(Third day)

P U B L I C H E A R I N G

Before

SENATE COMMITTEE ON
REVISION AND AMENDMENT OF LAWS

On

SENATE BILL NO. 272 - WATER BOND ACT
SENATE BILL NO. 273 - On-RIVER WATER SUPPLY LAW, 1957

Held:
June 21, 1957
Assembly Chamber
State House
Trenton, New Jersey

MEMBERS OF COMMITTEE PRESENT:

SENATOR WAYNE DUMONT, JR., (Chairman)

SENATOR ROBERT C. CRANE

SENATOR DONAL C. FOX

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SENATOR WAYNE DUMONT, JR. (THE CHAIRMAN): We will start this morning's hearing with the insertion of two letters into the record, which Senator Crane will read.

SENATOR ROBERT C. CRANE: The first letter is from Mr. Paul M. VanWegen, President of the Stony Brook-Millstone Watersheds Association:

(Reading)

"In response to a question from Senator Crane last Thursday I said our Association had never had a water expert as an employee. That is correct but lest it detract from any merit our presentation might otherwise have, I would like to add the following:

"Our executive director, a full-time employee, holds a graduate degree in conservation. While this does not make him an expert on water, he is familiar with all phases of conservation and a very capable director of our affairs. There are also members of the Association with outstanding (some with international) engineering records who have voluntarily consulted with us as need arises. Add to these the many eminently qualified engineers, hydrologists and geologists with whom we have consulted in State and Federal Service, and from Rutgers and Princeton Universities, as well as private individuals. For our whole existence we have had the finest kind of cooperation from such individuals and organizations.

"I would like to reiterate a very strong conviction. This parade of 'experts' by the proponents obscures the real issues of the matter. Their most significant testimony has been in the realm of opinion rather than fact. The facts being asked for are take lines at different elevations and borings to determine the practicability of a dam site as well as to estimate its cost. These facts can only be gotten on the ground, all of the expert 'opinion' to the contrary notwithstanding. It is our judgment that people want and are entitled to facts, not opinion, before voting for a bond issue on huge projects.

"We believe the possible recharge from small multiple purpose dams have tremendous possibilities. To this end we would like to see an appropriation for the Department of Conservation and Economic Development to participate with the United States

Department of Agriculture and ourselves in trying out two or three as a pilot project.

"We believe this should be part of a $2 million (our guess) appropriation for the detailed engineering and geological investigations that are needed for the whole Raritan Watershed. We feel that it is important that 'pre-design' studies be made at the various reservoir sites in the entire basin before any one site is approved for construction. For only after this information is at hand can a truly integrated and well-planned development of Raritan water be accomplished. The relative merits of the small dams and the larger ones should be weighed at all locations by such studies.

"You gentlemen seem determined to come up with something constructive. I think you will, and I admire you for the splendid job you are doing.

Cordially yours,
/s/ Paul M. VanWegen
President."

The second is a letter from George R. Shanklin, Chief Engineer and Acting Director of the Division of Water Policy and Supply. It's quite a technical letter and it has to do with the taking of water from the Raritan by the Middlesex County trunk sewer. Since many of us are not engineers, I think there are some parts of this letter which we can skip, but its entire contents will be in the record.

(Reading)

"Dear Senator Dumont:

"In reply to the request submitted to me at the legislative hearing on June 13 relative to the above water legislation bills by Senator Edward J. O'Mara, Counsel for the Citizens' Committee for a Sound Water Policy, I am pleased to submit the following report on diversion on the lower Raritan River by the Middlesex County trunk sewer.

"According to information given me by Mr. Charles J. Kupper, Engineer for the Middlesex County Sewerage Authority, the 1951 Medcalf and Eddy report on this trunk sewer listed the following estimates of effluent sewage to be discharged into the trunk sewer by the various participants.

"Source	Sewage Discharge (MGD)	Comments
Somerset County Line to five Mile (Fieldville) Dam		
Plainfield Joint Meeting	5.4	Principally served by Plainfield-Union W. Co.
S. Bound Brook Boro.	0.2	Bound Brook W. Co. from storage reservoir on Middle Brook
Bound Brook Boro.	0.6	
Middlesex Boro.	0.6	Elizabethtown W. Co.Cons,
Bakelite Corp.	0.1½	Delaware & Raritan Canal
Five Mile Dam to Raritan Bay		
City of New Brunswick	9.4	Storage reservoir on Lawrence Brook and Del. & Raritan Canal
Highland Park Boro.	0.8	Elizabethtown W.Co.Cons.
Raritan (Edison) Twp.	1.6	Elizabethtown W.Co.Cons. municipal wells and Middlesex W. Co.
Metuchen Boro.	0.65	Middlesex W. Co.
Hayden Chemical Co.	0.30	Private wells
National Lead Co.	4.5	Private wells
Catalin Co.*	0.1	Source not known
South River		
South River Boro.	1.1	Municipal well supply
Sayreville Boro.	0.6	Perth Amboy well supply
Peter J. Schweitzer	2.1	Private wells
Anheuser-Busch	0.6	Private wells
Denzel	0.07	Source not known
Hercules Powder Co.	7.0	Private wells

* New customer not listed in Medcalf and Eddy report.

"For clarity, the sewage effluent discharges have been tabulated in three reaches:- Somerset County line to Fieldville Dam wherein the natural stream flow may be considered to be suitable for industrial use; the tidal reach from head of tide at the Fieldville Dam to the Raritan Bay and South River, one of the major tributaries of the Raritan Basin which joins the lower river downstream of New Brunswick.

"From the above tabulation, it is apparent that no riparian water from the lower river is to be discharged at present into the trunk sewer. Under 'Comments,' I have attempted to summarize briefly the sources from which I understand the participants obtain the water which is to be discharged into the trunk sewer as sewage effluent. It is to be noted that such water is obtained from ground-water sources in the Plainfield and South River areas, from the Middle Brook storage reservoir of the Bound Brook Water Company, from the Farrington storage reservoir on Lawrence Brook of the City of New Brunswick, from the Delaware and Raritan Canal and from the public water supply system of the Elizabethtown Water Company which obtains its supply from the Delaware and Raritan Canal and from river intakes on the Raritan and Millstone Rivers at their confluence.

The municipal sewage effluent is derived from existing public water supplies and possibly also from some private industrial wells. The industrial water on South River and the lower river below Fieldville Dam is from ground-water sources with possibly one or two small exceptions. The Bakelite Corporation does have a river intake for riparian use of Raritan water upstream of the Fieldville Dam but such water, I understand, is used solely for fire protection. The water discharged into the trunk sewer is part of the supply purchased from the Delaware and Raritan Canal. The company also has wells which I understand are not used at present.

"The flow of the lower river will, of course, be reduced by the amount of sewage which was formerly discharged into it by local treatment plants. But, as previously stated, there does not appear to be any appreciable diversion of what is truly riparian water.

Yours very truly,
/s/ George R. Shanklin
Chief Engineer and Acting Director."

SENATOR DUMONT: Thank you very much, Senator Crane.

Now, Mrs. Ann Hughey was here for two days waiting for her opportunity to testify, and I wonder if she is here today. Well, she will be given an opportunity if she does come in later. I thought that at long last she could be given the opportunity to be the first witness.

We will start, then, with Henry G. P. Coates of the Stony Brook-Millstone Watersheds Association. Mr. Coates.

H E N R Y G. P. C O A T E S: Senator Dumont, Senator Crane: I reside in Hightstown and I am not interested as a landowner in any of these proposed projects in the Stony Brook area. I speak for the Stony Brook-Millstone Watersheds Association.

One of the ingredients of desirable legislation from the standpoint of all persons concerned, is that it have sound foundations.

The Water Resources Advisory Committee was appointed by the Honorable Joseph E. McLean, Commissioner of the Department of Conservation and Economic Development in September 1956.

On October 31, 1956, the New Jersey Water Resources Advisory Committee formulated a statement of guiding principles, one of which was No. 2:

> "We would want to point to the immediate acquisition of the sites necessary to the complete program to avoid higher costs later and to minimize inconvenience to the public. Cost estimates of such acquisitions will be needed."

It will be suggested by other speakers for the Stony Brook-Millstone Watersheds Association that it is the belief of that Association that the Committee has not done all the homework that should be done before the Legislature submits such an important question to the public for a vote. It is only necessary to point out that the Committee uses the phrase "immediate acquisition of the sites necessary to the complete program," and then to compare that statement of a guiding principle with the limited scope of the present bills to find that the program suggested to the people, and which the Legislature is asked to enact, is but a partial effort and in complete disregard of what the Committee itself has indicated as its second guiding principle.

This is no immediate solution and two dams to supply one part of this State do not constitute a complete program. Recommendation No. 2 of the Committee's Report says:

> "The 10 billion gallon Stony Brook Reservoir, located about two miles west of Princeton, should be constructed two to five years after Spruce Run is completed unless the demand for water indicates that an earlier construction of this reservoir is required."

If the Stony Brook reservoir is a two to five year situation after Spruce Run is complete, why such haste and why such incomplete physical data?

The third guiding principle, under date of October 31, 1956, reads as follows:

> "We regard it important to provide complete, satisfactory assurance to up-river counties that there would be no lowering of their optimum lake and stream levels and that such counties would always have sufficient water for their own needs and growth."

This established, that policy would be to assure upriver counties that their water needs would not be adversely affected by taking from them lake and stream water which they could not recapture. However, a study of the bills points to the fact that no consideration is being given whatever in their content to the situation in Mercer County, where it is as important as it is anywhere else, that water be made available for industrial and other purposes. It is true that in parts of the bills the suggestion is made that the water would be made available to all persons, corporations, etc., who applied, but the plain emphasis of the bills is to provide water for the use of upstate counties and there appears to be a disregard of basic needs of the home county of Mercer, so far as its water needs are concerned. While Mercer County is not specifically excluded by language in the bills, it is nevertheless excluded by inference. Further, the clear impact of Mr. Shanklin's testimony of last week was that the needs and demands of the users to the north of Mercer County would, as a matter of policy, be first served.

Another guiding principle of the Committee is set forth in No. 11, which is as follows:

> "We want to achieve the maximum of protection against soil erosion. In these and in other respects we want to give consideration to the federal aid which may be available for such purposes."

This guiding principle talks about protection against soil erosion and giving consideration to federal aid. The plain truth of the matter is that this Committee has disregarded the work of the Association for which I speak. Despite the fact that the Stony Brook-Millstone Watersheds Association had progressed to the point of having federal aid assured for its conservation program and dams, this Committee ignored the work of years, and this guiding principle is also a mockery in view of the record. There is not one reference to soil erosion in either bill, and it is manifest that should these reservoirs be built they would be things in being and that soil erosion programs would be on a hit or miss basis, so far as these bills are concerned. It may be that problems of flooding have been carefully considered, but if so there is no factual information that I know of available.

Mr. VanWegen testified last week that the Stony Brook-Millstone Watersheds Association, together with other agencies and including prominently the Department of Conservation and Economic Development, has been working on conservation reservoirs on the tributaries of Stony Brook. In view of his testimony and the rich background of information already acquired, would it not be the part of wisdom and in the best interests of all our people to have this thoroughly explored

before plunging ahead? This Watersheds Association would welcome the opportunity to assist in a study to relate its program to the needs of the State on their water problems. And I submit on its behalf that Federal Aid should not be ignored by New Jersey in these matters nor should the work of this agency, which does not depend on New Jersey tax money, be thoughtlessly obliterated.

A fourth guiding principle was No. 14, to the effect that "any water supply project will be self-liquidating." While it may be proper in bills of this nature to authorize the use of the State's funds for the payment of bonds and to provide that ultimate levies shall be against the home owners of this State, this guiding principle is also mocked in the absence of any statistical information or evidence that, indeed, these projects will be self-liquidating. In effect, the people of New Jersey are being asked to sign a blank check.

A further evidence of the haste and lack of firm foundation of these bills is the fact that, despite the importance of planning in this State and in the various communities, these projects, which by their very nature require over-all planning to a great degree, have not resulted in any sense from consultation with local planning boards and other governmental agencies below the State level. This failure to consult, in itself, constitutes an indictment of the program suggested. I would further point out that this in itself is a major reason why the Stony Brook-Millstone Watersheds Association should, to justify its existence, oppose the haste with which this program is being put forth, for it

is a matter of the record that this Association has instituted studies over the past two years which it makes available to interested planning agencies throughout its area.

To ignore the people who have established these local planning boards which safeguard their interests, and to ignore this Association which has labored to conserve the water and soil of the area, is unjustifiable and smacks of paternalism.

We are not opposed to sound water programs, but we do say that the Committee has ignored and twisted at least four of its basic guiding principles, and we urge that the two bills in question be not adopted for the above and other reasons which will be advanced by other speakers.

In closing, I would call the Legislative Committee's attention to page 14 of the proposed On-River Water Supply Law of 1957. There are no specific standards established for the ascertaining of the amount reasonably contracted to be paid to school districts and municipalities, and it is my view that this portion of the act is legally unsound as now written.

Thank you very much.

SENATOR DUMONT: Mr. Coates, what type of program does your Association have with regard to these conservation dams and reservoirs that you speak about?

MR. COATES: Well, I think that Mr. Malcolm Crooks, our Executive Director, is better qualified to speak on that subject than I am. He knows all the details, Senator. I don't want to avoid your question but I am not as familiar with those details as he is. I do know that under this 566 act that the Association has engaged with the Department of Economic Development and with the Federal Government and

they were all set to go ahead on at least two of the dams, as I understand it, having gone to the point where they had obtained easements, and so on. But as to these specific details, I would defer to Mr. Crooks.

SENATOR DUMONT: I would like, before we go any further, to note the presence of Senator Donal Fox of Essex County, a member of the Committee.

Senator Crane has a question.

SENATOR CRANE: Mr. Coates, just what is your position?

MR. COATES: I am a trustee of this Watershed Association.

SENATOR CRANE: And what's your normal livelihood, sir?

MR. COATES: I am an attorney at law.

SENATOR CRANE: Have you had an acquaintance with water programs prior to this time?

MR. COATES: I would say only slightly, Senator.

SENATOR CRANE: Now, I believe you have the same statement that I have - probably it's typed up differently. In the sixth paragraph, you are talking about complete programs and the desirability of having a complete one offered to the people rather than fragmented programs. I believe that was your point.

MR. COATES: Yes, that is so.

SENATOR CRANE: Sir, are you aware of the various studies that have been undertaken by the State and by federal authorities on water?

MR. COATES: I am somewhat aware of them, having waded through the 1955 Report, Senator.

SENATOR CRANE: Well, do you believe it's fair to state

that if we developed the Tock's Island Reservoir in the Delaware, that would take ten years and would you also concede that if we worked to develop Round Valley as rapidly as possible that might take from five, six or seven years before we could take water from it?

MR. COATES: I am not familiar with all the engineering data on that. If that is what the engineers say it would take, I would agree with their estimates of it, in the absence of any contradictory evidence.

SENATOR CRANE: I believe we do have those statements in the record. But I wanted to point out to you, sir, that this very program was one which was suggested in the TAMS Report, the Tippetts-Abbett-McCarthy-Stratton Report, and are you asking that they bring out the entire plan for the development of the Raritan River Basin before the people are asked to judge it?

MR. COATES: I would think, sir, that that would be the part of wisdom in New Jersey. We have had a sad experience with Chimney Rock. The people voted it down. I would think that unless the people had the full information they will vote this down. I think that you have to trust the people's judgment in these matters. I don't think that you can go in with a program that is not complete. What I am attempting to say is this: We have heard testimony here that ultimately the solution may be the Delaware River and that may take ten years. We are in dire need of water, there is no question of it, but there are many other states in this Union which have far less water than we do and they regulate it far more stringently

than we do, and when we compare our situation with some of our western states' situations, we have nowhere near the problem. And, therefore, I think that, where we have an available natural resource such as the Delaware River, even if it takes five or ten years, we should be loathe to plunge into programs which are not well conceived and well considered. Now, it may be that ultimately the work of the engineers will develop that this is a good sound program. If so, I think then that, once that's established, this Watershed Association would be in favor of a sound program.

SENATOR CRANE: Well, now, sir, what would you consider a sound program? You know the Elizabethtown Water Company investigated 15 sites on the Raritan for possible small dam development. The TAMS Report suggested seven or eight sites, and now Whitman, Requardt & Associates, of the Water Resources Advisory Committee, has recommended two. Now, which of those programs do you think are sound and look to over-all development?

MR. COATES: Senator Crane, you compliment me in thinking that I could answer that question. I do not have enough background--

SENATOR CRANE: No, I'm trying to point out, sir, that there are three different choices as to what might be considered a competent program - fifteen, seven or eight, or two. Possibly it might be that in the integration of our water programs throughout the State, I am suggesting that it may not be necessary to develop more than two reservoirs on the Raritan.

MR. COATES: That may be so, but I think at this point that the foundations have not been laid.

SENATOR CRANE: Well, then, I would like to get on to the next point: On page 2 of this release you have, it seems to me you are trying to make a point of haste and incomplete physical data. What is your opinion of the Tippetts-Abbett-McCarthy-Stratton Report?

MR. COATES: Well, I'm not an engineer. But I would point this out to you, Senator, that this Committee was appointed - with all due respect to the capabilities of the engineers who participated - in September of 1956 and they come out with a report just a few months later, and I submit that this preliminary report is not anywhere near--

SENATOR CRANE: I'm not referring to that report. I was asking your opinion of the Tippetts-Abbett-McCarthy-Stratton Report.

MR. COATES: Well, I'm not an engineer, Senator.

SENATOR CRANE: Well, it cost $167,000 and they investigated both the groundwater sources of the State and the sources from run-off waters, and was believed to be quite comprehensive. In fact, the Army Engineers have stated that it was considered excellent in every phase.

MR. COATES: Well, you are speaking of the 1955 Report, is that so?

SENATOR CRANE: That is correct.

MR. COATES: Well, as I recall it, there was just about 14 lines devoted to this Stony Brook Reservoir in that Report, and, as I also recall it, the figures in that Report

the facilities for developing the water, and so forth. It may not be the correct technical term but the cost estimates there were based on a different basis. This is considered to be raw water.

SENATOR CRANE: It offered three different plans for the development of the Raritan and I was under the impression it went into them at quite some length. Perhaps it didn't have more have 14 lines in one particular section with regard to Stony Brook but it certainly considered these various sites. One plan was to provide simply regulation of flow in the stream, another plan was for regulation of flow in the stream plus diversion, and another was for development of these small dams in conjunction with such projects as Chimney Rock or Round Valley, and it was my impression that it was quite comprehensive, but it evidently was not to your mind.

MR. COATES: Well, I think it was quite comprehensive, but if it was quite comprehensive, why is it, Senator, that we hear this testimony day after day that we don't have the facts on this, we don't have the facts on that. I just can't understand that.

SENATOR CRANE: Well, I would like to point out that these objections that we have received have been mainly from the Stony Brook-Millstone, from Hunterdon County, but that other very competent sources have testified here in behalf of these measures and have seemed to back up the fact that competent statistics are available on which to make a start; in other words, that at this time we have ample statistics on which to at least say this seems feasible, and then, from that point, when they authorize the project, they

make the detailed engineering investigations which fix the site of the dam.

MR. COATES: I understood from the hearing last week that that was the way to do it. I simply disagree with that method of procedure. I don't think it's sound.

SENATOR CRANE: Well, why do you recommend that New Jersey do any differently than the federal government or any other agency of government?

MR. COATES: I think, Senator, you pay me a compliment in thinking I can answer all these questions. I'm not an engineer. But as I see the picture, this program has been presented or is being presented to the Legislature with a lot of things lacking and I don't think that the Legislature should be asked to enact legislation of this sort unless you have more detailed information available. Apparently from what I have heard, unless my ears deceive me, you don't have all that information available. It is true you have these different reports, but as Mr. VanWegen pointed out in this letter you read this morning, as I understand it, and I may be wrong and would be glad to be corrected, there have been no test borings made, the contour lines which appear to be significant have not been established, and all those things I think are important before we begin asking the people to spend money.

SENATOR CRANE: Well, now, let's at least establish this, sir, that this is a matter of your own personal opinion.

MR. COATES: I think that this opinion may be shared by others.

SENATOR CRANE: Yes, but I mean, so far as you are concerned, this is your own personal opinion and you are rendering it as a lawyer and as one who is a member of the Stony Brook-Millstone. Is that correct?

MR. COATES: I would say that is true, yes.

SENATOR CRANE: Now, to enter a phase of questioning, sir, that might be in more agreement with you, I noted in about the middle of your report you were talking about Mercer County as not specifically protected, and you are talking about being able to get water in the future. I would like to ask you - At the first hearing we had a statement entered on the record by Thurlow Nelson of the Division of Water Policy of the State and he is considered by many to be an expert, and he, himself, proposed that more consideration be given this point. I know that in his statement he said specifically that we should think of the immediate areas and that they should be safeguarded, and since there is no actual language in the bills which states that specifically, he suggested it as an amendment. I was trying to find that - page 85-A; that's where it starts but the specific statement isn't there.

Would you like to see that provision written into the bill, sir?

MR. COATES: I most certainly would. I think that in simple justice to Mercer County and as a potential for industrial users, etc., it should be written in. I would like to point out that, I think it's Senate 273, on page 5, paragraph 6 (a), states that the department, meaning the Department of Conservation and Economic Development, "shall

have jurisdiction and control over the use and disposition of all additional water made available for public use, pursuant to this act...." Now, I understood Mr. Shanklin to say, unless I heard incorrectly, that primarily the waters here would be for the use of the people up north, in the northern counties, before anybody in Mercer County would be considered. Now, I may have misunderstood him, but I think that's what he said at this desk the other day. That being so, I think most emphatically there should be some other provision written in here, and I would like to point out that it's quite important because of where some of this water springs from. I happen to live in Highstown and I know that the flow there of the water is sometimes very slack in the summertime, and it's used a great deal by agricultural interests there. Sometimes these lakes and ponds are practically drained. If you are going to have this situation, I think it's most important, not only for industry but for our farmers too, that these things be considered and some protective provisions inserted.

SENATOR CRANE: Dr. Nelson had in his statement, "May I for emphasis repeat the last two lines, 'particular consideration being given to their present and future necessities for sources of water supply.'" with respect to the local areas, which would be the taking areas.

Then, too, in the latter part of your speech, sir, do you conceive that this program, which I understand Mr. Crooks will testify to, that is, the Stony Brook-Millstone - do you feel that a program such as that is one which could possibly meet the state's needs?

MR. COATES: I am suggesting this, which I think Mr. VanWegen was suggesting, that it ought to be considered. Now, here you have an association which for a number of years has been gathering data on water and the availability of it, etc., primarily for conservation purposes, erosion, and that sort of thing. But there is no reason, as I understand it, why this could not be developed further so that water could be used for other purposes which are conceived by this bill. Now, no doubt there would not be the quantity of water that these bills anticipate being provided in this smaller system of dams, but if this were to be considered possibly on a wider basis throughout the State, it might be ultimately that it would be a very desirable thing for this State from several points of view. You might be able to mitigate the water problem at far less cost, with aid from the Federal Government, you certainly wouldn't dislocate as many people as these plans contemplate, and ultimately you might be able to get enough water to mitigate the situation until this five or ten year program with the Delaware is resolved. I think we are entitled to look to the future and investigate these things.

SENATOR CRANE: Well, do you think on an over-all basis that such a program as this could be utilized to the benefit of a state-wide water program; in other words, our desire to meet the needs of more potable water supply.

MR. COATES: I think it should be explored, Senator. I would not say after study whether or not it would be feasible. I don't know enough to tell you that. But I think definitely it should be explored.

SENATOR CRANE: Now, sir, you talked or questioned the fact as to whether the project was self-liquidating or not. I would ask you, sir, was the Bunnvale project or Chimney Rock or Round Valley self-liquidating?

MR. COATES: I don't consider myself qualified to speak on those, Senator. I am only basing my statement on what I have heard here, what I have been told about these bills, and what I have read, and I haven't heard any testimony here from anyone to establish anything but an idea or an opinion or an estimate that it would be self-liquidating.

SENATOR CRANE: But you felt qualified enough to criticize, though.

MR. COATES: I certainly feel that I have the right as a citizen of this State, even if I were not a trustee of the Stony Brook Watershed Association. I think it's just fine that the members of the public can come here and you gentlemen graciously listen to us.

SENATOR CRANE: Did you criticize at any time the Bunnvale, the Chimney Rock or the Round Valley project as being not self-liquidating?

MR. COATES: I did not.

SENATOR CRANE: All right, sir. And my last question of you: You referred again to that experimental paragraph which is included in the bill for negotiating purposes. It was put there solely to put the people on notice that we would like to develop a paragraph related to rebate to communities. Are you aware that that's an experimental paragraph and we are attempting to get better language?

MR. COATES: I'm not aware-- I would consider that all of the language would be studied, Senator. I think there are various areas here where probably the Senate would, before these bills are enacted, improve the language and change it. I think that's the normal course of legislation.

SENATOR CRANE: Did you hear Senator Lance and I debate the subject?

MR. COATES: No, I did not. I missed that.

SENATOR CRANE: Commissioner McLean enjoyed it.

Have you any language that you would like to recommend for that paragraph, for rebate to communities?

MR. COATES: Not specifically.

SENATOR CRANE: All right. That's all I have.

SENATOR DUMONT: Senator Fox, have you any questions?

SENATOR FOX: No, sir.

SENATOR DUMONT: Are there any questions that anyone desires to ask of this witness?

EX-SENATOR O'MARA: Mr. Chairman -

SENATOR DUMONT: Senator O'Mara.

EX-SENATOR O'MARA: Mr. Coates, were you in the chamber here when Commissioner McLean testified?

MR. COATES: No, I wasn't.

EX-SENATOR O'MARA: Well, let me read you an excerpt from Commissioner McLean's testimony which appears on page 52-A of the record:

> "While my testimony is obviously favorable to the provisions of the legislation, I do not wish for the tenor of my remarks to seem dogmatic. My conclusions are based on preliminary data obtained in the course of broad engineering surveys. Let me acknowledge the necessity of additional information. The facts and

figures now available must go through a process of refinement. Or, to express it as clearly as possible, we must go beyond the general inquiry that has led to our present conclusions. We do not have all the data we need to have; and obviously there are many questions that cannot be neatly answered at this time.

"The next logical step is to gather more detailed information relating to the geology of these areas as well as the amount of land required for the reservoir sites and the value of real estate which must be acquired. Detailed information of this kind is essential in determining the proper location and design of the reservoirs and in establishing conclusively their general soundness. As a matter of common sense and as a matter of fairness and responsibility to everyone concerned, under no circumstances would I be willing to proceed with the purchase of land until more detailed fact and figures have been compiled."

I take it from the tenor of your remarks, Mr. Coates, that you are in thorough agreement with the testimony of Commissioner McLean that I have just read to you.

MR. COATES: I would commend him for such a statement.

EX-SENATOR O'MARA: And you agree with it?

MR. COATES: I certainly do.

EX-SENATOR O'Mara: Again let me read from Commissioner McLean's testimony. I'll go back a question or two so that we can put it in proper context:

Question by Senator Crane: "How much do you propose would be spent for such a survey?" (This question is directed to Mr. Ritter.)

"Mr. Ritter: It's in the category of maybe one to two hundred thousand dollars, something like that."

"Senator Crane: A hundred to two hundred thousand dollars."

"Mr. McLean: Senator, I might add that Mr. Shanklin - and I am not trying to pin George down to an estimate, this is a wild estimate on his part, but he threw up the figure of about

a hundred thousand."

Did you hear that testimony?

MR. COATES: No, I did not, sir. I wasn't here.

EX-SENATOR O'MARA: Have you any reason to suppose that it is inaccurate?

MR. COATES: I have not, no.

SENATOR CRANE: I have one further question, Senator Dumont.

Mr. Coates, I wonder if you would lose faith, then, in Commissioner McLean if I read to you a question that was put to Commissioner McLean by Ex-Senator O'Mara. At the conclusion of a debate which led up to these very points which he was bringing out, we were determining that this survey was one which would normally be conducted after a project was authorized. At the end of finding out the cost of such surveys and everything else, we came back to the original point and Ex-Senator O'Mara, according to the record, asked this question: "Well, do I take it that in your judgment the information presently at hand is sufficient to submit to the people the question of adoption of a referendum?"

"Mr. McLean: I believe so."

MR. COATES: I think he's inconsistent. I think further that the Commissioner is inconsistent in this, and I think the Senate would be, in this planning aspect that I spoke of. In 1953 the New Jersey laws on planning were passed and they have been of great aid to the State and the municipalities since. Here we have a situation where one of the departments of the State just ignore through this committee all the local planning people, and so forth and so on. I think there are

many inconsistencies and I agree that that is inconsistent.

SENATOR CRANE: They may be inconsistencies, sir, but, as I asked you to previously acknowledge, certainly the federal and state programs of record point to the fact that they more or less paralleled present procedures that we have instituted on these dam projects, and that no further investigations were necessary before authorization was granted or the State submitted it to a referendum. You are aware of that?

MR. COATES: I may be wrong in my entire concept of this, but as a matter of putting it to the people of New Jersey, I should think that we ought to have these things in hand first. I may be entirely wrong; I'm not an expert on these things, but it doesn't seem to me to be the part of good sense, Senator.

SENATOR CRANE: Well, that's the sense of your opposition, then, that you would like to have further investigation.

MR. COATES: I certainly would.

SENATOR CRANE: Thank you, sir.

SENATOR DUMONT: Any further questions of Mr. Coates?

Thank you very much, Mr. Coates.

I will now call on Mr. Malcolm Crooks, Executive Director of the Stony Brook-Millstone Watersheds Association.

M A L C O L M C R O O K S: Senator Dumont and members of the Committee: My name is Malcolm Crooks. I am Executive Director of the Stony-Brook-Millstone Watersheds Association. It is as an employee of that organization that I would like to read the following statement from the Board of Trustees of the Stony Brook-Millstone Watersheds Association:

The 23 Trustees are: From Hopewell, Mr. John Fausett, Mr.

Frederic Peterson and Sol Posner; from Hightstown, Mr. Henry Coates; from Lawrenceville, Mr. Lloyd Carver; from Princeton, Mr. William Flemmer, 3rd, Mr. Edgar Gemmell, Mrs. Harry Hart, Mr. Edward A. MacMillan, Mr. David H. McAlpin, Mr. I. Russell Riker, and Mr. Herbert H. Smith; from Pennington, Mr. Harold Blackwell, Mr. William P. Howe, Jr., Mr. Robert Jones, Mr. Fred Rasweiler, Mr. T. P. Reed, Jr., Mr. Paul VanWegen, and Mr. Donald Woodward; from Titusville, Mr. Charles Oldis; from Blawenburg, Mr. Albert VanZandt; from Skillman, Mr. George Drummon and Mr. E. H. Wellemeyer.

Last Thursday, Mr. Paul Van Wegen, president of the Watersheds Association, criticized the lack of data in the Advisory Committee's report. Inasmuch as Senate Bills 272 and 273 are based upon this report, Mr. VanWegen properly questioned the wisdom of asking the citizens of New Jersey to sign a check for a $14 million dollar bucket of water of unknown dimensions. He made some positive suggestions for immediate and long-range programs for the full and economic development of water for New Jersey.

