking about for the Ohio River is in the millions of dollars and several years to do it completely.

We should also not just do it for the Ohio River, but we have to worry about the other rivers as well.

Mr. JONES. You have got to take an example. You can't do it all over the country, you know that. You have got to take an experienced river and you develop the Ohio principally on navigation alone—you couldn't go back there and control that river to save your life from flood, you know that.

There is no way in the world that you could do it. So you have let the people move onto the flood plains. If you had to take all that property, you couldn't have enough money at Fort Knox to do it—and you know that.

General COOPER. Yes, sir.

Mr. JONES. So that is a bygone day. So you have to take it up in its capabilities of navigation, what little flood control you have—and it is very limited, you know that.

And the water quality—we set up the institute up there, it has done a remarkable job. But you know and I know that you can't rehabilitate the Ohio River like it has been done on the Arkansas, the Tennessee, the Columbia—that is past you now. You know that is lost.

So what is necessary to do is to make whatever repairs are necessary. Why don't you give us a figure to make a complete study of the river?

General COOPER. By complete study, you mean for repair of the stream bank erosion and the total economic benefits?

Mr. JONES. The whole river.

General COOPER. Let me give you the information that was just handed to me. I don't want to pretend that I remembered or had this figure at hand, at my fingertips.

The Ohio River Basin Commission proposed two different level B studies which are the regional studies at a cost of about $6 million or $7 million.

Mr. JONES. These are action studies?

General COOPER. These were proposed studies that were recommended, but that gives you an idea of what the cost is going to be.

Mr. JONES. You are talking about total basin studies now?

General COOPER. Yes, sir.

Mr. JONES. Give us one for the Ohio River. We are here and we are trying to put on a priority basis the money that we will have.

Let's see what we can do with the first requirement that is in distress.

General COOPER. Off the top of my head, I would say it would cost $2 million to do the complete study, because we not only want to study this but we want to start spending more money looking at a lot less expensive ways of perhaps handling this erosion.

Mr. JONES. In other words, we are pleased to have you recommend $2 million for the study of the Ohio River? That is a good way of saying it; isn't it?

General COOPER. I will defer to you, sir.

Mr. JONES. I beg your pardon?

General COOPER. I defer to you, sir.

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Mr. JONES. Well, you acquiesced; didn't you?

Mr. CLAUSEN. Mr. Chairman, I ask unanimous consent that we be permitted to channel some questions to the general in order to get on with some of the other witnesses, because we may have a vote coming up on the floor.

And, if that is agreeable with you, Mr. Zion, I think it might save some time.

Mr. ROBERTS. All right, without objection——

Mr. SCHWENGEL. Just one quick observation. First, I hope pretty soon you people talk about investment benefits and quit talking about costs. I know about your operation and you have been marvelous.

It kind of gets me uptight when people get critical of the Army engineers. And I know you have made your mistakes, but partly that is the result of Congress judgment, too.

But one important thing I think we should keep in mind—it certainly applies to most of your operation—and that is in benefits to investment—I know there are projects up and down the Mississippi River, and if we are going to have something special for Ohio I want a little amendment to put the Mississippi River on that.

Now, since we have had unanimous consent to address questions, I won't pursue it anymore except to let the audience here know that I am an admirer of Mr. Zion. I want to thank him before all of you here for the help he has given me in the river soil bank erosion bill that we had for our area.

And what we experimented with you can benefit from and maybe use in this kind of a problem, even your study of the Ohio.

I yield back my time.

Mr. ROBERTS. If there are no further questions, then, I will ask General Cooper to step down, please, and let's go ahead with the witnesses from Newburgh.

I expect we will have a vote around 3:30.

Mr. CLAUSEN. Do any of the witnesses have to leave early? Maybe we ought to take them out of the order, those that have to leave early.

Mr. ZION. Thay have all come together.

Mr. ROBERTS. Why don't we do this—as many of you as want to go and answer the first rollcall, go ahead and the rest of us will stay and we will just swap around.

Does the gentleman from Indiana, Mr. Zion, want to call the first witness?

Mr. ZION. Thank you, Mr. Chairman, I would like to review the witnesses who will be appearing before us. There will be appearing before us as spokesman for the delegation, attorney Edward W. Johnson.

His cocounsel in the case is Mr. Dennis Dewey. Would you stand up, please, Mr. Dewey?

And if you will, Mr. Johnson, I will ask unanimous consent that you present your case uninterrupted and that we will defer questions until you have completed.

I will ask if you would expedite it as much as possible and still present the case in the way you think is appropriate.

Please identify each of your witnesses.

STATEMENT OF EDWARD W. JOHNSON, ATTORNEY, EVANSVILLE, IND.; ACCOMPANIED BY DENNIS DEWEY, TOWN ATTORNEY, NEWBURGH, IND.; JACK GALLOWAY, NEWBURGH, IND.; JOHN F. WRIGHT, NEWBURGH, IND.; AND DR. CHARLES INSKEEP, UNIVERSITY OF MISSOURI, ST. LOUIS, MO.

Mr. JOHNSON. Mr. Chairman, Mr. Zion, Mr. Clausen, I am Edward W. Johnson, I am an attorney from Evansville, Ind.

I am the only man here who is being paid to be here today.

I want to thank you, first, for letting us come here and present our case. I will be honest with you. I am sorry you didn't interrogate the general at leisure here in Washington, since we have got to go back to southern Indiana.

We have come loaded for bear, because we are all in danger. We are in jeopardy and we have got to fight this case. We have to put our case now before you three men and the other men that may come back later on with the hope that this can all be integrated into your committee and action can be taken immediately—not after a study of a year or two, but immediately.

Mr. CLAUSEN. May I interrupt to make a point? Your testimony will be recorded permanently and all the members that are not able to be here will read this record.

Mr. JOHNSON. Yes, sir, I am aware of that. But the force of my people from southern Indiana and my own interest in the case, I am sure will have some effect.

Mr. ROBERTS. Let me interrupt to say one thing. There is no such thing as immediate as far as Congress is concerned. We have to have an authorization from this committee and an appropriation from the Appropriations Committee.

Mr. JOHNSON. Thank you, sir. There is immediacy from the Ohio River, because the Ohio River is immediately caving in and washing away the banks of southern Indiana.

Now, I would like to tell you what you are going to hear from the witnesses and I would like to reserve some time briefly with the chairman at the end in order to recapitulate our position.

We have this down to where it will only take about 40 minutes or so and we will go right through it.

We are going to hear that Newburgh is a town of about 2,300 people located on the Ohio River on a very sandy soil, which, in 1929, the Corps of Engineers established a dam and locks, and the locks are immediately adjacent to Newburgh, the Indiana shore.

You will also find out that in part of this land that we are talking about, there has been no substantial change, no erosion from 1830 to 1969—some 139 years. And in the last 3 years at this particular point, the erosion has been 60 feet at one level and 10 feet at another level.

You are going to, we presume, draw from the testimony that you are about to hear the fact that some abnormal intervening force has come about to change things in 3 years, as opposed to no change in 139 years.

You are going to find out from the testimony that the river traffic has increased tenfold or more, that the power and the type of the

vessels are so much different, that the Corps of Engineers has put the channel immediately adjacent to the Indiana shore, that the towboats and their fantastic loads coming up the river are hydraulically mining our shore.

You are going to find out now that houses have their backyards washed away, that the next year will take the houses themselves.

And we hope that you will draw from that that the Corps of Engineers has been casual or, at least, if not casual, negligent to our situation. And we must put it before you.

And if we can't put it before you, we will put it to whatever arbiter, courts, or whatever else there is to keep our houses from falling into the river.

Now, I will make a concluding remark after you have the information that is going to come to you, but you will find out that the increased velocity of the river at Newburgh caused by the building of the cofferdam and the accelerated energy it takes the towboats to overcome that velocity and the position of the river on a curve is hydraulically mining the place out.

And we hope the good chairman will find some ways of establishing an immediate remedy for Newburgh.

Now, Newburgh is unique. We are not talking about 5,000 miles of the Ohio River. We are talking about a stretch of a mile or two beneath a lock.

The evidence will show that there are more than about 20 tows a day that go through there, that is one an hour. So there is a constant tow going by there.

Some times the locks are blocked, the tows line up, the tows don't anchor—they have no anchor, they don't tie up to the shore, there is no place to tie up. They just point right in and keep their engines churning right next to the bank 24 hours, 48 hours, 72 hours, whatever it takes to stay stationary along the bank till they get through there.

That is what you are going to hear. So Newburgh is unique. Sure there is erosion all the way up and down the river, I have no doubt of that.

But the erosion below a dam, below the locks where the soil is sandy and loam, such as it is there, is very much susceptible to these diesel-powered boats.

Now, that is what you are going to hear. And I am going to take the liberty, with the chairman's approval, to conclude the remarks after our testimony has all been delivered.

I would like to call first, Dennis Dewey and Jack Galloway. I would like to say first—I said that I am the only paid person here. If this were Cincinnati or Louisville or some other big city, of course, we would have batteries of engineers.

We have done the best we can. But we can prove our case, not by preponderance of evidence. I will take the burden and say we are going to prove it beyond a reasonable doubt. We are going to use the criminal criterion to prove this case.

Dennis, could you and Mr. Galloway come here and establish your interest?

Mr. Dennis Dewey is the town attorney for the town of Newburgh.

Mr. DEWEY. Mr. Chairman and members of the joint subcommittee, if I may, I would appreciate permission to address the committee standing and direct my questions to Mr. Galloway.

Second, I would like permission to supplement the testimony that we put in here by more complete data, which we have not as yet been able to ascertain and put into writing.

Mr. CLAUSEN. Mr. Chairman, I ask unanimous consent for his request.

Mr. ROBERTS. But without objection so ordered.

Mr. DEWEY. We will endeavor to make these corrections as quickly as we can and submit this—would it be suggested through Mr. Zion's office?

Mr. ROBERTS. Fine. Proceed, Mr. Dewey.

Mr. DEWEY. We will try to brief. As Mr. Johnson pointed out, I am an attorney, but I happen to the town attorney for the town of Newburgh, Ind.

I am going to ask Mr. Galloway to give you some very brief background regarding Newburgh, where it is, who we are, then we will primarily turn the presentation of the technical aspects of this matter over to the citizens' committee.

