(Fourth 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:
July 9, 1957
Assembly Chamber
State House
Trenton, New Jersey

MEMBERS OF COMMITTEE PRESENT:

SENATOR WAYNE DUMONT, JR., (Chairman)

SENATOR ROBERT C. CRANE

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INDEX OF SPEAKERS

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of what might be done in the way of developing the Gorge as a storage basin for water on the South Branch of the Raritan.

We were informed that depending upon where the dam is constructed - if it were placed somewhere near the end of Lake Solitude, it could provide storage capacity of a little more than five billion gallons a day; in other words, half as much as the Spruce Run site is estimated to provide. Just how far this would back up the water, I am not quite clear on but up where the Gorge opens at the northeast end, there is a place called Hoffman's where there used to be a dam - you can still see the remains of a dam across the South Branch of the Raritan.

Now, one of the ideas some years ago as a possibility was to construct a subterranean tunnel from that point over to Round Valley, which of course has been acquired by the State, with the exception, from what we got on our tour, of approximately five or six farms which will have to be condemned by the State. The other properties have been purchased and I understand the State has given notice to the property owners when they will have to move out. Some have already moved.

Now, if this tunnel as a possibility were constructed from Hoffman's over to Round Valley, the cost of construction, according to information we received from Dr. Capen last Tuesday, would be about seven million dollars, as I recall, for the construction of the tunnel and other things that would be necessary.

From that site we went over and toured through Round Valley, which of course is a very fine natural basin for

water supply. We were advised that the cost of constructing a dam and two dikes at Round Valley, whether the source would be the Delaware or the South Branch of the Raritan or some other stream, would be about fifteen million dollars.

Bear in mind that has nothing to do with the construction of any tunnel either from Hoffman's or Hamden.

After leaving Round Valley we went over to Hamden, which lies about two miles south of Clinton along the South Branch of the Raritan, and which two years ago was also suggested as a possibility for supplying water from the South Branch to Round Valley.

There are two or three important differences, as I understand it, and the engineers can correct me on any of this because, not being an engineer, I respect their opinions. At Hamden we would have to pump water; whereas, at Hoffman's we get a gravity flow. From Hamden, water would be supplied to Round Valley by means of a pipe line; whereas, from Hoffman's the subterranean tunnel would be constructed. The cost of the pipe line and pumping station at Hamden would be, according to Dr. Capen, about five million dollars.

After leaving there, we went to Spruce Run and went through the area that would be represented by the proposed reservoir at Spruce Run, which is of course the first of the two proposals made by the Citizens Water Resources Advisory Committee. We looked over one or two of the properties in the Spruce Run area and also considered the question of any roads that might have to be relocated and also whether the water would at any time inundate any portion of State

Highway No. 69 as it runs between High Bridge and Glen Gardner.

Now, that generally was the route and the people who were on the trip and the things that we have checked into.

Speaking only for myself, I feel that you learn a great deal from a field trip, and that doesn't mean that we don't learn a great deal from public hearings, but it is sometimes very beneficial to go out on the ground and look over the areas that are involved.

We more or less tentatively decided that we would take another trip, this time on the Delaware, to look at Walpack Bend and Tock's Island and, in addition to the members of the Legislature and the Executive Branch of the State Government which we would like to have present when we do this, we would also want to be accompanied by the Army Engineers because they of course are now engaged in a comprehensive study of the Delaware River and all of its tributaries, under the leadership of Colonel Allen and Lieutenant Colonel Lee. We would also like to have with us at that time, if possible, some members of the Citizens Water Resources Advisory Committee.

I believe that perhaps I can make one statement with safety, at least that everybody seems to concede: that in time we must go to the Delaware River for long-range water supply as well as flood control and regulation of the river downstream. Obviously, the sooner we get to this task the sooner it can be accomplished and the sooner some kind of on-river dam and reservoir on the Delaware can become a reality. So we hope to schedule such a trip in the early part of August.

That may sound a little late but I have to spend about ten days toward the end of this month on military duty, which will therefore make the arrangements perhaps delayed somewhat. But if we can look over the area the early part of August and at least show some activity in regard to the Delaware, instead of what has been done too much, I think, over the years, talking about the development of the Delaware, maybe it won't do any harm and it might accomplish considerable good.

I might say that all of these things I mentioned here are simply possibilities that we are trying to explore. We hope that we can have the engineers of the Citizens Committee and the engineers who accompanied us on this tour last Tuesday get together and see whether they can agree on certain points as to how much land would be inundated if the level were at a certain number of feet above sea level, and so forth.

I mention these things - not to throw any reflection in any way on the Report of the Citizens Committee. I couldn't possibly extend, on my own behalf at least, too much praise to the Citizens Committee and the able leadership of George Smith for the splendid job which these people have done voluntarily and the time and effort they have put into this work. But I do think, in trying to find a solution for water, which I hope we can do this year and put a question on the ballot for November, that we ought to and it's our duty and responsibility to look into all the possibilities that there are. There are so many problems involved - the question of the cost of acquiring land, the question of how many property owners you are going to dispossess, in contrast with perhaps state-owned land in certain instances and the use of it, the

question of whether Round Valley is going to be used in the near future instead of lying idle for perhaps seven or eight years, or even longer maybe, while the Delaware River is being developed; the question of how much water can be supplied from any of these sources in relation to the needs of the State, and also how much that water is going to cost to consumers, the problems of lower riparian owners along any of these streams and what damage, if any, it's going to do to the areas where the streams rise and start - all of these things have to be considered along with many other problems. I believe that's our duty in this exploration and investigation, to do all of these things and then come in with a report, which I trust would be something that would perhaps get on the ballot and passed this year so that we can make some real strides and real contributions toward resolving, at least for a while and I hope quite a while, the water supply and water storage problem in New Jersey and also get on with the bi-state development of the Delaware at the same time.

I believe that covers all I can say about it.

Senator Crane, is there anything you want to add at this point?

SENATOR ROBERT C. CRANE: Yes, I would like to say one thing, Senator Dumont. Unfortunately, I could not be on the trip with you due to the illness of my wife, and I regretted the fact that I wasn't with you on this very fine trip. Frankly, as I view these field trips, I do feel that they are worth while. I know that we must make some research, because we sitting on this Committee are not engineers and

we are making this research for comparison in the State so that we can better judge the two bills that have been introduced to see if they are the solution to New Jersey's water problem. I feel, too, that the research is good so that we legislators may have some basis for over-all, long-range programming - something that has been lacking, I think, for too many years.

I am not sure in my mind what is the long-range answer - the Delaware, the Round Valley, or the Raritan development, and at what stage they begin, except that I do feel that through these hearings and through this research we can evaluate these bills and place them in the proper perspective so that we can offer service to the people.