Mr. VanWegen endorsed two principles which have received popular approval in this room; that is, the development of Round Valley to partial capacity with Raritan water and the speedy advancement of commitments looking to the future use of Delaware River water. Further, he urged a modest pilot study to test the Sanford theory for use of surface and underground water in the sands of the Upper Millstone and South Jersey areas.

Reminding us that "with water in scarce supply we should no longer act as though it were plentiful," he said, "the

State should lose no time in enacting legislation requiring certain minimum standards of water conservation in municipal and industrial use."

Mr. VanWegen's water policy proposals were highlighted by the suggestion that the Stony Brook-Millstone Watersheds Association's existing small dams program be the core of water supply development in the Stony Brook, as well, possibly, as in other areas of New Jersey.

These dams which are being built by the Watersheds Association, the United States Soil Conservation Service, and numerous Federal, State and local agencies, could be redesigned, in some cases relocated, to fulfill the multi-purpose functions of water supply, conservation, and recreation. Their economic justification would be simpler, their disruptive dislocations less, and their value to the local area far greater, than with the one large reservoir which is now being considered.

Mr. VanWegen emphasized in his Thursday statement positive alternatives to the recommendations of the Advisory Committee rather than dwelling on the numerous flaws and shortcomings of this report.

The Watersheds Trustees would not have you think for one moment that we do not find grave omissions in the proposal before us. However, although it is tempting to pick this document apart piece by piece, inference by inference, this would not serve the Watersheds Trustees' desire to help solve the water problem.

Whether it knows it or not, modern society is becoming attuned to and dominated by principles of conservation,

psychotherapy and physiotherapy for the mentally and physically disabled, social rehabilitation for the curable criminal, land and water conservation for natural resource waste, and now, finally, regional planning for community disorders. And so, for this proposal, we wish to be non-destructive, unwasteful; that is to say, we wish to be completely constructive in our criticisms.

That is why we feel compelled at this time to call attention to the remarkable neglect in these two bills of any integration of the water supply proposals with other vital aspects of the region's growing needs.

We believe that any proposal or recommendation of such far-reaching consequence as the development of water supply reservoirs should be carefully related to a study of existing land use patterns and future development potentials within the affected areas, as well as to studies projecting and anticipating future land uses.

The problem of water supply - to paraphrase a famous line of poetry - "is not an island unto itself." It cannot be treated as a separate entity within those areas where it happens to fall. It is part of a complex whole. Any project for reservoir locations should be carefully plotted and planned for harmonious relationships with other vital institutions, not carelessly superimposed - like some tremendous bomb-crater senselessly wiping out roads and buildings - on an unprepared community.

This proposal shows little respect for the affected counties and municipalities. It heedlessly violates their necessary sense of integrity and orderliness. How wasteful

and traumatic it is! It thinks to be a long-range plan, forward looking into the future. And yet to those of us who have dedicated ourselves these many years to conservation and planning for the orderly development of our area for generations to come, this hasty proposal seems shortsighted in the extreme.

We prefer to go more slowly - take time to collect the facts which are necessary and to relate our plans to the requirements of all phases of the region's needs. A thing worth doing being one worth doing well.

Let us list briefly several of the specific disruptions which the affected municipalities and counties may expect of these proposals.

First, possible dislocations in transportation systems which must be mended and inserted into alternative sites at unestimated expense and with incalculable upheaval of present social and economic values.

One of the most important aspects of regional planning is that of proper traffic circulation. Major arterial highway and secondary road systems are increasingly fundamental to the economic well being of established communities and growing urban fringes. The New Jersey State Highway Department and our local municipal planning boards have long been developing master plans for an orderly circulation system keyed to the major highway and traffic patterns. The job still remains to correlate all of these, but work to this end is under way.

The Advisory Committee, apparently blind to all problems except that of water, has not advanced any solutions to this

major problem, except to allocate a "contingency fund" in its proposals. Thus existing roads may be blocked off with no provision made for the redirection or relocation of traffic facilities. The municipalities and counties will be saddled with these additional problems if the proposed reservoirs are built.

Second, a great deal of discussion has occurred concerning the promised recreational potential of these reservoirs. This aspect of the proposal is being sold without sufficient factual evidence to guarantee it. If these reservoirs are going to be multiple purpose facilities which will serve both water needs and recreational opportunities, then the questions should be asked - what studies have been made for the needs of this area? What standards have been established to decide how much land is needed beyond the actual water level, and where? What techniques will be used to minimize the adverse effects draw-down has on recreational use of the reservoirs?

As a result of regional planning studies which our Association is jointly conducting with the Rutgers Planning Service, we have already investigated some of these aspects. We have made a preliminary study of the recreational facilities for the Watershed and the region. We have suggested standards for recreational facilities based on our studies in land use, population, traffic, zoning, topography, and water resources. Serious consideration is indeed in order before a major change in land use is thrust upon any area. Picture the effect of this sprawling, muddy water reservoir. It is not a temporary structure. The people in the vicinity will be living with it

for generations to come. It should be planned with serious thoughtto the future potential for recreation and other local uses. It should be so designed and land should be so purchased that it offers maximum benefits instead of haphazard benefits for this increasingly important aspect of living.

Third, water is becoming more and more the economic base to our communities. Water, its abundance or scarcity, is regulating, in a large measure, our population expansion, industrial expansion, and all the facilities which go to make up a well-balanced and happy community. It appears that very little consideration has been given to the over-all effect of this proposal upon the economy of the immediate vicinity of the proposed sites.

In planning for water needs, let's look into the crystal ball projecting the future rather than stick our heads into the mud of the lower Raritan. Yes, present water needs of the New Brunswick-Manville areas far exceed the requirements of the less populated upstream areas. But will today's ratio hold true 25 years from now? All indications point to a rapidly increased water demand in the Upper Millstone Watershed, along the Pennsylvania Railroad, along Route 1, and near Hightstown. This area is about two per cent urbanized. A neighboring township, East Brunswick, grew 300 per cent in nine years.

At present the Stony Brook Watershed is only 7 per cent urbanized. This area is immediately adjacent to the congested Trenton area and is within 20 or 25 miles of a number of other urban developments which are 30, 40 and 50 per cent urbanized.

This forms the pattern for many of our rural areas some 10 to 20 years hence. Those municipalities of most rapid growth in the past decade will be supplanted by others which are only now showing these signs.

A few moments ago I referred to the regional planning studies which are being carried out by our organization and Rutgers University. Incomplete as they now are, they indicate a very serious water problem developing in the near future in the Stony Brook Watershed, because of an anticipated rapid population growth as well as some industrial development in this area.

You will note on the zoning density map of our Millstone Regional Studies that I have put up over here beside Senator Crane that there is a zoned industrial strip (the gray area) which travels along the Reading Railroad line. It is no mere coincidence that this zone straddles the Stony Brook. The industries which will move into this zone will be best served by the multi-purpose type reservoirs which were suggested by the Watersheds President last Thursday rather than by a larger reservoir some distance downstream.

I would like to quote from the section on water in the preliminary Progress Report of our Millstone Regional Planning studies which was issued last February: "In a time when the urban areas of our State are clamoring for water and reservoirs, it is questionable how much attention would be paid to the future needs of an area such as the Stony Brook or the Upper Millstone Watersheds, which have yet to reach a peak demand. However, the area lies in a pattern of rapid development. There is a strong need for an analysis of the

water potential and supply of the area so that the interests of the watershed may be protected in a long-range program."

We did not know at the time this was written how close the clamoring was to be upon us.

In concluding these remarks, the Trustees of the Watersheds Association wish to make three suggestions for your consideration:

1. Any proposal for water retention reservoirs in the Raritan Watershed should be a part of a thoroughly studied integrated plan for the full development of the water potential in this region.

Specifically, we urge that pre-design investigations be made at the various reservoir sites in the entire basin before any one site is approved for construction. For only after this information is at hand can a truly integrated and well-planned development of Raritan water be accomplished. The relative merits of the smaller multiple-purpose dams and the larger ones should be weighed at all locations by such studies.

We would like to quote from a paper recently given before the State Planning Conference by Lt. Colonel John Lee of the Philadelphia District Army Engineers. You are no doubt aware that Colonel Lee is in charge of the comprehensive Delaware River studies. He said, "Unless there is already prepared a basin or watershed plan to which to refer, the errors of the past will be repeated. The planner will project a rising demand curve, determine when and by how much existing water resources will become inadequate, and engineer the direct solution. The competing uses for water will be largely ignored, since the machinery of basin-wide coordination is

not normally available. Therefore, water supply planning is nearly always piecemeal and erratic.

"In any such procedure, waste and inefficiency are inevitable. Water supply structures are usually either too big or too small, and too early or too late. But, far more important to the local economy, since these structures are designed and built for just the one purpose, they preempt a dam and reservoir site that normally can also be used for many other purposes. It has been found that multi-purpose structures make it possible to spread the cost of their construction and operation over a number of purposes so that the charges on water supply are lessened. Thus the usual water supply plan not only is too costly, but also takes for its own use an irreplacable natural resource that should belong to all the people for all compatible uses. Although water is itself a renewable resource, dam and reservoir sites are not. They are the critical resource that must be conserved and used wisely for the highest and best purposes for the benefit of mankind.

2. Water supply investigations should take their proper place with Raritan regional planning studies which would include an inventory of traffic circulation, population growth, economics, recreation and all the other important aspects of community growth and well-being. The approach which the Watersheds Association and Rutgers Planning Services have found workable in our pilot study is the type of approach we feel should be used in any program of such far-reaching consequence as that of water supply.

With bills S-272 and S-273, the citizens would be asked to vote on a 14 million dollar bond issue for a water supply proposal that not only is lacking in essential information but has been made, it appears, with little regard for other essential aspects of the growing population and industry in this region.

It has been estimated that for a cost of about $500,000 a comprehensive study (the type that should be made) can be accomplished for the Raritan Watershed. This study would relate water supply, traffic, population, recreation, and economics. It would produce a survey of present and future water customers in the various sections of this region. It would give a better idea of who is going to pay for the water now and in the future, where the water will need to go and where it should be developed. We might find that our customers are not so much around Elizabethtown, Linden, and so forth, but around the other future industrial and residential areas developing in other areas.

It is possible with such studies to more nearly direct the future growth because the planning studies are implemented with capital expenditures by municipalities and by the State. The Highway Department builds the roads which are planned and are needed. The municipalities zone areas appropriately so that the watershed and other values may be protected. All this is a part of a comprehensive planning study. The reservoirs would fit into such a study and would be thereby much more sound economically, physically, as well as socially.

Inserting a comment, it has been estimated also that this study could be accomplished within a year's period.

The logical group to head such a study is the State Planning Bureau which is within the Department of Conservation and Economic Development.

3. As the Trustees see it, the need for speed in this matter of water is most urgent in the temporary "freezing" of good potential reservoir sites.

The lands in the several Raritan basin reservoir sites are daily receiving capital improvements that in most cases could just as easily be located elsewhere. In looking back to earlier water supply proposals we note with dismay that several of the best reservoir sites are no longer feasible. Mushrooming population and industrial growth on these lands make it impossible to ever reclaim these sites for water storage.

In his report on the water resources of the State of New Jersey in 1922, Allen Hazen proposed a reservoir at the juncture of the North and South Branches of the Raritan. This is the location of the TAMS' North Branch reservoir. The TAMS Report recommends a 10 or 30 billion gallon storage reservoir at this site. Hazen's Report called for one of 300 billion gallon capacity, covering 48 square miles. Mr. Hazen's water supply for the Raritan would have been 1,500 m.g.d. in contrast to the present day expected development of about 300 m.g.d. In 1922, Mr. Hazen foresaw a problem, and we quote: "to find a market for so much water." The same problem could exist today if we still had the reservoir sites of 1922. Let's save what's left.

But how? The first step is to make the basin-wide investigation which can then be drawn into a master plan for Raritan water supply development. Then we'll know the

reservoir sites that are needed as well as their dimensions. The second step is to tie down these areas - freeze them from additional capital improvements. This can be a problem. We'll suggest four methods - there are doubtless others. First would be the adoption of an official state drainage map which would include demarcation of the reservoir areas. This would operate in a manner similar to the existing "official map" legislation. It would legally dedicate the land involved to this particular use. Should any of the landowners involved wish to make capital improvements, the State would have a year, or some other specified time, in which to decide whether to release the land so held or purchase it at the market value. Since there would be relatively few wishing to make capital improvements under these conditions in any one year, acquisition of the properties would be at a slow pace. Of course, at the time a reservoir is needed, the State could immediately purchase the acreage involved.

A second method might be to purchase flowage easements; in other words, pay rent to landowners in the reservoir sites in return for the privilege of holding those lands for water storage use. Third, and closely related to the latter scheme, is to option the land for a short period of time, perhaps 5 years, with the idea that during that interval the State would find a means of purchasing all of the sites. A fourth procedure would involve the cooperation of the municipalites with the water study group and the State by local zoning - zoning to prevent additional development from coming into these vital areas. The municipalities could give this co-

operation if they were assured that these water prospects are good for them.

But whatever method is used to save these irreplaceable water storage sites, let's be on with it. We have no time to lose. Is it unreasonable to ask for money NOW for these investigations that are needed - and to ask that as soon as these studies are complete to devise some way to immediately stake out a claim on the economical and desirable areas? Can we afford delay?

Senator Dumont and members of the Committee, the Watersheds Trustees appreciate this opportunity to bring before you our thoughts on the development of water supply in the Raritan Basin.

Thank you. (Applause)

SENATOR DUMONT: How many dams and reservoirs does your Association contemplate in the area where this map is?

MR. CROOKS: We not only contemplated them; we had them actually designed and located nine of them. That does not mean, of course, that there necessarily would be nine or any other specified number, should they be redesigned for water supply. There could be three, four; there could be fifteen or eighteen. We wouldn't know until studies were made.

SENATOR DUMONT: What would their size be?

MR. CROOKS: It would be according to their location and the justification. We found that in justifying these reservoirs for conservation purposes and for local water supply, the sites where they were located could take various size reservoirs, but in order to justify them on a benefit cost ratio, theycould be pretty much only one size, more or

less. So the size would be dependent upon the justification. If water supply is included, they could be considerably larger than they now are. A few of the sites which are now held for our reservoir sites could not be used for water supply, as I see it; they would be too small. On the other hand, several additional areas which we could not use for our sites could possibly be used now, using water supply as an additional justification.

SENATOR DUMONT: Did you plan these sites just for conservation or for water supply?

MR. CROOKS: We planned them for most all uses except downstream water supply. We had no information that would lead us to believe that downstream users were willing to pay a portion of the cost. I would like to point out, by the way, that in the 566 federal legislation, these dams for water control, as these dams are, may be built with federal cost sharing on them. Should additional local benefits be desired for water supply or for any other reason which would make their size larger than for the specific purposes of the Act, the local people would pay the entire cost of the additional storage capacity required. In other words, the federal government will cost-share on the original size of the dams, which will suit the federal government's specifications. Then the local interest - in this case it might be the water supply interests - would pay for the additional storage capacity.

SENATOR DUMONT: Well, now, wouldn't the federal government only contribute money for the purpose of conservation as distinguished from water supply?

MR. CROOKS: Flood control, de-silting, and conservation, yes. They would not cost-share on water supply itself, but water supply can be built into these reservoirs and take full advantage of the federal aid. So the cost to the people interested in water supply would thereby be lessened.

SENATOR DUMONT: Well, then, on a smaller scale this would be the same idea so far as federal participation is concerned as we hope to get the federal government involved in the Delaware River.

MR. CROOKS: I would say so. There is a little difference. The federal government, as I understand with the Delaware River, is cost-sharing-- yes, for one purpose, isn't it, and not for two purposes. That's true.

SENATOR DUMONT: As I understand it, the federal government considers water supply peculiarly a state problem; therefore, they don't participate financially in that.

MR. CROOKS: That would be a very good simile.

SENATOR DUMONT: To what extent would the federal government actually participate in that? Have you ever figured it out on a percentage basis or an actual amount basis?

MR. CROOKS: On the reservoirs which we have planned and located, it was roughly a 50-50 split on the over-all project, the dam construction and the conservation and land treatment that went along with it. It's a two-base program - treating the land with conservation practices and building reservoirs to supplement these. It was about a half million dollar project. The federal government's share, I would say, would be about $240,000, but that was on the basis of the dams that we could justify alone. I couldn't say what their

cost-sharing would be on a new scheme such as we propose.

SENATOR DUMONT: How long has your Association been in existence? Is it eight years as one witness said?

MR. CROOKS: That's right, eight years. We have been officially incorporated for six, but we have been in existence and working for eight, carrying on research as well as other projects.

SENATOR DUMONT: Has your Association bought any of the land that you contemplate in any of these reservoir sites?

MR. CROOKS: We have purchased no land. That is part of the local contribution to this reservoir program, that the local people would contribute the land for these reservoir sites. I might say that we have had tremendous cooperation from the landowners on this very point, but no land was purchased.

SENATOR DUMONT: Do you believe that on all these reservoir sites that you contemplate, you can get the property owners to contribute land?

MR. CROOKS: I am not sure. If you increase the size of them, as they would have to be increased for water supply, I very much doubt that all the lands would be contributed. I can foresee that part of them would be contributed, because, you see, when there are smaller dams distributed throughout the countryside, there are a lot of local benefits and the people there realize that they are local benefits and they are willing to give up something in return for those benefits.

I would like to add, by the way, that the first dam which was to have been built, and originally was slated for construction sometime in April or May and then because of

government red tape it was delayed a little bit, was to have been cost-shared by the Howe Nursery property and they were going to pay a portion of the expense because they wanted the dam a little bit larger than the federal government wanted it so they would have irrigation benefits. So there was a point in which this very way of local contribution for additional benefits would have been carried out in our particular program.

SENATOR DUMONT: You think the property owners would be much more inclined to provide some land if this were an alternative to the Stony Brook project?

MR. CROOKS: My goodness, yes, because their houses would not be covered. None would contribute land if their houses were going to be covered, but if you can still live there and you have additional benefits from this water in your back yard and it is desirable from your standpoint, I would foresee that there could very easily be cooperation on that point.

SENATOR DUMONT: Did you say the first such dam was actually planned for May? Of this year, you mean?

MR. CROOKS: That's right. Our plan was to let contracts in late winter or early spring, around March or April, and I would judge that some six weeks after the letting of contracts, four to six weeks, construction would begin. It came down so that the first of May- I'll tell you; the day that this thing broke of the Advisory Committee, I was going to go out and get signatures on three of the easements that day. Contracts were to have been let by Mercer County - they were cooperating with this - around the first or second week of June.

SENATOR DUMONT: Did you contemplate through these dams and reservoirs the supplying of water to any other area of

the State than the local areas involved?

MR. CROOKS: No, except in so far as it would regulate stream flow. There would be some stream flow regulation possibly in these. We did offer to local municipalities the proposition of water supply, but they did not feel that they could afford at this particular time to pay for the additional cost of water supply. They knew they would have water needs coming up but they had just had a school bond that they voted on and they were deeply in debt and could not see putting out additional money this year for building water supplies for the future. They thought it was desirable but they could not see putting out the money at this time.

SENATOR DUMONT: Well, then, these communities at the present time have enough water supply in your area to take care of themselves?

MR. CROOKS: Barely. Another thing, I notice by the papers, is restricting undue waste in water this week. You see, and I would like to point this out, whatever has been said about the comparable quality of Stony Brook water with the quality of water in other sections of the Raritan Watershed, it's very clear that the quality of our Stony Brook water is quite low, unfortunately. We are sorry. In addition to paying for water supply, these municipalities would also have to put up quite elaborate treatment plants for treating this water. The soils in our area are highly colloidal, clay. It stays in suspension a long time. Let's not fool ourselves that this lake on Stony Brook that is proposed by the Advisory Committee would be a crystal clear lake like

like we see in the mountains. It would not; it would be muddy. Look at Lake Carnegie. That's the type of lake it would be. It's low quality water, but it's water and it should be developed.

SENATOR CRANE: First of all, Mr. Crooks, I would certainly like to compliment you on the very fine presentation here this morning. It certainly supplements that which Mr. VanWegen gave us last week and, so far as I am concerned, I think it shows a very constructive attitude. But there is one thing that I would like to point out: Two statements by Commissioner McLean were read to a previous witness, and while he felt the first one was good, he said the second one was inconsistent, which more or less points up that this depends on which side you're on. In your second paragraph you refer to principles which have received popular approval in this room. Would you tell me if there are more than just Princeton and Hunterdon County people in the balcony.

(Applause from balcony)

MR. CROOKS: Now you don't know. I have seen in the past others from other sections, but I don't know about today.

SENATOR CRANE: Well, most of the applause has come when you good people have made your presentations, and I doubt that there will be any applause for the bills.

MR. CROOKS: I would like to say that we have 450 members and we certainly hope that our membership is supporting us, all the trustees in there.

SENATOR CRANE: We'll concede that.

Now, sir, further on in your talk--

MR. CROOKS: May I comment first of all on the remarks which you first made, that there seems to be an inconsistency in Commissioner McLean's remarks. I was here that day and from reading to Mr. Coates those statements, they did seem inconsistent. But in thinking back to Commissioner McLean's testimony, I believe those statements may not be inconsistent because on the one hand, he said, "Further studies are needed before the land is acquired"; in the second point, he said, that there was adequate information for the passage of these bills. Isn't that more or less what he said?

SENATOR CRANE: That's true.

MR. CROOKS: All right. They are two different things. He was saying that these bills should be passed and then investigations made, and that is what the Association is objecting to. We feel that the bill should not be put out for a public vote. We feel it is very dangerous for the water supply of New Jersey for this bill to be put out for public vote without this detailed information first.

SENATOR CRANE: Well, this we drew from Mr. Coates.

MR. CROOKS: Yes, but it's the procedure there. Are we going to have the bill before or after these facts?

SENATOR CRANE: Well, again, I'll ask you then the same question: Why is it necessary for New Jersey to go further than any federal or state authority has gone before?

MR. CROOKS: I'm very glad you asked that question because if you had not, I would have made comments on it before I left the stand.

SENATOR CRANE: Why?

MR. CROOKS: The procedures of the federal government, as we have experienced them and as I have understood, are this: A preliminary survey is made. That would compare to the TAMS Report. Then, if those preliminary surveys indicate that whatever it is is desirable, tentatively desirable, then further investigations are made and money is appropriated at that point to carry out those investigations. In our case, we applied first in 1954 to the Federal Government - first to the Department of Conservation and Economic Development and the Governor and got their approval, and then to the Federal Government for a watershed protection project, to look into the problem and possible solution. That approval came early in 1955, I guess it was; then, at the time that approval was given, money was set up for the State Office of the Soil Conservation Service in New Brunswick to send a work plan party out to our area to make on-the-ground investigations. They also hired Economists; they brought in the U.S. Fish and Wildlife Service; they brought in the U. S. Forest Service, although the U.S. Forest Service was a part of this, actually. Several divisions of Commissioner McLean's own department came out on the ground and made forestry investigations - what were the forest problems? what could be done about them? The same thing with wildlife. The counties were considered; the Soil Conservation Districts were part of it; in fact, there are 17 different federal and state and local agencies which have coordinated in this thing. These engineers made on-the-ground surveys; they spent from about May to October, as I recall, and then went out in the field a few times later

for spot checks on information which they were not sure of, and it wasn't until February, from about April or May to February, that the final information was available upon which the final work plan was drawn. Then that work plan, containing the specific information, which included two foot contour intervals, by the way, analysis of the soil of each one of the dam sites, and other pertinent information, was submitted to Washington, to the Soil Conservation Service, to the Army Corps of Engineers, Department of Public Health, Welfare, etc., by way of Commissioner McLean's Office and the Governor's Office, receiving approval of both offices, and then, in August of last year, the money was appropriated for the first year's project which was to include two dams. We anticipated they would be built before July 1st, 1957, but we would only have gotten one started as it turned out, before July 1, 1957. That was the procedure. That's different from the procedure in this case.

SENATOR CRANE: That's on your dams.

MR. CROOKS: You spoke about the federal government procedure. And that is federal government procedure. I would also like to point out municipal procedure, and I don't have personal experience here but I have talked to municipal engineers on this. When municipalities want to build a highway or dam or any other engineering project, they have to get pre-design information and sound engineering estimates based on these pre-design studies and submit them before the bond companies will take up the bonds. Sometimes now, the bond companies even require that actual bids be made on the structures. But that is most often not true. But with

municipal bonding, and you mentioned municipal procedures and federal procedures, so I want to discuss them - the municipal procedure has to include these pre-designs we are asking for. The federal procedure, so far as we know it, requires pre-design information as we ask for.

SENATOR CRANE: I am unaware as to when I asked about municipal procedure.

MR. CROOKS: When you were talking to Mr. Coates, I believe.

SENATOR CRANE: The point that I wanted to ask about was on the Delaware River. An investigation is now being conducted by the U.S. Army Engineers, by a person who was mentioned here, Colonel Lee, and he reported last week that after completion of a survey being conducted there, which was approximately the same in every respect as the TAMS survey, the project, if it recommended itself, was considered authorized by the U. S. Government and, after that, further more intensive surveys would be made. My point was that the federal authorization was somewhat comparable to the people's approving a referendum here.

MR. CROOKS: May I ask what project that was?

SENATOR CRANE: Tock's Island.

MR. CROOKS: I do know, let me point out, that the Army Engineers have made surveys of the Delaware River, the last one completed in 1955, just a month or two, as I recall, prior to the flood - a preliminary survey, such as in the TAMS Report - and they indicated that flood hazards did not warrant flood control structures on the Delaware. It is very evident, then, that preliminary surveys can be quite far from the truth,

because they immediately then were authorized to go into full study of the Delaware Basin. In other words, Flood Diane completely reversed the information which they had on this preliminary data.

SENATOR CRANE: Well, they'll release no information on that investigation up there in the Delaware beyond their preliminary report. The final report won't be in until 1959. But leaving no stone unturned, both Senator Dumont and I have invited Colonel Lee to come here so that we may have these facts set before us. I believe he'll be here at our next hearing.

MR. CROOKS: Fine.

SENATOR CRANE: Now, you talk, again early in your presentation, about the value of these dams to the local area, far greater than the one large reservoir which is now being considered. Therefore, you are talking to the point of local benefits. Have you at any time considered state's needs in implementing this program as far as it states?

MR. CROOKS: You mean, at what time have we contemplated that. We certainly are now, yes.

SENATOR CRANE: You are now. But when did you first think of that?

MR. CROOKS: We have been thinking of the Stony Brook Watershed as a part of the Millstone and, in the long distant future, as a part of the Raritan. The Raritan has been somewhat remote from our thinking, I'll admit, and we may have been incorrect in that, but our immediate concern first of all was with the Stony Brook, and then with the Millstone, and lastly with the Raritan. You see, we didn't come to any

special conclusion at any special time on our broad thinking because we foresaw a lot of problems, so far as water supply, industrial development, population expansion, and such, We got together with Rutgers University and have been developing for going on two years now regional planning studies of the Millstone Watershed which, by the way, is 300 square miles. You can see some of the results of these studies outside in the corridor and on this map here. We have been trying to collect information which would tell us what the problems are now and what we might expect in the way of problems. Yes, sir, we have been trying to relate, and we hope in the future to relate, our thinking and our problems and our water supply to the broader picture.

SENATOR CRANE: You were talking first of all in terms of a local project because you said the people would donate land to it.

MR. CROOKS: That's right. There are all types of benefits from these. There are local benefits which are cloest to us because they are right in our back yard and, naturally, those are of high concern to us.

SENATOR CRANE: Well, that was the primary interest behind your investigations, the local benefits, was it not?

MR. CROOKS: Behind our planning studies and investigation, or behind the dams which we have built?

SENATOR CRANE: The small dams that you are talking about.

MR. CROOKS: Small dams? Yes, because they had to be justified locally.

SENATOR CRANE:

How many acres are going to be taken in the 9 small dams that you propose, sediment dams?

MR. CROOKS: About 120, actually flooded acres. It's a little higher than that, but it's about 120.

SENATOR CRANE: That's the total taking area?

MR. CROOKS: No.

SENATOR CRANE: That's the water area.

MR. CROOKS: That is the water area. I don't recall the taking area. There is a figure but I don't recall it.

SENATOR CRANE: Well, since it's been suggested that we are looking for raw water first of all to help maintain the flow and, secondly, to divert some water, perhaps to render it potable, how much, in terms of millions of gallons, would be impounded behind these nine dams?

MR. CROOKS: May I answer you in this way? It's not fair, I do not believe, to judge the worthiness of the nine dams on our maps to the possible development of water resources and other side resources in the watershed for future dams, because the design of these dams was for one set of purposes - the design of water supply reservoirs in addition to this would be of completely different design, would take in different acreages, would be in different locations, and would be of different sizes.

SENATOR CRANE: Yes, but you were talking of development of water for other uses.

MR. CROOKS: In getting around to that, I can foresee very easily the full development of the water resources in the Stony Brook by the small dams program - by a small dams program, not the present one that we have.

SENATOR CRANE: Would you have any idea as to how many dams you would have?

MR. CROOKS: I do not. I would anticipate there might be two or three on the main stem, - it's just an anticipation; we would have to get engineers on it to find out, plus some supplemental small ones. Now, to answer your question directly as to the number of million gallons stored, I do not know. First of all, we have been thinking in terms of acre-feet, and we would have to convert acre-feet into millions of gallons, and it's a little difficult to do in the head. But I recall one of our reservoirs has a capacity of about 40,000 gallons. That's not much but on that particular site it could be enlarged considerably.

SENATOR CRANE: Well, would it be rather a rough guess that it would take about 540 of these dams to equal that which is proposed as the Stony Brook Reservoir?

MR. CROOKS: No, because we are not proposing that the dams - this term "small" is perhaps confusing us. We are not proposing that the dams which we think should be investigated for water supply would be nearly as small as the ones which we were able to justify under one single justification under the federal government, and that was silt control. They will have to be larger; they will need to be larger, and they can be larger, I'm sure.

I would like to emphasize that small dams may not be the answer. We don't know. But on the basis of our eight years of working in this area, of reading widely on these problems, of meeting with others, nationwide as well as regionally, on the

same problems at the watershed conferences and soil conservation conferences, etc., we have come to the conclusion that this type of program might very well be the most feasible and the most economical and the most desirable.

SENATOR CRANE: For your area.

MR. CROOKS: No. Totally.

SENATOR CRANE: For the State?

MR. CROOKS: For the State as well as for our area. If they can provide for the full development of water resources in our watershed, you can't get any more than that for benefits for the State, can you?

SENATOR CRANE: Well, you couldn't do it with nine sediment dams.

MR. CROOKS: You misunderstand me, sir. We are not asking that our nine dams that we have on the books be used. They may be in different locations entirely. Some of the locations, I am sure, would not be used for water supply. We are saying that there are a lot of smaller sites possible on which dams and reservoirs could be built, both off the main stem of the Stony Brook as well as on it - each one of a smaller dimension but with possibly as much or more total capacity. I don't think it could be more because that capacity, I think, is fully developing the water that's running down the stream. But certainly I think there's a very good possibility that the water held behind these several reservoirs could be equal to the one large one.

SENATOR CRANE: How about the cost factor?

MR. CROOKS: I have talked to engineers and they will not stick their necks out and say it will cost less or it will

cost more, or it will cost the same. They don't know. But you might think at the outset that the cost of several dam structures would be more than one large structure. That, I do not believe is necessarily true. One of the large costs in a reservoir is the spillway, the concrete work, and the larger the dam the larger that concrete work - not by arithmetic but almost by geometric progression; furthermore, the land acquisition on the smaller sites would be considerably less because there would be less displacement, less interference with the highways, and so forth.