Part of what Mr. Galloway is going to tell you will explain why a citizens' committee is doing so.

Mr. Galloway, would you please state your name and address?

Mr. GALLOWAY. My name is Jack Galloway, I reside at 912 North State Street in Newburgh.

Mr. DEWEY. Could you tell the subcommittee where Newburgh is located and give us some background regarding Newburgh?

Mr. GALLOWAY. All right. Newburgh, Ind., is located on the Ohio River at the southernmost boundary of the State. It is approximately 9 miles due east of Evansville, approximately 2.9 miles west of the new dam construction.

Newburgh, Ind., was established in 1803 on its present location and primarily, because of its close proximity to Evansville, it is a residential community.

It has acquired the name of "bedroom town." By this we mean there is no industry in Newburgh to speak of. Alcoa is west of us, the largest rolling mill in the world, but Newburgh itself has no industry.

Newburgh is governed by probably the most primitive form of government, and that is a town board. Actually, I think this dates back even to colonial days. These trustees are elected by wards and have both legislative and executive powers.

It is also referred to as a village or hamlet, whatever part of the country you happen to come from.

Citizens come to the board with any and all problems. No one member of the board can make any particular decision without an affirmative majority.

The town of Newburgh has a population of 2,302 and derives its operating funds primarily from real estate assessed valuation tax.

The total budget for the town for the fiscal year 1973, is $125,340. The portion of the budget requirements to be raised by tax levy is in the amount of $76,958. Other funds available to the town are moneys derived from State taxes on cigarette, alcohol, and similar taxes and

are reflected in special funds such as motor vehicle, highway and commulative capital improvement, which funds can only be used for specific purposes. Thus, the basic revenues upon which the town government relies for its operation are derived from tax levies based on the assessed valuation of properties located within the corporate limits of the town.

(Off the record.)

Mr. DEWEY. Now, would you please state to the joint subcommittees your position with reference to the town board?

Mr. GALLOWAY. I was elected in November of 1971 to take office January 1, 1972. I was elected president of the town board of trustees by my peers on January 5, 1972.

Mr. DEWEY. Now, in your capacity, Mr. Galloway, have you become familiar with what have been termed the slough-offs and the resulting cave-ins along the riverbank within the corporate limits of Newburgh, and, if so, can you give the subcommittee some idea as to your familiarity with that problem?

Mr. GALLOWAY. Yes, I have in my possession a map together with a report, furnished by a team of scuba divers.

This report was furnished to the town board on or about the 13th day of August, wherein they studied certain areas along the riverbank which were affected. This area was affected by currents from the river coming around the new cofferdam.

I have also been contacted at home and at public meetings of the town board by citizens owning property along the river who have experienced serious losses in the area due to accelerated erosion.

They have indicated that the problem, which was only a minor problem in the past 20 years, has become most serious and at least in one instance a totally dangerous problem.

I am further aware that the town of Newburgh's Water Street, which is the hub of "Old Newburgh," an area recently established and preserved as historic by a new-formed preservation and development commission. This commission was allowed by the 1971 State legislature and approved by the Governor and the State attorney general.

Mr. DEWEY. At this point, I would like to submit to the subcommittees the report of the scuba diver team and also an article from the Evansville Press, which is a Scripps-Howard newspaper, with a very brief editorial regarding this study.

Mr. GALLOWAY. Also an area which is being severely threatened is our present sewer treatment plant. All of these have caused a great deal of concern to the citizens.

I have also reviewed the minutes of the town board for the past few years and noted that the severity began to increase about the time that construction began on the new dam.

Mr. DEWEY. Now, at this point we had intended to call Mr. Kincaid briefly later, regarding other damage which has occurred to some of the streets.

For the sake of brevity, we will ask that the report that Mr. Kincaid prepared, which is not a particularly polished report, due to the time involved, again, that we be given permission to submit a more polished report regarding street damages—and we will dispense with Mr. Kincaid's testimony.

Mr. ROBERTS. Without objection.

(The report received follows:)

A Report Submitted by Mr. Raymond J. Kincaid

My name is Raymond J. Kincaid and I am a member of the Town Board of Trustees of the Town of Newburgh. Part of my duties as a Trustee are to oversee the maintenance of the streets of the Town. I have recently had occasion to examine Water Street as it proceeds from Monroe Street to Market Street in Newburgh. Water Street in that location runs along and adjacent to the river.

In recent months, due to what, in my opinion, must be considered a combination of river current problems created by the construction of the coffer dam located some two miles or so upstream and the backwash off the props of the towboats using the river channel which runs right along side Water Street, together with the normal soil conditions and high water conditions, Water Street has been damaged in at least two locations. One of these damaged areas is located approximately eighty-four (84) feet west of the centerline intersection of Monroe and Water Streets. This damage is evidenced in the crumbling and caving in of the supporting bank within thirty (30) inches of the right-of-way paving, and some actual settlement and creeling of the paved portion itself.

The second location is approximately 100 feet west of the first location and is at a point where re-rip-rapping has been done. The Street is creeling and settling at this location also.

These two locations create dangerous situations on a street which is heavily traveled by both commercial and personal vehicles.

I would also like to point out that directly across from the second location is the pumping station for Indiana Cities Water Corporation which serves the citizens of the Town of Newburgh and much of the surrounding area.

In addition to the streets. I am aware of problems concerning our sewer utility department. In each of the above locations, the sewer line serving the homes located on those streets lies in the center of Water Street and is in danger of being damaged and broken due to the creeling and settlement. I further note from my views of the Town sewer treatment plant that substantial portions of the riverbank protecting the sewage treatment plant facilities have been lost within six (6) months. This, of course, endangers the plant itself.

Mr. Dewey. Thank you. Now, Mr. Galloway, do you feel, in your own opinion, as a resident and as someone who has lived with this problem for quite some time, that the loss being occasioned by the citizens of the town should be of any concern to the town and its governing body?

Mr. Galloway. Certainly. As I previously stated, the basic revenue derived by the town comes from the property tax assessment, based on the value of the property being taxed.

This means that in situations where the erosive forces of the river have washed away parts of the property, the property is subject to reassessment.

The property owners in the area affected have deeds which are unlike most. They own to the low water mark in pool stage, not a definite number of feet.

Furthermore, we are the seat of government for the town, and we have the obligation and the duty as town trustees to do anything in our power to help our citizens in achieving protection of their properties.

Mr. Dewey. Now, you are aware, Mr. Galloway, that this meeting was primarily called, through Congressman Zion, at the request of the citizens' committee.

Would you clarify the town's position regarding that committee and this hearing?

Mr. Galloway. As this matter progressed through various board meeting—parts of the minutes of these board meetings are attached,

we have those here—we learned the severity of the problem and at one point had decided to seek satisfaction of this problem through the courts.

However, in meetings that we attended personally with some of the Corps personnel in Louisville and in other conversations with the Corps and their representatives, it became apparent that we would be premature at this point in seeking action against them in the courts.

And, after conferring with the citizens' committee, we decided to jointly pursue the matter before Congress, who has the final say in making the emergency appropriation to correct our situation and preserve our historic town.

We do not mean to imply a threat, but we do wish you to know and understand that we will go to any lengths and do anything to save our community.

Mr. DEWEY. Gentlemen, I would again like to submit matter regarding the town's board minutes.

Mr. ROBERTS. Without objection so ordered.

(The following was received for the record:)

EXCERPTS FROM THE MINUTES OF SEVERAL MEETINGS OF THE BOARD OF TRUSTEES OF THE TOWN OF NEWBURGH, IND.

The Board of Trustees of the Town of Newburgh, Indiana, met at their usual meeting place on the following dates: (1) May 9, 1972; (2) May 23, 1972; (3) June 13, 1972; (4) July 6, 1972 (special meeting); and (5) August 8, 1972.

The meetings were all called to order by Jack Galloway, President of the Board of Trustees. On call of the roll, it was established that a quorum was present at all of the above meetings. (Among other proceedings had on the subject dates—the following actions were taken by the Board.)

(1) Mr. Bob Traylor spoke for Mr. John Wright as to plans that were underway for the seriousness of the river to our riverfront. Mr. Siegfried Weng is chairman of the committee of citizens and submitted a letter of appeal to our Senators and Congressman: Senators Birch Bayh and R. Vance Hartke, and Congressman Roger Zion, and Col. John T. Rhett, for the Town to send an assistance appeal. This was made by a motion of Elmer Madden seconded by Roy Cook. Motion carried unanimously.

(2) A representative of Corps of Engineers, Mr. Martin Petigo, of Louisville, Ky. was present to present their version of river problem to the public.

Mr. Petigo stated the bank would be repaired where the river is threatening the street or any municipal property but the corps had no power to protect private property involved because they had determined that the dam was not causing the deterioration of the bank's erosion. The money for private property would have to be allowed by Congress for construction at the same time they allowed money for a study of the situation.

Mr. John Wright spoke for residents in the threatened area, stating he had a letter from a Ph. D. Engineer who had checked their situation and had written this letter to Congressman Zion and copies to others in their behalf. After discussion from other citizens requesting the Board take action in their behalf.

Pres. Galloway stated a motion was in order for the Trustees to take a 15 minute recess to the conference room for a discussion. Motion made by Roy Cook seconded by Ray Kincaid. Motion carried unanimously.

8:50 p.m. Pres. Galloway called the meeting back in session with a decision the Town Board file a preliminary injunction against the Corps of Engineers charging that the construction of the coffer dam is causing the water to come through in a nozzle effect aimed at the opposite shore causing the erosion; in hopes it would influence Congress to take action and supply necessary funds, thus protecting the citizens' property with the Town's property protection and Attorney Dewey be directed to take the necessary preliminary injunction. This was made in a motion by William Tucker seconded by Roy Cook.

Under discussion Attorney Dewey pointed out facts that could make this an expensive procedure. Other citizens expressed opinions with approval of the Trustees decision being right in trying to protect the citizens' property. Pres.

Galloway called for a roll call vote of Trustees. A vote of "yes" would authorize Attorney Dewey to proceed as per motion.

(3) Mr. Joe Rees from Sen. Birch Bayh's office was present and stated their office was considering various ways that might be possible to get the work of the riverbank erosion through Congress. They would keep the Board advised on their progress.