The other point I wanted to make was that I felt that a remark in the public press, after the third public hearing, was most unfortunate. It quoted a highly-placed legislative leader as saying that these two bills on which we are conducting this public hearing happened to be "dead ducks." And you have given me your word, sir, and of course I know it to be true that you did not make that statement. However, I feel that if we are to have prejudgment and a display of minds already made up, we are going to get nowhere in solving New Jersey's water problem. I think that this is a problem of such gravity we must all approach it with open minds and I feel that these hearings have been very well taken, and I also feel that the field trips in their proper place are going to better prepare us to do the job that we are called upon to do.

SENATOR DUMONT: I certainly agree with that, because we can't have any prejudgment of this plan that has been recommended by the Citizens Committee, or any modification of it or any other substitute for it, nor can we have any prejudgment on the bills themselves.

I might say that Senator Lance has indicated that he would be very happy to take anybody who didn't come along last Tuesday on the same tour again. He's available for that purpose. So, too, is Dr. Widmer and, I imagine, Dr. Capen. So for any of you who want to make this trip, the opportunity is there. All you have to do is ask for it.

Well, now, we will proceed to take testimony. We will start with Mr. Fred Van Deventer.

F R E D V A N D E V E N T E R: Senator Dumont, Senator Crane, and other members of the Committee: My name is Fred Van Deventer. I live at the headwaters of one of the branches of Stony Brook in Mercer County, although this branch is in no wise connected with the proposed dam and reservoir on that stream.

I speak today as the Republican candidate for Mercer County State Senator, and I may say that this statement has been read and approved for content by Messrs. A. Jerome Moore, Daniel O'Donnell, and Edward Meredith, Republican candidates for the Assembly from Mercer County. It also has the approval of the Republican County Chairman, Joseph M. Pierson.

The Republican candidates have opposed the erection of a dam and reservoir on Stony Brook for a variety of reasons, many of which already have been stated by the Stony Brook-Millstone Watersheds Association, by the Citizens Committee

for a Sound Water Plan, and by individuals who have spoken at this hearing.

At the very outset of this statement, I should like to say that I am not an engineer, that I cannot substantiate technically any of the ideas herein contained. Rather, like Senator Crane, I am a newspaperman. As a newspaperman for a period of time, perhaps, Senator, even greater than yours because I think maybe I am a little older, I have been accustomed to reporting on facts and suggesting ideas which might bring about reforms and even a better way of accomplishing a given purpose. And that's my reason for being here today.

Mercer County and its citizens, like all good citizens of the State of New Jersey, are sympathetic to the plight of those who live in such crowded areas that there is a shortage of potable water. If it could be proved that Mercer County contained a supply of potable water not needed in this immediate area, a supply that would not create hardship of any kind for this particular area, then it seems reasonable to assume that the people of Mercer County would be glad to share this supply with those who are in need.

I have been attending these hearings with considerable interest, but beyond the bare statement that water is needed I have neither heard nor seen any adequate proof that the tremendous shortage exists as has been stated. Further, even some of the proponents of the plan to erect a dam on Stony Brook have admitted that perhaps even more extensive surveys of the area should be made before it can be positively stated that a supply of water sufficient to be of benefit to the northeastern counties is available along Stony Brook.

Since absolute proof of need and absolute proof of the availability of water on Stony Brook has not - to this moment - been forthcoming, it seems unreasonable that the people of Mercer County should be subjected to the loss of ratables and thereby increased taxes, or that our verdant countryside should be subjected to the ravages of mud flats for the benefit of industrial enterprise in one or more other counties.

We realize that this is an industrial state. In fact, Mercer County is constantly seeking new industries to augment its own population. But again, the plight of people, the plight of homeowners who have erected their buildings with loving care, should never be made secondary to the crass commercialism and ratable consciousness of political areas. On this basis, we, the Republican candidates for the Legislature from Mercer County, must recommend to our voters that they disapprove the bond issue as proposed in Senate Bills 272 and 273 if they should be offered at a public referendum.

On the other hand, the people of Mercer County are not insensible to the needs and desires of others, and to that end we wish to submit to this Committee a proposal or an idea whereby the potable water necessary for the continued existence and well-being of northeastern counties of New Jersey may be obtained. There may even be a means of increasing the stream flow of the Raritan River, although this should be secondary to the provision for potable water. As a matter of fact, it may well be that cleaning up the unsightly and unhealthy stream pollution of the Raritan below Bound Brook should be required

before any additional flow of the river should be maintained by the State from any area. That there is now in the area below Bound Brook industrial stream pollution, there can be no doubt.

I wish to state in submitting this idea that it has not been surveyed and checked by engineers, but then the recommendation of the Conservation Department's Advisory Committee for a dam and reservoir on Stony Brook has had no greater inspection by the engineering firm employed by the Committee than has been given to this idea.

Further, I should like to give it as the opinion of the Republican legislative candidates from Mercer County that we believe the only long-term solution to the water problem of northern New Jersey lies in water from the Delaware River. Our idea admittedly is a stop-gap to provide potable water for northeastern New Jersey until the waters of the Delaware can be adequately tapped for use. And we think the plan I shall propose is cheaper by far than any of which we have heard so far. I should like to remind the Committee that under the last mandate from the Supreme Court, the State of New Jersey is permitted to take a daily average of 100 million gallons of water from the Delaware for use in some other river basin without providing for compensating flows. The State may take as high as 120 million gallons in any one day, so long as the daily average over a one-month period does not exceed the 100 million daily average.

I have obtained from Sally Aiken, Assistant to the Secretary of the Division of Water Policy and Supply, some

statistics on the use that has been made of this 100 million gallon daily diversion. I also have obtained from Mr. Howard Acken, Superintendent of the Delaware and Raritan Canal, which transports the water from the Delaware to the Raritan, additional statistics which I should like to call to the attention of this Committee.

I quote from the Aiken letter: "The canal is presently transporting about 55 to 60 million gallons a day. Our current sales of water average between 20 and 25 million gallons daily. The highest month of record was July 1955, during which we sold 758-1/2 million gallons. The highest month in 1956 was October, when 578-1/2 million gallons were sold."

Unfortunately, the Aiken letter does not disclose the largest amount of water sold in any one day. However, it is noteworthy that current contracts now call for a daily maximum of slightly more than 40 million gallons. This does not mean that this much water is used. It means only that under present conditions that much may be taken. I frankly do not know whether that much water ever has been taken in any one day. The maximum that may be taken in any one month under current contracts is 1,107 million gallons, which is nearly 350 million gallons more than was taken at the peak load of the drought year of 1955.

In addition to the 40 million gallons under current daily contract, the Division of Water Policy and Supply also has pending applications for an additional 49 million gallons daily. The applicants and the amounts they are requesting are 20 million gallons from the Elizabethtown Water Company,

14.5 million gallons from the City of New Brunswick, 1 million gallons from the Bakelite Corporation, and 13.5 million gallons from the City of North Brunswick.

Now, the State of New Jersey, through its Division of Water Policy and Supply, has established the following monthly rates for the sale of Delaware water as taken from the Canal: For the first 25 million gallons or less, $30 - that's per million gallons; for the next 50 million gallons, $22.50; and for all over 75 million gallons, $15.00. However, certain minimum rates are demanded for the standby service. The rules provide that during the first five years following date of approval of the water use agreement, the user shall pay to the division a minimum monthly charge amounting to 50 per cent of the value of the rates as I have just set forth.