SENATOR CRANE: Well, now, that brings us to the next point: You used the term concerning these reservoirs - you likened them to bomb craters and that they were carelessly superimposed. Now, would you agree, sir, that water storage is rather an inflexible problem rather than flexible?

MR. CROOKS: In a way, in a measure. You are pointing out that there is one place that a water supply reservoir could go in in the Stony Brook watershed and therefore with no matter how much planning and looking to the other phases of community needs, that reservoir necessarily has to go in that one place. I would not agree in the Stony Brook watershed necessarily. There are several places where a reservoir could go. In fact, Mr. Ritter conceives that this dam could go half a mile upstream or downstream,--

SENATOR CRANE: That's correct.

MR. CROOKS: That the volume may vary from nine, and other engineers make it eight, maybe up to eleven or twelve million gallons. That's a lot of difference. Then this proposition of the small dams raises the question that there

very well may be other sites. We know there are other sites, actually, so I do not agree that there is necessarily just one site in the Stony Brook or in any other area. They are restricted and that is what I point out in the last part of this paper, that it's so important that we take and reserve the best of our sites as soon as we know where they are. But let's find out where they are first before we reserve land.

SENATOR CRANE: Mr. Crooks, I am overlooking purposely the human factor involved in this question, so I don't want to be tagged with it. But I would ask you, sir, which is easier to locate - a home, a utility, a roadway, or a reservoir? Or, conversely, which is the hardest to locate?

MR. CROOKS: Generally speaking, and you have to speak generally on that question, a reservoir site.

SENATOR CRANE: You talked of highways - I have before me the only map that I have for ready reference this morning, the Stony Brook Reservoir. On page 17, it shows the proposed Stony Brook Reservoir, of course, obliterating quite a few roads. I couldn't tell how many; I would have to count. But of those, which are key roadways - 569?

MR. CROOKS: It's according to who you are and where you live.

SENATOR CRANE: Well, yes, but I mean-

MR. CROOKS: You are speaking from the county plan.

SENATOR CRANE: Now, in your estimate, sir, would it be absolutely necessary to restore every single road there, or are there some secondary roads of little use?

MR. CROOKS: I hope that you will ask that question of

Mr. Edward Mount when he is on the stand, the engineer for Mercer County. I would not care to answer that question,

SENATOR CRANE: Well, I'll defer the question.

MR. CROOKS: I would say, yes, 569 is a major highway. Elm Ridge Road, which goes parallel to the main section of the reservoir, and is crossed, it shows here, in three different spots; it may be crossed only in one - it's according to which map you use - is a key roadway for the people of the area, and the one going from Pennington to Centerville and out to Mount Rose. Those are the main key ones. But the picture I would like to leave is this: People living in Pennington and people living in Princeton travel back and forth, as do people in Hopewell and the surrounding areas. When a bombshell is dropped and a crater is opened up, we'll say, such as this, their circulation patterns must be changed necessarily considerably unless those roadways are again rebuilt. Their social patterns may have to be readjusted - many patterns. You ask which is the most difficult to locate of these various things - utilities, highways, reservoirs, etc. Naturally I answered that a reservoir is. But we are not starting with a blank map; we are starting with a map on which utilities, roadways and houses are located.

SENATOR CRANE: I said we were overlooking the human factor.

Now, again, I repeat that you have said that these were carelessly superimposed; in other words, the reservoir site was set down on a map, thereby being carelessly superimposed. Do you think that any state government would ever so carelessly superimpose such a thing as a reservoir without

incurring the obligation to restore major routes?

MR. CROOKS: Not without wanting to do so. But could they? I don't know.

SENATOR CRANE: All right. Now, were you here when Senator Lance and Commissioner McLean were talking about this problem of rebuilding the roads and building bridges across?

MR. CROOKS: Yes, I was.

SENATOR CRANE: Do you remember that Senator Lance brought up the point that he felt this could be reconciled if we saw it in terms of the difference between duty and obligation, and I was trying to draw from him an amendment that would be acceptable to him which specified that it was a duty of the State to restore certain roads and to build bridges. Look, would you be satisfied with such an amendment?

MR. CROOKS: No. Let's start from scratch. Who is the State? The State is us and the people outside. Who is paying for it? Us. We don't want to have a reservoir built by us or by the water users, whichever the case may be, and then the relocations paid for by us. Let's figure first of all where the reservoir sites should go so that the minimum of conflicts will be established and then the people of the State will be paying a minimum amount. I wish I had Colonel Lee's paper here with me. Colonel Lee concluded his remarks last May 22 before the planners by asking a question: If Commissioner McLean acquires a stretch of stream and its boundaries for a future reservoir site and then, at the same time, the Commissioner of State Highways has on his master plan a highway crossing that site, will that highway cross

through the valley or will it be crossed by a bridge? Colonel Lee continued, "Until the problem is resolved of whether or not we are going to plan in a coordinated fashion.." Then he says that the people will be paying for the crossing in the Valley and then later a crossing over the reservoir. And I submit that that is a very, very thought-provoking question to me.

We want to minimize disruptions; we want to minimize costs. I think that can be done but it cannot be done by thinking "we want water, let's develop water, put a reservoir here because it's the best place." We must say, "we want water, we need water, let's look at the possible solutions to our water problems in relation to the over-all plan of the State." And I would like to point out, sir, that the Department of Conservation and Economic Development has been spending considerable amounts of money; I understand in the neighborhood of maybe thirty or forty thousand dollars a year, in developing a state plan for a period of fifteen to twenty-five years. It does not appear that the Advisory Committee consulted with this state plan from the recommendations which they here put forth. If they did, I am sure that their reservoirs and their allegations to upstream communities would have been different

SENATOR CRANE: Well, now, by the way, there is no one sitting here at this head table who dreams otherwise than that the people are supreme in this State. So let's have that settled once and for all.

MR. CROOKS: I did not mean to imply that, sir.

SENATOR CRANE: No, but you were talking about the people being the State. Now, overlooking the matter of self-liquidation of these proposed projects, let us say that theoretically

this water is to be paid for by the users; isn't that true?

MR. CROOKS: It is supposed to be and should be.

SENATOR CRANE: That's true.

MR. CROOKS: And I think it can be.

SENATOR CRANE: The next question I have is, do you believe that these bonds as they are sold- do you feel that that is taking your money and my money and spending it for something on which there is no return? Isn't that rather confused thinking?

MR. CROOKS: I am trying to think of a comparison. I can buy a bucketful of marbles and I think I am getting so many marbles; maybe I don't get that many when I pay my money. I am essentially not a gambler. I want to know before I pay my money how many marbles I'm getting. I want to know before my money is jeoparized. Now, it may be that my money will not be jeopardized. Maybe the tax dollar will not have to go into these reservoir sites. I don't think it has to. But as long as it's written into the bill the way it is, there is jeopardy that my tax dollar will go into or might go into these reservoirs. I don't want to be buying the most expensive or the next most expensive; I want to be buying the best solution.

SENATOR CRANE: Well, we've labored rather long to establish that all these various procedures involved here have been more or less normal and have adequate precedent. There is a question that many have raised as to self-liquidation. But have you ever known of any large reservoir that was ever built that was completely paid for when it began operation?

MR. CROOKS: No.

SENATOR CRANE: Therefore, it's normal to think that we are going to have to take care of this by some bonding program and, out of the moneys that are realized by the sale of these bonds, these various things such as roads and bridges and the like will be taken care of; then it's for us to get in here the proper amendment that would satisfy people that these roads would be rebuilt and the bridges would be built so that there would be no great interruption of traffic flow. Isn't that correct?

MR. CROOKS: Yes, but I get back to my other point again. These may not be the best sites. I do not know and I don't think the Committee knows. Before we have a bond issue, let's find out what are the best sites and their dimensions.

SENATOR CRANE: Well, then, you also brought up recreation which was discussed quite at length with Commissioner McLean and then again with a gentleman from Hunterdon, and I would ask you: Isn't it true that we think mainly in terms of water when we are building a reservoir?

MR. CROOKS: Naturally. I would hope so.

SENATOR CRANE: Well, now, if we have a reservoir and in time of drought, which is more important, the water, or the recreational facilities?

MR. CROOKS: You are asking a question again which has no yes or no answer. Of course, water is of prime concern. But may I reiterate my question: What techniques will be used to minimize the adverse effect draw-down has on the recreational use of the reservoirs? There are techniques.

SENATOR CRANE: Were you here when they discussed the times the reservoir will be down? We discussed, I believe, cycles at one time, that there would be a very infinitesimal

drop one year out of five, a moderate drop in the reservoir level once in every ten years, and a great drop once in every twenty. At those times I think we would be happy that we had a reservoir, though a low one might present an ugly picture.

MR. CROOKS: I was here when that testimony was given and it conflicts with the information which we got from Mr. Roy Ritter when he and Mr. Baumer met with the Association on May 10th. Mr. Ritter read from the record: "In 1955 it is estimated the Stony Brook dam would have been drawn down eight feet." These are from his calculations. "1954 - eight feet." Before I go further, I would like to remind you that, besides the figures which you just gave, a number of the proponents said the average draw-down would be about five feet. Is that not correct? "1955 - eight feet; 1954 - eight feet; 1953 - 15 feet; 1952 - 2 feet; 1951 - 2 feet; 1950 - four feet; 1949 - 15 feet; 1948 - 14 feet; 1947 and 1946 are also 14 feet."

Mr. Ritter did not continue on down, except he jumped to 1932 - I do not know the intervening years - but I would be interested in knowing. In 1932 - this was on the tape and I had a little difficulty in listening to it, but I think it was 32 feet in 1932. I will stand corrected. "In 1931 - 13 feet and 1930 - 28 feet."

He further said that he would estimate that an average draw-down might be around 8 feet. He emphasized that you cannot say there will be an average draw-down because no year is an average year.

SENATOR CRANE: That's true, but over the years we do have what are called "cycles."

MR. CROOKS: That's right. The average here, by the way, of the figures he read is 13 feet. With a planimeter, I went around the 150 and the 140 contour line on the contour maps, on the state geologic contour maps which were on the ground surveys, by the way. And there are inaccuracies here, very possibly of course. But with a ten foot draw-down, and this averages 13, there would be approximately 625, or we will say in excess of 625 acres exposed. I do not want to dwell on this point because I don't want it to detract from the testimony that the Association is giving, which we hope will help in the solution of water problems in New Jersey. But this point which you just raised has been kicked around here and it has not been settled in my mind what the draw-down would be and the effect upon recreation.

SENATOR CRANE: Well, then, my last question to you, sir, and then I'm through: Even in its drawn-down state, which of course when it's drawn down represents the dry period, perhaps a drought, isn't it true that a large reservoir would still hold more water than your small dams would have in them at that time? We are considering State's needs, not Princeton, or other communities.

MR. CROOKS: I would assume, and again I can't say for sure because the studies haven't been made, that with a comparable draw-down in the small dams, the comparable area, even perhaps more, sir, would be exposed. But I would like to point out also that the exposed areas would not constitute more or less a solid block. In the case of the proposed reservoir on the Stony Brook, the large one, the largest

portion of the draw-down would be in the neighborhood of Pennington.

May I be excused for just one second to get a map?

SENATOR DUMONT: Yes, surely.

MR. CROOKS: (Indicating on map) The red area is the portion between the water level, estimated now, that is,- the portion between the high water level and the take line. The black portion of the map is estimating what an eight-foot draw-down would be. It would expose about 500 acres by rough estimate. And you will notice, sir, that the area I just pointed to is Pennington. The largest portion of the draw-down, exposing mud flats, would be adjacent to Pennington, which would be a very undesirable thing for that community. It's a very high-class residential neighborhood, we feel, Pennington and the local Hopewell Township communities. Now, the draw-down in these small dams would be scattered throughout the countryside. Some of it would expose mud flats next to houses, I am sure. It would have to. On the other hand, a lot of it would be out next to hayfields and cornfields, which is quite another matter.

SENATOR CRANE: Well, thank you very much.

I have been asked to ask you if you have any conception as to the number of small dams that would be required in your program.

MR. CROOKS: Well, anything I would say would be just a conception. I am hesitant to answer that because we have not made studies for that purpose. I said before, it's possible there would be two or three on the main stem. I picture there probably would be one for the Elizabethtown Water

Company which has originally made investigations. There might very well be one at the site of the present reservoir, or at Hunts Mill Dam, which is above Carter Road, Route 569. Or there might be one in some other reach, maybe farther down toward Princeton, maybe farther up. I'm not sure. Then there would be supplemental ones to the side. I would picture that the Honey Brook area would receive one of these reservoirs and it's the largest of the tributaries. You know, anything from four up to fifteen - probably not the higher number, though.

SENATOR DUMONT: Any further questions of Mr. Crooks?

Thank you very much, Mr. Crooks. I think we will now recess for one hour for lunch, so we'll start about five minutes after two.

(Applause)

(R E C E S S)

AFTERNOON SESSION

SENATOR DUMONT: Mr. Crooks, would you take the stand for one question, please?

MR. CROOKS: Yes, sir.

SENATOR DUMONT: Mr. Vandeventer has a question he would like to ask of you.

MR. FRED VANDEVENTER: Mr. Crooks, you went to some length this morning in explaining your story of the small dams on Stony Brook. In the TAMS Report and other reports which have been submitted to the Legislature at various times there was also mention of a rather large dam on Bedens Brook at Rocky Hill. I wonder if you would like to comment on the possibility of a series of small dams in the Rocky Hill vicinity which might augment the series of small dams on Stony Brook and make a comparison with the proposal in the Senate Bills under discussion.

MR. CROOKS: Yes, sir. The dams that we have been talking about that might be possible to serve multiple purpose, including water supply in the Stony Brook - I certainly would hope that that same idea would be thought of wherever water supply is thought of in New Jersey. It might not be as likely in south Jersey but in the Piedmont area, and that's the section that we're in, it certainly, I think, is a distinct possibility for the whole Piedmont section. It should not be overlooked. The topography the soils, the type of drainage area, the slopes of Bedens Brook are very much the same as Stony Brook. So I should

suspect that the same proposition could hold true in Bedens Brook, in Neshanic, in many parts of Hunterdon and possibly a few sections in Union County, Mercer County, some sections of Middlesex and Somerset Counties.

MR. VANDEVENTER: Then it would be a possibility that by combining the Rocky Hill Reservoir site, which has been pretty much excluded from any consideration, - by combining Bedens Brook and Stony Brook they could get a water supply equal to or superior to, in quantity, what is proposed in the Stony Brook dam?

MR. CROOKS: Yes. As I tried to point out this morning, while we don't know what can be developed in the smaller reservoirs, I would foresee that we should develop nearly all the potential water resources in the Stony Brook area with these small dams, else they may not be justified. The same thing should hold true in the Bedens Brook area. I would like to point out that the reservoir in the Stony Brook, as with the reservoir in the Rocky Hill area, are not ideal reservoir sites. It was pointed out, I think the first day of testimony here, that the TAMS Report itself says that one disadvantage to all of these sites, except possibly Spruce Run, is that a large portion of them would be shallow and marshy. That does not make them ideal sites for water supply because of the drawdown involved. So since they are not ideal sites, every opportunity should be taken to look at all the possible alternatives to the development of water in Stony Brook, in Bedens Brook and

similar areas. I think it could very well be that the total quantity of water developed for water supply in these two reservoirs could be the same -- in these two systems of reservoirs could be the same or nearly the same as that proposed by the Rocky Hill reservoir and the Stony Brook Reservoir in the TAMS Report.

SENATOR CRANE: Mr. Crooks, isn't it rather true, though, that here you have already mentioned three sites which are known as small dam sites on the Raritan in the TAMS Survey - Neshanic, Stony Brook and Rocky Hill - and wouldn't you, therefore, be imposing this smaller dam structure to the detriment of future development of supply in terms of ten billion gallons reservoir sites which the State needs?

MR. CROOKS: I am talking about this proposal of small dams for State needs, as well as local needs. The purpose of developing these small dams is not to develop them primarily for the local areas, it is to develop them primarily for the local and state area. I don't want you to misunderstand me. We do not want these small dams built if it will not serve the function of the state needs. These small dams should be built only if they do serve the function of the state needs as well as local needs.

SENATOR CRANE: Well your original testimony this morning, you were talking of additional water supply beyond your sediment dams as more or less a secondary feature, and in a state project, of course, water supply, raw water and maintenance of flow would be the prime object.

MR. CROOKS: Yes, insofar as the justification of that portion of the reservoir which supplies water supply. It would not be the prime consideration of that portion of those reservoirs which do not supply water for potable or for minimum stream flow regulation. I would like to point out that the Stony Brook-Millstone Watersheds Association is a grass roots movement. It started with 26 people. In about 3 years it grew to about 160 people. It has now grown, as I mentioned before, to 450. It has not been superimposed from the top down. It started to grow from the bottom up. It started to grow in the Stony Brook area. It has grown and expanded to include parts of Bedens Brook and the Upper Millstone Watershed. We are likewise growing in the scope of our thinking, from local problems to water problems in Bedens Brook and in the Upper Millstone and now in the Lower Millstone and yet we are continuing to grow, our thinking is continuing to grow to include state needs insofar as it relates to our local problems.

SENATOR CRANE: A superficial examination of this last proposal, about the utility of very small dams on the Rocky Hill site, looks as though you are proposing the utilization of several of these major sites to accomplish one purpose, and that is to find the alternative to the complete development of Stony Brook. Isn't that true?

MR. CROOKS: Could you rephrase that question? I didn't quite understand it.

SENATOR CRANE: Yes. You have in this latest suggestion by Mr. Vandeventer mentioned three sites that were

specified in the TAMS Report, ten billion reservoir sites or thereabouts, as related there to the State's needs. You have talked of these small dam programs this morning relative only to Stony Brook. Now, Mr. Vandeventer's proposal is that if the State perhaps needs more water that we could also develop Rocky Hill the same way, and you added Neshanic to be developed the same way --

MR. CROOKS: And others.

SENATOR CRANE: And others. But at the same time you are tending only toward the goal of replacing what would be in Stony Brook if it were developed to the ten billion gallons reservoir that was proposed there.

MR. CROOKS: What I am proposing is this, that this idea of small dams - smaller dams we should say. Let's not say small dams - smaller dams be studied along with the large ones. It may be that the best thing for the Stony Brook Watershed, for the Bedens Brook Watershed, and for the Neshanic River Watershed, might be a large dam. We don't know but neither does the Advisory Committee nor anyone else that we know of. This is a proposal which we feel is rather unique and should be studied and has a lot of basis in fact to make it a possibility. We don't say, instead of building this one reservoir build these others; we say, let's look at both, let's compare and build the best.

SENATOR CRANE: Well, you don't know, however, how much water this would yield for State needs?

MR. CROOKS: In the development of the plans or

the development of the information, from looking at these various watersheds on the basis of studying them for possible utilization, on the basis of smaller dams, prime consideration must be given to the amount of water supply that could be developed by these small dams. If it is insufficient, if it is considerably less than would be developed by one large dam, or is considerably less than could be developed by a medium size and several small size dams, any kind of combination, then let's take the proposition which will give the maximum water yield considering, now, other aspects, considering local needs, considering local disruptions. You will note on this map that there is an industrial zone. That could best be served, as I pointed out in my paper, - the Trustees, rather, pointed in the paper which I presented - that area could be best served by a reservoir upstream from that. There isn't enough groundwater there to supply them. It's a matter of 500,000 gallons a day per square mile of water yield. That will support about a family for every two-thirds of an acre, average. You get variations from that but that's the average yield for groundwater. The groundwater supplies are going to be short in the Stony Brook watershed, as they will be in Bedens Brook and similar watersheds in areas of industrial expansion and in areas where there is a population expansion. So, you need to look at the State needs and part of the State needs is the local Mercer County, the local Hunterdon County needs. The State needs do not comprise only - and I don't want to infer that you are

saying this - but they don't include only the river -- the lower Raritan River watershed needs of the industries or the municipalities down there.

SENATOR CRANE: But you will need water.

MR. CROOKS: There and upstream too. And I tried to point out this morning that the population and industrial growth is coming in the Stony Brook and the Upper Millstone areas, it's coming fast. Maybe - I don't know what Mr. Agle will give in his testimony this afternoon but he is a Member of the Association, we have been talking with him over the past years, and he and Herbert Smith and other people, who have been studying this population and industrial growth and the various changes that are going on in our State, see this change, this rapid growth in these more unpopulated areas. And as far as State needs are concerned, we need to look to State needs now and in the future, both.

SENATOR CRANE: Well, the point is that the State can only be satisfied with the larger reservoir.

MR. CROOKS: I beg your pardon? You say the State would only be satisfied --

SENATOR CRANE: The State's needs could only be satisfied with the larger reservoir.

MR. CROOKS: I couldn't agree. On what basis do you say that? that the State's needs could only be supplied by the larger reservoir?

SENATOR CRANE: The State's needs - if we took your testimony of this morning, relative to Stony Brook,

and you pinned it down, you didn't know yourself how many small dams it would take, but using your arithmetic and your schedule there it would take many, many small dams to develop the water that is needed or will be needed within three years. You have heard people sitting here talking in terms of ten and twenty million gallons a day, and I don't believe that you could divert ten to twenty million gallons a day from these 9 dams that you were talking about. That's why I say it is relatively true that the State needs larger dams to take care of the developments.

MR. CROOKS: Senator Crane, I think you still misunderstand me and I am sorry that I have not made myself clear. We are not proposing the 9 dams which we now have on our books as water supply dams. Let's forget the 9 dams. Let's think that we are looking to other possible alternatives which would be better for the local area and at the same time serve the State. The number of dams does not matter, or matters very little. What matters is the social displacement - I am not even rating these especially in order of importance - social displacement, interruption with traffic circulation, in social patterns, we are concerned with State water supply needs and in local needs - that may be irrigation, that may be fire control, that may be recreation, that may be all kinds of things. Now, these dams that we are proposing, we don't know how many there are but we see no reason why a study should not be made to see if an equal amount of water could come from those dams as would come from the large reservoir. Why does it take a large reservoir to supply

40 million gallons a day rather than several smaller ones?

SENATOR CRANE: Well, by your formula this morning, how many small dams would it have taken to supply that much water?

MR. CROOKS: I don't know and we can't know until studies are made. Let's not try to solve the problem before we have the information. The studies must be made to find out if the smaller dams are possible and will supply the 40 million gallons a day or whatever the Stony Brook Watershed will produce. But there is no reason at all why these small dams, as we see it, can't produce an equal quantity of water as the one large dam, and be in a lot greater harmony with the needs and the desires of the local people. It can serve both the local people and the State's needs equally. Have I gotten this idea across to you that just as much water can come from the small dams as can come from a large one?

SENATOR CRANE: Let's call it a standoff. I don't think you have impressed me and I don't think that I have reached you with my question.

Now the last thing I would like to say, sir, relative to Rocky Hill - You talked about the TAMS Report and you talked of the paragraph in there which I cited the first time that I spoke on the very first day, about the over-all, you might call it, criticism of the small dam program as to the type of water it produced as compared to the water that would be stored in Chimney Rock or Round Valley. Now, are you aware that Rocky Hill is the only small dam

location to which this criticism of marshland was specifically had?

MR. CROOKS: No. I would like to refer to the TAMS Report, if I may, - I see you have a copy there - I believe it says and I'll paraphrase it but I think it is very close, that the disadvantage of these water supply reservoirs, on-stream reservoirs which have been suggested in that report, are, with the exception of Spruce Run, shallow and marshy. I don't think it related only to the Rocky Hill one. I think it related to all of them except Spruce Run.

SENATOR CRANE: That's the general paragraph I was talking about. However, in a specific description of each of the small dam sites, Rocky Hill was the only one to which they appended that description of the marsh area.

MR. CROOK: Yes, but lest we forget, that is a preliminary report. They did not have actual contour lines, close contour lines, to tell. When there is a fall of 8 feet in the Stony Brook Reservoir and if our figures are anywhere near correct and they are as near correct as can be had at this time - with an 8 foot drop on the Stony Brook Reservoir, when there are about 500 acres exposed that means that there are 500 acres that are less than 8 feet deep, which means marshy area.

SENATOR DUMONT: Senator Fox.

SENATOR FOX: Mr. Crooks, may I just ask a few questions for my own satisfaction. You are the Executive

Director of the Association, is that correct, sir?

MR. CROOKS: Correct.

SENATOR FOX: I see. And you have been for 8 years? Is that correct?

MR. CROOKS: No. I have been --

SENATOR FOX: For how long?

MR. CROOKS: About two and a half.

SENATOR FOX: About two and a half years. And are you an engineer?

MR. CROOKS: I am not an engineer. I have been trained as a Biologist and a Conservationist. I have had agricultural engineering training in school and I have had a small amount of engineering experience in the field.

SENATOR FOX: I see. Then I take it that the technical data that you have supplied us with today has been provided to you by those who have made a technical study of the matter?

MR. CROOKS: Yes, from the information which the Association, Rutgers University, the U. S. Soil Conservation Service, the Department of Conservation and Economic Development, and others have provided us, yes.

SENATOR FOX: I see. Has there been or has the Association itself conducted any specific survey with respect to the small dam theory as contrasted with that of the large reservoir?

MR. CROOKS: No. We have not done that and the reason, very frankly, is that in two weeks, which has been the length of time since we first fully developed this

idea, as an alternative now, in two weeks we could not do that. We have carried on research projects in the Stony Brook Watershed for several years. We have instigated, as Mr. Paul VanWegen said, the conception of a stream gauging station. We have been taking surface water flow records from that since 1953.

SENATOR FOX: Well may I ask you this question then, has Rutgers University or the United States Conservation Department or any other group expounded this theory of small dams versus large reservoir during the course of the existence of the Association or during the last two and a half years that you have been affiliated with it? or is this just of recent origin, of the last two weeks?

MR. CROOKS: Of course, this matter of a large reservoir is only of recent vintage.

SENATOR FOX: That was not my question. The question is a very simple one. Has there been any study made by Rutgers University, the Department of Conservation, or the technical experts that have been utilized by the Association with respect to the theory of small dams versus a large reservoir, or is that of just recent origin, comparatively, say within the last month or two?

MR. CROOKS: It is of recent origin. We have consulted --

SENATOR FOX: How recent, may I ask.

MR. CROOKS: Two weeks, as I said.

SENATOR FOX: That's what I wanted to know.

MR. CROOKS: And we have consulted with engineers during that two weeks but all you can get are guesses. I have tried to emphasize that we don't know that this is the alternative but we think it is a plausible suggestion.

SENATOR FOX: Yes, in other words within the realm of speculation.

MR. CROOKS: Exactly.

SENATOR FOX: Thank you very much.

SENATOR CRANE: Mr. Crooks, I felt that I should say something to you because my last remark drew a response from the gallery and evidently they considered it personal.

When I said that you hadn't reached me, it was not with the sense that I was immovable, faced with the impact of your argument. What I wanted to say, sir, was that I feel your presentation has been an excellent one but that, unfortunately, I had hoped that there might have been more fact to back up this small dam so that I could actually relate it in my own thinking with these other dams. And I am hopeful that in the near future perhaps you will have some of those facts that we can consider so that we can make a fair comparison because these small dam sites, which have been talked of, Neshanic and Pottersville and Rocky Hill and the rest, are, of course, not comparable to what has been suggested in this legislation by way of development of Spruce Run and Stony Brook. And while we are looking for alternatives I wanted to make a very strong point of the gallonage which was testified to as being needed within the next one, two and three years. That was my

point, sir. I didn't want to offend you by saying you just haven't reached me. Did you understand that?

MR. CROOKS: Yes. I would like to bring up a point at this time. In 1922, as I referred to Mr. Allen Hazen's report on the New Jersey Water, and in the section on Raritan, the Raritan System, he had a dam, as I pointed out, 48 square miles of 300 billion gallons storage. Let's take that as a comparable situation with our proposal versus the one in the TAMS Report. This reservoir would have been fine in 1922, perhaps. As an alternative to that at this date the TAMS Report suggests 7 smaller dams for the supply of water in the Raritan Valley. Likewise, rather than one dam on the Stony Brook or any number of other watersheds, we are suggesting that you look at other smaller sites which can furnish water supply for the State as well as for local people.

I am still disturbed by your comment that only the large dam can serve the water supply needs of the State and I wonder, as a consequence of our discussion in the last few minutes, if you could say anything further about whether that is your feeling and, if so, why.

SENATOR CRANE: I had hoped that you would take my rebuttal there. Rather than use the term "dams", let's use the word "supply".

MR. CROOKS: All right. In other words, you feel that the supply developed by the large reservoir is in excess of what could be developed by small reservoirs?

SENATOR CRANE: No, without respect to that. I am talking in terms of looking for a water supply that has a diversion or a potential of somewhere in the neighborhood of 40 million gallons a day. Let's just talk in terms of supply when we are talking of comparison, that's all, not size of dams.

SENATOR FOX: Mr. Crooks, may I just ask you this, the name of the organization or engineers that have supplied the Association with their technical data, or do you have that?

MR. CROOKS: I could give you a whole list of them. What data were you talking about, sir, any specific data?

SENATOR FOX: The data that you have given us here today, or have you consulted with a series of organizations?

MR. CROOKS: The data that I have presented here today has been the result of - some I will forget, I am sure, but I shall mention some - The U. S. Soil Conservation Service, Department of Agriculture; the Rutgers Planning Services, Edward Wilkins, principally; Austin Palmer; Mr. George Shanklin; Mr. McMillan from Pennington who has been associated with a very well-known engineering firm, he is a Member of the Association and has been helping us over the years; The State Geology Department; Dr. Kimbell Woodmer; Mr. George Moorehead. Offhand I couldn't give you all of them.

SENATOR FOX: That's all right. I just had this one other question. Using the term "dams", I mean the

small dam theory versus the large reservoir, by virtue of your own experience, do you know of any comparable situation such as we face in New Jersey where this theory has been resolved?

MR. CROOKS: Of small dams versus large --

SENATOR FOX: Yes. I would just like to satisfy myself on that point.

MR. CROOKS: Yes, there are a number developing and they are recently developing because of the 566 program throughout the country. I know of one in Salem, West Virginia, for instance, that is well in operation now. They had a flood control problem. They had terrific floods down there. They built dams to control the floods but in addition to that they tacked on the top of one or two of the reservoirs water supplies for the City of Salem. The Salt Wahoo Watershed --

SENATOR FOX: Where is that?

MR. CROOKS: In Nebraska, outside Lincoln, Nebraska. -- developed flood control structures and, as I recall, they also have water supply along with it. It's not a new idea insofar as the last few weeks, it's been used throughout the country.

SENATOR FOX: Thanks very much.

MR. CROOKS: You are very welcome.

SENATOR DUMONT: Any further questions of Mr. Crooks? Thank you, sir.

At this time I would like to call Mr. Edward L. Mount, Engineer of Mercer County.

EDWARD L. MOUNT: Mr. Chairman and Members of the Committee: I am Edward L. Mount, Mercer County Engineer.

The Mercer County Board of Chosen Freeholders has directed me on their behalf to enter an objection to Senate Bills 272 and 273 predicated on the fact that there is insufficient engineering, real estate and financial data, to permit a proper consideration of the effect the construction of the Stony Brook Reservoir will have on Mercer County.