(4) Pres. Galloway read a letter signed by Col. John Rhett, District Engineer of Louisville, Ky., stating the proposed project did not qualify for the requested funds under Public Law 99 but referred to Flood Control Act of 1946, and funds must be for the prevention of public facilities. Also the amount must not exceed $50,000 also that a project under current consideration by Congress would not be limited to protecting public facilities. Citizen's Committee Attorney, John Carroll, stated if this was taken to Court the attorney must have basic scientific evidence from qualified engineers, which could be costly.

(5) Discussions were made by Citizen's Committee and Board members. Mr. John Wright, Robert Traylor, Robert Griffin, Seigfried Weng, William Tucker as to the Town's loss of taxable property, and if the river is making a change and going back to it's original bank and legal approaches.

William Tucker stated he had an opportunity to talk to Congressman Roger Zion who stated he had received approval of a congressional hearing on the problem.

Pres. Galloway stated he had talked with Harry Thompson, Evansville representative of the Ohio Valley Improvement Association, and he was also checking the situation.

Pres. Galloway suggested Congressman Zion go on with his plans until the Town Board and the property owners decide if they want to go into legal action and Attorney Dewey's next step would be to get an expert to establish if the river's flow is caused by the Government Dam.

William Tucker made a motion seconded by Roy Cook that Attorney Dewey prepare an Ordinance for the Town to apply for additional appropriation of discovery fee to help the citizen's committee. Vote three to one. Raymond Kincaid opposed. Motion carried.

Mr. John Wright stated they would have a citizen's meeting prior to next Board meeting.

(6) Charles Marx stated that he and a few other scuba divers would make an underwater survey of how badly the bank was eroded on Sunday, August 13, 1972, 12:00 noon.

There being no further business, the respective meetings adjourned upon motion duly made, seconded and unanimously carried.

Mr. DEWEY. This completes the presentation of the town. And the remainder of our presentation will be conducted by the citizens' committee, which I should preface my remarks by saying they have the money, we do not have.

The town—we kind of glossed over the budgetary process—and they said we have 124,000 or 90,000. That is all. We have that to fix streets, alleys, to pay for rent on street lighting and things of this nature.

For trips such as this, for repair of river banks, for litigation expenses, which I am sure you are all quite aware of, we have no money.

And thus the amount of money that is being expended in this procedure, in this proceeding, is being picked up by a citizens' committee. And they have done the technical research.

I would therefore respectfully turn the remainder of our presentation over to Mr. Johnson and that committee.

Thank you, gentlemen.

Mr. Johnson requests that we read the scuba report into the record:

SURVEY OF THE OHIO RIVER BANK, NEWBURGH, IND., AUGUST 13, 1972

We found the basic starting point of erosion under the riprap placed by the Corps of Engineers at Water and Monroe Streets. On the upriver side of the riprap the current is light and not too swift. The area of riprap, however, has several conditions existing and working on it.

First, the riprap does not go to the bottom of the navigational channel. It stops short of it.

The second factor working in this area is that this is the point of impact of the current coming inland from the river.

These two conditions cause an undermining of the riprap. Thus the rocks are shifting into the faster current and the riprap is sliding downward and away.

The under cut is approximately eight feet into the bank.

The second area of riprap was found to be undercut approximately six feet into the bank.

The bank is spotted with minor erosions until a point in back of the Booth property on the Water Street edge at Jefferson Street.

There is considerable undercutting at this point approximately 60 feet along the bank and six to ten feet into it.

The next major cut appears east of the mouth of the creek at the water plant—I believe that is the sewer treatment plant. This erosion runs from approximately 40 feet east of the creek to it and approximately ten feet west of the creek. The depth varies from three feet to about eight feet into the bank.

The next area of erosion runs from the area of Phelps Drive to the area below Williams Lane down to the creek and ditch by the sand and gravel company.

This area has several large slide eddies and numerous area of undercutting, some running about 30-feet long and eight to twelve feet into and under the existing bank.

These are the findings of this survey. The time taken for this survey was 10 a.m. to 4 p.m.

Signed Charles W. Marks, Certified Scuba Diver, Water Rescue Unit, Newburgh, Indiana.

Signed John W. Shackleford, Certified Scuba Instructor, Water Rescue Unit, Newburgh, Indiana.

Mr. JOHNSON. I would also like to read into the record at this point the August 24 editorial from the Evansville Press:

NEWBURGH NEEDS HELP NOW

The river won't stay away from Newburgh's door. This week's disclosure that scuba divers found the river bank sharply undercut in at least three areas is the latest in a string of bad news about serious erosion.

It is true that the Ohio River is menacing the Newburgh river front and treatening both public and private property, including the town's sewage system.

But somehow the sense of urgency needed to bring relief to the town has not been transmitted to Washington, the place from where the relief must come.

The U.S. Corps of Engineers steadfastly denied that the construction of the new dam upstream from Newburgh has anything to do with the accelerating erosion of the river bank, although outside experts aren't so sure.

Instead the Corps talks of a study of unspecified duration to determine if it is indeed to blame.

Meanwhile, Representative Roger Zion, who presumably is in the best position to marshall Federal resources to aid Newburgh, suggests bringing a Congressional fact-finding hearing to town, if that is what the residents want.

These are pretty late responses to a critical problem that merits immediate attention. In one place the river bank is caved to within inches of a main public street, at another point the bank is collasped to within twenty feet of a citizen's home, at still another point undercutting has formed a twelve-foot underwater shelf at the municipal sewage treatment plant.

In desperation some citizens are considering a lawsuit against the Corps to find relief. Citizens of Newburgh shouldn't have to resort to courts to get action from their government.

The Corps, Congressman Zion, others in Congress, should realize this and offer real help. That means action now. We don't want another Wilkes-Barre where natural disaster is made worse by an inability of government to bring relief.

Incidentally, I would like the record to show that this is not the town's editorial. This was written by an Evansville editorial staff writer.

Mr. HARSHA. Mr. Chairman.

Mr. ROBERTS. The gentleman from Ohio.

Mr. HARSHA. Mr. Dewey, you have two Senators. What are they doing in regard to this problem?

Mr. DEWEY. Both Senator Bayh and Senator Hartke have been contacted. Senator Bayh has a staff person here at the hearing right now.

Perhaps you could direct some of that as to what Senator Bayh's staff has been doing to Mr. Rees.

I specifically don't know. But I do know they have been in contact. Mr. Rees was at a town board meeting. He has made specific inquiries—I do know this to be a fact—regarding requesting from the Corps their feasibility studies and other reports from the Corps regarding this problem.

Beyond that I have no knowledge of what Senator Hartke or his staff has been doing, beyond what I have just stated. I am not aware of the other activities of Senator Bayh's staff, other than to say that he has in fact shown a great interest and has sent a staff person to a town board meeting to be present and listen to some of the complaints of the landowners.

Mr. HARSHA. Has there been a comparable hearing on the Senate side to this hearing?

Mr. DEWEY. There has not.

(Mr. Roberts leaves the room. Mr. Johnson assumes the Chair.)

Mr. HARSHA. Have there been any hearings on the Senate side?

Mr. DEWEY. There have not.

Mr. HARSHA. Thank you.

Mr. SCHWENGEL. Mr. Chairman.

Mr. JOHNSON. The gentleman from Iowa.

Mr. SCHWENGEL. This isn't something that just developed this year, is it?

Mr. DEWEY. It has developed much more seriously this year than at any time in the past. This is a little bit outside the scope of my expertise, but what I think we are talking about is a situation whereby in the past maybe 2 feet may have fallen into the river or maybe 6 inches have fallen into the river, but this year, for some reason or other, a chunk of 30 feet goes into the river.

It is a vastly accelerated situation, particularly this year.

Mr. SCHWENGEL. I am in complete sympathy with your position. And I have a comparable situation in my district of Wappalo, Iowa.

And the people there have shown a concern dating back to the time I came here. And since the time I came here we have worked on this question, a lot of things have been tried and tested, and finally they decided, well, this does belong in the Federal Government, and finally it came before the committee and the committee has OK'd a study to find out just what are the best answers to this problem.

I don't know, Mr. Chairman, why the engineers wouldn't have the authority under the amendment that we passed just a few months ago, that you supported and helped with, because you told me about your problem then.

So I think we have the authority. And I think we should expect the engineers to move. And if they don't have authority, let's give them authority.

This is the first time I have heard about how critical this is.

I think you present a persuasive case, but I want to say to you, too, that even when you lose 6 inches, that is a lot.

Mr. DEWEY. We are aware of that, Mr. Schwengel.

Mr. SCHWENGEL. Somebody should have been concerned years ago, probably. I am glad we are finally getting concerned. I am one of those that regret that we are losing soil. Last year we lost 4 billion tons of soil; it went down the river.

Now, we have been impatient with the engineers sometimes, but the engineers are bound by what the—by the laws that have been passed here in the Congress.

Mr. DEWEY. Thank you, sir.

Mr. JOHNSON. Now, Mr. Dewey, are there others to be heard here?

Mr. DEWEY. Yes, sir.

Mr. Johnson, would you introduce your others.

Mr. JOHNSON. Mr. Wright, would you come up now and give your statement?

Mr. Wright has a prepared statement, copies of which are in the hands of your secretary for distribution.

Mr. JOHNSON. All right, Mr. Wright, you shall proceed at this point.

(Mr. Roberts returns and resumes the Chair.)

Mr. WRIGHT. Thank you, Mr. Chairman.

My name is John F. Wright, resident of 1119 Phelps Drive, Newburgh, Ind.

Gentlemen, the report of Dr. Rao, assistant professor at Purdue University, states at one part:

> The increased erosion from 1935 to 1965 may be due to (a) construction in the Ohio River of locks and dams and (b) increased river traffic.

I intend to speak only to the facts of the increased river traffic.

The series of locks and dams for the Ohio River completed in 1929 was designed to handle 13 million tons annually and in the year of its completion the system handled 20 million tons. In the calendar year 1971 the Ohio River system handled in excess of 133 million tons of commercial river freight shipping. And this was taken from the report on waterborne commerce on the Ohio River for 1971, U.S. Army Corps of Engineers, dated July 19, 1972.