For example, the Bakelite Company has requested an additional one million gallons daily. This amounts to 30 million gallons a month. The cost for the first 25 million gallons at $30 a million gallons is $750. The cost for the next 5 million gallons would be $87.50, or a total of $825.50, of which half would be payable if none of the water was taken. This I would judge is a comparatively small price for a large corporation to pay for a guaranteed supply of water, when that commodity is so valuable in its manufacturing process.

In the case of the Elizabethtown Water Company, using the same process of figuring, its standby price would be about $4,000 a month, and about $8,000 a month if the total supply was used. Again, this is a fairly small price to pay for guaranteed service to one of the two largest private utilities in the State.

Measurement of the 100 million gallons a day from the Delaware is made at the lock at Kingston, since all water used from the Delaware, prior to its arrival at Kingston, is technically in the Delaware Valley and is, therefore, not chargeable to the total allowable under the Supreme Court mandate.

As you know, this water is taken from the Delaware above Lambertville at a point called Raven Rock. It is transported through Trenton, to Kingston, Bound Brook and New Brunswick by means of the Delaware and Raritan Canal, a wholly-owned state property.

As I mentioned previously, the management of the Canal and the sale of water from it are under the supervision of the Division of Water Policy and Supply in the Department of Conservation and Economic Development, a department of the State Government, which also is sponsoring the Smith Committee Report.

The Department received the Canal as a gift from the owners, and when the 100 million gallons a day was permitted under the Supreme Court mandate, the Canal seemed to be the best means of transporting the water from the Delaware to the Raritan Basin.

Unfortunately, however, the Canal was constructed as a means of transportation for boats and not for water. Its condition was such that back in the administration of Governor Harry Moore, he suggested that the Canal be fitted as a concrete conduit to prevent leakage. However, then and

now, this appears on the basis of available information to be uneconomical. The Canal at present does have a clay base except for those spaces which have been concreted. The clay base, on the basis of engineering reports, is the best for the money, but there are leaks. The extent of these leaks has never been accurately determined, but on the basis of information given to me, it would appear that water fed into the Canal by streams along its path is sufficient to refill the Canal with whatever loss occurs between Kingston and Bound Brook.

Now for a bit of arithmetic. At the present time, some 55 to 60 million gallons a day is being transported from Kingston toward Bound Brook. Some 25 million gallons a day is being sold, which means that some 30 to 35 million gallons a day is being dumped into the Raritan at the point where the Canal ends.

Mr. Howard Acken tells me that he once experimented to determine just what the maximum capacity of the Canal might be. He is not certain even now, but over a period of time he did take 90 million gallons a day from the Delaware without material damage to the Canal. He is not certain but he feels that with some repairs the Canal might be able to take the whole 100 million gallons a day. But for the sake of this discussion, let us assume that with proper repairs only 90 million gallons daily can be taken and transported beyond the locks at Kingston. Remember please that the present daily average take is only 25 million gallons beyond Kingston and that the largest single user is the Elizabethtown Water Company, which on Monday, July 1, took only approximately 8 million gallons.

This leaves, according to my arithmetic, 65 million gallons a day which might be used for the benefit of the northeastern counties.

I am well aware, as I mentioned previously, that 49 million gallons more has been requested. But in this regard may I once again point out that this water is not now being used. You may say that there will come a day when it will be needed, and with that I am in sympathy. But it is not being used now.

You may say that the Canal must be prepared to deliver the maximum of its contracts at any given time, and with that I am in sympathy. But I believe a solution to that is possible, even though it will take engineering studies to prove. This could be accomplished by the erection of a series of small dams on the Millstone just before its confluence with the Raritan, and on the Raritan itself.

I have taken a trip through the valley of the Millstone and the Raritan Rivers, another field trip, gentlemen, and while I am not an engineer, there appear to be points along the River where these small dams might be constructed entirely, or mostly, within the banks of those rivers. In fact, in testimony given before a previous legislative hearing on the proposal to buy and fill the Chimney Rock project, Mr. Robert Kean, President of the Elizabethtown Water Company, and Mr. Girand, the Chief Engineer, both stated that their company was prepared at its own expense to build a series of small dams along the Raritan and its tributaries which

would provide all of the water the Raritan Valley will need until the year 2000, or until the Delaware can be developed.

The Elizabethtown officials did not locate the dams they had in mind, but suffice it to say, they thought then that they could build the necessary reservoirs for a total cost of something like three million dollars. Thus, surely, Stony Brook would not be one of them.

Now, my proposal is that, if necessary, the surplus waters of the Delaware and Raritan Canal be used to supplement water in these dams if necessary. There are any number of points between Kingston and Bound Brook where breaks in the Canal could be made to increase the flow of the river. I assume, of course, that some satisfactory system for measuring and charging for the water that is moved into the Raritan could be worked out. Certainly with increased flows as a result of the nine dams as proposed by the Stony-Millstone Watersheds Association and with increased flows from the Canal, there should be a sufficient supply of water for the Somerset, Middlesex, and Union County areas and, according to testimony two years ago by Mr. Kean and Mr. Girand, these are the only counties which now need an increased supply of water, both potable and for the maintenance of stream flow.

Mr. Acken and Mr. Connard of the Delaware and Raritan Canal made the trip with me into the valleys of the Millstone and the Raritan on Monday, July 1. They did not say that this plan is engineeringly sound, but they did say that there is sufficient merit to it that it is worthy of investigation. It apparently has been investigated as thoroughly as has the Stony Brook project by the Advisory Committee.

Certainly this plan, if it is engineeringly and economically sound, would have the merit that it will cause no political hassels among different areas of the State. The State already owns the Canal. The Stony Brook-Millstone Watersheds Association has already stated it is prepared to go ahead with its small dams. The Elizabethtown Water Company two years ago pleaded for permission to go ahead without political disruptions. The combination of all three would appear to me and to the Assembly candidates of the Republican Party for Mercer County to offer at least a temporary solution without taking away valuable ratables from Mercer County and without destroying the homes of citizens of this county, to which their owners have devoted much of their lives.

SENATOR CRANE: I'll admit to one thing, Fred. You are older than I am, I believe.

You referred in here many times, Mr. Van Deventer, to the fact that your plan had evidently as much research as the Smith Committee proposal. I mean, do you actually believe that's true?

MR. VAN DEVENTER: Well, all I know is what the engineer said, that he had driven through the Stony Brook Valley; and I have driven through the Millstone and Raritan Valley, and I admit that I am not an engineer.

SENATOR CRANE: Well, do you believe that that's all that engineer did? Had you read his report, the Smith Committee Report?

MR. VAN DEVENTER: Yes, sir.

SENATOR CRANE: Did you read the TAMS Report?

MR. VAN DEVENTER: I did.