By admission of representatives of the State, the Water Resources Advisory Committee and their Consulting Engineers, there is not available sufficient engineering data to acquaint Mercer County with such information as (1) the exact location of the dam; (2) the cost or what is supposed to be done with county roads that would evidently be inundated; (3) if the assumed elevation of 152.0 is to be the final flow line elevation that is to be held; (4) the elevation that should be selected for the taking of land adjacent to the proposed reservoir sites.

The Mercer County Board of Chosen Freeholders further requests that more complete information be forthcoming:

1. As to a firm estimate of the number of feet of drawdown of water in drought seasons, in order that the question of approximate area of mudflats that will be prevalent during the drought season can be determined, particularly in the upper region of the reservoir, namely, Hopewell Township and Pennington Borough.

2. Clearly state as to whether the proposed reservoir will provide a potable supply for Hopewell Township, Pennington and the Princeton areas, together with a guarantee that an adequate volume of water will be maintained in the upper region of the reservoir to provide such.

3. Determine and make available information as to the availability of water that could be pumped from the Delaware River into Stony Brook Reservoir during the low flow months and show concrete figures as to the amount of water that may be diverted from the Delaware River to the Stony Brook site, in view of the 1954 Supreme Court ruling setting a definite gallonage per day as New Jersey's quota of water from the Delaware.

4. That the bill should spell out as to whose responsibility, financial or otherwise, it is to reconstruct roads and bridges that will be necessitated due to the construction of this reservoir, and that the State must receive the county's approval as to any change in the county's facilities.

5. The Board of Chosen Freeholders of Mercer County also urges that provisions be made in the legislation in order that areas to be affected would not suffer financially through the loss of ratables, to reimburse these areas from the income of the sale of water in lieu of the lost ratables.

6. The Mercer County Board of Chosen Freeholders also strongly urges that in any legislation proposed to be written in conjunction with the construction of any

reservoir in Mercer County, that any concessions that may be leased by the State or any authority having control of the reservoir be assessed by the governing body in which locale it may exist. Mercer County was very cognizant of this item due to the legislation that was imposed upon them for the New Jersey Turnpike Authority where no concessions were allowed to be taxed or assessed.

7. Mercer County Board of Chosen Freeholders also requests that the rights of riparian owners along the site of the proposed reservoir be spelled out as well as the rights of riparian owners along the Millstone and Raritan Rivers, in order to determine whether or not the latter be assessed for benefits derived either for potable or industrial water supply by the proposed reservoir.

8. The Mercer County Board of Chosen Freeholders stongly urges that moneys be appropriated in order to permit the Department of Conservation and Economic Development to make surveys to provide the public with the essential details so that the public may be properly enlightened as to the effects any such construction will have upon them and the areas in which they reside.

Therefore, in conclusion, the Mercer County Board of Chosen Freeholders contends that the electorate of the State and more important the citizens of Mercer County must be fully acquainted with all the facts and data concerning the proposed legislation before placing them before a referendum

asking them to act on a $14,000,000 appropriation without knowing the facts.

Thank you.

(Applause)

SENATOR DUMONT: Mr. Mount, is this report that you have here based upon your own investigation of the area or surveys of it, to some extent? I know you have recommendations about amending the legislation, too.

MR. MOUNT: We have no surveys on this. We have information that could be available for your consulting engineers which we have told them we would make available to them. However, it isn't forthcoming in our report.

SENATOR DUMONT: Senator Crane, any questions?

SENATOR CRANE: Mr. Mount, have you been here since the first day?

MR. MOUNT: I was here the first day, Senator, but I have not been here since that time except for a few minutes.

SENATOR CRANE: Well, I believe you only missed one day but I do believe that we discussed the matter of fixing the responsibility for roads during the first day. That was a three-way debate between Commissioner McLean, Senator Lance and myself. We also discussed the rather experimental rebate clause, paragraph 14, and also we discussed the matter of the review of riparian rights which, of course, may be somewhat of a thorny problem due to our past legal precedent in this State. But do you believe

there are amendments along these lines that would make these bills more attractive to Mercer County?

MR. BLACK: We are only asking, Senator, that they be written in the bill and spelled out so that we could study them.

SENATOR CRANE: Well, sir, since our experimental paragraph, particularly, didn't elicit favorable commentary from you, and yours would be a county that would be affected, would you care to submit to us your thoughts as to a good rebate clause to cover communities that might suffer damage from the imposition of a reservoir?

MR. BLACK: I can't answer for the Board of Freeholders, sir, but I will be glad to take that back to them and have their Counsel offer something in that respect.

SENATOR CRANE: We would be very glad to receive it. Thank you.

SENATOR DUMONT: Any further questions of Mr. Mount? That's all. Thank you, sir.

Mr. Frank J. Black, Freeholder, Mercer County.

FRANK J. BLACK: Mr. Chairman, my name is Frank J. Black. I am a Member of the Mercer County Board of Freeholders and Director of the Mercer County Industrial Commission.

The Commission is a county agency which offers information, cooperation and assistance to prospective new industries interested in exploring the possibilities of locating and expanding in Mercer County.

We regard water as one of the most essential commodities required for industrial development. Our position in Mercer County somewhat parallels that of the State as a whole, in that certain areas have plenty of water while other areas do not have sufficient water because of a lack of adequate distribution.

Mercer County has three readily available sources of water - the Delaware River, Delaware and Raritan Canal, and the ground water supplies. Of these the Delaware River is of greatest significance since it is a source of supply of water for industries in Trenton and the areas of Ewing, Lawrence and Hamilton Townships, served by the Trenton Water System. The Delaware and Raritan Canal is available to us for industrial development in Lawrence and West Windsor Townships along the Pennsylvania Railroad. It may also be possible to pipe canal water to parts of Hopewell Township from the canal feeder. According to the State Geologist, groundwater supplies are abundant in Washington Township and in East Windsor Township areas.

We face a problem, however, in a large part of Hopewell Township served by the Reading Railroad. There is substantial area zoned for industry with all the natural advantages for industrial development if adequate water supplies are available. In the past year or more Mercer County has taken action on several occasions, along with the Chamber of Commerce and interested municipalities, to oppose the granting of large quantities of the remaining

water in the Delaware and Raritan Canal to water companies and municipalities in Middlesex County.

Our position has been that the approval of one or two of these requests would quickly use up all of the water available to the Raritan Valley Watershed and thus deprive Mercer County municipalities in the Raritan Valley Watershed of the industrial waters needed to supply continued industrial expansion.

The demand for water is so great, however, in the counties above Mercer that we realize that a comprehensive, long-range program is necessary to serve the industrial and residential growth both in Middlesex, Somerset and Union Counties, and still have adequate water supply in the northern section of Mercer County.

The development of the Raritan Valley Watershed appears to be an absolute necessity to any comprehensive and long-range program for Mercer County as well as for our neighbors to the north of us who should be included in the project. We had hoped that the proposal before us today would be the answer to a very serious problem. However, we cannot support the legislation because we feel there is not sufficient information at this time to use as a basis for considered approval. Many citizens throughout the County have risen to protest the proposed Stony Brook Reservoir and I believe this is due primarily to the fact that the people of Mercer County do not have adequate information to accept the proposed legislation as the best

solution to the State's urgent need for the new water supply.

I talked to residents in the area which would be covered by the proposed reservoir and same have said, in effect, "Maybe we need the reservoir and maybe we will have to accept it eventually but, unless I get enough facts to show me that it is necessary and that it is well planned, I am going to fight it as hard as I can."

I have been told that there is a good chance that the Legislature will drop the whole question because it has become a hot potato. Now this, to my mind, would be a serious mistake. The State needs new water supplies and the development of the Raritan Valley Basin certainly seems essential to any state-wide program. But I do not see how Mercer County can go along with the present proposal until more facts are made available. I feel that the New Jersey Legislature should take the initiative to see that adequate facts are developed on the proposed Stony Brook Reservoir so that the people of this area and probably other parts of the State will be in a better position to determine whether it is a good idea.

It is quite possible that some of the people who are now violently opposed to it may be in favor of it if more information is made available. I know that there are many people interested in getting increased water supplies who will take no position one way or another until the information is produced. Therefore, I believe the

Legislature should supply the funds to make the detailed studies needed. In view of the importance of the development of our water resources to the future economic progress of the State, the expenditure involved for detailed studies would be amply justified. If we can get the facts, it should be possible to decide the question without further dispute.

Such studies would answer decisively the question of Mercer County's right to take our full share of water from the Reservoir to support our industrial expansion and residential needs. There are many other questions, such as the need for positive assurance that the municipalities will be fully compensated for the loss of tax ratables and that the property owners will receive a realistic price for the land taken from them for the reservoir.

I respectfully urge that the Legislature accept this responsibility and provide the funds to make detailed studies of the reservoir proposal and to make that information available to local citizens and officials.

At this time I would like to read into the record, you have a copy of it Senator, the resolution that was passed by the Mercer County Board of Freeholders on June 11th:

"Whereas, the New Jersey Water Resources Advisory Committee has recommended a program for the construction of dams for the purpose of creating reservoirs, part of which will be in the various townships and municipalities in the County of Mercer; and

"Whereas, the Senate has introduced Bills 272 and 273, pertaining to this program upon which public hearings are now being held; and

"Whereas, it appears that the implementation of such program is being urged with unusual haste and that there is insufficient engineering, real estate and financial data to permit a proper consideration of the program of such magnitude and importance; therefore,

"Be It Resolved, that the Board of Chosen Freeholders of the County of Mercer, in order to protect the interests of the people of our County, oppose this program for the reason that full and complete information is not available upon which to base a thorough and comprehensive understanding of the proposed program; and

"Be It Further Resolved, that a copy of this resolution, opposing the construction of dams creating reservoirs in Mercer County, be forwarded by the Clerk of the Board to Senator Wayne Dumont, Chairman of the Senate Committee, for consideration, and that it be made part of the record of the Senate hearings now pending."

SENATOR DUMONT: That resolution, not only by your having read it, will be made a part of the record.

Any questions? Thank you very much. Wait. You have a question? Excuse me, I'm sorry.

SENATOR CRANE: Mr. Black, have you read either the TAMS Report or the pamphlet published by the Water Resources

Advisory Committee?

MR. BLACK: I have not.

SENATOR CRANE: Neither one?

MR. BLACK: Neither one.

SENATOR CRANE: Are you, sir, by profession an engineer?

MR. BLACK: I am not.

SENATOR CRANE: Was the statement that you read to us, not the resolution, sir, but the statement that you had prepared, was that your own opinion, sir?

MR. BLACK: Yes. Oh, it reflects the opinion of the Industrial Commission.

SENATOR CRANE: I allow that, sir, but you say you are not an engineer and you haven't read these reports, yet you accuse the Water Resources Advisory Committee and their engineer of insufficient facts --

MR. BLACK: That's right.

SENATOR CRANE: -- on which to base a conclusion.

MR. BLACK: That's right.

SENATOR CRANE: Well, how can you draw that conclusion, sir?

MR. BLACK: From the information that I received from our engineer and the various members of the Industrial Commission and the Stony Brook-Millstone Watershed, sir.

SENATOR CRANE: Now, sir, you have advocated that we obtain further information to reassure you, is that correct?

MR. BLACK: That's right.

SENATOR CRANE: And you know that that type of information they talk of, in terms of a survey, may cost a hundred or two hundred thousand dollars, and one proposed this morning $500,000. Are you proposing, sir, that the State pay that?

MR. BLACK: I am.

SENATOR CRANE: And then on top of that, sir, since that's your recommendation, are you aware that that type final survey is accomplished in the engineering report which is usually conducted after authorization of the project?

MR. BLACK: I feel that a project of the magnitude of $14,000,000 we should have more information on it.

SENATOR CRANE: I have no further questions.

SENATOR DUMONT: Mr. Black, are you Director of the Mercer County Board?

MR. BLACK: No.

SENATOR DUMONT: No further questions. Does anyone else have any questions of Mr. Black? Thank you very much.

(Applause)

SENATOR DUMONT: I'm sorry, there's a question from the gallery, Mr. Black.

GENE NELSON: My name is Gene Nelson. This is the first session I have attended but I have heard through other witnesses against the dam that they have stressed the fact that there is insufficient evidence. I would like to know if anyone from the Smith Committee has made an attempt to get this information to satisfy these people.

SENATOR DUMONT: Mr. Nelson wants to know, having listened to the witnesses in opposition testify, whether anybody can furnish him with an answer as to why the Smith Committee or their engineer has not furnished or does not furnish additional information to those who say there is insufficient information.

Is there anybody who wants to volunteer an answer to that? Mr. Ritter? I don't think it was directed to you so there is no reason why you have to answer it.

SENATOR CRANE: I would like to say this, that this is a public hearing at which we hear the criticisms and approval, such as there might be, of any program. It is quite a democratic process. However, it is impossible to respond at the given moment at the hearing to any request that might be made of us at that time. It may be that after our Committee has finished its deliberations we might decide that further information is necessary. However, I know from acquaintance with the people who have propounded these various reports that more information was obtained than they expounded in their written reports and that probably, in carrying on any educational program thereafter, the State will make use of all the information such as Mr. Shanklin has available, Mr. Ritter and the Water Resources Advisory Committee might have available, republication of certain parts of the TAMS Report - every effort will be made to place adequate information, based on what we consider adequate and reasonable routine, in the hands of the people.

Now, as to answering any specific questions you might have here at the time of these hearings, I don't think that it would be possible for us to rebut it point by point because that is not actually the purpose of these hearings. A hearing is held so that the Senate may make up its mind, or the Legislature, as to the tenor of public reaction to see whether a bill is aimed correctly or not.

SENATOR DUMONT: I think, Mr. Nelson, what you better do is ask anyone privately, that is anyone who is here, if you want to, when the hearing is concluded so as to try to get any information that you desire. But until you direct your question to a specific person, it is pretty hard for us to do much about it.

MR. NELSON: Could I ask a specific question? If this proposal goes through and in the future will cost much greater than anticipated now, will the water still sell for $25.00 per million gallons or will the cost go up accordingly?

SENATOR DUMONT: To whom are you directing that question? I certainly don't know the answer to it.

MR. NELSON: I will ask Senator Crane.

SENATOR CRANE: Sir, it would be inconceivable if the cost were proven to be more than $14,000,000 that the State could proceed with this project. We are setting forth a program based on a $14,000,000 bond issue and have no right to proceed further. Actually the engineering studies that would be conducted to fix the site, the final site, everything that's final in the whole engineering job, would certainly

determine if it could be built reasonably within those specifications and therefore that the charges are correct.

MR. NELSON: One of the witnesses on the first day, Mr. Otto Nelson, pointed out that the cost of land would be much greater than Mr. Ritter's firm had estimates on. I am interested primarily as a land owner -- (inaudible)

SENATOR CRANE: Well, as I said this morning, if the price was right I would probably sell the Elizabeth Daily Journal. But what I want to say to you, sir, is that before these hearings are over you will probably hear that there are several people who would refute General Nelson's estimate as to $5,000 per acre. So far all that we have had set forth is that double the amount has been allotted for Stony Brook in condemnation than was allotted in the TAMS Report, and that there is a contingency reserve for anything beyond that. But I do believe that as we go further and some rebuttal is entered into the record you will hear those points brought up and it will be proper at that time to ask questions because I believe that one of the persons might be a real estate expert.

I just want to enter one thing in the record - it's just an observation as a newspaper man. There are some things that are rather interesting in all this. Actually it depends on who you are for as to whether the advice is acceptable, but when I said that there was more information available than was actually reduced to a printed record, we know that Mr. Shanklin worked with the Stony

Brook-Millstone Watershed Association in this smaller dams program that they have advocated, and it is true that they at the State level approved that project for the reasons which the Stony Brook-Millstone people wanted it. At the same time Mr. Shanklin's services were approximately the same as Mr. Ritter's. He drove through the area in a car. At that time that was acceptable. Mr. Ritter's drive through the area was not acceptable. So at some point there is a humorous parallel.

MR. CROOKS: I wonder if I could just make a comment.

SENATOR DUMONT: The only thing here is that I want to get on everybody this afternoon who has issued a prepared statement. I think it is important because it keeps the newspapers and the witnesses consistent with the fact that the issued statements are now already in the press.

MR. CROOKS: Well, I will save it.

SENATOR DUMONT: All right, sometime later.

Mr. Alfred Hess, Chairman of the Mercer County Planning Board.

UNIDENTIFIED SPEAKER: He is not here today.

SENATOR DUMONT: Mr. Harold Coleman, Solicitor for Lawrence Township.

HAROLD COLEMAN: Mr. Chairman, Members of the Committee, Ladies and Gentlemen:

My name is Harold Coleman and I appear here today by direction of the Mayor and other members of the Township Committee of the Township of Lawrence in the County of Mercer as attorney for said Township.

I should like to state first that Lawrence Township is one of the communities that will be most directly and most seriously affected by the completion of the program being considered here. The approximate location of the Stony Brook Reservoir covers an extensive portion of one of the few remaining choice, residential areas in Mercer County, together with many of the established means of access thereto. I emphasize the words "approximate location" because we have not yet received any accurate and proven data upon which to estimate with any appreciable degree of certainty the perimeter of this proposed reservoir.

I should now like to read into the record a resolution duly adopted by the Lawrence Township Committee on June 5, 1957:

"Whereas, it has come to the attention of the Township Committee of the Township of Lawrence, in the County of Mercer, that the New Jersey Water Resources Advisory Committee has recommended a program to construct dams for the purpose of creating reservoirs, part of which will be in the said Township of Lawrence; and

"Whereas, it appears that the implementation of such program is being urged with unusual haste; and

"Whereas, it is the opinion of this body that insufficient data is available to permit proper consideration of a program of such magnitude and importance; now, therefore,

"Be It Resolved, that full details and complete information concerning said program be obtained and made available to affected municipalities prior to the taking of any definite action towards the implementation of said program; and

"Be It Further Resolved, that the implementation of said program be delayed until sufficient time has lapsed to enable such affected municipalities to study the complete information to be made available."

This resolution is directed toward the two bills now under study by this Committee. We find ourselves in the difficult position of being unable properly to evaluate this program because there are numerous questions which remain as of now unanswered or only partially answered. I shall not raise all such questions at this time partly because others who have appeared or will appear here have already raised the same issues and partly because the mere fact that there are so many loose ends, at least in the minds of many of us, would seem to indicate that considerable further study is necessary before we become committed to a program of such magnitude. To list just a few of our questions, however, I would ask:

Has sufficient consideration been given to alternate proposals to accomplish the same purposes without such upheaval in the midst of existing communities?

Has it been established that the benefits claimed for this program outweigh the anticipated detriment to the areas most affected?

Have the estimates of the cost of this program been based upon complete and accurate information and upon consideration of all pertinent factors?

Are such provisions as those regarding reimbursement of municipalities for the loss of tax ratables, regarding public use of the reservoirs, regarding the continued Common Law rights of riparian owners, and many others, spelled out in sufficient detail and with such degree of certainty as will enable local officials and the local public to comprehend the impact of the program?

These, and numerous additional questions leave us in an unhappy state of confusion and uncertainty.

In past years a practice, which I certainly hope has long since been discontinued, was, unfortunately, fairly common. Many persons who acquired a new litter of kittens which they did not desire to keep or which they did not want to feed took the simple expedient of disposing of these helpless animals by tying them in a sack and dropping it gently into the nearest body of water. Such wanton behavior could be rationalized, I suppose, by the assumption that such acts were necessary for the benefit of those more fortunate kittens which survived. Gentlemen, today we feel like those poor kittens -- except that we are being informed in advance of what may occur. But unlike them, we, happily, have a system of law and government which provides that our voices be heard. Thus our appearance at this hearing. If we must be subjected to the deliberate

drowning which is proposed in the bills now before you, then, at least, we ask that you first make every possible inquiry to determine that no more feasible alternative is available and that you make every possible inquiry to determine that this program is the efficient and practical solution to the problems involved.

Thank you.

SENATOR DUMONT: Any questions of Mr. Coleman? Thank you very much, Mr. Coleman.

Mr. I. Russell Riker.

I. RUSSELL RIKER: Senator Dumont and Members of the Committee:

My name is I. Russell Riker. I live on Herrontown Road, Princeton. I hold a Civil Engineering Degree from Cornell University and a Professional Engineer's license in New Jersey and New York. I was Sanitary Engineer for the State of New Jersey from 1916 to 1931 dealing with public water supplies and sewage disposal. Incidentally, I sat through the hearings in the Assembly Chamber in the early twenties when New York City first moved to take 800 million gallons per day from the Delaware. There was much discussion at this time about the Delaware being the most likely future water supply for New Jersey communities. I remember statements that New Jersey was facing a water famine in the near future if steps were not taken immediately to go to the Delaware for water.

Since 1931 I have been Engineer for Princeton and vicinity and have lived on land bordering on the Millstone. I have taken frequent samples and measured the flow in both the Millstone and Stony Brook.

I own no property in the Stony Brook Watershed or proposed Reservoir.

I am appearing here not as a water expert but as a Trustee of Stony Brook Association, which I joined soon after it was organized, because of my professional interest in watershed problems in general, and Stony Brook in particular. I have continued my interest in the water supply problems of the State, as well as my membership in the American Water Works Association.

There seems to be some confusion as to the engineering procedure connected with such a water project. I would like to state my experience in numerous public works projects. First, there is the Engineering report, similar to the report of the Water Committee. Sometimes the report is supplemented by an opinion of citizens appointed by the Executive or Governing Body. The Governing Body then reviews the report and authorizes preliminary plans from which the Bond Attorney writes the Ordinance. He also requires a detailed statement of the project, preliminary field surveys with levels, description of the property to be purchased or condemned, soil tests and/or soundings, approximate construction quantities derived from the field survey. I understand that the bond houses will not market the bonds unless a responsible bond

attorney approves the Ordinance. After the Ordinance is passed, final construction plans are drawn and an advertisement for bids made. No bonding house or attorney will recommend an ordinance without actual preliminary plans with quantities from which the cost or the amount asked for in the ordinance is computed.

There are two points I would like to make in the interest of bringing facts out in the open - so they are a matter of public record and knowledge.

First, I believe it is important for everyone to understand that the proposed Stony Brook Reservoir is entirely different from the reservoirs of North Jersey, such as the Wanaque, Macopin on the Pequannock, Boonton and other smaller reservoirs. These reservoirs collect and store water and transmit it through pipes to its destination, be it factories, dwellings, or other. This is the usual, recognized, type of reservoir.

The reservoir that is being contemplated here is something else again. There is much confusion on this point. And, as a consequence, the general public has tended to think of this reservoir in the traditional sense.

From the evidence submitted here, the Stony Brook Reservoir is what is called a "compensating" reservoir. Water is stored in the Reservoir to be released through gates whenever the flow downstream, in this case, below the confluence of the Millstone and Raritan, reaches a low point. This, of course, depends upon the rainfall. It would be used only during a long, dry period. This

means that the reservoir might possibly not be used in one year. Another year, it might be used for only a few days or a week - or, at its maximum a few weeks. It is like insurance guaranteeing a minimum flow downstream, or like a fire hydrant held in reserve for later demand.

It is insisted that the cost of the reservoir is justified because it increases the natural minimum flow downstream, in dry weather, so that a minimum flow is available all the year round. It is expected that sufficient water will be obtained during this dry period from the Stony Brook Reservoir to maintain a minimum flow downstream of 40 million gallons per day. Just how much will have to be released from the Stony Brook Reservoir to secure this 40 million is an unknown quantity. We know there will be much loss between the reservoir and the point where the minimum flow is to be maintained, some 27 miles, due to evaporation, absorption, riparian users and other factors.

May I digress a moment and say that the matter of evaporation has been waived aside as infinitesimal, the fact that it is compensated by rainfall, but it was astonishing to find out that the evaporation during the year from this Stony Brook Reservoir will be about 1.8 billion gallons, and if it were divided evenly throughout the year it might be compensated by the rainfall. But the evaporation takes place during the summer months. At the present time of the year the evaporation from this Stony Brook Reservoir, the acreage, may be as much as 10

million gallons per day in evaporation, from it alone. The average for the year would be 5 million gallons but it may be as much as 10 million during the hot summer months due to the fact that evaporation during the summertime is twice as much as it is in the wintertime.

We, therefore, cannot say absolutely how many feet the reservoir will be drawn down. It should be clearly understood, however, that the average yield of the reservoir over the year could not possibly be much over half of the 40 millions mentioned.

I will digress again for a moment. The average yield for this reservoir figures out about 20 to 23 million gallons per day. And the general conclusions you get from certain paragraphs is that it will supply 40 million gallons per day. I am speaking of the average yield of the reservoir, about half of the 40 million gallons per day.

When the reservoir is drawn down during a dry period, it must be filled, and during this period a minimum flow must be allowed to discharge into Stony Brook below the dam, so that it may be several weeks or even months before the reservoir can be filled again to its normal level. Incidentally, it may take nearly two years to fill the reservoir. What's going to happen during those two years? Is there a guaranteed minimum flow during those two years of filling the reservoir or filling it when it has been drawn down to almost its minimum capacity ?

All references by the Smith Committee report to minimum stream flow, and varying amounts of water for sale,

are based on the stream flow at the confluence of the Millstone and the Raritan Rivers. This point is 32 miles below Spruce Run dam and 27 miles below Stony Brook. It can be readily understood that there are many other streams besides Spruce Run and Stony Brook that are contributing to this flow. In fact, there are only 79 square miles in the two streams mentioned while there are 700 square miles in the other watersheds which contribute to the flow at the confluence.

This brings me to my second point, which is that the economic features of this reservoir have not been made entirely clear.

The yield of salable water from the Stony Brook or the Reservoir cannot possibly be 40 million gallons per day, that is, from the Reservoir itself.

The charge of $25 per MGD will be primarily for water flow from the Upper Millstone River, Cranbury Brook, Bedens Brook and others, not from the Stony Brook.

The income, therefore, for water actually secured from the Stony Brook Reservoir per year may range from nothing to $30,000 to $50,000 based on taking water from Stony Brook for from none to six to ten weeks at 40 m.g.d. and $25 per million gallons.

Compare this with the amortization of the bonds for Stony Brook for a 35 year period which will cost $350,000 per year.

The Report states that after 35 years, the State will enjoy a clear profit of $700,000 per year from both reservoirs. This clear profit, which even if the figures

were correct, would not be from water secured from Stony Brook Reservoir but rather from all of the streams which flow into the Millstone and Raritan Rivers above their confluence.

These are the two points which I felt should be clarified so that there would be no misunderstanding about the role of these reservoirs, their limitations and their cost justification.

Now, it would appear, from the information available, that the cost of the project is underestimated. And I might say that, of course, this report does not give the details. We have been told that there is a lot of other information from which the details of the cost have been secured. None of that information has been available to anybody as far as I know.

The Stony Brook-Millstone Watersheds Association requests that a complete breakdown of the cost of construction, including land acquisition, damages, road relocation, the cost of constructing new bridges, dam, and engineering services, be made public.

Nothing at all has been said about the cost of operation. Will not a complete staff be required to police, operate and maintain the reservoir and dam?

There will be little circulation in the reservoir. What about the warm and stagnant water? What about the cost of control of the algae and plant life, mosquitos and the cost of dredging?

But let's go beyond this picture a moment. Let's take up the broader picture. Is this dam even a partial solution of the water problem in New Jersey? Is it not merely a drop-in-the-bucket? This would appear to be a very feeble attempt to solve the problem.

Is it justified to spend five million dollars, or even more, possibly much, much more, for such a reservoir as Stony Brook?

The Stony Brook-Millstone Watersheds Association is not opposed to compensating reservoirs guaranteeing a minimum flow, but we are opposed to the kind of public information which tends to give one the impression that the Stony Brook Reservoir will be self-sustaining and it alone will provide such a profit to the State after 35 years.

Gentlemen of the Legislative Committee, the Stony Brook-Millstone Watersheds Association Trustees submit these questions, facts, and opinions for your consideration.

I thank you for the opportunity to speak.

(Applause)

SENATOR CRANE: Mr. Riker, did I hear you correctly when you said that the average daily evaporation would be ten million gallons a day?

MR. RIKER: The average daily evaporation would be 4.97, to be exact, but the ten million would be during the hot spells such as we just passed through, during the summertime, inasmuch as evaporation is not even throughout the year. It is much greater during the summertime than

during the winter, by far.

SENATOR CRANE: Sir, were you here the first day?

MR. RIKER: Part of the first day.

SENATOR CRANE: Were you here when I mentioned that they had experimented in Australia with a film of Cynol alcohol?

MR. RIKER: Unfortunately, I was not here when you gave your presentation.

SENATOR CRANE: If you will wait just a moment, sir, I would like to ask Mr. Ritter a question. Would you care to comment on the use of averages as given by Mr. Riker here as a basis of comparison for this reservoir, judging its yield?

MR. RITTER: On a revenue basis, the money involved is for water which is exported outside of the Raritan Valley which will never be returned. That's one thing that I don't think has been emphasized enough, Senator. The water that is used over and over again --

SENATOR DUMONT: Mr. Ritter, would you mind stepping over to one of the microphones.

MR. RITTER: All right. Perhaps I haven't explained it fully to Mr. Riker. We are not thinking of a yield from the reservoir as we are talking about a yield from Wanaque. Wanaque Reservoir has a pipeline directly from the reservoir into Newark. Only the water behind that reservoir can be sold and revenue can be obtained from it. On these on-river

reservoirs half the time no water is let down from the reservoirs. So when we say 40 million gallons per day for sale and Mr. Riker says 20, we are virtually in agreement because you only have to release the water during, say, six months of the year when it's dry. The other six months of the year, on the average, it is very, very wet and, therefore, the State could guarantee that a hundred million gallons a day of water would be available for export outside the basin because by releasing the water in the summertime months you would have a guaranteed summertime flow. As Mr. Riker said, this is a different concept than any other types of reservoir, and the money comes from the water which is exported outside the basin. And in our estimate we have assumed no revenue from water used locally. If Mercer County would use this water and treat it properly and put it back in the reservoir, in the stream, water can be used over and over again down the entire 30 miles and whatever income would be received from that would be in addition to our amount.

Senator, does that sort of partly clarify this?

SENATOR CRANE: I am still in rather a turbid state, sir. One question I did have on these statistics as to evaporation.

MR. RITTER: Yes, sir. I believe, as both Mr. Riker and I studied in school, the general method in the Atlantic Seaboard is to assume that the rainfall on

the water surface area itself is equal to the evaporation. About 45 inches a year will fall on top of the water's surface and the evaporation is roughly 45 inches a year. So if a reservoir area has 38 square miles and there is 2 square miles in the water surface, we assume only the yield from 36 square miles is available. Now, since the reservoir in the great drought of 1930 would not quite fill up, what you capture in the wet months is available to you in the dry months. And Mr. Riker is substantially correct, that the average evaporation is in the category of 5 million gallons a day, yearly average.

SENATOR CRANE: Well then, sir, is it fair to assume that on an average the evaporation is replaced and on an average there is 40 million gallons per day available for diversion from the River.

MR. RITTER: For diversion and export beyond the shed, that's right, sir. But, Mr. Riker is correct, you could not put a pipeline and take the water behind Stony Brook Reservoir and sell -- you could only sell about 20 million gallons a day if it was piped from the reservoir, sir.

SENATOR CRANE: All right. That answers my question, sir.