The log of river traffic compiled at lock No. 47 at Newburgh, records of which are published weekly in the Newburgh Register, a general newspaper, reveals that the river traffic passing this lock during the first 6 months of 1972 averaged 143 vessels per week or 20 per day. Since it requires nearly an hour per locking, this represents a continuous stream of traffic.

The Inland River Record, 1972 edition, contains a registry of diesel and steam vessels operating on the Ohio River and reveals the following: The most powerful towboat operating in these waters, up to and including 1944, was the *Minnesota Husky* of 1,400 horsepower, launched in that year.

In 1949 a towboat of 3,000 horsepower was completed. Since that time over 200 towboats of 3,000 to 9,000 horsepower have been placed in service. Towboats less than 500 horsepower which prevailed in 1944 have proven economic losers to owners and have been largely replaced by the much higher powered vessels.

Since the end of the Second World War substantially all towboats have been of the diesel-powered screw variety, the paddle wheel type of boat having disappeared from the river.

Not only has there been a dramatic increase of horsepower in the towboats, but the means of propulsion of the screw-type vessel creates a much greater turbulence at a lower depth in the river, and we are told this is down to a depth of 9 feet at about the bottom of the propeller on the boats in the river, than was created by he paddle wheel type vessel whose dip was generally not more than 2 to 3 feet.

The Corps of Engineers had maintained a narrow navigation channel intimately against the Indiana shoreline for 1.3 miles south of the Newburgh Dam to the dam and above it.

This channel occupies less than 25 percent of the width of the river at this point and a large sandbar has been built up opposite from the Kentucky shoreline. The growth of the sandbar opposite the erosion of the Newburgh shoreline demonstrates that the channel is being permitted to move northward in an increasingly accelerated rate.

The shoreline at Newburgh and south is composed mainly of sand and silt in generally equal proportions, a type of soil susceptible to hydraulic erosion. Statements by Martin Petigo and Col. John Rhett of the Corps of Engineers, Louisville district, disclose that the Corps has been aware of the type of soil and the problems of erosion by hydraulic action for many years yet the Corps has steadfastly maintained the channel on the far north side of the river immediately adjacent to the Indiana shore.

The erosion on the Indiana shore, including the town of Newburgh and south for 1.3 miles, has been continuous and accelerated since the installation of the dam at Newburgh in 1929.

Mr. Russell Booth who lives in Newburgh approximately 1 mile south of the dam has made measurements of the erosion accelerated in the years 1971 and 1972 and also from the period since 1952 and for both of these subsequent years, 1971 and 1972, the erosion was 10 times the annual erosion occurring in the years from 1952 to 1970.

This year, 1972, the amount of erosion of Mr. Booth's land was 38 feet and in 1971 the erosion of land was 18 feet.

The beginning of the construction of the cofferdam surrounding the Newburgh Dam above Newburgh marked a dramatic acceleration in the erosion which began in 1969 and continues to date.

Following the commencement of the construction of the cofferdam a large sandbar accumulated from the Kentucky side resulting in the flowing of the river channeled directly at the Newburg shoreline at an increased velocity due to the restrictions of the river. The combination of the restrictions of the river by the cofferdam and by the sandbar immediately below the cofferdam channels the river to the Indiana shore at the noted increased velocity—that noted increased velocity will come from Dr. Rao's report—which compounds the erosion by mining of the towboat propellers inasmuch as the boats must exert more power to overrun the increased velocity.

Because of the current in the river, the sterns of the towboats must constantly be pointing toward the Indiana shore in order to drive the tows around the curve so that not only is the shoreline being mined by reason of the lateral turbulence from the propellers and the bow

wake, but also from the direct jet action of the propellers' discharge against the shoreline.

And I would add here—it is not in my report—but there has been no restriction of speed of vessels or distance from the shore along this stretch of Newburgh shoreline by the Corps of Engineers or anybody else. They run at will.

The casual observer can confirm the action of the passing tows by the mud swirls. Although the turbulence from the towboats is nearly constant, there being on the average 20 boats per day or more passing, there are occasions that arise with some frequency because of a tow being stuck on a sandbar or locking difficulties that will cause six to 10 towboats to bunch up in the stretch south of the Newburgh Dam awaiting their turn to lock through.

One incident in point occurred May 27, 1972, when the towboat *Polo II* towing eight barges of coal upstream and grounded just upstream from dam 47, thereby blocking the use of the lock.

The last of the barges were removed on May 29 and, during the 3-day period in which the locks were blocked, seven tows parked against the Indiana bank with engines running and propellers chewing for 3 days in order to hold the tows against the river's current.

During this period, the number of tows so parked on the Indiana shore can only be estimated at 20 to 30 and being parked for 20 miles downstream from dam 47.

The report of the scuba diving team which investigated the subsurface shoreline in the Newburgh area on August 13, 1972, when the river was in pool, discloses that in spite of the huge cave-ins along the shoreline in May 1972, that new undercuttings of the river bank had occurred in the ensuing 3-month period with the river in pool.

In our opinion the cause of the undercutting of the river's subsurface bank in pool stage is caused by the increased river velocity in the river channel and by the huge thrust of water against the shore occurring by water displacement waves and the turbulence and jet action caused by the towboat propellers.

This action amounts to hydraulic mining of the Indiana shore by reason of the location of the channel immediately adjacent to the Indiana shore.

At high water the action continuously hydraulically mines the upper banks of the river in the same manner as the lower banks but the effect is drastically increased because of the increased high velocity of the river at higher water and the watersoaked condition of the soil at that time.

With new river ports being constructed on the river, the larger dams and locks being put into operation and the accelerated industrialization of the Ohio Valley, as represented by the huge new Alcoa plant near Newburgh, the Harvey Aluminum near Owensboro, the Anaconda plant near Henderson, the National Southwire plant near Hawesville, all within 50-river-miles of Evansville, and with some of the largest steam and electrical plants in America located adjacent to each of these, the tonnage being moved and the horsepower moving such tonnage can be expected to continually increase and the problem changed from critical to terminal for the town of Newburgh.

And this is respectfully submitted by myself to your record.

Mr. Chairman, if there are any questions, I would be glad to answer them.

Dr. INSKEEP. I am Dr. Charles Inskeep. I am primarily a technical consultant. I am also assistant professor of physics on the faculty of the University of Missouri at St. Louis.

My technical consulting activities are primarily engineering in nature and concern various branches of engineering.

Since I am also a resident of Newburgh since about 1937, I have been asked by the committee to look into the technical aspects of the erosion problem at Newburgh and deliver an opinion, although it can't be a detailed opinion, because the time simply wasn't available.

In addition, the committee has contacted a Dr. A. R. Rao, who is assistant professor of hydraulics and hydrology on the staff of Purdue University, and asked him to make a somewhat more detailed investigation of the problem, particularly with reference to the possibility that the constriction imposed by the cofferdam at mile 776 on the river increases the velocity sufficiently in the stretch from the cofferdam to 2 miles downstream to create noticeably additional erosion, that is, a noticeably increased rate of erosion over what we have learned to expect for many years past.

I would like to read the opinion I have written and summarize Dr. Rao.

The reason for summarizing Dr. Rao's statement is in part that there was a considerable overlap between the information he developed and the information I developed.

It is the intention of this discussion to identify at least the more important causative factors relating to he erosion problem at Newburgh. In view of the high level of human activity in the reach of the river along the Newburgh shore, it is important to distingiush between the erosive processes which could be expected to occur in the river in its natural state, and those which may be the direct result of human interference in the river.

This discussion will of necessity be presented in qualitative and semiquantitative terms, since an exact quantitative determination would require an expensive and time consuming set of measurements concerning the numerous parameters of the river and its banks.

Such a quantitative investigation would also be confronted with an additional difficulty arising from the fact that much of present-day theory is incapable of interpreting the data in an exact and highly precise way.

GENERAL GEOLOGICAL OBSERVATIONS

The banks on both sides of the river are composed of an alluvially deposited mixture of sand, silt and clay. The soil composition is estimated to be roughly 30 to 40 percent each of sand and silt, with clay composing the remainder. Significant gravel deposits are not found in the bank material above the water line and outcroppings of rocks are entirely lacking.

The facts known to us concerning the nature of the soil in the vicinity of the banks, and the configuration of the river in the vicinity of Newburgh make it appear that the present river bed is possibly located somewhere near the northern boundary of an ancient flood plain.

It should be emphasized, however, that data in our possession show that no substantial change has occurred in the position of the river at Newburgh at least since 1830.

EROSIVE FACTORS IN THE NATURAL RIVER

Because erosion rates depend on a complicated interaction of many factors, the problem of estimating natural erosion rates at Newburgh must be solved by the use of historical records extrapolated to the present, using semiempirical and semiquantitative concepts.

In this respect it should be noted that a generally useful measure of a river's ability to erode its banks due to its stream velocity is contained in the concept of competency, which is measured by the maximum size of particle that can be moved by a flowing stream. The competence of a stream is considered to vary in proportion to the square of its velocity.

Additionally, it should be noted that factors relevant to erosion and deposition typically operate at a bend in the river in such a way that both bed and bank erosion predominate along the concave bank while filling occurs along the convex bank. This well-known effect indicates that the river at Newburgh could be expected to slowly erode the Newburgh bank and very possibly to gradually shift the entire channel to the north. And, parenthetically, I will remind you that "to the north" means into the town of Newburgh.

If we consider the rate of possible future shifting in comparison to those of the past when the river may have been bounded by a normal flood plain, it would appear that the future rates should be substantially slower by virtue of the height of the Newburg bank and the land behind it.

In order to estimate the rate of natural erosion at Newburgh, Dr. Rao has compared the result of a shoreline survey made in 1830 with those of a similar survey as shown on a map originally drawn during the period 1911–14 and revised in 1935. This interval is important, since it was a time when human activity on the river is known to be substantially less than it has been in recent years. A comparison of the two sets of data indicates that the natural rate of erosion at Newburgh is something between 0.2 and 0.5 feet per year. I would like to add parenthetically here that this rate refers in particular to the rate of movement of the shoreline to the north. In some of the testimony we have talked about bank cave-ins, which are not taken into account in these numbers. This is the general rate of movement of the shoreline to the north, which does not concern itself with the huge bank cave-ins that we have discussed in Mr. Wright's testimony.