SENATOR CRANE: Don't you believe that more engineering work has been done other than just a field trip?

MR. VAN DEVENTER: Well, I think you're being trivial about it. I mean, for the sake of discussion we will concede that that is true but then that might be open to discussion.

SENATOR CRANE: Well, I am not trying to be trivial, Mr. Van Deventer, but you did refer several times to the engineering work done and, in that it appeared from your remarks that the same could be done by a layman and not a specialist service, it seemed to more or less impugn the man's -

MR. VAN DEVENTER: Well, you understand I had Mr. Acken and Mr. Connard with me, too.

SENATOR CRANE: Yes, I realize that, but I wanted to draw a comparison.

The other thing is, sir, were you here present when the Water Policy Council gave its report through George Shanklin?

MR. VAN DE VENTER: I was.

SENATOR CRANE: And through others it was developed that not all of the 100 million gallons per day could be delivered through the Delaware Canal; in other words, that they could not use up to 100, that they would have to stop somewhere short of 100 million gallons.

MR. VAN DEVENTER: Well, I stopped short of it, too, with 90 million gallons.

SENATOR CRANE: I'll cite now Leggette, Brashears & Graham as those who have conducted the ground water surveys for

both TAMS and the Smith Committee, and I thought they gave rather an exhaustive outline of the in-balance of the State's water supply. Are you familiar with that?

MR. VAN DEVENTER: No, I'm not.

SENATOR CRANE: They developed how it was possible that one portion of the State might have a critical shortage while the other might not.

MR. VAN DEVENTER: I believe that is also the statement of Robert Kean and Mr. Girand two years ago. They said essentially the same thing.

SENATOR CRANE: Well, in the Leggette Report it is pointed out that it's not possible to take the same amount of water from each acre throughout the State, that in some acres they take more and drive our levels down to salt water intrusion, and in the other parts of the State there might be more water than necessary; therefore, it becomes a matter of transportation to get it to the areas that need it the most. Now, sir, would you describe your area as one that is blessed with an abundance of water ?

MR. VAN DEVENTER: I think that all you would have to do would be to go out to Stony Brook today and see how little water there is there.

SENATOR CRANE: Well, then, you too are interested in a water program, sir?

MR. VAN DEVENTER: Definitely. I'm trying to suggest something here which, to my knowledge, has not been suggested, recently anyway - certainly not to my knowledge. I am trying to suggest something different, whereby you can get the water

you need without tearing up Mercer County. That's what it amounts to.

SENATOR CRANE: Well, do you mean tearing up, or inundating?

MR. VAN DEVENTER: Well, take it either way you like.

SENATOR CRANE: Do you believe that this would be a stop-gap measure that would take care of all our needs until the Delaware is developed?

MR. VAN DEVENTER: Yes, sir. If you take into consideration that somewhere up around 60 million gallons a day is available every day in the Canal, approximately that - call it 50, call it anything you like. Now, if the Elizabethtown Water Company would go ahead and build the dams which two years ago they said they were ready to build and, if the flow of the Raritan and the Millstone and its various tributaries would not fill those dams, then every day without exception you could dump 50 to 60 million gallons of water from the Canal into the Raritan behind those dams.

Now, you understand I am not an engineer but I am told that this is sufficiently feasible that it's worthy of investigation, by competent engineers. As you say, I'm no engineer.

SENATOR CRANE: This plan that you cited that the Elizabethtown Water Company had proposed - I believe that they have stated through their engineers that they at one time investigated fifteen smaller dam sites, and if I recall their testimony I believe they stated that they felt it was unwise to proceed with that plan while this was under investigation, and I believe that the same thing holds true of the smaller dam

program of the Stony Brook-Millstone, without stating that those plans are not the correct ones.

MR. VAN DEVENTER: I have the Chimney Rock testimony here if you would like to go into it, as to what Mr. Kean and Mr. Girand said. If they have testified at this hearing, I have not heard them, but I do have their testimony of two years ago.

SENATOR CRANE: Well, either Mr. Girand or Mr. Kean brought that out.

MR. VAN DEVENTER: I didn't happen to be here at the moment when they testified.

SENATOR CRANE: I believe that's all I have right now.

SENATOR DUMONT: Did Mr. Acken give you any idea of the cost that would be required to repair the Delaware and Raritan Canal, Mr. Van Deventer?

MR. VAN DEVENTER: He said that that would require very serious investigation, and I hesitate to quote him on what he said because I don't wish to hold him to it, but he estimated it would be somewhere around a million dollars. And that was purely a guess. He said he didn't know. Apparently the biggest single repairs can be traced to muskrats, I understand.

SENATOR DUMONT: And his statement is that today the Canal is only taking on an average about three-fifths at the most of the water that New Jersey can take without returning any of it to the River by compensating releases. I believe that was 55 to 60 million gallons.

MR. VAN DEVENTER: I believe that was the Aiken letter and I have the letter here. I have that complete if you would like to hear it all; I will be glad to read it to you.

SENATOR DUMONT: How long is it?

MR. VAN DEVENTER: Very short.

SENATOR DUMONT: Suppose you read it then, please.

MR. VAN DEVENTER: It is addressed to me and is dated June 24, 1957.

> "The following is the information concerning the Delaware and Raritan Canal which you requested on Friday:
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> "The Canal presently is transporting between 55 to 60 million gallons a day. We could transport 80 million gallons a day if we had sufficient personnel to operate the control structures. We are hard pressed at present to spread the Canal operating force to cover a seven-day week. The Canal Supervisor advises that we could take the full 100 million gallons now allowed from the Delaware River if a conduit were built the full length of the feeder and the canal.
>
> "Our current sales of water average between 20 and 25 million gallons a day. The highest month of record was July 1955, during which we sold 758.472 million gallons. The highest month in 1956 was October when 578.683 million gallons were sold. Current contracts call for a maximum of 40.156 million gallons daily and a monthly maximum of 1106.90 million gallons. Some of the contracts are on a 22 or 25-day basis, while some are on a 30-day basis.
>
> "Pending applications are: Elizabethtown for an additional 20 million gallons; New Brunswick an additional 14.5 million gallons a day; Bakelite for an additional 1 million gallons, and a new supply for North Brunswick of 13.5 million gallons daily."

That is signed by Sally C. Aiken, Assistant to the Secretary.

SENATOR DUMONT: Does anyone have any questions they desire to ask of Mr. Van Deventer? Mr. Crooks?

MALCOLM CROOKS: I would like to ask Mr. Van Deventer, did Mr. Acken give any indication whether or not repairs will be needed to the Delaware and Raritan Canal even if the water

capacity is not increased?

MR. VAN DEVENTER: The canal is under constant repair. They maintain regular maintenance men for the entire length of the canal and you understand I toured it only from Kingston to Bound Brook. I was told it was unnecessary to go beyond Bound Brook because I wouldn't see anything worth while. From Kingston to Bound Brook they are constantly repairing it. They have just cleaned off the towpath, for example. You understand the Delaware and Raritan Canal was also to be used and is being used for recreation as well as the transport of raw water and, for that reason, it is necessary to keep it in repair. They frequently find along the top where muskrats have dug in, and then when the water level is raised in the Canal this will create - I don't know what you call it - sluices, I suppose, which then have to be repacked with clay. And this is being done on a constant basis, and presumably that costs money over a period of a year. I don't know how much.