MR. RIKER: May I comment. The point that I make is that the evaporation is taking place at a time when you need the water. That's the point that I want to make. We don't care about the evaporation that occurs in the wintertime, but the greatest evaporation is occurring

during June, July, August and September, and that's when you need it, - by far the greatest evaporation.

SENATOR FOX: What was the rate of evaporation that you gave before, Mr. Riker?

MR. RIKER: Well I would say at this time of the year the rate of evaporation is between 9 and 10 million gallons per day.

MR. FOX: Thank you.

SENATOR DUMONT: Any further questions of Mr. Riker? Senator O'Mara.

EX SENATOR O'MARA: Is it true that on the average throughout the year the evaporation approximates the amount of rainfall on the surface?

MR. RIKER: That's right.

EX SENATOR O'MARA: But during the hot months, I suppose, the rate of evaporation is very much greater than the average, is it not?

MR. RIKER: That's correct. Yes, sir.

EX SENATOR O'MARA: Take, for instance, the last two or three weeks that we have had when there has been no rainfall at all, practically, and what would be the rate of evaporation per day, approximately?

MR. RIKER: Well I would say right now that the rate of evaporation from a reservoir of this size would be at 9 and perhaps 10 million a day.

EX SENATOR O'MARA: And, if our experience of the last few weeks is any criterion, that would not be supplied

by any rainfall at all, would it?

MR. RIKER: That is correct. May I comment a little further on that point?

EX SENATOR O'MARA: Go right ahead.

MR. RIKER: We had a guage installed on Stony Brook just below the point of this dam, back in '54 - it was in December of '53, I believe. We hadn't been able to get the record until a couple of days ago. I plotted one of the records - this is 44 square miles that this drains whereas the reservoir would drain 38 square miles. But the most significant thing that I think this indicates is, for the Members of the Committee, just what is happening today, in June - see, those high points are the storm and the runoffs - and from June on through to December there was practically no runoff, the runoff stopped in May, the latter part of May, and then started again in December, the latter part of November. In the meantime there were little thundershowers and little storms in which you have those short peaks. But for all that long period - this year is an exact repetition of this year that I showed here. We hope that we will get a greater rainfall later on but this is an exact duplication of what is happening this year.

SENATOR DUMONT: Do you want to enter that as an exhibit, Mr. Riker, or do you want to keep it with you?

MR. RIKER: Well, I want to give it some more study because we just got the information. I just plotted it up yesterday.

SENATOR DUMONT: Any further questions?

EX SENATOR O'MARA: May I ask, Mr. Chairman, when Mr. Riker has given this some more study that that sketch be entered as an exhibit?

SENATOR DUMONT: Are you willing to enter it as an exhibit when you have finished with it?

MR. RIKER: Yes.

SENATOR DUMONT: We will be back here again so you will have time.

Mr. Ritter.

MR. RITTER: The chart that Mr. Riker gave here I am sure is correct but we are working with a still worse drought than the last two or three years, we are working with the 1930 drought when in fact it was very dry in December and part of January, sir. Mr. Riker is absolutely right. There is no water here for sometimes as great as 200 days and that's why we have a reservoir. Now, with respect to evaporation, taking the ten inches, ten million gallons per day, and assume every day of a month is the maximum evaporation, you only lose one/third of a billion gallons and if you had that extreme evaporation for 90 continuous days it would still be less than 10 percent of this ten billion gallons reservoir that we are talking about. So evaporation is to be considered but it is not a major item in the volume, and we have assumed that in all cases at least 25 percent would remain in the reservoir.

SENATOR DUMONT: Mr. Ritter, do you want to make any similar compilation of information and present it here

as an exhibit?

MR. RITTER: I don't think it's necessary, sir.

SENATOR DUMONT: All right. Mr. Riker.

MR. RIKER: The point that I want to make, of course, is, it has been stated here that the water would not be drawn down in this reservoir before September. Maybe I am wrong but that's the way I understood it, that it would be late in the fall. Well, at this time or say ten days or two weeks later, the water would go down in this reservoir, according to the evaporations and there would also have to be something let out of the reservoir to maintain a minimum flow in the streams, and the sum of those two, of course, would have some bearing on the drop in the reservoir. Then, of course, the draught down at the Millstone and Raritan River would have to be added to that. So, instead of taking 40 million from the reservoir, you may be taking 50 or 60 million a day from the reservoir.

SENATOR DUMONT: Senator Crane.

SENATOR CRANE: Sir, this program, as I see it from the layman's viewpoint, is one of building an on-river dam to capture flood flows and to impound them so that we can have maintained flow in the streams during abnormal periods, not only to guarantee those flows but to divert water, as well, for potable or commercial purposes. Do you believe there are sufficient flood flows in the Millstone to fill that reservoir?

MR. RIKER: Well, as I say, it would probably take two years. With the heaviest runoff it would take at least a year, and if you had a bad year or a year, say, that was below normal, it might take two years, very easily, to fill it.

SENATOR CRANE: Because Dr. Thurlow Nelson, in testifying on the first day, stated: "A single flood on the Raritan-Millstone rivers during the last days of 1948 and the beginning of 1949 passed our automatic gaging station at Bound Brook in volume which in less than four days would have filled every major reservoir in northern New Jersey to overflowing, starting with dry basins in each."

Now, sir, are you what is considered a water engineer in the same sense as, perhaps, Dr. Nelson?

MR. RIKER: Well, no. He's been Chairman of the Water Policy Commission for a number years. I don't think he's an engineer at that. I think he's a biologist.

SENATOR CRANE: Excuse me. I should use the word "expert", sir.

MR. RIKER: Well, let me say that I think this thing has got to be arrived at and decided on through common sense rather than engineering opinion. I think you gentlemen can make a common-sense deduction, but I think engineering is not an exact science when it comes to water. You have too many variables, you have too many assumptions that you have to make.

SENATOR CRANE: Well, sir, I don't know of any major water supply project that was ever built without engineering advice.

MR. RIKER: That is true but when it's so close to the margin like this, then I think a great deal more study should be made of it.

SENATOR CRANE: Sir, are you aware of the many studies that have been made on the Raritan Basin, back through 1929 and then another one was just introduced today, made in 1922?

MR. RIKER: Yes, I have followed those through and -- Do you want my opinion?

SENATOR CRANE: It's an open hearing, sir.

MR. RIKER: Well, my opinion is that the Round Valley is a natural. That's my opinion, from all the studies that have been made.

SENATOR CRANE: That's your recommendation as to a project.

MR. RIKER: Yes. If you asked me for a recommendation, that's what I would give.

SENATOR CRANE: Then what was your opinion of the TAMS Survey?

MR. RIKER: Well, the TAMS Survey was a very nice, excellent report, well gotten up. There were some very wonderful maps in there and very wonderful over-all pictures, but most of that report was devoted to Chimney Rock which was natural because that was their recommendation.

As was said here this morning, there was 17 or 19 lines devoted to Stony Brook, as a possibility. But there was no rating as to Stony Brook first, or Rocky Hill second, or some others, it was just mentioned as a possibility of this type of reservoir.

SENATOR CRANE: No, but they have been cited over and over again in all these varying reports. To your mind was there any special engineering report that recommended Round Valley to you?

MR. RIKER: Well, this report right here recommends Round Valley, the one of the Water Resources Committee. That was one of the first questions I asked the representatives of the Committee when they met with the Stony Brook Association.

SENATOR CRANE: Well did you ask for any more statistics at that time on Round Valley than you are asking for now?

MR. RIKER: I did, yes.

SENATOR CRANE: Did you receive them?

MR. RIKER: I was told that that was a political issue and they couldn't give them to me.

SENATOR CRANE: I think you will agree with me then that we are about at a routine position. Is that correct, sir?

MR. RIKER: A routine --

SENATOR CRANE: Routine. In other words that we have proceeded on State projects based on this very

same advice. Isn't that correct?

MR. RIKER: That's right.

SENATOR CRANE: All right. Thank you, sir.

SENATOR DUMONT: Any further questions of Mr. Riker? Mr. Crooks.

MR. CROOKS: Mr. Riker, was engineering information available before Round Valley was purchased? the type of engineering data we are talking about, the borings and the actual --

MR. RIKER: Oh, yes. The North Jersey Water Supply Commission has made numerous borings in that area. They have that information.

MR. CROOKS: Then the situation is not the same with Round Valley as it is with this because Round Valley, is it true then, had the borings and had the accurate contour on the ground surveys made even though it was not by the State?

MR. RIKER: That's right. Well it was done by a State Commission

MR. CROOKS: And that information was in hand before the authorization for the purchase of Round Valley. Is that correct?

MR. RIKER: That's right.

SENATOR DUMONT: What State Commission were you referring to, Mr. Riker, that checked on Round Valley.

MR. RIKER: Well I believe the North Jersey Water Supply Commission had investigated Round Valley and done considerable work there.

SENATOR DUMONT: Do you know when they did that, approximately?

MR. RIKER: I am not exactly sure, but I think it was done within the last 8 years, 7 or 8 years.

SENATOR DUMONT: Mr. Shanklin, do you remember? Was it within the last 7 or 8 years, approximately, as Mr. Riker says, when -- what did they do in Round Valley, make test borings? is that what you are referring to?

MR. RIKER: Oh, yes. They made test borings.

MR. SHANKLIN: The North Jersey District --

SENATOR DUMONT: Water Supply Commission?

MR. SHANKLIN: -- had made a topographic survey of the dam sites and had borings. That information was available to the State. There was no contour map available until last week, this week when we received them. I just received a five foot contour map on the Round Valley property, this present week.

MR. RIKER: This report is dated '54.

SENATOR DUMONT: Senator O'Mara.

EX SENATOR O'MARA: Mr. Riker, I show you a report entitled: Round Valley Project for the Metropolitan Section of the North Jersey Water Supply District, dated November 1, 1954, and ask you if you will examine that and tell us from that what work was done by the North Jersey Water Supply District on the Round Valley project up to 1954.

MR. RIKER: Well, I have never gone through this report in detail but from a casual examination of the report it appears that they went into the cost of a 30 million gallons reservoir pretty much in detail, giving the breakdown of cost and the conclusions, the water borings, the borings of the dam, the dam locations, and the preliminary plans of the dam.

MRS. BIGELOW (speaking from the gallery): The test borings for Round Valley were made, I believe, in the spring and summer of 1953.

SENATOR DUMONT: You were here the first day of the hearing and are a resident of Round Valley?

MRS. BIGELOW: Yes.

SENATOR DUMONT: Well the report, of course, is here and I understand Mr. Capen, who at that time, I believe, was Engineer for the North Jersey District Water Supply, is here --

EX SENATOR O'MARA: May I say, Mr. Chairman, that Mr. Capen is going to testify further on and maybe we can get detailed information from him when he takes the stand, unless you want it now.

SENATOR DUMONT: As long as we are on this question it might be better to clear it up now.

MR. CAPEN: It was in 1954.

SENATOR DUMONT: 1954.

MR. CAPEN: That's right.

SENATOR DUMONT: Any further questions from Mr. Riker? Thank you very much, Mr. Reiker.

(Applause)

SENATOR DUMONT: Mr. Fred Rasweiler, Member of the Township Committee of Hopewell Township.

FRED RASWEILER: My name is Fred Rasweiler. I reside in Hopewell Township, am a Member of the Hopewell Township Committee, and also a Director of the Stony Brook Watershed Association.

Statement of the Township of Hopewell in the County of Mercer, State of New Jersey, before the Senate Committee on Revision and Amendment of Laws, on S-272 and S-273, June 13, 1957:

Hopewell Township is the northern-most in Mercer County, having an area of 65 square miles. By accurate computation of Stony Brook-Millstone Watersheds Association, 71 percent or 46 square miles of Hopewell Township lies in the Stony Brook-Millstone Watershed. 38 square miles or 24,320 acres drain directly into Stony Brook and the proposed reservoir. Of the 2300 acres estimated for reservoir needs, both flooded and fringe areas, 60 percent, or 1400 acres, falls in the Township of Hopewell.

Mr. Chairman, we submit that these few statistics justify our keen interest and immediate claim to specific consideration.

Hopewell Township is principally a rural residential community. The residential is growing because of nearness to the industrial areas of greater Trenton and the Princeton area. This brings school and other service

areas. In order to help balance our local economy, straining under a $13.10 tax rate, an industrial belt has been zoned through the middle of the Township along the Reading Railroad. This industrial zone comprises 2335 undeveloped acres. Serious efforts are being made by several agencies to attract usage of this territory. A critical and limiting factor is water. If water is not assured, this industrial area will never be developed.

Several proponents of the Smith Report, who have preceded me, have issued some fine phrases in defense of upstream rights but, Mr. Chairman, we do not consider these phrases to be adequate. If such statements are sincere, we believe that any legislation proposing the use of Stony Brook Water should carry a section specifying in definite terms and formulae amounts to be held for local use. This may even include the future erection of reservoirs for local industry above the present proposed Stony Brook Reservoir.

Without repeating the details, Hopewell Township supports the views taken by the Stony Brook-Millstone Watersheds Association and endorses the program they propose for the development of the said watersheds as being the most constructive and comprehensive for the area involved, which we feel has just prior claim.

Mr. Chairman, to summarize Hopewell Township's views, permit me to read into the record a resolution passed at a meeting of the Hopewell Township Committee on May 28, 1957, and already distributed to Governor

Meyner, Commissioner McLean and the Chairman of the Senate Committee and other Senators:

"Whereas, a report of the New Jersey Resources Advisory Committee, dated April 25, 1957 has been presented to this Committee and has been considered by it; and

"Whereas, members of this Committee have had the opportunity to discuss and explore the proposals contained therein at public meetings and at a meeting held by the Stony Brook-Millstone Watersheds Association; and

"Whereas, the alleged but unproven merits of the proposal were advanced in talks by Roy Ritter and William Baumer, representatives of the New Jersey Resources Advisory Committee, responses made by them to questioning revealed many glaring and manifold deficiencies to the proposal; and

"Whereas, the Committee has from its study and independent research found the proposal to be lacking, deficient and imperfect in the following respects:

"A. Engineering studies were predicated upon old, inadequate and imperfect data. Not an accurate single survey was made of the area by the engineering firm hired to support the proposal.

"B. Real estate appraisals were not competently made, same having been made by maps. No local realtor in the area was consulted as to the actual fair market value. Estimated condemnation costs do not approximate one-fourth of that which may reasonably be anticipated.

"C. The estimate of the New Jersey Water Advisory

Committee as to the number of dwellings within the 1500 acre area is inaccurate, incorrect and fallacious, and undoubtedly advanced for the purpose of misleading. There are many more properties within the area involved than that represented by the proponents. There was no inclusion of properties that would be subject to severance damages.

"D. There has been no provision made and no provision appears in the report as to the cost, relocation of roads and bridges and upon whom the costs would eventually be placed for these and other projects resulting from creation of such reservoir.

"E. No provision has been made for the tremendous loss of tax ratables that will be sustained by each municipality involved. No provision has been made to offset, counteract or make up for such tax loss. Such a loss would only result in the imposition of greatly increased taxes upon remaining properties in the municipalities affected.

"F. The comprehensive legislative survey made by Tippetts-Abbett-McCarthy-Stratton revealed that the proposed dam on Stony Brook was the least desirable site from a view of economics, water supply and engineering problems involved, although seven dam sites were under study. The report made by the Resources Advisory Committee fails to contain any data or suggest that the conclusions of the legislative survey were erroneous.

"G. During dry periods access to water level could only be over mosquito infested mud flats. No 'magnificent view' nor 'recreation area' would result from such proposed dam. The control of all facilities and the use of water will be denied to the municipalities involved, despite the fact that the reservoir would be in the center of the better residential area.

"H. Water would be parcelled out under long term contracts wth large industrial organizations and municipalities far removed from the boundaries of Mercer County. No assurance being made for Hopewell Township needs in the future as to water, opportunity of further growth will be denied.

"I. Competent engineers report that water in such reservoir would be very shallow and not fit for the purposes reflected in the report of the Resources Advisory Committee. This latter committee hesitatingly admitted that it did not have accurate estimates of water flow, that such were not sought due to the limited time within which the report could be made.

"J. The Stony Brook-Millstone Watersheds Association has compiled accurate data regarding the best use of the stream. This information was not requested nor sought by the Resources Advisory Committee, but instead prepared its report based upon non-specific figures such as U.S. Geodetic maps, average rainfalls for the Northeastern United States translated into runoff per acre and the like.

Absence of field surveys, failure to use data relative to the stream involved and lack of new studies which might change the conclusions of the Tippetts-Abbett-McCarthy-Stratton report and the statement of the proposal's spokesman to 'ram the proposal through' the legislature this coming November is reflective of ill-considered haste and the crying need for calm, dispassionate and careful assay of the motives of the New Jersey Resources Advisory Committee; now, therefore,

Be It Resolved, that the Township Committee of the Township of Hopewell in the County of Mercer, New Jersey, unalterably oppose the present proposal of the New Jersey Water Resources Advisory Committee and request that careful and thorough studies be undertaken and made to accurately determine the merits, actual costs, hydraulic and engineering soundness of this and alternative dam sites. It is further urged that legislative action be delayed until such time that physical studies and surveys be completed and compared with the data contained in the report of the New Jersey Water Resources Advisory Committee, and that there be no 'railroading' of the proposal." Signed by Kenneth L. Williamson, Mayor.

(Applause)

SENATOR DUMONT: Did I understand you correctly to say that your tax rate is $13.10?

MR. RASWEILER: That's correct, sir. It will be the end of this year.

SENATOR DUMONT: And what is the percentage of assessment?

MR. RASWEILER: Approximately 18 percent. We are in the process of re-evaluation right now.

SENATOR DUMONT: How many properties would be involved, in your opinion, in this project of Stony Brook in your township?

MR. RASWEILER: We figured out that we would lose approximately $85,000 a year in ratables.

SENATOR DUMONT: In ratables - but how many home-owners and property owners would actually be forced off their property?

MR. RASWEILER: Well, I can't tell you exactly how many. Maybe Malcolm can.

SENATOR DUMONT: Approximately how many. I understood you to say that the Report of the Water Resources Advisory Committee with relation to that figure was faulty. Now they must have stated a figure with which you disagree.

MR. RASWEILER: They state a figure that has already been put out in the former report and since that time there have been many subdivisions in that area.

SENATOR DUMONT: Well, what was the figure they used?

MR. RASWEILER: They used -- did I quote it or didn't I.

SENATOR DUMONT: I don't think you did.

MR. RASWEILER: I think it was some 50, or something. No, I didn't quote it, but it's in their report which I have a copy of.

SENATOR DUMONT: But you do think their report is wrong.

MR. RASWEILER: I believe there are many more properties involved at the present time than the number involved when they made the report.

SENATOR DUMONT: But you don't remember what their figure was, and you don't know exactly what your figure is. Is that correct?

MR. RASWEILER: That's right. That's correct.

SENATOR DUMONT: Senator Crane.

MR. RASWEILER: I realize that since we wrote this testimony you gentlemen have talked about amending these two laws, I realize that, and we would like very much if they could be amended the way we have suggested.

SENATOR CRANE: Well, thank you very much. You anticipated my question. However, I would like to say one thing, that when we are forwarding these criticisms we must be fair, and it has been stated that provisions for roads and bridges have been made in the over-all financial structure suggested by these bills. Unfortunately, it hasn't been spelled out to say to the satisfaction of Senator Lance, but in all these things - on roads, how to spell that out, - on rebates to communities, on all those things we would like your suggestions. That's

what these hearings are for.

MR. RASWEILER: There was no provision whatsoever in the two bills that were brought before this hearing, though. Was there?

SENATOR CRANE: Yes, there was. Paragraph 14, I believe, of 273 refers to an experimental paragraph providing for reimbursement to communities in affected areas.

MR. RASWEILER: It doesn't say how long, though, or how long we would get our ratables or a percentage of them.

SENATOR CRANE: Well, have you read, sir, these bills?

MR. RASWEILER: Yes.

SENATOR CRANE: Did you read paragraph 14?

MR. RASWEILER: Yes.

SENATOR CRANE: Senator Lance gave quite a lengthy criticism on it --

MR. RASWEILER: Yes. I was here.

SENATOR CRANE: -- and I felt it was well taken and we are going to try to work something out but we hope, to make it mutual, that you also will send us something.

MR. RASWEILER: We will do that.

SENATOR CRANE: The same thing applies to roads and bridges. This wasn't spelled out but at least they have been provided for in the engineer's mind under certain contingencies.

MR. RASWEILER: Yes, the main road but there are a lot of township roads in that area also and no pro-

vision has been made for them, has it?

SENATOR CRANE: Well, that's what we were asking this morning, if there were any roads that they knew of that were knocked out completely or any that would be completely obliterated and, therefore, perhaps we want something that is more specific in that regard. Senator Lance at that time suggested a possible provision that he found in another act which spelled out duty and obligation.

MR. RASWEILER: I might also state that about 50 acres of my farm will be three feet under water for about two months of the year and the rest of the year it would be mud flats.

SENATOR CRANE: Well you are a resident of the area then.

MR. RASWEILER: Yes. I operate a dairy farm which is under water or will be.

SENATOR CRANE: I would like to ask you, sir, - you did question the real estate values - how many acres did you say you would have inundated?

MR. RASWEILER: I have a farm that totals about 137 acres of which I estimate between 40 and 50 would be under water.

SENATOR CRANE: Well, how much do you estimate those acres to be worth, per acre?

MR. RASWEILER: That's very hard to do.

SENATOR CRANE: Well it's pretty hard for the engineers to fix an over-all value but here we are talking

acres. In some places it's going to be subdivisions, in other places it's going to be individual homes.

MR. RASWEILER: That's right.

SENATOR CRANE: It's very difficult. I know some man may feel he owns a home on a piece of land and it might very well be worth $5,000 an acre, but somebody else's farm might be worth only $1,000 an acre.

MR. RASWEILER: That's correct. I can see the point. I know that the properties won't all be worth the same.

SENATOR CRANE: Well thank you. I just wanted to establish this point.

SENATOR DUMONT: How large a percentage of the total acreage of the township would this inundate? Did you say that about 1400 acres would be under water? I was trying to remember how many acres you said you had in the township.

MR. RASWEILER: Yes, 1400 acres will fall in the Township of Hopewell, 60 percent of the dam site.

SENATOR DUMONT: And how many acres do you have, in all, in the Township? What is your total acreage in the Township?

MR. RASWEILER: We have 46 square miles in Hopewell Township - no, we have 65 square miles. It's a very big township. We also have some other State property at the present time, and county property in the Township. We have a big State Park, Washington Crossing State Park; we have a county farm.

SENATOR DUMONT: Have you any idea how much of your total acreage is now State owned?

MR. RASWEILER: It doesn't come to IO percent.

SENATOR DUMONT: It does not?

MR. RASWEILER: No.

SENATOR DUMONT: Any further questions? Thank you very much, Mr. Rasweiler.

Ex SENATOR O'MARA: Mr. Chairman, may I respectfully ask that Mr. Charles K. Agle be called out of turn?

SENATOR DUMONT: Surely.

C H A R L E S K. A G L E: My name is Charles K. Agle, I reside in Princeton, New Jersey; I am a planning consultant and an architect. A brief resume of my qualifications might be in order - I have done city planning and housing consultation in more than onehundred cities prior to opening my office in Princeton in 1953. I am a member of the American Institute of Planners, the American Institute of Architects, The American Society of Planning Officials, The National Association of Housing & Redevelopment Officials, Lambda Alpha, which is an association of land economists, formerly the Director of Planning for Harrison, Ballard & Allen, New York, formerly Director of the Projects Division of The Federal Public Housing Authority, associate of Henry Wright, Sr. of Hackettstown, N.J. and New York City. My publications have included "An Approach To Urban Planning" for the Princeton University Press in 1953 - "A New Kind of Zoning Architectural Form" 1951, "Four Stages of Life and Housing" - AIA Journal, 1952, "The Second Fifty Years" New York Times 1949, "Re-housing Urban America" of

which I was contributor and editor of 1934. I have given lectures at Pennsylvania, Yale, Columbia, Princeton and Western Reserve. I graduated from Princeton AB in 1929, MFA in architecture in 1931 and then studied in France and have done work in Italy. Some of my recent clients include lectures at Columbia University, zoning consultations in Greenwich, Connecticut, a two-year lecture course on planning at the University of Pennsylvania, a study for the Institute for Advanced Study, Princeton, consultations on highways for the Port of New York Authority, master land plan of real estate consultation for Princeton University, a study of the centre of Princeton for Princeton Municipal Improvement, Inc., a lecture course on planning with Princeton University, recent articles on a plea for perspective in the Architectural Record of June 1954, a master plan and official map advanced before the New Jersey League of Municipalities which was published in 1956. My present committee worked with the American Institute of Planners, of which I am past-chairman of the Urban Renewal Committee. I am a current member of the American Institute of Architects' National Committee on Community Design and a member of the Committee on Development for the National Association of Housing & Redevelopment Officials.

In order to facilitate the discussion of the implications of the proposed Stony Brook Reservoir on the present and future road pattern of the area, I have prepared a hypothetical map for illustration. - Can you three gentlemen see it from there?

SENATOR CRANE: Do you want the audience to see it, or us?

MR. AGLE: I thought I was addressing you people.

SENATOR CRANE: Let's place it so everybody can see it.

(Map placed on display)

MR. AGLE: I should have brought a bigger map.

SENATOR DUMONT: Mrs. Hughey, are you going to testify today? I just want to check so that we can space this out properly. (Mrs. Hughey's reply not on record).

MR. AGLE (continuing): The reservoir would be in Hopewell and Lawrence Townships and has most serious implications in those two municipalities. It also may have a serious effect in Princeton Township, but because of the comparatively smaller area invaded readjustments may not be as difficult.

The reservoir would completely destroy all previous thinking in Hopewell, as expressed by its Master Plan. It is necessary to do some quick rethinking as to what a Master Road Plan might be, and to examine the consequences of the flooding, not only of the existing facilities, but more importantly of those proposed in the future.

There are two major problems which may be easy to overlook,

and which proponents of the reservoir may play down, since there is no evidence within the Advisory Committee Report of their having considered either. These are:

A. Any bridges should be ample for future traffic loads, and must not be based on the short-sighted replacement of today's antiques.

B. Land cannot be isolated from easy circulation. Otherwise contingent damage must be added to the cost of the reservoir in addition to all of the other considerations.

Specific road considerations are as follows:

1. Carter Road, already numbered 569, as a "secondary", will in the future be one of the three principal spines essential for the proper development of the area bounded by Hopewell on the north, Pennington on the west, Lawrenceville on the south and Princeton on the east. Since its present width and alignment are inadequate for the purpose, its future extension and realignment must be carefully studied before any new bridge over the reservoir is put in the wrong location.

While the location shown on my diagram is a professional suggestion, based on the study of only several days, it should not carry the imputation that it is either final or acceptable to any of the municipalities concerned. Howver, it does have the support of the following reasoning:

It must connect the Hopewell Valley with the lands lying south of the Mount-Rose, Rocky Hill Trap Rock formation. This formation is so difficult to develop that it, like the

Watchung Range, acts as a dividing line of denser development areas. In order to provide proper direction of circulation to the south, this road should intersect U.S. 1 in the vicinity of Bakersville, where three other roads may intersect. First the circumferential route around greater Trenton, suggested by the County Engineer, crosses U.S.1 at about that point, and convenient local circulation to the south of U.S.1 can be provided easily. Secondly, the extension of the Trenton Throughway is planned to connect with U.S.1 somewhere in this location; thirdly, Lawrence Township has recently placed a 100 ft. set back line on Mercer Road, and the opportunity for it to become a principal feeder road from the Princeton area to Trenton is protected. This should be picked up and led to the same point of intersection in Bakersville where the other major roads lie. Such a major spine should have at least a 44 foot pavement, and a right-of-way width of at least 100 feet in order to be serviceable in the future. Existence of many houses along Carter Road at the present time makes the continued use of the present alignment impossible for such future traffic purpose. A bridge crossing in the vicinity of the present alignment would completely destroy or make prohibitively expensive the proper treatment of local traffic circulation in this direction in the future. The suggested bridge location, moreover, is a shorter and less expensive crossing than would be necessary in the present location.

2. Elm Ridge Road. Easy access must be provided to both of the cups of the double U-shape of the reservoir on either side of Honey Branch. This means that there must be a minor crossing of the reservoir from the intersection of the Federal City and the Mount-Rose Roads immediately east of Pennington, then an extension to Elm Ridge Road and the relocation or extension of Elm Ridge Road at least to Province Line Road or possibly to the Pretty Brook Road northwest of Princeton. In the present alignment of Elm Ridge, two bridges would be necessary, one where the water is deep. In lieu of this, a realignment farther north is suggested where the water is shallower, and where the realigned Elm Ridge Road may be close enough to the connection between the Mount Rose Road and the Rocky Hill Road in order to obviate the necessity for its replacement west of the location where it is drowned out at the intersection with Van Kirk Road. Because of the importance of this circulation between the two cups of the double U and the outside world, and also because of the fact that this alignment will be the major connection between Pennington and the Hopewell Valley north of Rock Hill, until an additional Turnpike is built, it should be planned to have a width comparable to that suggested for Carter Road.

3. Rosedale. As the area matures in population, there will be no doubt about the need for an easy circulation road between Pennington and Princeton. The route in commonest use is the Rosedale to Carter then north on Carter to Elm Ridge

and west on Elm Ridge. Since this is being destroyed and probably made much more circuitious, it seems fair to charge to the reservoir enterprise an extension of Rosedale Road straight on to connect with Blackwell Road, and then the minor bridging of a small draw in order to connect with the Federal City Road. However, since Blackwell Road does not amount to much at the present time, and since interference by the reservoir is not extensive, it is not suggested that a new major right-of-way and alignment be charged to the enterprise. Whatever extension there is, however, should be at the width of an appropriate arterial rather than for a minor land service road.

An illustrative tabulation of costs has been prepared and is attached hereto. These are based on the following factors: $20 per lineal foot of paving 30 feet wide on minor land service roads, and a cost of $35 per lineal foot for 44 foot wide paving for arterial roads. (This cost is believed to be low by certain people in the County Engineer's Office). For minor land service roads a width of 70 feet, and for arterial roads of 100 feet are assumed, and rights-of-way are assumed to be purchaseable at about $2,500 per acre.

The cost of bridges is based on the assumption that earthen causeways will be built for the greatest part of the distance across the reservoir, and that the actual roadway supported by the bridges will be held to a minimum. Earth rolled in place in six inch layers is assumed to cost $1.50 per cubic yard, and the cost of structures at this time is any-

one's wild guess. In spite of the fact that they may be short, it must be remembered that they necessarily would be in the deepest part of the crossing, and must have foundations going for the full depth of the reservoir and below this to solid rock.

In order to obviate futile debate about precision either of road layout, or of cost figures at this point in the study, a minimum and maximum range of possibilities is indicated. The maximum is considered to be the minimum which would be needed within 25 years, and the minimum constitutes replacement of existing facilities without any contemplation of the future. This minimum expenditure would, of course, be almost entirely lost when they would have to be replaced by later enlarged facilities. Vague as my figures may be, it would be foolish to estimate less.

New and widened roadways are always cheaper to build through open land than togo back to old roads which are now built up with improvements, even without regard to the inevitable argument as to who should pay for how much of what. It is most seriously urged that new and adequate rights-of-way should be purchased for the entire pattern while there is still opportunity to secure such land at less than astronomical future figures. This, of course, will entail the full planning and determination of road layouts by Hopewell, Lawrence, and Princeton Townships, Mercer County, and the State Highway Department, at once.