It is interesting to note that a similar comparison of the 1935 data with that obtained for the year 1965 indicates that the average rate of erosion in the latter period is 5 times that of the former period. Again, we are talking about the rate at which the bank is moving north. The more recent interval spans a time during which activity on the river was increased substantially.

FACTORS OF EROSION RELATED TO HUMAN ACTIVITY

The increased rate of movement of the Newburgh shoreline and the unusual series of bank cave-ins, which commenced in 1969, suggest strongly that the Newburgh bank is seriously threatened by the increased human activity in the river.

Three important sources of increased erosion are present at Newburgh, and these are:

(*a*) The presence of the cofferdam at mile 776.

(*b*) The presence of two dikes extending from the Kentucky shore to a point near the center of the river and close to the cofferdam.

(*c*) The constant passage of river traffic close to the Indiana bank.

An examination of river charts for the area at mile 776 and below will show that the dikes and cofferdam restrict the river current to about half of its normal channel. And at this point I would like to introduce two photographs which show this stretch of the river.

And before I give them to you I would like to point out one or two features. We didn't have time to include a description of these features in the testimony, since the flight that was necessary to get these aerial photographs was made on the afternoon before we came up here.

In the upper part of the picture toward the left, you see the cofferdam construction. This construction on the river extending completely across the river is dam 47. At the present time the width of the dam is almost up completely across the river.

In this area between the cofferdam and dam 47, you will see a sandbar which is partially maintained by the two dikes I was referring to.

Toward the Kentucky shore on the right side of the picture you see a set of spillways. You see a great deal of white turbulence in the water there.

Moving towards the Indiana shore, which is towards the left, you see a small amount of turbulence, which was due to the fact that a few wickets near the spillway had been removed.

Now, the important feature in this picture is this white area that you will see, a turbulent area, which is very close to the locks at dam 47. The construction that you will see formed by the cofferdam increases the velocity of the water at that point to about double its normal velocity.

This velocity forms a jet which is channeled toward the locks at dam 47 in part by this sandbar, which is maintained by the two dikes.

Now, notice that even with the wickets of dam 47 up in that area, there is enough additional velocity, carrying additional water over the dam at this point, to make this noticeably increased turbulence.

We have, in fact, two different pictures showing turbulence in both pictures.

You will also notice, if you extend a line from the opening in the cofferdam through the apparent channel of waterflow past the sandbar, through the point at which turbulence at the dam indicates a substantially increased velocity in the water, relative to what it is on the side—you will notice that that line intersects the town of Newburgh just about here.

Well, this area is the area where the first cave-ins occurred. It is an area which is presently seriously undermined. It is one of the more serious problem areas.

I am sorry that I didn't have a chance to include that in the written discussion, but I thought I had better point these features out.

I would like to say, in addition, I think that is one of the strongest pieces of evidence that you can obtain to the effect that the constriction in the cofferdam does in fact noticeably increase the velocity of the current. This is visual evidence that is extremely difficult to deny on any basis.

According to results obtained by Dr. Rao, this constriction substantially increases the current velocity downstream. His calculations indicate that at a point nearly 2 miles downstream the water velocity is increased by approximately 60 percent at a point 11,000 feet downstream during high-water periods. This calculation is considered to be accurate to within 30 percent.

The importance of this factor in explaining the problems of the Newburgh bank can be seen by making two additional observations:

(*a*) As shown by river charts near the cofferdam there is a sandbank (partially maintained by dikes) which directs the jet stream formed at the cofferdam into Newburgh bank.

(*b*) Bank erosion can be expected to increase with increasing water velocity at a rate greater than in direct proportion to the velocity increase.

A square-law dependence is often assumed. Under this assumption a velocity increase of 30 percent increases the erosion rate by 70 percent and an increase of 60 percent increases the erosion rate by 156 percent.

A possibly more serious factor in the bank erosion is the passage of river traffic through the navigation channel, which is located immediately adjacent to the bank. Boats operating in this channel typically approach the shore to within 50 to 300 feet.

The effects of the screw-type propulsion from 3,000 to 9,000 horsepower exerts turbulence and wave disturbance, which is well documented by available engineering studies, which directly affect the area, in excess of 1,000 feet from the source of energy.

It is my opinion that empirical investigation will corroborate the the conclusions that each tow passing the Newburgh shore mines the increment from the bank and bed and, in addition, disturbs the high-bank and high-water level for a distance of many feet from the water's edge.

At this point, I would like to introduce exhibit 10, which shows a ship passing within approximately 50 or 60 feet from the Newburgh shore and particularly shows the extent of the wake stirred up by this relatively small towboat passing.

That concludes my statement. I would like to conclude my contribution to the discussion by summarizing the observations that Dr. Rao has made.

Mr. ROBERTS. Dr. Rao's statement will be printed in full at this point.

(Dr. Rao's statement follows:)

Mr. J. F. WRIGHT AND Dr. CHARLES INSKEEP,
Evansville, Ind.

DEAR MR. WRIGHT AND DR. INSKEEP: Thank you for your letter of August 31, 1972. After I returned from my visit to Newburgh, Indiana, I completed some preliminary computations about the waterfront erosion in Newburgh and this letter is a summary of my findings. Mainly due to the lack of sufficient data and time, the results of these computations are to be treated as estimates only as they are based on rather rough estimates of quantities.

The data I have used are (*a*) the three maps of the Newburgh area, the first two of which are the maps from the Corps of Engineers (1935 and 1965) and another map (1830) supplied by you, and (*b*) the report "Water Resources Data for Kentucky" for the year 1970, published by the Geological Survey, the U.S. Department of the Interior. I have selected the flood of April 8, 1970, which had a gage height of 41.76 ft. and a discharge of 537,000 cfs at Evansville, Indiana. I have assumed the Maximum Stage attained by this flood at Newburgh, Indiana was also 370 ft. However, by considering the stage-discharge relationships for Evansville, Indiana, we can select other discharge values also.

ANALYSIS

(*a*) *Rate of erosion of the Indiana bank at Newburgh as computed by the maps*

We read off the distances from the Water Street to the river banks along the several streets. The Indiana bank of the Ohio River is gradually eroding. The erosion from 1830 to 1935 is not as severe as it is from 1935 to 1965. This increased erosion from 1935 to 1965 may be due to (*a*) construction in the Ohio River at locks and dams and (*b*) due to increased traffic on the river. However, the average rate of erosion appears to be about 2–3 ft. per year even if we consider the most serious period of erosion from 1935 to 1965. The data have not been corrected to take into account the water level differences.

If the cross sections of the river between Jefferson and Market Streets are drawn, they appear as shown in Figs. 1 and 2. The areas of cross section up to El. 370 ft. are approximately 82,619 sq. ft. (1935) and 103,937.5 sq. ft. (1965). There has been an increase of area of about 21,337 sq. ft. between 1935 and 1965.

(*b*) *Velocity of flow*

If we consider a discharge of 537,000 cfs corresponding to El. 370 ft., the average velocity of flow must have decreased from about 6.5 ft/sec in 1935 to about 5.16 ft/sec in 1965.

If normal conditions were to prevail this decrease in average velocity in the Ohio River at Newburgh must have been conducive to decreased erosion of banks.

(*c*) *Effect of construction of the new locks and dam*

The cross section of the river just upstream of the locks and dam presently being constructed (as it is taken from the 1965 map) is shown in Fig. 3. Let us assume that the Cofferdam extends to about 1250 ft. from the Indiana bank into the river. The available area of flow at the Cofferdam then becomes about 48,800 sq. ft. (up to the El. 370 ft.). For a discharge of 537,000 cfs, the velocity of flow at the Cofferdam is about 11 ft/sec.

The velocity of flow in the river at the Cofferdam is about twice the velocity between the Jefferson and Market Streets.

If we assume this flow at the Cofferdam to be that from a jet of width 1200 ft. and further if we assume this to be a two-dimensional Jet, then the velocity of flow 11,000 ft. from the Cofferdam can be calculated to be about 8.35 ft/sec, but using the information given by Albertson et al. (1) This means that there has been an increase in the flow velocity by about 3 ft/sec at Newburgh due to the effect of the constriction in the River upstream of Newburgh, Indiana. Increases in velocity normally induce increases in the erosion.

In the above mentioned computations, I have not considered (*a*) the effect of bend and consequently those of secondary flows which might exist, (*b*) the effect of the bed friction. Both of these effects might cause a reduction in velocity, and the net increase in the flow velocity might conceivably be less than about 3 ft/sec. Consideration of these would entail a more detailed analysis.

We should also be concerned with the direction of flow in a more detailed analysis.

CONCLUSIONS

Summarizing the above analysis and other pertinent qualitative information we can state the following; (*a*) the formation of a sand bar downstream of the dam indicates that the main direction of the riverflow is towards Newburgh. (*b*) The difficulty encountered by the barges in navigating the river just upstream of Newburgh implies that there has been an increase in the flow velocity. This increase in the velocity can be expected as the river is constricted by the Cofferdam. (*c*) The report of the divers has indicated the existance of large undercuts in the river bank where the river impinges on the bank. (*d*) The preliminary computa-

tions I have presented has also indicated an increase in the velocity of flow near Newburgh, Indiana, and hence implies increased erosion in the river bank. (*e*) The rate of erosion during the last two or three years has been much greater than the approximate erosion rates which can be observed from the maps. All these considerations indicate that the construction of the Cofferdam has played a predominant role in the accelerated erosion of the Ohio River bank at Newburgh, Indiana.

Thank you.

Yours sincerely,

A. R. RAO.

Dr. INSKEEP. In respect to calculating the natural rate of erosion along the Newburgh bank, Dr. Rao states:

We read off the distances from the Water Street to the river banks along the several streets.

The Indiana bank of the Ohio River is gradually eroding. The erosion from 1830 to 1935 is not as severe as it is from 1935 to 1965. This increased erosion from 1935 to 1965 may be due to (a) construction in the Ohio River at locks and dams and (b) due to increased traffic on the river. However, the average rate of erosion appears to be about 2–3 ft. per year even if we consider the most serious period of erosion from 1935 to 1965. The data have not been corrected to take into account the water level differences.

Now, that is the data concerning maximum rates observed before the construction of the dam.