SENATOR DUMONT: Anything else?

Mr. Van Deventer, it is my recollection that in the legislation that I sponsored in the fall of 1955, after the disastrous flood of August 1955, there was an appropriation of $250,000 made in the bill, which appropriated about six million dollars in all for flood relief, for the purpose of rehabiliating the Delaware and Raritan Canal. Do you know whether any of that money has been expended by the Department of Conservation and Economic Development?

MR. VAN DEVENTER: No, sir, I don't.

SENATOR DUMONT: Any other questions? Thank you very much.

MR. VAN DEVENTER: Thank you very much for your time.

SENATOR DUMONT: Dr. W. Taylor Thom, Jr. Is he going to make his own statement, or are you going to make it, Mr. Test, for him?

Mr. Test will make the statement for Dr. Thom.

A L F R E D L. T E S T: Dr. W. Taylor Thom is an Emeritus Professor at Princeton University and had hoped to be present. Unfortunately, he is in Arkansas and Texas doing consulting work for the Federal Government and the local states on water problems.

Dr. Thom graduated with a degree of B.S. in Engineering from Washington and Lee University in 1913. He received his Ph.D. in Geology from Johns Hopkins in 1917. Between 1912 and 1925, he served as Geologic Aide, Assistant Geologist, Associate Geologist, and Geologist in the U. S. Geological Survey. He became Geologist-in-charge of the Survey's coal section in 1923. From 1925, until joining Princeton University's faculty in September 1927, he was Geologist-in-charge of the oil and gas work for the U. S. Geological Survey. After joining Princeton University's staff he served as a member of the faculty for the Geology and Geological Engineering Department and in 1940 became Chairman of the Princeton University's Department of Geological Engineering, continuing in that post until retirement from the University in June 1956.

During 1944 and 1945, as Chairman of the Department of Geological Engineering, he conducted a study of the water supplies then available in New Jersey areas contiguous to the

Pennsylvania Railroad lines, this study being executed under co-operative agreement between the Railroad and the University.

He has served as Chairman of various committees of the American Association of Petroleum Geologists, American Institute of Mining, Metallurgical and Petroleum Engineers, National Research Council of Geology, and the American Geophysical Union.

This letter is addressed to me:

Though I should like to accept your invitation to testify at the next public hearing on New Jersey's water problem, I shall be unable to do so because of professional commitments which call me to Shreveport, Louisiana. However, I am sending you this brief memorandum in order to put forward a few suggestions which may contribute to a proper solution. In this connection two facts should be mentioned which provide background as to my competence to offer useful suggestions.

First, as I reported to you earlier, as Chairman of the Princeton Department of Geological Engineering, I carried forward, on behalf of the University, a study of the water supplies then potentially available along the lines of the Pennsylvania Railroad in New Jersey - this work being done under a co-operative agreement between the Railroad and the University.

Secondly, before I came to Princeton, I had been serving as Geologist-in-Charge of the U. S. Geological Survey's Oil and Gas Section - and in that connection, and in connection with subsequent National Research Council and scientific society activities, I followed with interest the techniques being used for injection of water into underground reservoirs:

First, in connection with the increase of oil production by the so-called "water-flood" process of water injection;

Second, in connection with re-introduction into underground reservoirs;

a. Of great quantities of oil field brines, as in East Texas, or

b. Of fresh waters which had been used for air conditioning and comparable purposes;

Third, the phenomenally successful Seabrook Farms method for returning waste waters to the subsurface by a modified form of induced artesian recharge or "water spreading."

The Basic Water Problem in New Jersey.

The basic water problem in New Jersey, at present and in the predictable future, involves in major degree the development of an imaginative plan for the underground storage of the flood water intermittently provided by snow-melt and by storm run-off. It is my confident belief that the underground reservoirs available to us not only have a capacity greatly exceeding that of any possible system of large surface reservoirs, but that this underground water storage can be developed far more cheaply, and has the added advantage of yielding relatively cool, filtered water with minimal surface damage, including dislocation of highways and surface culture.

New Jersey's available underground reservoirs are of two types; namely, "sheet-sand" aquifers, and gravel-and-sand floodplain and channel-fill deposits, which exist at varying depths mainly along and southeastward of the Pennsylvania

Railroad's main line from Trenton to Newark. In this connection and at this time, particular interest reasonably attaches to developments which should be practicable in the Assunpink and Millstone drainage basin areas southeast of the Delaware and Raritan Canal.

Experience at the Seabrook Farms; the experience provided by many oil field water-flood and brine-injection projects; the experience provided by various "water-spreading" and water re-injection projects, coupled with modern water-production techniques, should enable us to meet the prospective and predictable needs of the State for years to come, especially if an intelligent "planting and harvesting" of our water crop is paralleled by the development of a great number of small surface reservoirs, within areas where sound soil and woodland conservation practices are being applied.

In contrast to the use of large surface reservoirs - which is a technique that is already semi-obsolete besides being more and more beset by the law of diminishing returns - the "engineered" and imaginative use of underground reservoirs can provide the State with far greater water storage capacities and on a basis which is not only compatible with but conducive to both the maximum economic advantage and the general well-being of the State's increasing population.

I should like to conclude by offering two suggestions, one of which relates particularly to New Jersey's water problems - whereas the other applies in essentially similar fashion to the water problems of the whole United States.

My first suggestion is that a relatively short, intensive and inexpensive study be made of underground water storage possibilities within the Assunpink and Millstone drainage basins, southeast of the Delaware and Raritan Canal. I am confident that enough geological and hydrological data are available to give a fairly clear and fairly quantitative idea as to what could and should be done in this area.

My second suggestion relates to our urgent national need for men so trained that they can deal effectively with the problems incident to discovering, delineating and evaluating potential underground water sources and reservoirs. This calls for men who are not only engineers but who, at the same time, have competence in dealing with the geological and geophysical problems concerned. One of the nation's senior geologists, now retired from the Gulf Oil Corporation, has been working for some three years on the water problems of the Gulf Coast region, and his opinion, as stated to me, was that the nation currently has critical need for some hundreds of men capable of dealing effectively with ground-water problems (compared with the few dozen such men now existent) and that within 20 years we shall need to train at least 10,000 such men in order to meet the urgent public and industrial needs of the future. (Signed: W. Taylor Thom, Jr.)

I will present this in evidence but I would like to read into the record a letter which Dr. Thom wrote to both Malcolm Forbes and Governor Meyner.

SENATOR DUMONT: Go ahead.

MR. TEST: This is dated May 23, 1957. The letter to both was identical.