If this were not done prior to the undertaking of the reservoir, and prior to the determination and proper arrangement of financing, whether in proposed legislation or as a result of

authority granted by such legislation, the risk of putting crossings in the wrong locations will be great. Since it would be difficult to recover damages later caused by these mistakes, unless funds were provided now, an adequate overrun for contingent damage should be provided in any event. This overrun is not allowed in the figures I have prepared.

All of these matters, including financing, must be determined before a legislative authority is granted. Otherwise ill conceived commitments will be made by others concerned only with a fraction of the total picture, but which would control the destiny and the future lives and prosperity of the entire area. From these decisions there would be no appeal at a later date.

On the cost figures, I have various tabulations, which since I have prepared copies you may not need to have me read in detail. Should I read these in detail, for the record? Or can they be copied into the record?

SENATOR DUMONT: They can be made a part of the record, unless you want to read them.

MR. AGLE: Well, no. The implications from it are that the maximum cost would be somewhat over 3 million dollars and the minimum cost would be $1,138,000. And the rest of the details are merely the different alternatives depending upon what you want to pick off my map and what the map might eventually look like at some future date. Thank you.

SENATOR DUMONT: Thank you. Any questions? Mr. Agle, are we to have this map as part of the record, or what?

MR. AGLE: If you consider it useful, I'd be glad to leave it.

SENATOR DUMONT: It would be a little difficult to put it in the record. We can keep it here in the State House with the record.

MR. AGLE: If it is alright with you I'd like to have it back at such time as it has served whatever purpose that you have in mind. Let me know, and I'll come and get it.

SENATOR DUMONT: Right. Senator O'Mara --

Ex SENATOR O'MARA: That map can be duplicated -- and I think that's what we should have done.

SENATOR DUMONT; Right. Supposing you do that, then you can take this one with you, Mr. Agle.

MR. AGLE: I'd be glad to.

SENATOR DUMONT: Thank you.

(Applause)

Mr. Cassel Ruhlman, Attorney for the Borough of Pennington.

C A S S E L R U H L M A N: Senator Dumont, Senator Crane and Senator Fox, I am Cassel Ruhlman, Jr., I am Assistant Attorney for the Borough of Pennington. I have been directed by the Mayor and Common Council of the Borough of Pennington to present the following points in opposition to the proposal of the New Jersey Water Resources Advisory Committee and the legislation here under consideration; in particular to the proposal to construct a dam on Stony Brook. The points are as follows:

1. From the meagre information available it is apparent that the borough of Pennington will suffer the loss of two wells representing 40% of its existing water supply, and a large portion of its existing park area.

2. The current estimate of the loss of tax ratables to the school district of which the borough of Pennington is a part, represents an estimated 8% increase in our tax rate, with no benefit direct or indirect being derived by the Borough.

3. The cost to Mercer County and its municipalities for the relocation of roads and the erection of numerous bridges will become a direct burden on the already over-burdened home owner with no resulting benefit direct or indirect.

4. Due to the particularly flat contour of the land in the Borough of Pennington and immediately adjacent thereto, even a lesser drop in water level than is admitted by the proponents of the bill, will expose large areas of mud flats with resulting mud flats with resulting disagreeable odors, unsanitary conditions and hoards of aggravating insect-life.

Thank you.

SENATOR DUMONT: Mr. Ruhlman, how much of the Borough of Pennington is going to be inundated by the Stony Brook project?

MR. RUHLMAN: I cannot tell you how much would be inundated, Senator, the information which has been available to us from the proponents of this bill has not been detailed enough to tell us exactly how much. However, the park area belonging to the Borough of Pennington and known as Kunkel Park immediately adjoins Stony Brook. The two wells of which I speak, are in that area - one is on the bank of Stony Brook. From the meager information,

as the Mayor and Council stated in their statement, it appears that both of these wells stand a good chance of being flooded out and would be unavailable.

SENATOR DUMONT: And they supply about 40% of the water supply?

MR. RUHLMAN: 40% of the water supply, approximately.

SENATOR DUMONT: How much of your borough, if any, is already State owned?

MR. RUHLMAN: I do not believe that any of the property is State owned. It is a small borough.

SENATOR DUMONT: What's your tax rate, at the moment?

MR. RUHLMAN: Our tax rate is very close to that of Hopewell Township, but a little below it, I can't remember the exact figure but it is about $12.85 - I believe that's it.

SENATOR DUMONT: And is your assessing ratio about the same as Hopewell Township? About 18%?

MR. RUHLMAN: We have had a reassessment and it is at 20%.

SENATOR DUMONT: Any questions for Mr. Ruhlman? Thank you. Mr. Test.

ALFRED TEST: My name is Alfred Test, I am a resident of Princeton Township. I appear here as Chairman of the Citizens Committee for a Sound Water Plan--and I would stress the word "sound" -- in opposition to Senate Bills 272 and 273 which are presented to implement the proposal of the New Jersey Water Resources Advisory Committee of May 2nd -- seven weeks ago. We number over 2,800 members in the Stony Brook watershed area which covers about 38 sq.miles of the most beautiful developmental land

in central New Jersey: Lawrence, Hopewell, and Princeton Townships and the boroughs. We also have excellent facilities for certain limited types of industry.

We are not in a position to discuss the specific effect on our good neighbors at Spruce Run.

I can claim some small degree of knowledge on water needs since before retirement a year and a half ago my responsibilities included the real estate problems of a major oil company with operations in many states and in several foreign countries. Currently, I am on the staff of Princeton University and act as a consultant to a few businesses on site locations and development. I am qualified as an expert witness on real estate in several state courts, the Federal Courts and before the Securities and Exchange Commission. I also seem to be in character since one of my great interests has been deep water harbor sites and my own home will be fifty feet under.

Our opposition is three-fold:

First, the facts do not substantiate the proposal.

Second, to use the words of Senator Crane, we consider this a "stop-gap" measure which does not come to grips with the basic problem.

Third, the bills themselves, even if we are wrong, must be clarified and amended substantially to produce an equitable result.

We are not without prejudice admittedly. That, I think, is our right so long as we can rely on the democratic process in the true American tradition, a tradition that seems dangerously at stake because of the unseemly tactics of the proponents. The limited time

element forces us to be more negative than we would like to be, but for the record I can say that I have not heard one person against it if the proposal is truly a part of the basic answer and an economically sound one.

Our first objection is premised on the fact that no prudent person would proceed with a dislocation of such impact and expense on the basis of preliminary plans and estimates. Any business executive who did would have neither job nor business for long. We have repeatedly asked for hardpan facts without getting them. Even after their day in court here the proponents have not given the public the minimum information needed for a proper decision.

We are here today after two days of testimony by the proponents and their advocates. We are still asked to rely on adjusted estimates of a rewrite man for the Advisory Committee about one of the smallest segments in the T.A.M.S. Report. This report, I believe we all agree, is an excellent one, but admittedly only an order-of-magnitude review primarily of surface water sources and their approximate development costs. Peculiarly, we are now first asked to consider the T.A.M.S. Report a complete water bible and then specifically we are asked to accept its most minor segment in form varied by the Advisory Committee as somehow being more biblical. In the T.A.M.S. Report, the Stony Brook site is given exactly 14 lines of text in that physically monumental volume.

We have been told that all the proposals of the T.A.M.S. Report had been considered before Spruce Run and Stony Brook were chosen. Why was it then that the Committee's engineer had difficulty recalling where the Rocky Hill site was and did not inspect it? The Rocky Hill site, incidentally, was given 18 lines in the T.A.M.S. text.

T.A.M.S. objection to the much cheaper Rocky Hill site is shallow fingers, and yet we were told publicly on May 10th that the average summer take-down would be 8 feet in the Stony Brook Reservoir, which will leave 500 acres of naked mud, would not be objectionable. Why did the same engineer who stated the 8-foot figure change it here in testimony to 4 or 5 feet? And as brought out in the testimony today the average of 13 years' statistics indicate that his own calculations would be 13 feet.

Let's compare unit costs of the North Branch to the proposed sites. Using the T.A.M.S. figures, the North Branch has 174 square miles of watershed to cost six million dollars. The combined Spruce Run-Stony Brook has 79 square miles to cost 9.3 million. Thus the cost of the North Branch per square mile drained <u>is</u> $34,500 compared to $118,000 for the Spruce Run-Stony Brook combination. Granted all costs have gone up since 1955, can the Advisory Committee offer evidence that costs for the North Branch have gone up over 300% more than the subject sites?

Why did the spokesman for the Advisory Committee, upon public release of its brochure, state that people in our area were consulted when it was not so?

Let's sum it up this way. It would appear that if as much money had been spent on engineering as on publicity, we would have some of the correct answers right now.

We are rightfully concerned, I think, when advocate after advocate for the proponents have just one by-line: We want your water! Doesn't it transcend justice and common sense to consider such a request without thought of the resulting dislocation here or in any

area subsequently affected? Now that we resist, it is stated that we are misguided or don't understand. It is suggested we ought to think Big. I believe you will agree that this admonition must apply equally to every industrial proponent as well as every tax payer in this state.

You are asked to believe that if this project does not go through at once that somehow or other the welfare of the entire State of New Jersey is at stake. Let's bring this thing into sharper focus than has been done in the Advisory Committee's brochure.

While the time element does not permit us to present a completely engineered case, our group is deeply grateful for the introduction of these bills, which permits early public hearings of this scheme.

In the case of the proposed dam on Stony Brook, we believe we can show, beyond any question of doubt, that the costs will be at least double the estimates and the water avails one-half the estimate, an inverse ratio of about 4-to-1.

We believe that before any local on-stream reservoirs are built, a complete exploration of ground water sources should be completed. This will be brought out in testimony we will present. It is also discussed in summary form (Exhibit E) in the Advisory Committee's brochure.

Should ground water avails be insufficient, which known facts indicate unlikely, we would approve expansion of this watershed's small conservation dam program to include reservoir supply. As an example, it is a fact that just west of Pennington, there is a fine deep gorge which is capable of containing three billion gallons.

It is my firm conviction that the long range supplement lies in the economic conversion of sea water together with recovery of its mineral content. I am told that approximately one million dollars a year is being spent in research on that problem and that the answer is closer than is realized by most people. It is obvious, however, that much more such research is needed at national, state and corporate levels. The thought suggests that this is a fine project for the Advisory Committee instead of an attempt to assuage a local distortion to the enlarged detriment of another State area.

As has been pointed out, New Jersey today is using five hundred million gallons of potable water. Another three billion gallons, a substantial portion of which is brackish water, is estimated as being used by industry for both consumptive and non-consumptive purposes. Just a modest conservation program could perform miracles in added supply.

Doesn't this emphasize the basic need confronting us? And there is a very real problem in the offing if both industry and people are not balanced under a dispersal system to the greater good of all. Doesn't it require enforcement of workable pollution laws and conservation of use within reasonable limits that will still permit our manufacturers to be competitive in the world market place? Doesn't it mean that the classical Chamber of Commerce approach--industry

and yet more industry--may show to be more of a curse than a boon unless it is only encouraged and fitted into the concept of a balanced community.

Since these hearings have begun, I have done more required reading than since my school days. While I am far from fully informed, one basic fact is clear. Nature has amply endowed New Jersey with water resources. Our problems stem from the man-made dislocations and the consequential but natural concentration of industry in the northeast section of the State. This area has its internal problems for which it wants an outside cure.

Virtually all supply systems are privately or municipally owned with the result that some areas are adequately supplied for the foreseeable future and others are not. There is no adequate method to parcel the avails in relation to the needs, a situation which has been heightened by the fact that there are insufficient distribution mains in perimeter areas around the industrial core.

It would seem mandatory for the long range solution that some formula or control for exchange of water of the same type and quality at best, or lesser type and quality at worst, was vital to the general welfare. If we allow the Topsy-like growth of the past to continue, we will inevitably get ourselves into a situation where the cure of each specific problem creates another dislocation worse than the original. While we are concerned with any enlarging of Bureaucracy, it seems to the Citizens Committee for a Sound Water Plan that our troubles will continue to mount unless we have an over-all State planning program that might operate through regional groups, which will relate land use to water avails. While the concentration of industry in North Jersey bears a natural relationship to the world's

most highly concentrated market, we all enjoy excellent transportation facilities and if population continues to explode at its present rate, the magnetic field of that concentration will roughly include the seaboard between Boston and Richmond or beyond.

Let me now return to the project at hand.

First we are told that Stony Brook will produce an average of 50 million gallons a day. This is simply not so as will be shown through competent witnesses, but let's use the figure anyway. Of the 50 million gallons a day, 10 million is to stabilize the flow in the Raritan below Bound Brook, and the other 40 million is for use.

Let me point out that sustained flow is today the most important facet to industries and communities down the line. Why? Under an authority which was headed by the Chairman of the Advisory Committee, a new trunk sewer is being constructed between Bound Brook and Perth Amboy. This additional sewer was deemed necessitous and economically preferable by those involved to take care of the polluted effluent from factories primarily and municipalities secondarily. Through its diversion, down stream plants and municipalities face a reduced level in the Raritan River. In addition, any lowered flow of the Raritan will accentuate the invasion of salt water in the lower reaches which adversely affects the riparian users in this area, and over any protracted period will undoubtedly contaminate wells along the stream bed.

Most importantly, since this sustained flow is just as valuable as water in use, who and how is it to be paid for? I am not sure how sewer users and riparian owners should pay for replacing and increasing a sustained Raritan flow, but I can unequivocally state that it should not be the obligation of New Jersey tax payers.

Now, let's look at the purported 40 mgd to be sold for consumptive use, which, factually, will approximate 16 mgd on the average. A bare drop in the State bucket that will support a balanced community of about 118,000 persons. Is this monumental in scope? It is not. We are told magnanimously that we can have first call on this supply. Fine, but being still sparsely populated we cannot afford a large reservoir today on any standby basis. So who pays the interim bill for it is inevitable that we will need the water our land generates in the years ahead. Since economics make an immediate sale necessary, the result would create a rhetorical Sahara here that must find another cure tomorrow.

It is recommended by the Advisory Committee that the projects be financed by general obligation bonds of the State of New Jersey. If the State is going into the water business, a necessary philosophy for over-all control, why shouldn't it go into the water business on an economically prudent basis? If the project is ecomomic these bonds could be revenue or authority bonds and sold as such. Isn't it inherent that the Advisory Committee realize fully in advance that this would not be a self-supporting project and a jeopardy to State credit?

We estimate that the Stony Brook development alone will cost more than fourteen million dollars, but for the purpose, let's say fourteen million dollars. Assuming that bonds can be sold in the present market at 4%, on the 35-year payout recommended by the Advisory Committee, the level annual factor is 5.32%.

Debt Service therefore would be $744,800 per year.

Senator Crane has suggested that amortization be deferred for a period of ten years. Even simple interest would amount to $560,000 a year at first and the 6.34% factor for the last 25-year payout is $887,000 annually.

Our experts will testify that the market value of ratables is perhaps 8½ million dollars. Assuming that taxes will reasonably be 3% of market value, the obligations to local jurisdictions should be $255,000.

Operations will require around-the-clock attention, particularly if drum gates are used, which they should be, and the maintenance of the reservoir itself is an unknown quantity depending on the work necessary to control the growth of plant life, etc. Operating costs, therefore, should be estimated at between $50,000 and $100,000, let's say $75,000.

In adding these figures together, the annual expenses for the 35-year period would therefore be $1,074,800 per year.

Since the daily cost of operation will be $3,000 - $1,074,800 divided by 365 days - the true cost of raw water, if the entire average throughput is charged for, will be $115 per million gallons -- not $25 recommended by the Advisory Committee for salable water only.

Having reviewed the cost estimate, let's look at the income projection.

The Advisory Committee's engineer has stated that 40 mgd will avail for use. Gauging figures incontrovertibly show that this cannot be so in an average year. With allowance for evaporation and seepage, two substantial items brushed off in earlier testimony, both our experts can show that about 26 million gallons a day is the average maximum available for all purposes.

If the entire average throughput of 26 mgd were sold at the Advisory Committee's suggested price of $25 per mgd, the daily income would be $650, or $237,250 per year.

However, their proposal is that 10 mgd shall be used for stabilized flow without charge and that the excess shall be sold. If only the salable excess of 16 mgd is sold at $25 per mg, the daily income is $400, or $146,000. per year.

Here, let me state that in a really dry year there won't be more than 10 mgd to sell for use, which means that with proper allowance for the safety factor, annual income cannot be more than $91,250, or, say, 8% of income necessary to make the project self-liquidating.

The Advisory Committee enunciated, as one of the cardinal principles, that projects of this sort should be self-liquidating. With this point our Committee agrees. But we charge that S.272 in Section 21, Paragraph B, puts its hand slyly into the pockets of New Jersey tax payers. Since the net revenue derived from the Delaware and Raritan Canal is so small a part of the general funds, substantial new taxation will be necessary.

To avoid as much repetition as possible, I have not touched on many equally important factors. On these other points I commend you to the testimony of other opponents.

In any event, it is clear that the Advisory Committee has made no case for its proposals. Its Chairman, however, has asked for

constructive criticism and here are our proposals:

1. That an Advisory Committee be reconstituted to consider related planning problems inherent in adequate water supply. That it abandon the policy of secrecy. That the direct supervision and staff should be full time employees of the Committee. That it should be advisory to the Government in planning for and educating the people but not a promotional agency.

2. We reaffirm the principle that ground water sources are always preferable because they assure better palatability and act as a natural filtration bed for potability and hence should be fully studied before we splash the New Jersey countryside with surface reservoirs which will probably be obsolete in the years ahead. In this connection we will offer in evidence two such potentials as worthy of consideration.

3. We recommend that the Legislature study and act on appropriate legislation to enforce conservation of existing water resources to include a definition of the rights and limitations on riparian users and to control unlimited pumping or unrestrained flow of private wells. (For discussion of subject, see Engineering News Record of May 9th.)

4. We also recommend a review of our anti-pollution laws and enforcement practices. This should include limitations of trunk sewer construction and compensation of diminished stream flow that adversely affects riparian rights.

5. We recommend that the Legislature implement state-wide developmental studies to determine the characteristics and proper uses of the various areas in relation to local water avails leading to an eventual dispersal of industry in keeping with the residential

and commercial community, to promote the economic health and benefit of the commonwealth.

6. We applaud and encourage action by the Legislature to provide maximum cooperation with our neighboring states for early development of the Delaware River supply and flood control.

It is our firm conviction that if all our citizens would take positive action instead of saying it can't be done, that the results would be notable.

7. We recommend that in the interim of using Delaware River water supply, the Round Valley site now owned by the State be activated from an intra-state supply.

8. We recommend that in the interim of complete study and development of underground resources that no surface reservoirs be constructed except in the face of urgently demonstrated need and within the limits of sound economy and prudence.

9. We suggest that a bond issue referendum should never be submitted to the voters short of detailed plans, specifications and cost estimates since there is an implied promise the project can be had for the amount stipulated; a fallacy in the subject case as we will conclusively prove.

Thank you.
(Applause)

SENATOR DUMONT: Are there any questions of Mr. Test?

SENATOR CRANE: Yes.

MR. TEST: Senator Dumont, we have one other witness who is doing consulting work for the St. Lawrence Seaway, and he probably will not be available at another hearing. I am perfectly willing to answer questions, but could I be permitted to yield now and come back later?

SENATOR DUMONT: How long is he going to take? I have asked Mrs. Hughey to speak. She has been here for three days now.

MR. TEST: His answer is about half an hour.

MR. WERNER SCHMID: I am going to be away for the rest of next week and I am planning to leave for London, England, to attend an international conference. I won't be back until September.

SENATOR DUMONT: All right, Senator Crane. Ask your question.

SENATOR CRANE: Mr. Test, you are Chairman of the Citizens Committee for a Sound Water Plan?

MR. TEST: That is correct.

SENATOR CRANE: How many members are there?

MR. TEST: We have about 2,800.

SENATOR CRANE: And where do they reside?

MR. TEST: Ver largely in our watershed area, as I first stated.

SENATOR CRANE: In Mercer and Hunterdon counties?

MR. TEST: Not in Hunterdon.

SENATOR CRANE: Are there any persons outside of Mercer?

MR. TEST: Frankly, we have grown so rapidly that I can't give you that information right now, I don't know.

SENATOR CRANE: I see. Now, these opinions, were they formulated for you by a committee of experts or is this your own individual testimony?

MR. TEST: The facts as presented are formulated from the findings of experts; the stand is a group move of the Executive Committee.

SENATOR CRANE: Could you tell me who the experts are. I mean are they water engineers?

MR. TEST: Yes indeed so. You will be very much impressed with Mr. Schmid who will be on next, we will also have testimony from Dr. Taylor Thom who is on government work in Louisianna at the moment and cannot testify for himself. We have Charles Capon, a retired engineer of the North Jersey Commission, and we have Homer Sanford who is also an engineer.

SENATOR DUMONT: Mrs. Hughey, how long will your testimony take?

MRS. HUGHEY: Six handwritten pages.

SENATOR DUMONT: Can you come back another day?

MRS. HUGHEY: It depends on when the other day will be.

SENATOR DUMONT: Well, we thought that we would probably meet the week after next. I realize that that's the 4th of July week, but we could meet early in that week. In the first place it would appear that by that time we could get to rebuttals and it would give more adequate time for each side to start preparing their rebuttals. Now, I don't know about Senator Crane, but I have to be way up in the northern part

of the state by 8 o'clock so that I'd appreciate it if we could finish up. Oh, he has to be in New Hampshire.

MRS. HUGHEY: I came up from Virginia.

SENATOR DUMONT: Oh you want to go back there. I think we owe you the opportunity to go on here, This will be your third day here, so you may testify now.

MRS. ANN HUGHEY: Thank you very much, Senator Dumont. Senator Dumont and the other gentlemen of this committee, I am Ann Hughey and I speak not only for myself but also for my husband George Hughey, Lt. Commander, United States Navy, Night Fighter Squadron 74. One hardly dares refer to the Smith Report anymore for fear that the cited section is to be corrected by the errata sheet being prepared. But since I have not yet been furnished my sheet of corrections I would invite attention to Page 8 number IO of the Smith Committee's Report, where it is set out as a guiding principle "dislocation of people is all important". Since this consideration is endorsed by the Report and since stability of homes as a value goes to the roots of good American life, we feel that this senatorial committee should hear an example of what dislocation under the Smith proposals would mean to families.

When we moved to our house in Princeton Township we were making our 41st, and we believed last, permanent move in the Service life. We acquired our place so that we would have a base, could establish roots and could create a long-range center of solidarity to the otherwise chaos of Navy living.

These needs are so important to us that we went far beyond the usual efforts of new homeowners in fixing up our place. After purchasing, we spent the first ten months moving our house; only one who has moved a house can fully realize the struggle it entails, I can only say that it combines all the headaches and heartaches of building, of remodelling and of buying, plus. Certainly, when one has moved a house one feels entitled to live in it forever. Besides moving the house we went sixty miles to Greenlanes, Pennsylvania to bring old floor boards and other materials to incorporate into our place. Ironically, these materials were being rescued from houses being inundated by the Greenlanes Reservoir.

I recite the highlights of this personal history, to give an idea of the type of sacrifices the Stony Brook Reservoir asks. One could not be so selfish as to draw attention to individual problems were this Reservoir project well analyzed and founded on specifics. As presented, the project is so vague that it leaves countless conflicts to be resolved. At these discussions here, and in this Smith Report, I have heard and seen many specific answers put forth; for example, the Reservoir would provide so many gallons increased flow, and so on, but I have not learned the formulae, nor precise values by which these answers were secured. My mathematics stopped after college calculus but even at that, it does seem that to come up with specific answers as has the Smith Report, there must have been specific figures in the solution. Where are the numerical percentages of evaporation, perculation,

rainfall, present flow of Stony Brook and so on that would seem to be needed to provide answers on flow. If variables or guesses were used in the equation, is not the answer also a variable? We feel that the figures to the left of the equation, of the equal sign in the equasion, should have been presented along with the answers.

Page 2 of the Smith Report says that detailed data will be filed. We should ask has this been done, and if so, should not this basic information be part of the record of this hearing as considerably more vital data than the generalities in which the proponents continue to speak. Certainly, before asking families to give up their homes and, as in our case, such irreplaceables as a 4 I/2 % mortgage, certainly at the very least as a preliminary, an accurate up-to-date contour map of the area should be prepared and published. Commissioner McLean in supporting the bills has suggested this procedure.

Further, if all the engineering conflicts were resolved, then as to cost there would seem to be problems. Without knowing what is to be bought how can any price be set on the cost of this reservoir? How can the Legislature know whether it is alloting too much or not enough? Accurate, careful cost appraisals should follow the engineering contour studies. It would seem wrong to pay off the individuals who lose their homes at 8¢ on the dollar, as the bill implicitly provides. This has never been the American principle, and we feel that the State of New Jersey should not launch such a practice.

In its zeal to underwrite public good, this Legislature should be equally tenacious in guarding against improper methods and infringement of individual rights. We would respectfully urge this Commission to revise the present bills as follows:

In our opinion, it is only fair play to provide first that the necessary engineering studies that would have to go before reservoir construction be required to precede any land acquisition. It would seem wise to add a policy statement that wherever possible these engineering studies should be adjusted to affect the fewest number of property owners. Dredging that would achieve deeper lakes over a smaller area should be considered.

Second, in our opinion it is only fair play to postpone any authorization for costs other than these engineering studies until accurate appraisals can be made of the sites actually determined necessary for the reservoir.

We would further urge that in studying these bills this Committee not lose sight of Senator Crane's caution on allowing citizens unnecessarily to become doormats to progress.

We feel that page 9 of Senate Bill 273, the paragraph comprised of lines 11 to 20, even though judicially supported, is an insult to individual rights. Particularly is it insulting here, in view of the incomplete studies on which this bill is based. As a practical matter, such procedure leaves individuals without a remedy and removes former remedies which in themselves were only imperfect. We ask that this ugly clause on page 9 be eliminated.

We rely on this Committee aggressively to seek a

solution to this resoluble problem which does not disregard the individual or his rights, a solution which balances acts in the name of public good with traditional individual interests. Thank you.

(Applause)

SENATOR DUMONT: Which section? I know you said Senate Bill 273, but which section?

MRS. HUGHEY: It's on page 9 and it's the paragraph comprised of lines 11 to 20. It's the clause which permits administrative authority to take, and then later citizens can litigate. It would seem to me that as a matter of bargaining, the State has the right of condemnation and the individuals certainly should be allowed their remedies in court. I don't think that individuals litigate unless there is good reason. It's expensive and it's certainly time consuming. This way, they can be put out with no place to live. They can be handed any sort of a figure the State desires, and then they can spend years and expense trying to get their money out of their place to put into something else.

SENATOR CRANE: Are you an attorney, Mrs. Hughey?

MRS. HUGHEY: I am a graduate of the Temple Law School. I was Editor-in-Chief of their Law Quarterly. We studied water problems, too.

SENATOR CRANE: Mrs. Hughey, would you please re-read that portion of your talk in which you referred to page 8 of the

New Jersey Water Resources Advisory Committee, somewhere where you said it was advocating dislocation.

MRS. HUGHEY: Page 8, number 10. No, I did not say it was advocating, I said that they had set out as one of their guiding principles that dislocation of people is important. I felt that that gave me my right to speak as an individual. As far as the committee was concerned, they assumedly were guided by this thought although I don't see that they have given much consideration to it.

SENATOR CRANE: You feel that they are referring to the human factor, or overlooking it?

MRS. HUGHEY: I feel that they blandly referred to it and then subsequently overlooked it. (applause). I certainly wouldn't consider you gentlemen as doing the same, however.

SENATOR CRANE: Mrs. Hughey you've suffered through all these hearings with us, do you believe there could be such a thing known as a "happy" reservoir site?

MR. HUGHEY: I think that this reservoir site if it is sound could be a very happy reservoir site, I think the people would feel that they shouldn't be so selfish as to stand in the way of it. Certainly the President of Princeton University said he would not interpose the university land if the plan was sound, but I think that we feel that the ethics involved, the incomplete information, the lack of

detail, the complete out-of-proportion to cost- asking people to take 8 cents on their dollar - I just don't think that we should just standby and not speak up against it.

SENATOR CRANE: You believe that more information would make the plan more acceptable to you as something you could base your own decision on?

MRS. HUGHEY: As it now stands, everyone that is affected or not affected - they don't know if they are affected or not affected because no contour map has been prepared, only very general areas have been suggested. I think that many of the people who oppose it, if they felt that the information was sound and complete and they knew where they stood, they would be more philosophical about it.

SENATOR CRANE: In other words if you were reassured about the information that this was a good reservoir, one that would produce the capabilities that have been referred to, that you would then be able to make up your mind in its favor?

MRS. HUGHEY: No. I think also that the cost would have to be put into line. If they said they were going to take a certain amount of land to make a reservoir, that would be able to produce a certain amount of water and the result that was necessary, then they should pay people fairly. I don't think they have allowed enough money to do that.

SENATOR CRANE: Well now, how much money to your mind has been allowed?

MRS. HUGHEY: A fourteen million total, and I questioned Mr. Ritter as to how much was allowed for land acquisition which is the only thing I feel I know I can speak on, and he said in the Princeton area, the Stony Brook area, two million was allowed and he allowed a 15% increase on that from 1955 I believe it was; that brings it up to about $2,300,000. Then you divide that by the number of acres involved, roughly set out on that very preliminary map which is in the middle of their booklet, and you come out with about something like $1500 an acre, which includes improvement. I think if you go out and look at some of the places out there you will find that that's ridiculous.

SENATOR CRANE: Well now, Mrs. Hughey .....

MRS. HUGHEY: Excuse me, now also that 15% increase that he admitted was necessary has to come out of the 1 million which he said was set aside for roads and all other reimbursements, presumably utilities and whatnot. So if you take $300,000 out of that million you don't have as much as perhaps you should have left for the roads and all the other things that have to be paid.

SENATOR CRANE: Well now, Mrs. Hughey, you've been taking averages here. Don't you think there is such a thing as individual condemnation. Inotherwords, one man might have a home worth $100,000., another man might have a

farm with many, many acres. It wouldn't be fair to hand the man with the house with a $100,000 valuation on it $1100 for his acre and then walk away and pay the farmer more, would it?

MRS. HUGHEY: No ... but ...

SENATOR CRANE: Well then, do you think that that's the way they intend to pay it?

MRS. HUGHEY: I don't know, they haven't said - I think that some of those things should be clarified, and I think that $1500 per acre even for bare land is very minimum. Anywhere you go in the United States today land is about $1000 an acre, I believe, as a minimum and certainly in our area it is decidedly higher than that.

SENATOR CRANE: Do you know the actual evaluation of land on which taxes are paid in your area?

MRS. HUGHEY: I know in Princeton Township they had a complete reassessment last Fall, they used market value - real value - and at the time when we were all discussing our taxes they said that no land had sold anywhere in the Princeton Township area for under $3,000 in the last few years and that was a basic beginning and people's properties were assessed upwards from that. That's acreage; that does not include improvements.

SENATOR CRANE: Are you aware of any recent sales that might uphold the findings of the realtors who advised as to

values there?

MRS. HUGHEY: Are you asking me who advised on the township assessment? I think that Mr. Mason, the Mayor can answer on that, but I believe it was a firm in Cleveland.