Considering the construction of the dam, Dr. Rao explains his calcutions in brief as follows:

CALCULATION OF VELOCITY OF WATER FLOW

If we consider a discharge of 537,000 cfs corresponding to an elevation of 370 feet, the average velocity of flow must have decreased from about 6.5 ft/sec"—the unimpeded river before the construction of the dam—" in 1935 to about 5.16 ft/sec in 1965.

If normal conditions were to prevail this decrease in average velocity in the Ohio River at Newburgh must have been conducive to decreased erosion of banks.

And he has made a calculation of the effects of this increased velocity resulting from the constriction imposed on the river by the dam. To determine whether we can expect a substantial increase at a distance of approximately 2 miles downstream.

I would like to state Dr. Rao's conclusion:

The velocity of flow in the river at the cofferdam is about twice the velocity between the Jefferson and Market Streets.

which is toward the western limit of the eroded area.

If we assume this flow at the cofferdam to be that from a jet of width 1200 feet and, further, if we assume this to be a two-dimensional jet, then the velocity of flow 11,000 feet from the cofferdam can be calculated to be about 8.35 ft/sec, but using the information given by Albertson, et al. This means that there has been an increase in the flow velocity by about 3 ft/sec at Newburgh due to the effect of the constriction in the river upstream of Newburgh, Indiana. Increases in velocity normally induce increases in the erosion.

I would like to, then, just read his concluding paragraph:

Summarizing the above analysis and other pertinent qualitative information we can state the following: (a) the formation of a sand bar downstream of the dam indicates that the main direction of the river flow is towards Newburgh. (b) The difficulty encountered by the barges in navigating the river just upstream of Newburgh implies that there has been an increase in the flow velocity. This increase in the velocity can be expected as the river is constricted by the cofferdam. (c) The report of the divers has indicated the existence of large undercuts in the river bank where the river impinges on the bank. (d) The preliminary

computations I have presented has also indicated an increase in the velocity of flow near Newburgh, Indiana, and hence implies increased erosion in the river bank. (e) The rate of erosion during the last two or three years has been much greater than the approximate erosion rates which can be observed from the maps. All these considerations indicate that the construction of the cofferdam has played a predominant role in the accelerated erosion of the Ohio River bank at Newburgh, Indiana.

Yours sincerely, A. R. Rao.

Mr. ROBERTS. Thank you, Dr. Inskeep.

Mr. JOHNSON. Mr. Chairman, I would like to summarize the case of the Newburgh citizens. I would like to do it for the reason that some of the evidence that was read into the record was not read to you, so I know what is there.

First off, I would like to say, though, that General Cooper stated that there were two areas in Newburgh that were riprapped 300 feet in width.

I want to say first, before I forget it, that that is a very illusory thing, because our scuba divers, who are members of the fire department that we employed, made a scuba diving 8-hour exploration in August of this year and found out under both of these riprapping that the whole area is undercut from 6 to 8 feet underneath the water level on the bank of the river underneath the water.

They have testified in their report that the riprapping did not go down much past the water line, did not go to the channel.

So all that is happening is that this 8-foot undercut will collapse again in high water this winter. The entire riprap will fall in the river.

I don't want General Cooper or his people to get by with saying that they have done us any good, because they haven't done us any good. The rock is going in the river in January.

I would like to summarize what has been put before you, and that is that the new dam, the cofferdam, the wickets, weirs, the Corps has built on the Kentucky side just opposite there have channeled the river down around the new cofferdam past these weirs into a channel that points directly at Newburgh.

That has increased the velocity by 3 feet per second, according to Dr. Rao. It has increased the velocity according to your aerial photographs which you can determine visually.

That not only acts directly by the square of the increase, as reported by Dr. Inskeep, but it also increases the velocity that these tugs have to go, the force they have to go, to overcome the increased velocity caused thereby.

Now, we charge the Corps with this—of constructing a paddlewheel dam, 1929, next to the Indiana shore, which is well known to them to be nothing but sand and silt, maintaining without any riprap or seawalls, allowing the paddlewheel to disappear with this 2- to 3-foot dip and replacing them, which was usually under a thousand horsepower, with boats of up to 9,000 horsepower of the screw type, where the screw is 9 feet underneath the water, going right up beside our Indiana shore within 50 feet.

There is an aerial photo that you have right there showing one of 60 feet or so and there is a bank photo showing one of 50 feet.

The testimony is that the traffic is continuous. The one time we said, when the Polo II stuck up 3 days, we had 20 towboats anchored to

the Indiana shore—not anchored, as I said before, because they don't have anchors—they just nose into the shore and lineup side by side parallel with the Indiana shore and keep their engines running even with the velocity of the river, so they don't go any place.

In this particular case they had to stay there 3 days, right beside the shore, not 20 feet out, 10 feet out, 5 feet out—they were right next to the shore. That is where they stayed. They parked right there and they churn their engines so they don't go backward down the river.

Now, this is not an isolated case. It just happened to be the last one that we could document for you with newspaper clippings and photographs.

Now, I said, when we came up here, if it were Cincinnati or Louisville or some other big city, you would have batteries of engineers and lawyers before you. Little Newburgh, of 2,300 people, do the best they can.

The reason Cincinnati and Louisville and Evansville and Pittsburgh is not here is because they have 20 to 30 miles of seawall. Go take a look at Cincinnati. I am told there is over 25 miles of seawall along the city of Cincinnati.

I am told that Louisville has miles and miles of seawall. I know Evansville does. We have several miles. We are all seawalled in, in the city of Evansville.

There is nothing that protects the banks of Newburgh, so we consider this at least recklessness and perhaps negligence in just keeping the navigable stream navigable—what they are doing, they are mining out the Indiana bank and letting it go as far in as it will go that these towboats can blow it out. We are being blown out of the river and Kentucky is getting the increase. It is not doing them any good, because it is just a sandbar. But we are continuously having the Indiana shoreline eroded.

And the reason is partially by the increased velocity, but substantially, gentlemen, by the fact that you have got these fantastic towboats with their screw-type propellers.

Now, there is not one propeller down there. They all have two to three propellers. And they don't even go straight back.

Now, let me tell you, Newburgh is on this curve, so when a towboat comes up here, in order to get his tow around this curve, his back, his stern, is always pointing toward this bank. It has to point to this bank in order to get the tow up there.

Coming down it is just the opposite. He has got to make that curve and get his tow pointed into the middle of the river, so his stern, his screw, is allways punching into the bank as he goes around Newburgh, since the channel was put right up to the bank on the Indiana side.

As I say, we take the entire force of the river traffic. Now, philosophically, I think—I forget which gentleman here put his finger on it—it is just a matter of navigation costs. If you are going to subsidize and have towboats of 9,000 horsepower and larger—my brother tells me there is a 12,000 horsepower on the Mississippi now. If the Mississippi has got it, I guess we will have a 12,000-horsepower vessel next year.

If you are going to allow that type of vessel to ply our rivers with 1,200-foot tows and put it right next to our Indiana shore, then the cost of doing business is building us a wall.

One of our men, Mr. Weng—the river has cut-in, he has lost up to within 20 feet of his back door. He can't go through another winter or he is going to have his back door in the water and his whole house will be lost.

So this is not something, in Newburgh, at least, that can take a year or two of study. I say that Newburgh is unique. I am not denigrating any other part of the river that you gentlemen are interested in.

But any town that is located adjacent to a lock is unique, because that is where all the traffic is channeled. That is where the traffic has to come up and park and wait to get through. And that is where they have to use their great force to get those things through. They can't go through the lock fast. They come up there, they stop—and then, when they start in, there is an impulse, they have to rev up the engines and they drive that water back with an impulse, an additional force—so you have every factor in the world working to hydraulically undermine Newburgh. And we don't have to say it hasn't been done. It is there. We would like for any of you gentlemen to be our guest down there and take a look at the hydraulic mining that is going on.

Now, I want to put in two more things. There is a low-water stage, which is where we are now—and that is what these scuba divers went down, they dived under the bank and they say it is cut out from 8 to 6 feet under the bank, underneath the water into the bank for 60 feet on one stretch, and I believe 50 or 80 feet on another stretch underneath the river.

That will cave in. Then the riprap will fall in. The highwater will come up next January, as it always does. The high water will soak the silt and the sand, like the general said. And the towboats will come right next to where the bank is and high water—they don't need a channel, there is no channel in high water, you can go any place you want. Since the lock is right here by Indiana, they come right up the Indiana shore, and they will blow out again this January all the sand and silt that forms that plain there, where these people's houses are located.

And when the water goes down, of course the thing collapses. It doesn't collapse from something normal. This isn't God-given rain or erosion such as this. This is just simply 9,000 diesel horses driven against that bank.

I want to say one other thing. These boats not only have the treble screws 9 feet down, but they have a—what do you call it?—a nozzle, they have a nozzle. So if they want to go this way, they don't necessarily have to change their rudder. They can change the nozzle and blow the water wherever they want to go.

So when they come up around that curve they just change the nozzle over here, if it is a little out of line, and they blow it straight in.

Well, I think our documentary evidence is sufficient to show the cause and effect—I think we have shown that the causes are twofold. Only the Corps of Engineers builds the locks and dams, and if you build them next to us, you have got to protect us with a seawall, like you have done in Louisville and Cincinnati and Evansville and wherever else you have done.

I would say, we have gone to scuba diving for information—I know the Corps hasn't. If they had they wouldn't put the riprap like they have. So the Corps has done nothing, having knowledge of the sus-

ceptibility of this soil and the increase in traffic and horsepower and means of transportation—has done nothing to protect this bank.

The bank has been blown away. And we are going to have to have satisfaction. You take a man's home away from him, he will fight.

And we are here not to fight with you. We are here at your mercy. We are here to your good judgment. But when it comes to fighting, we will have to fight, too.

But we cannot let the town of Newburgh be blown into the river.

I will make no further argument. I know you have got questions to ask here.

Before I sit down, as the attorney for these gentlemen, I want to thank the chairman, all you Members, especially Representative Zion, for giving us this opportunity.

If you need more information, we will do it to our ability. Thank you.

Mr. CLAUSEN. Mr. Chairman.

Mr. ROBERTS. Mr. Zion.

Mr. ZION. I thank the gentleman for his summary. In my opinion, Mr. Chairman, the citizens of Newburgh have done a uniquely good job in presenting their case. I think they prove without question that they have a very serious problem. I think they have outlined the responsibility and I hope the committee can operate to the fullest extent of its ability to help solve this problem, just as quickly as we can do so under our authority.