(Reading)

"Because of the critical importance of New Jersey's water supply and water-storage problems, I am writing to call attention to information on this subject which was assembled for the Pennsylvania Railroad during 1944 and 1945, under a cooperative study* conducted by Princeton University - through its Department of Geological Engineering, of which I was at that time Chairman. Our review of New Jersey's surface and subsurface water supplies indicated that nature has provided underground storage facilities within the State for a very minimum of 100 billion gallons of spring flood waters - providing we begin to make efficient use of the five (or more) buried river valleys, filled with gravel and sand, which slope southeastward beneath the Coastal Plain strata from localities respectively near Gloucester, Burlington, Trenton, Princeton Junction, and Kingston.

"It should be possible to store more water, at less cost, without loss by evaporation and with far less surface damage, in such natural underground reservoirs than could probably ever be stored in even the most extensive and expensive surface reservoirs. And with the continuing growth of New Jersey's population and industrial activity, it is obviously critically important that correct answers to our water-storage problems be had as rapidly and constructively as possible. For these reasons I am writing identical letters to you and to Governor Meyner since I believe you are the two men who have principal capacity and responsibility at this time and in this connection.

"With all good wishes.

"*One by-product of this study was a conclusion that the Pennsylvania area just below Morrisville provided exceptional water-supply advantages for a major new steel-making operation on the Pennsylvania Railroad's lines."

SENATOR DUMONT: Any questions of Mr. Test?

MR. TEST: In this case you would have a very incompetent witness.

SENATOR CRANE: Mr. Test, I just have one question, and this is one asked you, sir, in your status as citizen:

Do you feel that this report criticizes the idea of on-river reservoirs or off-river reservoirs that are exposed to air?

MR. TEST: In conversations with Dr. Thom, I think he feels, as he states, that a number of small reservoirs are necessary to catch flood waters, subsequently used for injection purposes, and also for the natural infiltration that will "bed" up these bed rock stream beds.

I might add one thing to that and that is, on one of these so-called underground river beds a great deal of geophysical work has already been done. It is of such technical nature that Dr. Thom thought it should not be introduced here in evidence. But that would be a starter toward any additional studies, and certainly additional ones are in order.

SENATOR CRANE: However, he did not indicate that this proposal of his negated all consideration of surface reservoirs?

MR. TEST: Large surface reservoirs, yes.

SENATOR CRANE: Large surface reservoirs.

MR. TEST: That's right.

SENATOR CRANE: Because of the evaporation, for instance?

MR. TEST: That's one factor.

SENATOR DUMONT: Any other questions of Mr. Test?

Thank you very much.

We have some maps here that were turned over by Mr. Test on behalf of Mr. Agle, who was a witness at the third hearing. These have to do, I think, with the location of roads in the Stony Brook area. He was a Planning Consultant and Architect from Princeton. At that time we asked him if he could leave his original map, and the suggestion was made that it would be duplicated and kept here in Trenton as a part of the record. These are the maps which have now been delivered

from him.

The next witness is Homer Sanford of Elizabeth.

J. H O M E R S A N F O R D: Senator Dumont and Members of the Revision and Amendment of Laws Committee: My name is J. Homer Sanford. I was graduated from Lehigh University in 1914 with the degree of Bachelor of Science in Geology, and I live in Elizabeth. I am a licensed Professional Engineer in both New York and New Jersey and among the professional societies to which I have been elected are the American Geophysical Union, American Association for the Advancement of Science, American Waterworks Association, American Institute of Mining and Metallurgical Engineers, and the National Society of Professional Engineers, and some others.

For over 37 years, since 1920, my livelihood has depended upon solving problems that involved groundwater. A check of my files in 1952 revealed that I have been responsible for something over 3,000 problems in groundwater development, recharge, contamination, or interference effect. Since then, I have worked out solutions on several hundred more. My operations have ranged from the Mexican Border to New Hampshire, and from Florida to Wisconsin.

I was Consultant for the New York State Water Power and Control Commission. My report on the geology and hydrology of Western Long Island is available in all public libraries as New York State Bulletin GW-7. I was also Consultant for the U. S. Army Engineers, District No. 1, for whom I investigated 14 flood control sites in 1937; the National Parks Division of the Department of Interior; and for the Pennsylvania Railroad, Water Division, for six years; and the Baltimore and

Ohio for four and a half years. I have other large clients - such cities as New York, Buffalo, Pittsburgh, Binghamton, Rochester, El Paso, Saginaw, and Indianapolis; also lesser communities stretching from the Mississippi to the Atlantic.

Most of my work has been practical. Apart from when I have been engaged as consultant by public bodies, I have been a private practitioner and have depended entirely upon getting results to get an income.

I think my experience, commencing in 1920 - practical experience through all those years - antedated the development of what might be thought of as modern hydrological techniques that was initiated by the studies of Dr. Oscar E. Meisner of the U. S. Geological Survey, culmindated by a very careful series of tests at Grand Island, Nebraska, in 1932.

The water resources of the Upper Millstone that lie southeast of Princeton Junction were given no consideration in the report of the New Jersey Water Resources Advisory Committee. The selection of rock-bound valley sites for the Spruce Run and Stony Brook reservoirs is a conventional waterworks engineer's approach to an on-stream reservoir. In this case, however, vast storage of ground water, far superior in quality, has been disregarded.

The realistic approach, as emphasized by Senator Crane, is to provide enough water to tide over the increasing needs of Middlesex, Somerset, and Union communities, pending development of an acceptable over-all master plan. This plan should integrate the resources of the Raritan and ultimately those of the Delaware for economic utilization of Round Valley. There is urgent present need to develop at least 30 million gallons daily over and above

Elizabethtown Water Company's existing river diversion rights before the next drought brings even more critical shortages than ever before. A unique on-stream-groundwater reservoir development of the Millstone-Bear Brook drainage area will provide more additional water supply than either Spruce Run or Stony Brook. What's more, this Millstone-Bear Brook reservoir system will take care of water needs in adjacent Mercer areas that now face deficiencies. Furthermore, it can be equipped with a two-way outlet if necessary, by which water may be diverted into the Delaware and Raritan Canal. To make these things clear and to meet the objections of those engineers who may not appreciate the potential of this capacious underground reservoir, I must ask your indulgence while I present facts and figures to verify the feasibility of this project.

The Advisory Committee estimates a 10 billion gallon capacity for both Spruce Run and Stony Brook reservoirs. It is purported that incremental makeup from the Spruce Run reservoir will sustain a minimum dry weather flow of 150 MGD at the confluence of the Raritan and Millstone Rivers. Sixty MGD of this will be available for public consumption, of which 20 MGD will go to satisfy the diversion rights of the Elizabethtown Water Company. Only 40 MGD of the initial development will be revenue producing, because 90 MGD will be wasted to salt water for the purpose of flushing out the Raritan below the confluence. The wastage of 90 MGD is assumed necessary because of tidal underflow of salt water up the lower Raritan estuary. There are no data to substantiate how much flow will be necessary below

Bound Brook for the combined purpose of flushing and checking salt intrusion. However, operation of the facilities of the Middlesex County Sewerage Authority will commence before the end of 1937. Thereafter, contaminated water that formerly discharged into Green Brook and the Raritan River will be conveyed by a water-tight trunk sewer to the center of Raritan Bay, about 4500 feet from the nearest shore. This sewage effluent, ranging up to 10 MGD, will tend to lessen tidal underflow of salt water. It will moreover, eliminate most of the contamination that now should be flushed out of the lower reaches of the Raritan. It is questionable, therefore, whether 90 MGD of fresh water must be wasted below the confluence solely for flushing purposes.