SENATOR CRANE: No. I am talking about there being recent sales in your location. Do you think that they would tend to substantiate your high values, or tend to substantiate the values placed on the project by the engineers' staff? In conjunction with realtors' advice?

MRS. HUGHEY: Which engineers' staff? You mean, the Smith Advisory Committee's engineer?

SENATOR CRANE: Yes.

MRS. HUGHEY: I think that recent sales would decidedly underline and emphasize the correctness of the values I've mentioned.

SENATOR CRANE: If you were shown that the four most recent sales tended to support the findings of the engineering staff of the Smith Report, would you feel that they had more of a right to inject the figure they did? Do you think the four most recent sales would be a good basis?

MRS. HUGHEY: Well, my preliminary feeling would be that they have only found one little recent sale somewhere that is perhaps not generally indicative. Now, I know you may feel that that sounds prejudiced but we have all been

affected by the manner in which the proceedings prior to the hearing were conducted - so you'll forgive me if I say that.

SENATOR CRANE: No, that's quite allright. But the point I wanted to make is that if there can be a latitude of finding for value, then it is not fair to apply a given average and say it's unfair because my house is worth so much more therefore all these other properties are worth so much more.

MRS. HUGHEY: I always let a man win an argument.

SENATOR CRANE: I give up. Thank you, Mrs. Hughey.

SENATOR DUMONT: Mrs. Hughey, Princeton Township where you live, I believe, is the only municipality in the state that is now assessing 100% of true or market value, is that right?

MRS. HUGHEY: To my knowledge.

SENATOR DUMONT: Thank you, very much. Are there any other questions? Senator O'Mara?

Ex Senator O'MARA: No questions

SENATOR DUMONT: Dr. Schmid. This will be the last witness today.

DR. WERNER SCHMID : I would like to thank you, Senator Dumont, for allowing Mrs. Hughey testify. I think she has made a better general introduction to the subject about which I am going to speak, than I would have been able to, because I will be presenting some of those detailed investigations which should have been made and were not made. Ny name is Werner Schmid, I am an Assistant Professor in civil engineering at

Princeton University. I have been asked by Mr. Test, Chairman of the Citizens' Committee for a Sound Water Plan to review the proposals regarding Senate Bills Nos. 272 and 273 before your committee, from an engineering point of view.

I have dealt with water development problems for a considerable time. Initially working with the Bavarian Power and Light Company on the hydro-electric power development of the Yser River, I later conducted the research on dam material and construction of the 350 ft.flood control dam in the Bavarian Alps. More recently I have been teaching Water Supply Engineering at Lafayette College, Easton, Pa., for a couple of years. Last fall I conducted the soil engineering tests on the dam materials for the erosion control dams which were to be built by the U.S. Soil Conservation Service in the Stony Brook Watershed area, and acted as an advisor on certain design features for these structures.

At the moment, besides teaching in the Civil Engineering Department of Princeton University, I spend about one half of my time as a consultant on the St. Lawrence Seaway and hydro-power development project.

The statements set forth below are based on and derived from a study of the following material:

1) The Tippets-Abbett-McCarthy-Stratton report.

2) The First Report of the New Jersey Water Resources Advisory Committee, April 25, 1957; in particular, Exhibit E of this report.

3) Runoff data and other information furnished by U. S. Geological Survey and other federal agencies.

4) My reports to the U. S. Conservation Service on the soil properties on dam site no. 4 in the Stony Brook Watershed. (This is not a published report)

5) The transcript of the testimony on Senate Bills No. 272 and 273 given before this committee on June 6, 1957.

The development of an adequate water supply in the State of New Jersey for a rapidly-growing population and expanding industry is a serious and complicated problem. Everybody concerned with this question be he in or out of the employ of the State government should be commended for any efforts in trying to alleviate a grave situation. However, trying to do something one way or another and attacking the problem wisely and intelligently are two entirely different things. The engineering data and information presented so far in support of the bills are scarce indeed and most fragmentary. Not even the simplest most fundamental preliminary investigations for the two projects have been made and yet, gentlemen, you are asked to decide whether the State should plunge into a 14 Million Dollar Bond issue.

It may be well meant, but it reveals poor statesmanship if the State is catapulted into water development projects which can only be called financial adventures very likely to end up in financial fiasco. Such a procedure will only harm the sound development of New Jersey's water resources in the long run.

I shall prove and submit evidence below, that the claims regarding the actual water which would be supplied by the two projects are impossible, well, I am almost tempted to say fantastic.

I shall also discuss shortly the problem of water quality and elaborate on the engineering preparation for the proposed projects.

1) The Expectable Water Supply from Spruce Run and Stony Brook.

The Advisory Committee report recommends the immediate purchase of all the land for 2 on-river reservoirs, Spruce Run and Stony Brook, and completion of the Spruce Run Reservoir as soon as possible, construction of the Stony Brook Reservoir 2-5 years later at a total cost for both projects completed of $14 Million.

These reservoirs would retain the excess flood flows in these two upper tributaries of the Raritan River and release water during low flow periods. The respective rivers themselves would act as the raw water carriers for the additional water supply which may become available by the two projects.

It is claimed that these two projects would:

a) increase the minimum sustained flow at the confluence of the Millstone and Raritan Rivers from a present 45 mgd to 100 mgd.

b) <u>in addition</u> provide 80 mgd of <u>new</u> raw water supply.

In total it is claimed these two projects would provide a minimum sustained flow of 200 mgd (including 20 mgd diverted by the Elizabethtown Water Company) at the confluence of the Raritan and Millstone Rivers and I quote:"even if the worst drought on record (1930) should happen again." (From "Advisory Council Report, Exhibit E, page 22).

This, Gentlemen, is impossible and derived from one of the more fallacious arguments I have ever encountered.

To clear up all the confusion and misunderstanding created by the thoughtless manipulation of arbitrary figures I would like to state a few fundamental principles first.

1) No amount of human interference on a watershed like dams and reservoirs, will materially influence the "water income" of this watershed. The amount of annual surface water runoff from a watershed is determined by the annual precipitation diminished by the evaporation, the consumptive use of the vegetation, and the infiltration into the ground water. All these factors are beyond human control and vary from year to year, hence, so will the runoff. However, the average annual runoff for a large number of consecutive years is usually rather constant.

2) Spending cannot exceed income neither in a monetary budget and particularly not in a water budget.

To prove my claim that the promised benefits ofthe two projects are impossible even for the average year, I will establish and discuss in detail a realistic water budget for the Stony Brook and Spruce Run Reservoirs. There is sufficient information and runoff data available.

A) In determining the amount of water available for water supply purposes, or the required storage capacity to provide water during dry periods, one usually considers a sequence of dry years or a year with an extreme dry period.

Below I shall first investigate the water budget for the average year and later the budget for a number of consecutive dry years.

Water Budget for the Proposed Stony Brook Reservoir:

a) Water income: Direct runoff records from Stony Brook are only available for the period from December 1953 to September 1956, i. e. for 33 months. However, runoff records since 1930 are available from the adjacent Neshanic Creek gaging station at Reaville. A comparison of these data for a 21 month period for which parallel discharge records existed last week shows that for this interval the day average discharge was:

for the Stony Brook: 0.80 mgd/sq.mile

for the Neshanic Creek: 0.77 mgd/sq.mile

A comparison of the total monthly second feet days for the two stations in general show excellent agreement and identical runoff per square mile except for the months with frequent localized precipitation (thunderstorms).

The discharge figures for the Stony Brook as well as the discharge for the Neshanic Creek (in ink) corrected for the same watershed area are appended to this letter which

I would like to submit in evidence as

Exhibits A-1, A-2 and A-3 (Pages 135A, 136A, 137A)

It thus is permissible to use the twenty-five year records of runoff data from the Neshanic Creek corrected for the respective watershed area as the corresponding runoff records for Stony Brook. These data have been used to plot the mass diagram, i. e. the cumulative runoff for Stony Brook since 1930 (Exhibits B-1, to B-5). (Pages 138A to 142A)

The sum total of all runoff from the Stony Brook for a 38 sqare mile watershed for the twenty-four water years from October 1930 - September 1954 was 293.3 billion gallons, giving an average annual runoff of 12.2 billion gallons. That is an average of 33.5 mgd. This figure is in complete agreement with information given in the TAMS Report which gives the average annual surface runoff (Plate 1-7 page 1-II) for the Stony Brook Watershed

as 0.85 mgd/sq.mile

hence 0.85 x 38 = 33.3 mgd.

The driest year during the period of record had only an annual mean discharge of 15.4 mgd. What is actually now available from the total runoff:

I) Non-manageable supply:

Except for water reservoirs with a vast storage capacity it is in general impossible to exercise operational control over all the runoff for the following reason:

It is impossible to predict the future runoff on a monthly basis or even a weekly basis in more than a general and average way and the degree of reliability is about the same as that for long range weather forecasts. The operator of the reservoirs hence will always have to walk the dangerous path between providing ample storage capacity to catch anticipated flood waters on the one hand and on the other hand having too much depleted his reservoir supply in anticipation of flood flows which did not materialize. This applies in particular to the spring floods when the reservoir is filled from heavy winter discharges. As soon as the reservoir is filled, additional flood flows must be discharged over the dam spillway, hence they are beyond the control of the reservoir operator for conservation. This also applies to the flash floods of the hurricane season.

As an example the situation before the recent floods in August 1955 could be considered. During that flood a total amount of 5 billion gallons would have been delivered to the Stony Brook Reservoir within a period of twelve days. Had the operator gambled on the occurrence of a flood of such extent, he could have had the reservoir down at a level giving him 5 billion gallon storage capacity, i.e. he would have had a usable supply left of only 2.6 billion gallons. Had the storm then not materialized, he would have seriously endangered the water supply during the following dry months, September and October.

These risks in general cannot be taken and therefore part of the flood flows always will be lost or, as I prefer to call it, unmanageable. As this unmanageable supply is included in the

total discharge figure, it must be subtracted since it is a water loss for the reservoir. In my opinion the unmanageable supply for the normal or better than normal year may be estimated to be about 20% of the total runoff; in a dry year it may be estimated at 10% and in an extremely dry year it will be zero.

2) Evaporation:

The increased evaporation from the exposed water surface in an average year is estimated at 18 inches per year. For an exposed surface of 1500 acres it corresponds to an evaporation loss of

2250 acre ft. = 0.75 b.g./year for the average yr.

In a dry year this figure should be increased to 1.0 b.g. and in an extremely dry year to 1.5 b.g. (billion gallons)

3) Seepage:

The high water head on the dam will produce seepage losses through the dam and the reservoir bottom. It is estimated they will be about of the same magnitude as the evaporation losses, i.e. .75 billion gallons per year.

Losses enumerated under I, 2 and 3 are "dead" losses beyond the control of the reservoir operator. In addition he has legal commitments for "live" losses or withdrawals. A minimum sustained flow in the Stony Brook must be maintained in order to protect the rights of downstream riparian owners at all times during the year. In this connection I would like to quote the TAMS REPORT p. 11-9:

"It is the established policy in New Jersey and elsewhere in the Eastern United States to require projects involving diversion of water from natural drainage basins to provide for "compensation" of low-water flows for the benefit of downstream interests. Under this policy, even though a project is designed to make withdrawals from the stream only when there would be an abundance of water, facilities would have to be included for augmentation of natural low-water flows to a degree dependent upon local conditions. This policy has been clearly set forth in recent decisions of the Supreme Court of the United States in connection with the development of water supplies by the City of New York on the upper tributaries of the Delaware River, and in actions taken by the Water Policy and Supply Council of the State of New Jersey, The water bills enacted by the Legislature in 1955 also recognized this principle by making an increase in the sustained flow of the Raritan River at Bound Brook an integral part of the proposed potable water development (see Appendix E)."

The sustained minimum flow in the Stony Brook should be 10 million gallons per day. Actually this sustained minimum flow cannot, strictly speaking, be considered a loss. It is a definite improvement and will insure downstream riparian owners a steady supply.

Now, we can compile the Water Budget for the Average Year. I don't think I have to go through the figures because they are just confusing if you hear them. I would just like to comment on the results. (Budget Breakdown attached).

In Stony Brook, the actual available new raw water supply is 4.65 billion gallons per day in the average year, gentlemen.

In Spruce Run, the actual available supply is 7.0 billion gallons per day, or 13.4 million gallons per day. The total new raw water supply, hence, for <u>both</u> projects is 11.65 billion gallons, which could be either withdrawn on a continuous annual

rate of 32 million gallons or it could be released as compensating flow during the about 100 days of low flow period in the Raritan at the rate of say 120 MGD. Hence even for the average year the increased minimum sustained flow would not be 200 MGD. but at best 180 MGD. It should also be noted that both reservoirs will be empty at the end of each water year.

As stated earlier these water budgets for the average year give much too favorable a picture for the availability of water supplies in drier than average years. Exhibit C gives the total discharge from the Stony Brook Watershed for the years 1930 to 1954. One can see that only in 12 years during this 24 year period the runoff equalled or exceeded the average annual runoff. For the other 12 years this runoff was considerably below the annual average of 12.2 billion gallons.

If we investigate the water budget for a normal dry year we get from Stony Brook an actual available new raw water supply of 3.3 billion gallons, and from Spruce Run an actual available new raw water supply of 5.5 billion gallons, i. e. a total of 8.8 billion gallons, or a sustained minimum flow of 88 MG. per day during the 100 dry days - hence a sustained minimum flow of 150 MGD at the confluence of Millstone and Raritan and not as promised 200 MGD.

As will be seen from Exhibit C these drier than average years usually occur as 2 or 3 succeeding dry years and they occur 12 times in 24 years.

How fantastic the claims for the amount of water which will supposedly be available by the 2 projects really are will become obvious when we investigate the water budget for the extreme dry year.

In the extreme dry year, i.e. the water year 1930 - 1931, we had a total runoff from Stony Brook of 5.6 b.g. Subtracting unmanageable supply of O, evaporation of 1.5, Seepage of 1.0 billion gallons, we have available to maintain a sustained minimum flow of 3.1 billion gallons, or 8.5 million gallons per day - hence the total runoff in an extreme dry year would not be sufficient to maintain a minimum flow of IO MGD in Stony Brook. But the Advisory Council Report promises 50 MGD during the drought.

(For complete breakdown - see pages 128-A and 129-A)

In his testimony Mr. Ritter stated that these extreme dry years occur about once every 50 years (Page 30 -A of Transcript, Hearing June 6). By what arithmetic this is figured is beyond my grasp. The record (and again I refer here to Exhibit C) shows that such extreme dry years with barely 6 or 7 billion gallons of total annual runoff occurred in 1930, 1931 and 1953. That is three times in 27 years. It does not take an engineer to figure that this is more than once in 50 years.

If we look at records over a longer period, I think we would probably arrive at a statistical occurrence of not every 9th but every 11th or 12th year. This climatological cycle of 12 years incidentally is observed the world over and is related by some scientists to the cycles of the sun spots.

In all these investigations, gentlemen, I have neglected yet one most important factor which also speaks against these projects. It is the following:

Except for periods of direct storm water runoff all streams are fed by the ground water. During dry periods the ground water level drops and therefore the stream flow diminishes. If you now artificially increase the stream flow by the discharge from an upstream reservoir, this additional flow will in reverse feed the ground water. Thus, releasing for example 100 mgd from an upstream reservoir will not produce 100 mgd of additional flow 30 miles downstream. How large such losses would be in addition to evaporation losses and losses caused by riparian owners using the most welcome supply for irrigation purposes is anybody's wild guess.

To my knowledge there is no information available on this infiltration into the ground water during dry periods, and if there were it would not be of much value since it depends on local conditions of the soils and the geologic formations. As a cautious "guestimate" I would figure the loss to the groundwater for a 30 mile stretch from Spruce Run and

Stony Brook to be at least 20%. It could just as well be 50%.

Here I would like to inter ject also the question of the diversion rights of the riparian owners. As the TAMS Report concedes, the use of these rights for irrigation purposes would become more and more important.

In a rigorous and scientific sense diversion without diminishing quantity or quality of the water is hardly possible. This formulation of the diversion right must be and usually has been interpreted by the courts in some relative way, therefore I mention these irrigation losses.

Summarizing this lengthy excursion into water supply statistics the following can be said:

1) I have shown that the promised effect of the 2 projects can hardly be realized in an <u>average</u> year.

2) The claims are completely amiss and nothing short of fantastic in a dry, let alone an extremely dry year.

How, Gentlemen, can one justify a project which works not even half of the time? It certainly should be interesting to hear from the Advisory Committee how they arrived at their figures in their report.

Point 2 of my comments is concerned with water quality. I will deal with it but briefly.

There is a difference between raw water in the river and raw water in a reservoir. Water taken directly from the river is the poorest type of raw water we know. Its disadvantages are:

1) It is generally polluted.

2) Constantly changing amount of suspended solids which requires continued changes and experimentation in chemical dosage of coagulants.

3) It may be contaminated by chemicals producing disagreeable odor, taste or color.

4) It requires short filter runs with a large ratio of wash water to filtered water.

5) It is warm which induces much waste.

This all makes up for a rather expensive treatment.

The only advantage I can see in river water is, that it can be taken closer to the center of the water demand. However, in general when economic comparisons are made between an original higher investment for transmission lines and the higher operating and treatment costs the balance is frequently in favor of the transmission line.

Also, in the eyes of the public, river water never becomes very wholesome from a psychological point of view no matter to what degree of perfection its treatment and purification would be carried.

Mr. Ritter, in his testimony on June 6th compared raw water in the river with raw water in the Round Valley reservoir. For the above cited reasons this is like comparing a Ford and a Cadillac.

The last point which I will discuss is the question of reservoir selection, location and preliminary investigations which were or rather which were not made.

As it was brought out in previous testimony the engineers employed by the Advisory Committee relied upon the original TAMS Report in their selection of dam sites, construction costs, and benefits, etc. They used the original TAMS work sheets. Their own independent contribution appears to have been an examination and evaluation of aerial photographs of the reservoir sites, a "spot check" of construction costs which I interpret as a check of a limited, sampled number of individual cost items and a personal inspection by driving once or twice in a car through the reservoir territories.

First to the TAMS Report:

The TAMS Report is an excellent and comprehensive piece of engineering investigation pointing out the possible water supply potential for the entire State of New Jersey. Unfortunately, the information it contains has been misinterpreted and misused, as I have demonstrated comparing the actual and the claimed benefits. The information contained in the Report cannot serve as a substitute for a careful Preliminary Investigation which is necessary for each individual project. The scope of the TAMS Report precludes accuracy in each and every detail; therefore, to use such information <u>alone</u> for the proposal to build certain reservoirs without any additional detailed site and project sites could only be compared

in foolishness with an attempt to lay out the street plan for the city of Trenton on a topographic map for the entire State of New Jersey.

I must again take serious issue with testimony offered by Mr. Ritter. He contends that it is the normal procedure to go ahead with a bond issue before a more detailed preliminary investigation than is available now has been completed (Page 38 A of the transcript of June 6) I have "never" and I emphasize never seen or heard of any project for which procurement of funds was initiated upon such flimsy evidence as has been introduced so far in this hearing. Not even industry, which in general is willing to take much larger risks than a state can afford to take with the taxpayers' money, gambles in such a way. Today any major site acquisition in unknown territory is preceded by a careful subsoil investigation by drillings.

The U.S. Bureau of Reclamation makes detailed surveys and investigations before they request appropriations. Mr. Ritter's contention that it is customary to proceed in such a way is unbelievable. If, as he states, this is being done in Baltimore, it is in my opinion irresponsible. The cost of the bond issue over $14 million will be much higher than a preliminary project investigation. Where is the common sense in this reasoning? Mr. Ritter is also very confident (Page 39-A of the transcript of June 6) that the geology of the dam sites is sound and he has no reason to

believe that the selected sites are not first class dam sites. However, the TAMS Report states that the Spruce Run Reservoir is at least in part above a formation of limestone. Limestones are known to have large caverns and sinkholes and can be dissolved, particularly when water seeps continuously into almost always present fissures and cracks. More often than once dams were built under such and similar conditions without any previous test borings and later the reservoirs could not be used because of leakage. (See Tschebotarioff: Soil Mechanics, Foundations and Earth Structures; McGraw Hill 1953, page 334 Fig. 12-2) This is a book which I have with me, but which I do not wish to submit - it is my personal copy -- but it shows an empty reservoir behind a concrete dam in Spain, the water leaked out through sinkholes of the type shown in Figure 12-3. Now this could very well happen in the Spruce Run, gentlemen.

This brings me to the selection of the 2 proposed reservoirs. There is much contradiction and discrepancy between the confessed intentions and the actual execution in the testimony of the proponents of the bills.

Here I would like to quote the sponsor of the bill, Senator Crane, from page 10 of the transcript which I take it is an enunciation of the guiding principles.

"Development of additional water supplies for concentrations of population and industry should preferably begin with the resources most readily available and closest to the areas of demand and progressively utilize more remote sources as required." This is one of the sounder statements I have read in the entire record. But, Gentlemen, what is proposed in these two bills is exactly the opposite. The two dam sites are on the extreme periphery of the Raritan Watershed. Take for instance, Stony Brook vs. Rocky Hill. The watershed for the Rocky Hill reservoir is 48 sq. m. against 38 for Stony Brook, hence, it would supply more water. It is 15 miles closer to the area of demand, reducing the loss by water infiltrating into the ground water. The watershed is primarily agricultural land with no prospective local demand for the water. With dam construction cost lower at Rocky Hill, real estate costs lower, road relocation cost lower, higher yield and closeness to the center of demand, where, Gentlemen, can we discover a spark of wisdom in the selection of Stony Brook over Rocky Hill, a responsibility claimed by the engineers?

Now this is not an attempt to advocate the construction at Rocky Hill. I only used this example to demonstrate

in what haphazard way the site has been chosen even against the professed principles of the proponents of this bill.

The one and only reason for the construction of Stony Brook mentioned is that the Stony Brook reservoir would increase the minimum sustained flow in the Millstone between Princeton and Rocky Hill. But this, whatever its desirability, is not our problem at hand. The problem is to satisfy water supply needs below Bound Brook.

Local Needs:

Full lip service is paid to the satisfaction of local water supply demand in the Stony Brook-Mercer County area. But in the actual execution of the plan this is <u>impossible</u>. Both proposed projects derive their golden glitter from the fact that they actually do their job of supplying sal able water only about one-third or one-fourth of the time. During a critical period that is true. But you cannot do both, selling water at Princeton on a year-round basis and releasing the stored water during the summer to firm up the flow at Bound Brook because there would be no more water. Also, as Mr. Shanklin has correctly stated, any project which has to be self-liquidating and self-supporting cannot reserve the Stony Brook water for local demand for any length of time. Revenues must be produced as soon as possible and therefore the water must be sold on a "first come, first served basis." By the time that the local demand has developed in about ten to fifteen years, the water would be committed.

A Stony Brook reservoir would be able to guarantee a water supply of about 6 to 8 m.g.d. (this is on a year round basis) for the extreme dry year and such an amount would be sufficient for about 60,000 people. There is no question that this water will eventually be needed in the Mercer County area.

No matter from what angle one looks at the Advisory Council proposals, be it from the standpoint of actual vs. claimed yield, or from the standpoint of water quality, or cost, or reservoir selection, or site investigations and actual engineering data which are available, from neither of these standpoints do the proposals appear sound nor promising to me - particularly not from the standpoint of sound engineering investigation.

Commissioner McLean stated in his earlier testimony that a calculated risk is being taken. He tried very hard to avoid this term but I believe mentioned calculated risks at least twice.

I have demonstrated above how poorly and carelessly these risks are calculated. Therefore, these proposals can only be called financial adventures. The taxpayer will take the rap.

I have high regard and esteem for the integrity of Commissioner McLean and his officers. They are fine public officials and civil servants, but, as I mentioned in the beginning, acting in good faith on the poor judgment

of others and attacking a problem wisely are two entirely different things. I do not like to see the sad spectacle of meritorious public officials being sacrificed to an angered public opinion because of the financial failure of projects similar to these we discuss here today.

Your calculated risk, Commissioner McLean, is a gamble and the odds are against you.

My Recommendations:

I will admit frankly that my recommendations are not only guided by my engineering judgement but are also permeated by my political philosophy:

I. The intelligent long-range development of New Jersey's water resources is too serious a problem and too far reaching in its results to be subjected to the political tug-of-war of state politics, the momentary whim of state legislature or state government or the instantaneous fancy of the electorate which all too frequently is not informed or is misinformed.

Therefore, the development of New Jersey's water resources should be put into the hands of a public agency of the authority-type.

I most urgently recommend the creation of such a Water Resources Development Authority for New Jersey.

2. Only an independent authority-type of institution will be able to work out a sound, long-range master plan

for the development of our resources. I agree with Commissioner McLean that a sense of direction has been lacking for the development of water resources. Has been lacking? I maintain it still is. We have been oscillating between Round Valley, Chimney Rock and now we are confronted with such half-baked ideas as Stony Brook and Spruce Run.

At the moment 2.5 million dollars of taxpayers' money is lying idle in the Round Valley site. All the preliminary investigations have been completed. A sense of direction is lacking indeed.

3. I would like to differ also with one statement made by Senator Crane. He states that the development of these water resources should remain under the direct influence of the legislature and the taxpayer. A Water Resources Development Authority, Senator Crane, would not spend the taxpayers' money (except, perhaps for some of the initial capital) any more than a privately-owned and operated company. Authorities have worked extremely well and successfully and I would just like to recall to you the history and accomplishments of the Port of New York Authority.

4. The Water Resources Development Authority is the best, safest and most efficient way of securing the state's water needs. The state itself has no business to become a raw water supplier. In the first step the Raritan and Delaware Canal should be transferred to the Water Resources Development Authority.

5. Industry could demonstrate its public spirit by contributing to the capital of the Water Resources Development Authority.

6. By advocating a new authority I do not mean there should be new people. Probably all of the staff of the present Division of Water Policy and Supply could work within the Water Resources Development Authority. However, they should, under the status of an authority, be able to work under different and independent conditions.

They should work out a master plan and make a detailed survey of the expected needs, such as, for example, the City of Chicago has been doing for years in the greater Chicago area.

Then, and only then, may we expect a sound water plan.

Returning to the immediate proposals at hand, I am convinced that at least Stony Brook is unworkable and would bring an extreme loss of taxpayers' money. If the public is properly informed of the facts, I am sure they would refute the proposal in any referendum.

To end with a quotation by Charles Dudley Warner: "Public opinion is stronger than the legislature and almost as strong as the Ten Commandments." Let the facts speak for themselves.

(applause)

(Following is breakdown referred to on pages 113-A, 114-A & 115-A)

I. Water Budget for the Average Year:

A) STONY BROOK:

a.) Water Supply:

Total accumulative discharge:	12.2 b.g.(billion gallons)

b.) Losses & Withdrawals:

1.) "unmanageable" supply 20%	2.40 "
2.) Evaporation	0.75 "
3.) Seepage	0.75 "
4.) Sustained flow	3.65 "
Actual available "new" raw water supply	4.65 b.g.= 12.8 MGD

B) SPRUCE RUN:

a.) Water Supply:

1.02.41 = 41.9 MGD =	15.2 b.g.

b.) Losses & Withdrawals:

1.) "unmanageable" Supply	3.0 b.g.
2.) Evaporation	0.75 "
3.) Seepage	0.75 "
Sustained minimum flow	3.7 "
Actual available	7.0 b.g. = 13.4 MGD

II. Water Budget for a Normal Dry Year:

A) STONY BROOK:

a.) Water Supply: 10.0 b.g.

b.) Losses & Withdrawals

1.) Unmanageable Supply	1.0 "
2.) Evaporation	1.0 "
3.) Seepage	1.0 "
4.) Minimum sustained flow	3.7 "
Actual available "new" raw water supply	3.3 b.g.

B) SPRUCE RUN:

a.) Water Supply:	12.7 b.g.
b.) Losses & Withdrawals	
1.) Unmanageable Supply	1.3 "
2.) Evaporation	1.2 "
3.) Seepage	1.0 "
4.) Minimum sustained flow	5.5 b.g.
Actual available "new" rawwater supply	

III. Water Budget for the Extreme Dry Year:

A.) STONY BROOK:

a.) Water Supply	5.6 b.g.
b.) Losses & Withdrawals	
1.) Unmanageable Supply	0.0 "
2.) Evaporation	1.5 "
3.) Seepage	1.0 "
Available to maintain a sustained minimum flow	3.I b.g. = 8.5 MGD

SENATOR DUMONT: Any questions for Dr. Schmid? Mr. Ritter, do you want to make a statement?

MR. RITTER; The contest is a firming up one and not of safe-yield. I would be glad to discuss it with you later and it is too late in the evening. I will get other testimony in. I'd like to go on record, Sir, that these are not pipe-suppliers to the confluence, but they are used to firm up the low slough.

DR. SCHMID: Exactly. May I answer these questions, Mr. Ritter? I am fully aware that the dam sites for reservoirs at Stony Brook and Spruce Run are compensating reservoirs, I am fully aware of that, but you cannot take more water out of those reservoirs than you get in.

MR. RITTER: We all agree on that, Sir, but you haven't used it properly. If you want to get Mr. McCarthy and I from Tippets-Abbett when you come back from New York, we will be most happy to sit down and explain the whole thing in detail, Sir.

DR. SCHMID: I most certainly would be very glad to see your records and your figures.

SENATOR DUMONT: Any questions? Senator Crane.

SENATOR CRANE: One - just a statement. And its probably far removed from this Sir, except in here at the end of your report you took exception to one of my remarks wherein I had recommended that the water resources

remain under direct influence of the Legislature and the taxpayers. I want you to know, Sir, that is a matter of extreme conviction on my part, I am not an opponent of authority to the extent that an authority does not do a good job. I believe the Port Authority did a good job - I think the Turnpike Authority did a good job. But as a power it is about the furthest thing removed from the control of the people that I know of. And about 9/10ths of the problems in this State are created by authorities who simply ruthlessly go through our land, and the people are really doormats to authorities without recourse. And I hope it's last thing that this State will consider -- putting our water under an Authority.

DR. SCHMID: If I may reply --- it is my opinion that an independent authority would work and could do a job best of developing a long-range master plan for the development of the water supply resources for the entire State at the best interests of the entire State, and not as is attempted, in my opinion, perennially, by special interest groups to push their own limited special goal by lobbying in the legislature.

SENATOR CRANE: Well, I still think, Sir, that the control of the people is more to be desired than the autocratic authority rule that would be established once the thing is done. I believe that perhaps an Authority could come up with a good overall plan, but by the time they

have it you'd never be able to have a public hearing with an impact that this one has had.

SENATOR DUMONT: Now, any further questions of Dr. Schmid? As I understand it, you will not be able to get back here for any subsequent hearing, so any questions should be asked now.

DR. SCHMID: I will not be able to get back here say for about two weeks. I will be available for a few days, I don't know when you are scheduling another hearing. I will be able from July 10th to 19th and I will not be back until August 26th.

SENATOR DUMONT: Well, we were thinking of the next date being July 9th which is a Tuesday; we decided its better to stay away from the 4th of July week and there is some .....

DR. SCHMID: Did you say Tuesday, July 9th?

SENATOR DUMONT: Yes, Tuesday July 9th.

DR. SCHMID: I probably could come back one day earlier then ....