Mr. ROBERTS. Without objection, the Chair will start with Mr. Mizell and come straight up the line. Mr. Mizell, do you have any questions?

Mr. MIZELL. Mr. Chairman, the only thing that I have to comment on is, certainly, we have not only been brought to our attention an acute problem with one of the small towns in America—and certainly they deserve as much consideration as any town along the river.

And the other comment I have is that I think this is again to focus attention on the problem that we have along all of our waterways, not only the Ohio area, but in the other areas.

Maybe the time has come for us to see if we can't attack the problem in its entirety. But in the meantime—this is an acute situation. And certainly I will rest with the good judgment of Roger Zion and the committee as to what we should do immediately on this problem.

Mr. ROBERTS. Mr. Miller. I apologize for not being able to recognize you a while ago, but we had agreed that we would have all questions afterward.

Mr. MILLER. Very well. I heard Mr. Johnson make the statement that a seawall was constructed at Cincinnati, Evansville, or other locations.

Yet I see in the testimony from General Cooper where the authority to provide bank protection works is authorized and limited to section 14 of the 1946 Flood Control Act, Public Law 526, which authorizes the Secretary of the Army to construct emergency bank-protection works, to prevent flood damage to highways, bridge approaches and public works—and for 1 fiscal year is limited to $50,000.

And my question is, did the Corps of Engineers construct the seawall that Mr. Johnson is talking about or did the city construct the seawall?

Can anyone answer that?

STATEMENT OF BRIG. GEN. KENNETH B. COOPER—Resumed

General COOPER. I believe that seawall was constructed as part of a specific flood protection project authorized by this committee with funds appropriated by Congress, so it is not directly comparable.

The authority you quoted is our limited emergency authority to do something without a specific project.

Mr. ROBERTS. It was not a single-purpose project, that is what the general is saying. And it required authorization especially for that purpose.

General COOPER. Right.

Mr. ROBERTS. And local participation of a substantial sum.

General COOPER. Right.

Mr. MILLER. Could we have that for the record, so we will be able to clear this point as to how much local participation was involved in the various projects?

Mr. ROBERTS. I think either we have it or the general, one of his staff, can provide it.

Mr. MILLER. I ask unanimous consent that that be provided.

Mr. ROBERTS. Without objection.

(Information received follows:)

Local protection projects (flood control) along the Ohio River consisting of levees, walls and pumping stations have bank protection as a part of the project design. The total construction costs of these projects to date is about as follows:

	Total cost	Non-Federal
Cincinnati area (both sides of river)	$28,200,000	$2,700,000
Evansville area	27,000,000	4,400,000
Louisville area (both sides of river)	34,500,000	4,000,000

Annual operation and maintenance costs by local interests are not available since the funds and personnel come from various city departments.

Mr. MILLER. Thank you, Mr. Chairman.

Mr. ROBERTS. The gentleman from California, Mr. Clausen.

Mr. CLAUSEN. General Cooper, do you or your staff have any estimate of what the cost would be to provide emergency construction here, and also what the time frame would be, because we are talking about advanced engineering and design with $60,000, you say, impounded.

But assuming you could get the signal plus the funding—and I don't know what the situation is as far as local fund matching requirements would be, which we would have to obtain—but how much would it cost and how long would it take, as an engineer, to get it constructed, because they are talking in terms of trying to get some relief by this winter, I guess.

General COOPER. We think it would cost about $1.3 million for the total project, which has already been authorized by the committee, I think in full recognition of this problem earlier.

If you had the money now, is that what you are asking?

Mr. CLAUSEN. Yes. It requires engineering and construction.

VOICE. I think we could start by next summer. It would take possibly 9 months to complete.

Mr. ZION. If the gentleman will yield, is there any set of circumstances under which we could do something between now and the high

water mark in January, at which time we predict that a substantial part of Newburgh property will disappear?

Is there something that can be done between now and January?

An executive decision, based on emergency powers, rather broad powers, that the Corps now enjoys?

General COOPER. We could put some additional riprap now. As a matter of fact, we already have the authorization to do that.

But that is limited. We can't solve that whole 1.1-mile stretch. We don't want to kid the committee. We can't solve that between now and next January. We can do some things, limited things, with the existing authority we have, in putting the riprap there, putting the rock on for the $50,000.

We admit it is not a perfect engineering solution.

Mr. ROBERTS. Will the gentleman yield?

Mr. CLAUSEN. Yes.

Mr. ROBERTS. General, I don't know whether I am misled or just have a bad conception—a cofferdam is a temporary thing, isn't it? When the permanent dam is in, isn't the problem pretty well solved?

General COOPER. No, sir; that doesn't necessarily solve the problem. If I might interpret the desire on the part of the local people from Newburgh, with which I sympathize, if they can associate the specific damage that what we are doing now with the cofferdam construction, why, then, we go to section 9 of the Rivers and Harbors Act of 1946, in which case we can use the funds which are available for the construction of Newburgh lock and dam to do this.

The funds would be available immediately without any separate authorization.

But only as far as the highway, public utilities and railroads are concerned——

Mr. CLAUSEN. Well, you are anticipating my next question, because with the omnibus bill coming up—and you have this lock and dam project there—I am assuming it was authorized by the Congress, constructed by the Corps, is that correct?

General COOPER. Yes, sir.

Mr. CLAUSEN. Well, one, do you need additional authority for a modification of that, to take advantage of whatever benefit the cost-ratio that you have there in order to move, if you could get the funds?

General COOPER. No, sir; it is just a question of having the funds. the authorization, as far as I am concerned—and I would be willing to be corrected—was provided by this committee in the omnibus bill of 1970.

Mr. CLAUSEN. So what you are asking——

Mr. ZION. 1972.

Mr. CLAUSEN. For the people there to provide the kind of information to you to support what appears to be a desire on your part to tie it in with this lock and dam?

General COOPER. We try to play this as straightforwardly as our engineering judgment permits. If we thought it was specifically tied in to that, we would have said so in our testimony. Based on our evaluation—and we are subject to error, as is anyone else—we think that the primary cause is the raising and lowering of the high water mark, not the construction of the cofferdam and not the operation of the towboats next to the particular wall, which certainly doesn't help.

We don't think it is a major cause. We do think it probably does have an effect, but not sufficient to justify spending that full money without a specific authorization of Congress.

But that is our engineering judgment versus the town of Newburgh's.

Now, if the committee—or the courts, if we go to court—will decide that we are wrong and the city of Newburgh is correct, why, then, we can use some of those funds that are already appropriated for the construction of the lock and dam at Newburgh for this particular purpose, just insofar as those three items are concerned.

Mr. CLAUSEN. This is something, of course, that I would like to pursue with our staff and Mr. Zion. But, again, I get back to the question of timing, because I sense this great urgency that has been demonstrated throughout the testimony that you heard.

Is there no way that an emergency contract—assuming we can work out something to get the focus of attention on this particular problem—is there no way that this can be brought to contract before January?

I mean, how long would it take to design this thing?

General COOPER. We could do some localized protection, certainly, before next January.

Mr. CLAUSEN. Enough to protect the Newburgh area?

General COOPER. Not the whole 1.1 mile, no, sir. What we would probably do is try to protect the places initially like the sewage treatment station and other places where it was the worst.

But to cover the entire area, I would like to say yes, but I don't want to say yes if I don't believe it.

Mr. CLAUSEN. Well, I don't want to pursue it any further at this point, but I am sure you can see, General Cooper, what I am leading up to.

And I think we will have to continue to pursue this, because this could happen to any one of us in this committee, having concerned people here, and I am inclined to—I will tell you one thing, if it was a natural disaster declaration—I mean, this would be taken care of. It would have to be taken care of.

General COOPER. That is correct, sir. But it is under a different law.

Mr. CLAUSEN. Right. How far did Agnes extend?

Mr. ROBERTS. The gentleman from Iowa has been recognized.

Mr. MIZELL. I was just going to ask the gentleman to yield briefly.

Mr. SCHWENGEL. Go ahead.

Mr. MIZELL. I thank the gentleman for yielding, because if I understand the response coming from General Cooper, should it be determined that the cause of the problem in Newburgh is the result of the cofferdam, then of course you could proceed immediately to use funds available to correct the situation in compliance with this——

Is that what I understood, General?

General COOPER. Yes. Just for public facilities, not for the entire stretch—highways, railroads, and utilities.

Mr. MIZELL. Which, of course, would include the sewage treatment plant.

General COOPER. Yes, sir.

Mr. MIZELL. Now, without moving under that procedure, if this should be determined, how much time would we actually save rather than waiting for Congress to act for you to pursue this thing?

General COOPER. I would say that you would save at least a year.

Mr. MIZELL. All right. Then is it possible for the committee to establish cause and effect separate and apart from the Corps' determination? Because, if I understand what the gentleman has told us, we could save a year in beginning work, at least to protect the sewage treatment in this particular area.

Then, of course, if we needed any further action by the committee, we could get it.

And I thank the gentleman for yielding. I don't know if there is anyone that can answer my question.

Mr. CLAUSEN. Well, if the gentleman would yield.

Mr. SCHWENGEL. Yes.

Mr. CLAUSEN. This is the point I was attempting to make. All we can do here is try to establish the facts and then look for any possible avenue to try to find relief for this particular problem that could be occurring in your district or mine or anyone else's.

So I don't want to pursue it any further. But I intend, right at this point, I do want to look into this further.

Mr. ROBERTS. Then gentleman from Iowa.

Mr. SCHWENGEL. First I want to say that I think these gentlemen from Newburgh present a mighty persuasive case for their problem. I understand the problem. I understand their worry.

As I said earlier, we had a similar problem, not on the Mississippi, but on the Iowa River that runs into the Mississippi. And the Corps has been authorized to make a study on that problem there. It isn't near as severe as this problem apparently is.

Someone has been using this cost-benefit term again. I would like to get that out of your minds. It makes it harder for you to get your money for these problems. It is an investment.

The investment we have made in the Mississippi and the Ohio River has been a tremendous benefit to the country economically.