As a matter of fact, considering that 10 million gallons daily of sewage contaminated water is to be eliminated, and also considering the fact that the best flushing of the lower reaches of a stream is done during flood periods, it is questionable in my mind whether any more than 75 million gallons daily can be put to effective use in this flushing or in holding the salt underflows to the very extreme lower part of the estuary.

Apparently the purpose in constructing Spruce Run reservoir first is to assure a minimum sustained flow of 150 MGD, because the runoff of the Stony Brook area is insufficient. Data available from the published stream flow records of the U. S. Geological Survey reveal the following runoff from Stony Brook's 38 square mile drainage area, Spruce Run's 41 square mile area, and the 57 square miles of the Millstone-Bear Brook drainage:

For the long period, that is, taking the official state record up to 1945, Stony Brook averaged 34.44 MGD. And that rate of flow would have required 290 days to fill a 10 billion gallon reservoir. Spruce Run averaged 42.72 and would have required 234 days; Millstone-Bear Brook averaged 51.66 and would have required only 193 days.

In 1930, the key year according to the discussion that has developed over this matter of the Millstone and Raritan flows, Stony Brook averaged only 21.99 MGD, and it would have required 455 days at that rate to fill the 10 billion gallon supply. Spruce Run averaged 28.48 and would have required 351 days; and Millstone-Bear Brook 33.04 and would have required 303.

The year following that very low year, 1931, Stony Brook averaged 23.42 and would have required 427 days; Spruce Run averaged 26.50 and would have required 377 days, and Millstone-Bear Brook averaged 35.18 and would have required 281 days.

In 1932, the last year of that critical period, Stony Brook averaged 30.46 and would have required 328 days; Spruce Run 30.10 and would have required 332 days; and Millstone-Bear Brook averaged 45.77 and would have required only 218 days.

Average discharge figures for Stony Brook and Millstone-Bear Brook are taken from Special Report No. 12 (1952) of the Division of Water Policy and Supply for the 23 years ending in 1945. Those for Spruce Run are taken from the same report covering 25 years ending 1945. Average discharge figures for the years 1930, 1931 and 1932 are taken from the State Water Policy Commission Report No. 5. Runoffs from Stony Brook and

Millstone-Bear Brook areas are prorated percentages of the gaugings at Blackwells Mills. Those of Spruce Run are based upon gaugings at Stanton.

I might add that taking it that way gives Stony Brook the better of the argument, because it is a well-known fact that in dry seasons instead of having runoffs, which is shown under this method I used every day for Stony Brook, there was no runoff. The bed of the discharge stream was dry.

It should be noted, moreover, that the average discharge records for longer periods up to 1956 are somewhat lower than the published records up to 1945.

A striking feature revealed by the above tabulation is the comparative number of days required for runoff from each reservoir drainage area to store the same quantity; viz. 10 billion gallons. Using the optimum average rate of daily stream flow, it is evident that Stony Brook reservoir requires 80 per cent of its average annual flow to store 10 billion gallons. This, of itself, may infringe downstream riparian rights. During 1930, incremental makeup from July 29 to November 15 would have essentially depleted the Stony Brook reservoir. The storage deficiency that would have accumulated in 1930, 1931 and 1932 was evidently too great for Stony Brook to have performed its function. By comparison, the runoff from the 57 square mile Millstone-Bear Brook drainage area exceeds the long-time average of Stony Brook runoff by over 17 MGD. It is obvious also that the Millstone-Bear Brook resources greatly exceed those of Spruce Run. Consequently, the

Millstone-Bear Brook reservoir system is even more capable of sustaining a 150 MGD flow at the confluence than either Spruce Run or Stony Brook, as will be demonstrated later.

The Millstone-Bear Brook catchment area has yet another characteristic that makes it superior to either of the other proposed reservoir sites. It is covered by a thick, highly permeable blanket of Pensauken sand and gravel that absorbs rainfall like a giant sponge. The terrain of this permeable area is relatively flat and extensively cultivated. Consequently, the amount of rainfall percolation to replenishment of the underground reservoir approaches that of similar farm areas in South Jersey. It may be as much as 50 per cent in the more favorable areas. But assuming an average of 40 per cent, the percolation of rainfall to recharge is about 50 MGD. In other words, the average daily replenishment of groundwater storage beneath the area with which we are concerned, approximates the 52 MGD of average runnoff from the 57 square mile area. Obviously, therefore, the average daily percolation is ample to sustain a minimum flow of 50 MGD over and above the low recorded during the 100 critical days of 1930.

Elizabethtown Water Company does not expect to increase its river diversion during the next three years if permitted to increase their contract for Delaware and Raritan Canal water to meet emergencies. They have not been able to get a dependable supply of 20 MGD of river water during past droughts. Therefore, the first provision of the Millstone-Bear Brook project should be a base flow of 20 MGD at the Water Company's

Millstone interception dam. The initial stage of this on-stream-groundwater development can be put into operation about a year after work commences. Water from the first dam could be delivered into the D & R Canal by a temporary aqueduct if necessary. Consequently, this is the quickest possible source of relief from critical water shortages throughout most of Middlesex, Eastern Somerset and Union Counties, where connections for obtaining canal water already exist. Elizabethtown's initial contract for 30 MGD would only use a part of the Millstone-Bear Brook resources. Moreover, it will be a number of years thereafter before any of the public water utilities offer to contract for more water.

I have prepared a hydrograph comparing the daily Raritan and Millstone flows at the confluence for the period of greatest shortage, from July 29, 1930 to November 14, 1930. The combined flow during that interval averaged nearly 90 MGD. However, 72 days of the total of 109 days were below 90 MGD. They averaged about 71 MGD. It would have, therefore, required 1.375 BG of make-up water to sustain the 90 MGD flow through those 72 days. Furthermore, to provide Elizabethtown's authorized 20 MGD, an additional 1.6 billion gallons of reservoir storage would be needed. As will be shown later, the Millstone-Bear Brook resources are easily capable of supplying even more than 40 MGD over and above the foregoing incremental demand of 2.975 BG.

I have prepared the hydrograph, as I said, and there on the Assembly board I have posted that hydrograph with the flow of the Millstone shown in red or pink and that of the

Raritan, at the confluence in both cases, shown beneath that and shaded. Now, my primary purpose in doing this is to differentiate or distinguish for each day during that 109 critical days in 1930 the actual flows at the confluence of these two. The flows at the confluence, obviously, were net in that all the water that had been lost by evaporation upstream or diverted for various other uses was not recorded in those figures.