SENATOR DUMONT: Mr. Ritter, if you, or if any of the members of the Water Resources Advisory Commission desire to question Dr. Schmid and you'll let us know, then we will ask him to come back here on Tuesday, July 9th. Is that OK? Otherwise we'll adjourn until that time. Now, we should be able to get into rebuttal, I should think, that day. We may not finish that day but we ought to be able to get into rebuttal at least by one side at that time.

So, we will adjourn this Hearing until Tuesday morning, at 10.30 am. in this chamber, on July 9th.

Thank you very much.

(H E A R I N G A D J O U R N E D)

(Submitted by Charles K. Agle)

Roads	Length rebuilt Maximum	Minimum
MINOR		
Mt. Rose - out of Pennington	3,000	700
Mt. Rose - to Rocky Hill	5,280	----
Elm Ridge	9,800	1,000
Province Line	4,500	1,500
Federal City	3,000	400
Pretty Brook	6,800	----
Length in Feet	32,380	3,600
Cost - 30 ft. wide @ $20. per lineal ft.	$ 647,600	$ 72,000
Area of R.O.W. (32,380) (70) sq. ft.	2,266,600	252,000
Acres	52	6
MAJOR		
Rosedale	3,000	----
Carter	23,800	2,100
Length in feet	26,800	2,100
Cost - 44 ft. wide @ $35 per lineal foot.	$ 938,000	$ 73,500
Area of R.O.W. (26,800) (100) sq. ft.	2,680,000	210,000
Acres	62	5
Total Road Costs	$1,585,600	$ 145,500
Right of Ways @ $2400	273,600	26,400
Bridges	1,191,000	967,000
Total Circulation Consequence	$3,050,200	1,138,900

BRIDGES	Length	Depth	Volume	Vol. Cost	
1. Mt. Rose at Pennington	700'	20'	14,000 c.y.	21,000	50,000
2. Elm Ridge	1,000'	30*	40,000	60,000*	100,000*
		(40	59,259	90,000	125,000)
3. Carter	(2,100'	52	220,400	330,000	175,000)
	1,400*	45	124,400*	186,000*	150,000*
4. Province Line	1,500	65	204,600	300,000	100,000
				$ 567,000	$ 400,000
				$ 967,000*	
				$ 741,000	$ 450,000
				($ 1,191,000)	

* Lesser alternatives

( ) Greater alternatives

9-211c

UNITED STATES DEPARTMENT OF THE INTERIOR—GEOLOGICAL SURVEY—WATER RESOURCES DIVISION

Exhibit A-1

File No. _____

Daily discharge, in second-feet, of Stony Brook at Princeton, N.J. *, for the year ending September 30, 19* 56

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	5.2	63	17	6.0	50	78	129	22	11	2.7	1.7	1.4
2	4.5	48	18	4.2	352	82	108	21	33	2.1	1.7	1.4
3	3.6	43	18	4.7	216	80	88	31	232	2.4	1.5	1.7
4	3.2	43	20	5.5	110	74	78	30	50	2.0	1.5	3.4
5	2.9	35	20	6.6	157	57	68	26	27	4.2	1.6	3.4
6	8.5	30	18	6.3	339	60	55	31	18	6.3	4.6	2.5
7	14	28	15	6.3	512	133	259	513	14	6.0	4.5	2.1
8	14	36	15	4.8 ~~5.6~~	146	666	807	110	12	4.5	1.8	1.2
9	17	29	15	6.6	110	213	521	66	9.4	9.0	1.5	.91
10	10	27	13	27	96	118	256	54	12	14	1.3	.77
11	7.6	150	13	62	122	94	141	44	15	6.6	1.2	.77
12	5.7	80	12	113	204	84	106	38	10	3.8	1.1	.77
13	4.7	50	11	82	108	78	82	37	7.2	2.9	1.4	.77
14	623	45	10	61	76	850	70	33	6.0	2.7	1.4	.70
15	937	40	11	37	80	252	73	26	5.0	2.2	.99	.70
16	248	100	7.9	27	78	147	154	23	4.5	2.2	.91	1.2
17	115	70	9.8	27	60	126	88	20	4.0	2.1	.91	5.2
18	80	50	8.3	20	802	100	63	18	4.0	1.8	.84	3.1
19	60	45	8.3	22	256	80	54	17	4.0	1.7	.70	1.1
20	47	40	5.7	22	135	130	47	24	3.8	1.7	1.0	.99
21	40	50	5.2	19	94	92	42	17	4.2	37	12	1.1
22	36	60	3.6	17	64	114	38	15	6.6	24	2.2	.99
23	30	50	5.0	17	50	222	38	16	5.2	8.3	2.0	.91
24	29	45	5.7	15	43	300	34	13	11	5.7	2.4	1.9
25	28	40	7.9	15	107	175	30	9.8	11	4.5	2.0	2.0
26	26	35	9.0	14	139	280	38	8.6	5.7	3.2	1.6	1.4
27	23	30	6.1	12	76	385	42	11	3.8	3.8	1.5	1.3
28	20	25	5.2	11	337	229	34	12	3.4	2.9	1.3	1.7
29	19	20	4.5	12	132	205	30	9.0	4.5	2.4	1.8	1.7
30	240	18	6.9	240		303	26	7.9	4.0	2.1	1.4	1.5
31	124		6.3	140		185		8.6		2.0	1.4	
	2,825.9		331.4	3	5,051		3,599		541.3		61.75	
*	4,160.0	1,425 1,300	350.0	1,064.0 870	4660	5,992 5800	3620	1,311.9 930	630	176.8 200.0	93	48.58 90.0
MEAN												
ACRE-FEET												

U. S. GOVERNMENT PRINTING OFFICE 16—60066-1

YEAR OR PERIOD

MEAN _____

ACRE-FEET _____

* Comparative figures for Neshanic Creek based on same watershed as Stony Brook

9-211c

UNITED STATES DEPARTMENT OF THE INTERIOR—GEOLOGICAL SURVEY—WATER RESOURCES DIVISION

Exhibit A-2

File No. _____

Daily discharge, in second-feet, of Stony Brook at Princeton, N.J. *, for the year ending September 30, 19* 55

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	5.5	18	63	82	5.5	90	44	39	27	3.6	.11	19
2	6.0	22	54	130	5.7	92	39	28	12	3.1	8	16
3	9.4	89	44	93	5.5	55	36	23	6.9	2.9	7	14
4	8.3	44	38	70	5.7	307	33	22	5.2	2.5	6	12
5	5.9	34	35	55	6.0	147	34	21	11	2.4	.41	10
6	16	30	26	66	60	414	27	17	23	2.0	1.2	12
7	17	24	22	62	830	257	27	13	8.6	2.1	18	12
8	9.0	20	23	42	82	108	23	12	6.4	1.8	63	8.3
9	7.2	18	37	37	46	94	20	12	65	1.7	18	6.3
10	6.6	16	94	37	37	82	23	9.8	30	1.7	8.6	5.7
11	6.0	14	48	32	331	68	18	9.4	17	1.7	9.4	5.7
12	5.5	14	33	26	160	57	70	8.6	42	1.2	412	6.6
13	4.7	13	30	28	58	51	141	7.2	31	.99	2,140	5.2
14	4.5	12	131	21	46	43	68	6.6	16	.91	416	4.7
15	3.8	12	210	24	43	42	78	5.7	12	.84	76	4.5
16	3.8	11	94	20	48	60	55	5.0	8.6	.70	81	4.2
17	4.0	12	60	18	175	48	39	4.2	6.3	.58	84	3.8
18	4.5	12	345	16	91	44	34	3.8	4.7	.64	494	3.8
19	4.7	84	181	17	55	50	32	3.4	4.2	.34	1,660	3.6
20	3.6	1,430	88	11	47	47	61	3.1	86	.23	146	3.6
21	3.2	233	55	13	46	74	52	4.5	24	.25	119	2.9
22	3.2	113	39	13	47	1,060	52	3.8	12	.25	624	2.7
23	3.1	88	39	13	199	382	44	3.6	8.3	.22	124	2.5
24	2.9	78	38	12	118	138	32	4.0	7.2	.18	68	6.6
25	2.9	57	32	10	74	96	30	3.4	7.2	.16	50	14
26	2.7	48	26	10	60	239	34	3.4	8.3	.13	37	6.6
27	3.2	44	29	9.8	57	123	34	3.2	6.9	.11	17	4.2
28	3.8	301	26	6.5	57	80	28	2.9	5.0	.13	26	11
29	55	92	58	7.6		66	31	4.1	3.8	.16	21	11
30	46		466	5.5		57	62	1.8	3.6	.13	20	6.3
31	31		126	4.7		50		13		.11	19	
	293.0		2,590	992.1		4,521		317.7		33.81		228.8
		2,983			2,795.4		1,301		509.2		6,752.93	
	272	3,270	2540	1095	2300	4020	1065	285	154	31	8,4	245
MEAN												
ACRE-FEET												

U. S. GOVERNMENT PRINTING OFFICE 16—60066-1

YEAR OR PERIOD

MEAN _____

ACRE-FEET _____

COMPUTED BY JML

CHECKED BY OLW

136 A

Exhibit A-3

9-211c UNITED STATES DEPARTMENT OF THE INTERIOR—GEOLOGICAL SURVEY—WATER RESOURCES DIVISION File No. _____

Daily discharge, in second-feet, of Stony Brook at Princeton, N. J. *for the ~~year~~ period ending September 30, 19* 54

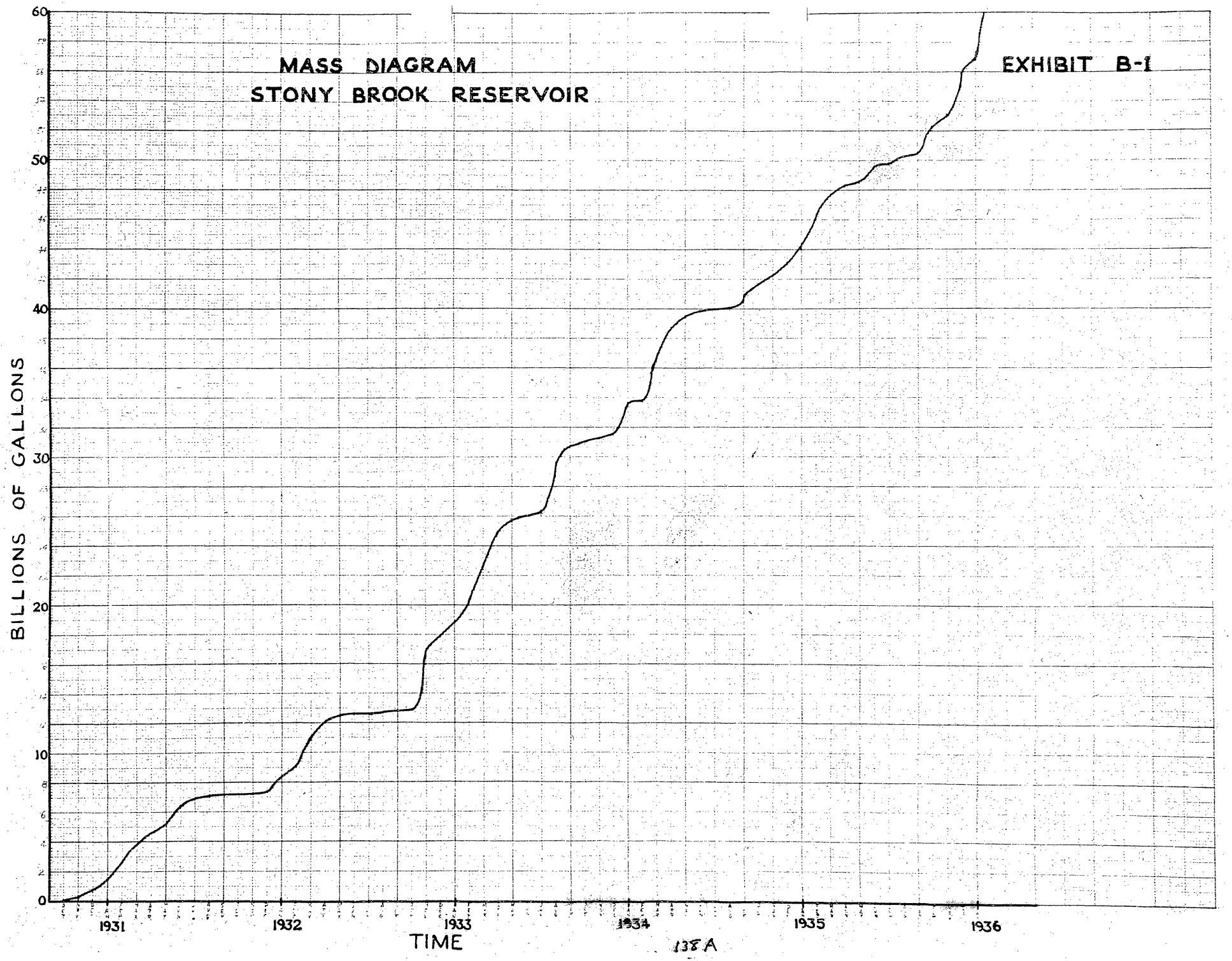
Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1				12	20	236	37	25	11	1.7	.18	24
2				12	22	260	31	22	9.8	1.8	.14	7.2
3				12	23	565	29	24	8.3	1.5	2.1	5.0
4				11	25	282	24	143	7.2	1.3	.70	3.8
5				10	22	110	22	56	6.3	1.5	.66	2.9
6				19	20	76	23	35	5.5	1.2	1.4	2.1
7				16	17	63	26	26	5.2	.84	.91	1.9
8				11	15	57	69	93	4.5	.84	.84	11
9				11	16	51	80	101	4.2	.77	74	5.5
10				11	16	48	37	71	4.0	.58	49	4.7
11				5.3	15	39	30	57	4.6	.52	10	567
12				12	8.8	35	32	40	5.2	.52	5.7	66
13				13	10	52	26	30	11	.38	3.8	28
14				9.4	9.8	325	22	25	8.4	.31	2.5	18
15				10	11	137	21	22	6.0	.38	1.7	15
16			82	16	13	73	26	19	6.0	.42	1.4	19
17			54	26	79	57	350	17	5.0	.28	.99	65
18			33	18	75	48	202	16	4.2	.22	.77	36
19			31	16	38	43	84	13	3.4	.20	.77	27
20			29	18	30	189	59	14	2.9	.22	.91	26
21			26	300	44	84	47	481	2.2	.20	3.0	22
22			27	135	103	55	39	150	2.1	.20	2.1	28
23			27	47	52	47	35	66	2.1	.18	1.6	17
24			20	47	42	40	34	56	2.2	.16	1.6	13
25			17	40	77	121	30	36	2.1	.22	1.3	12
26			17	45	66	152	26	30	2.2	.25	1.5	11
27			16	63	70	70	31	23	1.8	.22	1.4	9.8
28			15	78	50	55	60	21	1.6	.20	.91	7.9
29			16	34		48	49	18	1.6	.20	.91	6.9
30			16	31		43	31	17	1.7	.18	.77	6.3
31			14	24		39		13		.19	31	
			440		989.6		1,612		142.3		204.56	
				1,112.7		3,500		1,760		17.68		1,069.0
				1000.0	980.0	3450.0	920.0	1000.0	126.0	74.0	325.0	670.0
Mean												
Acre-Feet												

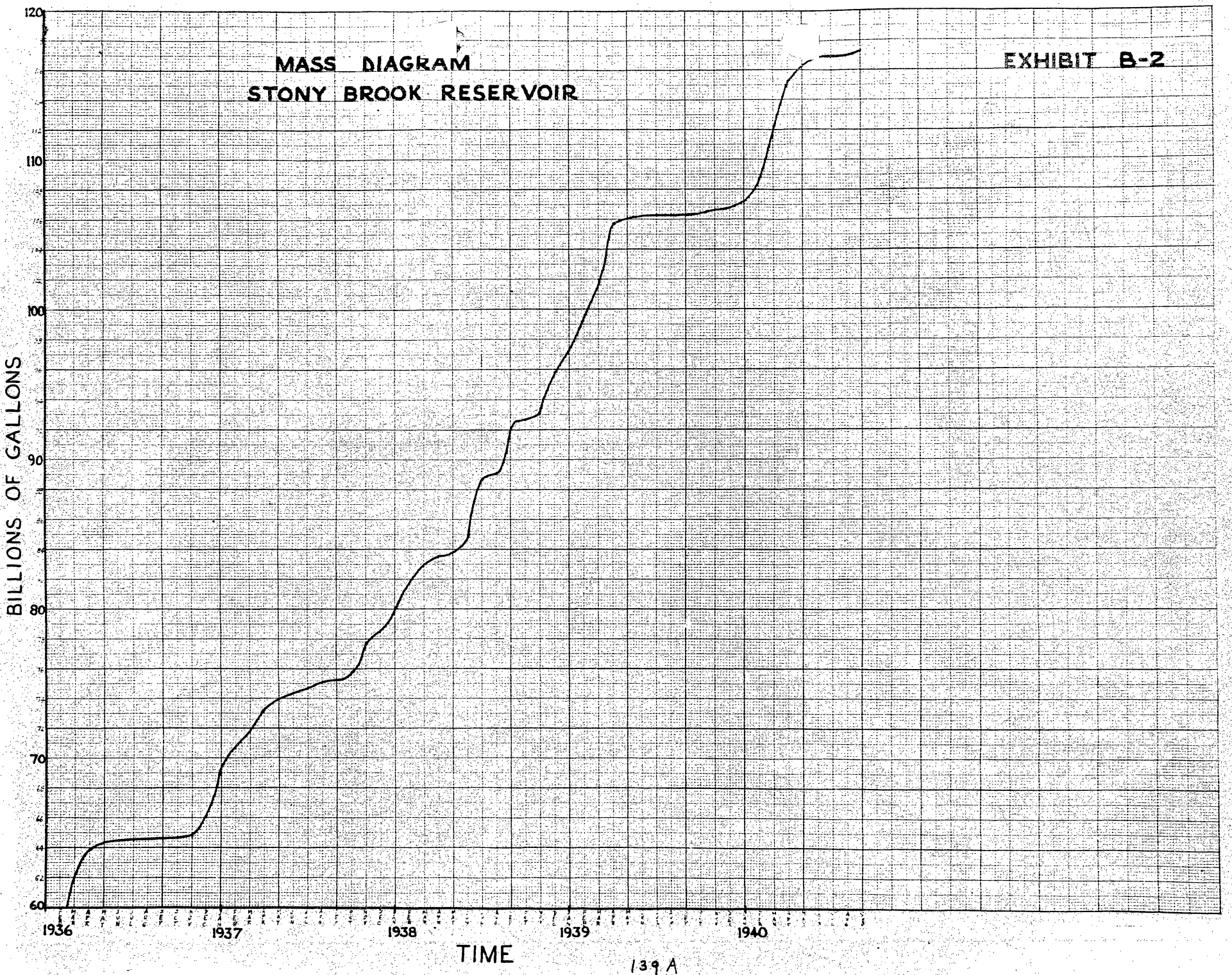
U. S. GOVERNMENT PRINTING OFFICE 16—60066-1

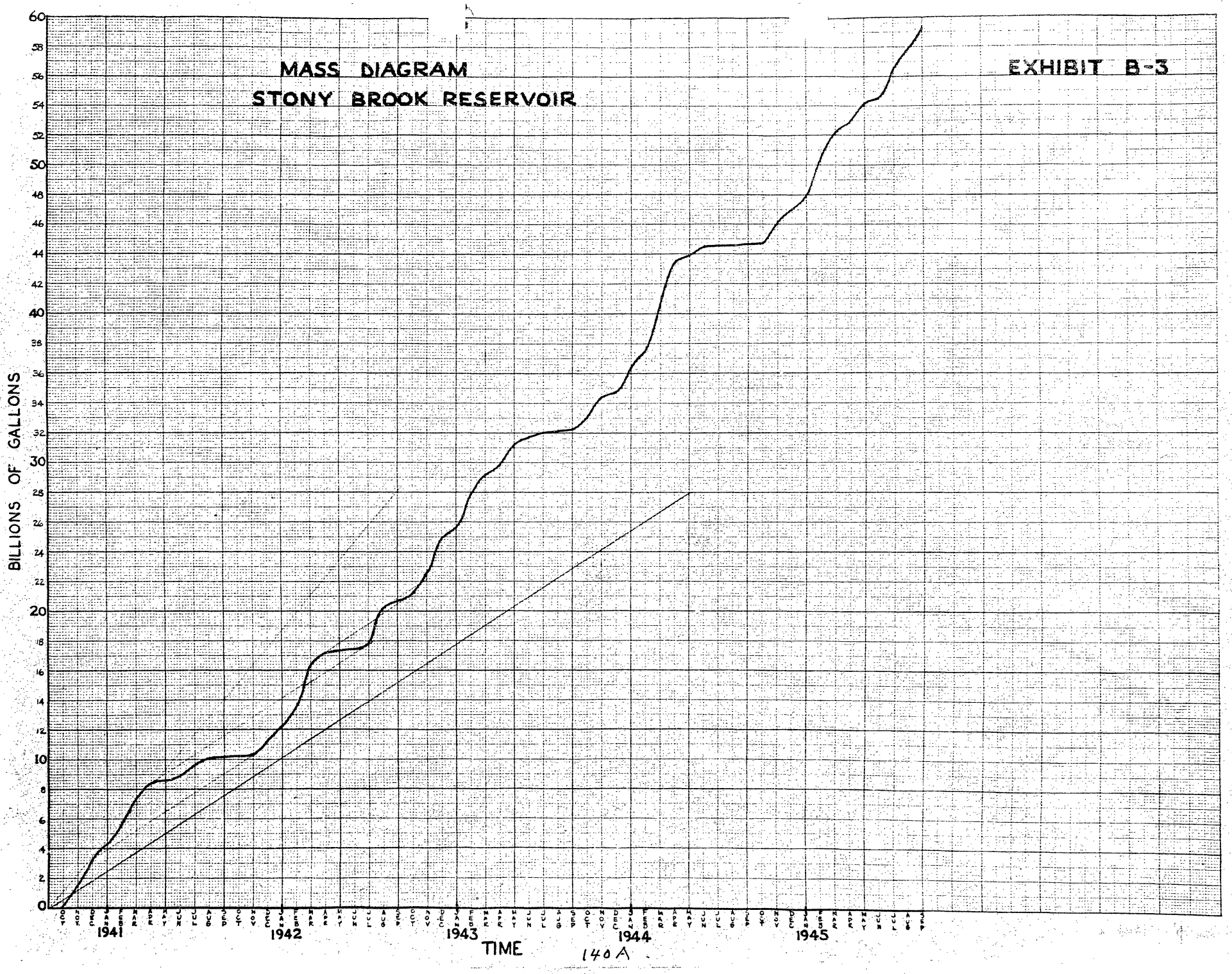
YEAR OR PERIOD MEAN _____ ACRE-FEET _____

COMPUTED BY LML
CHECKED BY JML

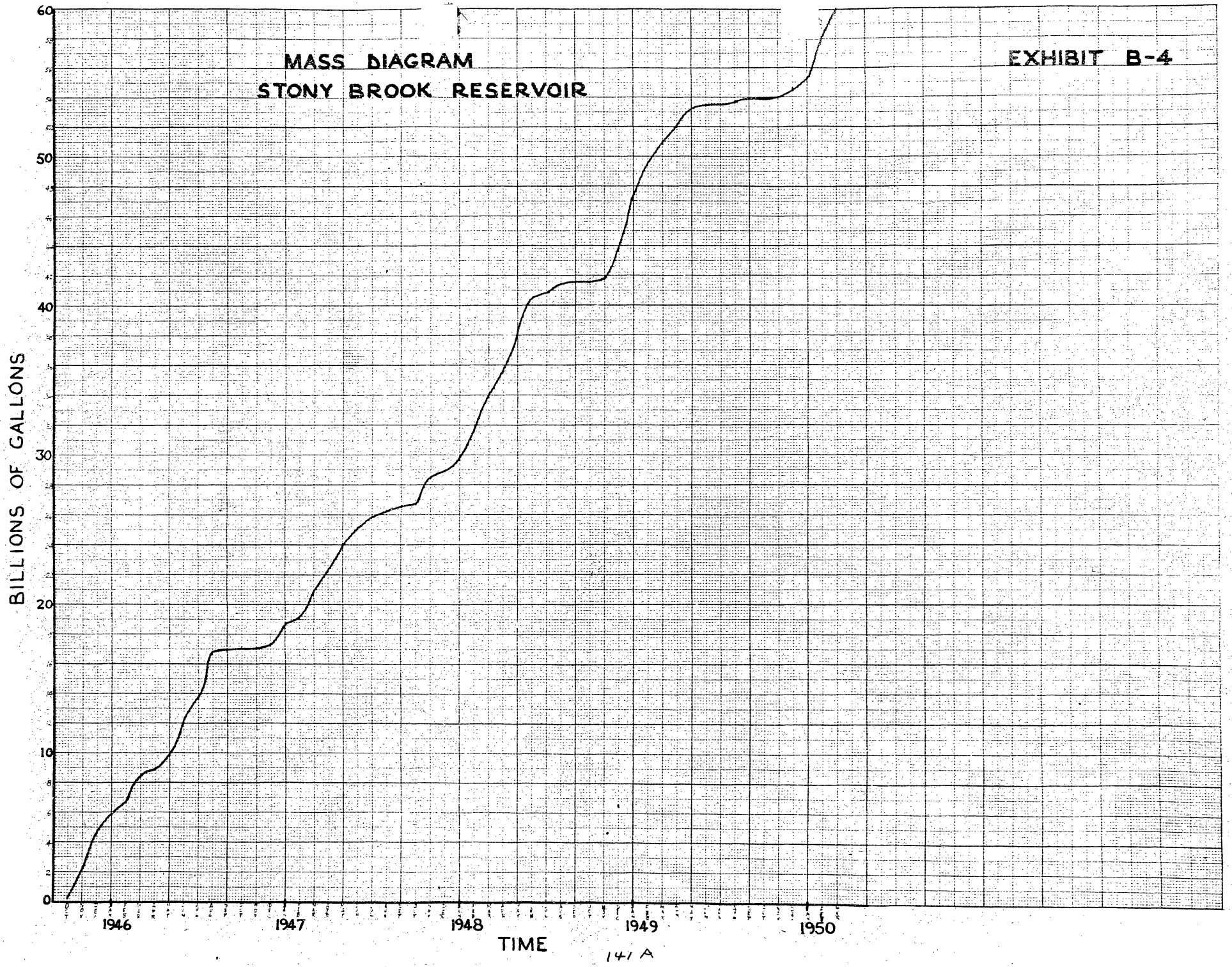
137 A

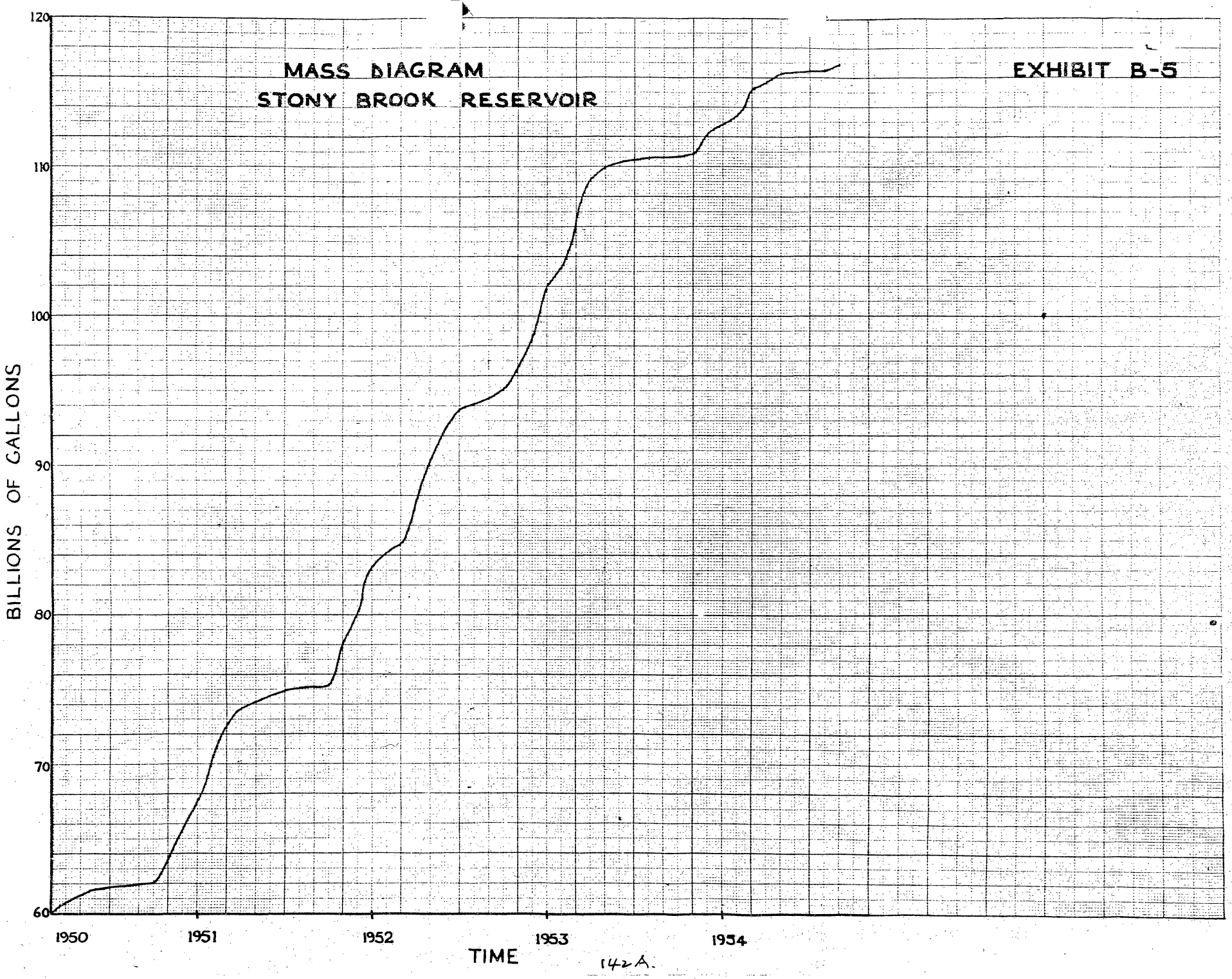

MASS DIAGRAM
STONY BROOK RESERVOIR
EXHIBIT B-1
BILLIONS OF GALLONS
0
10
20
30
40
50
60
1931
1932
1933
1934
1935
1936
TIME


MASS DIAGRAM
STONY BROOK RESERVOIR
EXHIBIT B-2
BILLIONS OF GALLONS
120
110
100
90
80
70
60
1936
1937
1938
1939
1940
TIME


MASS DIAGRAM
STONY BROOK RESERVOIR
EXHIBIT B-3
BILLIONS OF GALLONS
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
52
54
56
58
60
1941
1942
1943
1944
1945
TIME

140A


MASS DIAGRAM
STONY BROOK RESERVOIR
EXHIBIT B-4
BILLIONS OF GALLONS
0
10
20
30
40
50
60
1946
1947
1948
1949
1950
TIME


MASS DIAGRAM
STONY BROOK RESERVOIR
EXHIBIT B-5
BILLIONS OF GALLONS
120
110
100
90
80
70
60
1950
1951
1952
1953
1954
TIME

142A.