Someone testified—you did—that the dam system was built anticipating 13 million tons. You are wrong. That was the minimum they were reaching for. If you read your report, you will find we are trying to reach a goal that will take at least that much, and that has grown to 130 million tons. What a magnificent contribution that is to the economy.

So let's get this cost-benefit thing out of our mind and talk about benefit from investment. Now, we have got an investment to make in Newburgh, it is obvious to me.

And I think before we proceed we must proceed from the best experience and knowledge available.

No one ignores the problem here, but there is a difference as to what is the cause. Now, I have met an awful lot of experienced Army engineers who have been more often right than wrong through the years. So I would like to pursue the question and have the General comment on it.

And that is the solution to this excessive rise and fall that you think is the cause, rather than the cause as presented by Newburgh.

What is the answer to that problem?

General COOPER. It would require quite a few very large flood control structures some place. I asked the same question you asked of my engineering staff yesterday and today.

It would be very difficult. You have got a large river basin, you have got a tremendous amount of water that comes in there.

And the cost of providing sufficient flood control to prevent this rise would be—I don't have a study for it—but I think it would be extremely expensive.

Mr. SCHWENGEL. I will tell you one answer to it. The gentleman from Indiana is coauthor of the bill, H.R. 15568. This is something the engineers ought to be looking at. It is a bill that envisions completing all the watershed and all the conservation projects, programs, developments in the whole Mississippi—well, everywhere where we produce our foods and fibers.

Now, we have to estimate that that is going to take an investment of something like $15 billion for America. But that is nothing compared to the benefits that would come from that, because it would make the water safe again from the chemicals that come off the farm area, for instance, to develop the watersheds.

You have seen some, engineers didn't believe watersheds could have an effect on eliminating the rapid rises and falls of rivers, but it can. We have some magnificent evidence of that now, come from hearings that we have held all over the United States.

Now, you haven't made that comment. The only conclusion is we are going to have to do in Newburgh what you have been doing all the way in the Mississippi River south of St. Louis. You know what it is.

Now, in your opinion, would applying the technique we have used there solve this problem?

General COOPER. Those huge concrete mats——

Mr. SCHWENGEL. Concrete mats laid out there. Would that solve that problem?

General COOPER. I think it probably would, or some type of solutions, but what we would hope to find is some—we know an expensive way—a relatively inexpensive way, to do it.

We don't know any good way to make that, in this particular case, that layer of silty sand, if we could make that impervious in some way, we might be able to solve it.

I don't have the answer to the question. We haven't done the study. But it would be an expensive solution comparable to the mat, although that is a little bit different, because it is flatter area, but it is something of that general nature.

Mr. SCHWENGEL. Its purpose is to take care of the rise and fall.

General COOPER. Yes, sir.

Mr. SCHWENGEL. And to keep those levees from washing out in the high water period, same reason.

General COOPER. Very expensive.

Mr. SCHWENGEL. It may be expensive, but the benefit that comes to the public of the traffic on the river is immense.

And I don't think the people of Newburgh should have to pay for that, whatever damage comes from that, as a result of the installation—if the dam installations weren't in the Ohio River, Newburgh wouldn't have a problem; is that right?

General COOPER. We don't know the exact extent of that, but I think the committee in 1970 recognized the fact that there was proximate cause, if not direct relation, and authorized the project.

The question is, it takes longer to do it. 1972 had unusually high waters. They had unusually bad erosion.

So I think the committee and the Corps of Engineers, notwithstanding comments made by the other witnesses, is aware of the problem. Nobody disputes the amount of erosion, nobody disputes the question that we need to do something about it.

But we can't spend money that hasn't been appropriated. We can't unilaterally stretch laws just because we think the cause is just.

Mr. SCHWENGEL. As far as I am concerned, Mr. Chairman, Mr. Zion, I am ready to go to authorize whatever it takes to get that job done.

If we can spend $30 billion to go to the moon to get some rocks, we can spend some money on Mother Earth.

Mr. ROBERTS. Thank you, gentleman from Iowa. Mr. Johnson, I am a little concerned that no one put into the record, having had some exposure to the books once in a while, why didn't you tell us what the rainfall was over the 10-year period?

You had an abnormal rainfall the last 3 or 4 years, is this correct?

Why didn't you put in the annual rainfall? We are sympathetic, but we have got to have some facts. What effect did the rainfall have, Dr. Inskeep?

And Dr. Inskeep testified that actually the water speed had slowed down from 1935 to 1965.

Dr. INSKEEP. I would like to say a word or two, if I might, about that. We are aware of the problem associated with changes of climate. We didn't have time to do this in an exact way. A good deal of our data was averaged over a very long period of time, from 1830 to 1935 in one case, 1935 to 1965 in another case.

Now, averaged over such long periods of time, you tend to average out the effects of minor perturbations in the climate that last 3 or 4 or 5 years.

In order for climate changes to exert a significant effect on a comparison that we make between these two intervals, you would have to have a very significant long-range shift in the climate. It would have to be long-range and it would have to be large. A few unusual years wouldn't make enough difference.

Mr. ROBERTS. It would make a lot of difference on the flood control as to whether or not—and we have had terrific floods in all the rivers in the Midwest off and on the past 10 years, because this committee goes out there on the disasters, and it is almost one a year or two a year, sometimes three a year we are out on.

Dr. INSKEEP. We are aware of this, but I would like to remind you of one thing that might clarify it a little bit, as far as our argument is concerned.

We obtained an average rate of erosion for the years 1830 to 1935. It is an approximate rate within a factor of two, one way or the other.

This indicates that the rate of gradual movement of the Newburgh, entire Newburgh shoreline toward the north, is about half a foot per year on the average for a period of 105 years. It has averaged about half a foot per year.

Then in a later interval, 1935 to 1965, a 30-year period, we took a similar average—we find out that the average rate of movement is more like 5 feet per year.

Now, it is my opinion that you can't account for an order of magnitude's difference in the average rate, averaged over a sufficiently large

number of years—such as 100 years or even 30—by simply stating that for 2 or 3 or 4 or 5 years, or even 10 years, you had a little extra high river or a little bit more rain than normal.

You see, these differences tend to average out, first of all. And, second, we are talking about a very rapidly increasing rate of erosion. We are talking about something more like a factor of 10.

Mr. ROBERTS. Doctor, wouldn't you say the increase is in direct proportion to the horsepower of those tows? That is what Mr. Johnson was saying, I think. I think what you are saying to us, if you just stop the river traffic, we are all right.

Unfortunately, we can't do that, if we want to do it. You all couldn't stand the pressure, if you had the power to do it.

But we do need to do something to help you. It is not a question of that. But isn't it really—isn't the magnitude indirectly in proportion to the horsepower of the tugs? So let's put it on the record. Let's not beat around the bush.

Dr. INSKEEP. I would say that if we plotted the rate of erosion and plotted on the same curve increases in river traffic in horsepower and perhaps increases in one or two other things—which I won't go into in detail—we would find a good part of the answer as to why the rate of the bank retreat toward the north has increased by about a factor of 10 in the last 30 years or so.

Mr. ROBERTS. Let me be off the record a moment.

(Discussion off the record.)

Mr. ROBERTS. Are there other questions now? Yes, sir, do you wish to say something?

Mr. WRIGHT. Mr. Chairman, this might be off the record, too, but I think it needs expressing. The measurements made on the Russell Booth property, specifically, show that the year 1970—that was prior to this last bad hurricane we had—that 18 feet of land disappeared there.

And in 1971, 35 additional feet. That is almost doubling and redoubling each one.

In front of my own house I lost 70 feet of river bank, including 35 large trees, in the year 1969. And I point out that the year 1969 was the time that they extended that cofferdam out in that river.

I have in my hand here a map that was authentic for the time of 1830. And this shows a picture of the house and the location of Mr. Booth. And Mr. Booth's property was stable for 140 years, up until 1969 and 1970.

In 1969 Mr. Booth spent all of his savings to privately put riprap around his property. His next door neighbor, Mr. Weng, did likewise.

Those two gentlemen are retired. They don't have a lot of funds. In my own case, I spent $15,000 in riprap around my property to keep my house from falling in.

Yet all of the riprap of Mr. Booth and Mr. Weng, that they spent their savings for, is now on the bottom of the river. It is laying down there. It all caved in. Just as the riprap which the Corps of Engineers placed at the foot of Market Street, I suppose, in these two locations. And I say here is the proof. Here is a map that establishes the fact that right here between Washington Street and Jefferson Street on the south side of Water Street is the lot laid out in 1830. And that lot was still there almost in its entirety with just a few feet in 140 years.

And now, in 2 years, more than half the lot is gone. And those two houses are going to fall in the river unless there is an awful lot of work done on the back of it prior to the water rise, which can start in November.

General COOPER. May I say, we didn't start building the cofferdam until August of 1970. So anything you lost in 1969 couldn't be the result of the cofferdam. You may have made a mistake when you said you lost it.

I just wanted to keep that clear for the record, plus, for the record, there was an implication that all of the riprap we put on has fallen into the river, just as the others.

Now, none of ours has. It doesn't mean it won't in the future.

Mr. ROBERTS. Mr. Wright.

Mr. WRIGHT. Well, I would like to answer the General's question by another question. Did he not in fact, the Corps of Engineers, build a cofferdam around the lock portion of that dam which was for a period of approximately 5 years before that, and in fact start restricting that river—and I point out that our problems started in that period. They got worse in 1969 when the cofferdam for the dam portion of the lock and dam was constructed, and it just got out of hand completely.

Mr. ROBERTS. Are there other questions? Gentlemen, we are very pleased to have had you here. This was a special hearing after we had concluded other hearings, at the request of Mr. Zion.

By the way, I may say that this is a nonpolitical committee. I am the only Democrat that has been sitting here most of the afternoon. All the rest of these gentlemen are on the other side of the aisle.

But we all work together and try to do what is necessary for all the people of the country.

We realize you have got a problem. I am not saying that we can solve it. I am not saying we can authorize the solution to it.

But I will say one thing—you will get some attention and we will do the best we can.

Mr. Zion, do you have anything?

Mr. ZION. I thank the Chairman very much for his patience, his diligence and his interest.

Mr. ROBERTS. The subcommittees will stand adjourned, subject to the call of the Chair.

(Whereupon, at 4:26 p.m., the Joint Subcommittees adjourned, subject to the call of the Chair.)

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