I will go up there and show you briefly what that drawing shows: The variance flow is shown by this irregular section and right here (indicating) is 50 MGD rate. As a matter of fact, on my calculations the Raritan during that period actually averaged something in excess of 45 million gallons daily. Now, the Raritan-Millstone combined flows - here is 90 MGD rate; there is 110; in other words, 20 million on top of 90 million - to take care of the authorization to the Elizabethtown Water Company, and the upper or the top line going across there is 150 million gallons, and this (indicating) is 140 million gallons.

I want to call your attention to one thing: After this year there will not be a constant delivery of contaminated sewage water below the confluence delivered into the stream; therefore, there will be no need of continually maintaining a high greater flow for the purpose of carrying off that contamination. Whatever contamination there may be, it will be upstream of the confluence of the Raritan and the Millstone. Practically all of it or the greater portion of it will be Raritan contamination and therefore should be used for flushing purposes because it is the least desirable water, the least

valuable water.

Now, at the very lowest condition we have, there is something over 45 million gallons a day and, as I stated previously, I am certain that 75 million gallons a day will perform the necessary function of keeping the quality of the water below the Raritan-Millstone better than it is today, probably much better, due to the installation and putting into operation of the Middlesex County Sewage Authority facilities. It therefore is not necessary, even though the project that I am discussing here is capable of maintaining a minimum flow of 150 MGD - it isn't necessary to maintain by at least 10 MGD and possibly by something more, possibly by 15 or between 15 and 20, and therefore that water can all be used for flushing without any increase in cost.

(Leaves hydograph and returns to witness stand)

Dam sites and construction details: A map of the Millstone- Bear Brook watershed has been prepared showing the position of the dam, with flooded areas hacured at dam spillway levels of el +70 feet. May I emphasize the fact that these dams are not 70 feet high. They stand at elevation 70 feet above mean sea level. The additional areas needed for reservoir construction, up to the 80 foot contour - that's elevation +80 feet if you want to put it in the same terms - in each stream valley are indicated by peripheral dots. The total flooded area is only 733 acres by comparison with 1520 acres estimated for the Stony Brook reservoir. The aggregate purchase of land, including adjacent disposal areas, comprises about 1262 acres, while total purchases of about 2300 acres will be necessary for Stony Brook.

The flooded areas of the Millstone-Bear Brook valleys are covered principally with brush and scrub growth. It is essentially swampy wasteland, unfit for cultivation, without habitation. The shorelines along the disposal areas between Cranbury Neck Road and the dams could be attractively graded and landscaped for recreational purposes.

It is important to emphasize that both of these dams are low, earth-fill structures that can be built with material dredged out of the stream beds. The spillways of each dam would not stand more than 10 feet above present grade. However, the crest of the dam should be built up to el. +80 feet to provide storage space for storm runoff, pending recharge of such flood water back into the permeable underlaying aquifer. Trenches would be dredged behond each dam down to 30 feet below pool full level. They will function as huge infiltration galleries for intercepting groundwater stored in the vast Pensauken aquifer. This consists of highly permeable sand and gravel deposits that blanket the low ground between Trenton and New Brunswick with a buried valley extending southwestward from Kingston. The deepest part of this valley trough passes beneath the beds of both streams, presumably in the vicinity of the dotted line indicated as "X-X" on the plan map. Evidently, therefore, the locations selected for the two reservoirs directly overlie the thickest part of the Pensauken aquifer.

I want to explain one thing because of the difficulty in conveying the hydrologic thinking to a person who isn't accustomed to it. If you want to simplify your mental picture of

these troughs that I am talking about, just figure they are enormous horizontal wells with the top side open so water can pour into them every time it rains and that they have an enormous area that, whenever you lower the water, will permit the hydrologic differential or head difference to push a large amount of water in because the area is so great.

The utilization of infiltration galleries for interception of large quantities of groundwater from permeable water-bearing strata near the surface is a long-established practice both in Europe and the United States. Many large cities in Germany, Holland and Belgium, at the turn of the century, were supplied by infiltration galleries in sand and gravel beds of either glacial or alluvial origin. Infiltration galleries supplied Munich, The Hague and Brussels. The Munich system was notable by averaging 21.3 MGD from galleries only 4385 feet in length a half century ago. Detailed descriptions of the Massapequa and Wantaugh galleries of the old Brooklyn water works system may be found in Volume I, "Long Island Sources" by the Board of Water Supply of the City of New York.

Various other infiltration systems in the United States, as well as foreign countries, are cited in Water Works Handbook by Flinn, Weston and Bogert (McGraw Hill). The Massapequa and Wantaugh galleries were 18,200 feet and 12,600 feet over-all, respectively, each extending east and west from a central pump well. They were constructed by laying vitrified tile sewer pipe in a sheathed trench that was excavated ten feet to fifteen feet below normal groundwater level. The flow of water into the pipe was solely through the open joints, which

were surrounded with coarse gravel, having a two inch layer of fine gravel above it, with the trench backfilled by sand. The sewer pipe, ranging from a 20 inch diameter at the extremities, to about 36 inches at the central pumping well stations, had manholes with sumps every 250 feet to facilitate removal of sand. Thenoteworthy feature about the Brooklyn Water Works galleries was an average yield exceeding a million gallons daily for every 1000 feet of open-joint sewer pipe. The maximum drawdown of water at the gallery line averaged 9 feet below normal groundwater level. Consequently, the interception rate of a million gallons daily was obtained by draining a 9000 square foot cross-section of the aquifer.

Each dam of the Millstone-Bear Brook onriver-groundwater-reservoir project would have two infiltration trenches excavated by hydraulic dredges. One of these would be located between the high-tension power line right-of-way and the dam; the other, upstream of the power line. The total length of infiltration troughs or trenches in the Millstone proper would be 5550 feet; that of Bear Brook about 3850 feet; an aggregate trench length of 9400 feet. An average width of 600 feet, tapering to 300 feet at the bottom, should afford ample infiltration area to intercept upward of 50 million gallons daily from water stored in the Pensauken aquifer. This amount of hydraulic dredging will supply all necessary fill for dams and raising roadway and power-line levels above maximum high water. The disposal of any excess material will be made on property purchased for this purpose along the shorelines, which, as previously stated, can be attractively graded and landscaped for recreational purposes thereby.

Estimated Cost: Construction of the foregoing reservoir system would be done largely by hydraulic dredging involving the handling of about 5 million yards of incoherent sediments. Assuming an average cost of 30 cents per yard for hydraulic dredging and an average cost of $500 per acre, the two reservoirs, including steel piling, concrete for pump intake structures, and electrically-operated pumping equipment, figure $3.5 million. Allowing an additional 15 per cent for engineering, contingencies, etc., a maximum cost of $4 million is indicated. The indicated cost of the Stony Brook project, however, is more than double this amount. An even more important consideration in favor of the Millstone supply is the excellent quality of water it will deliver at the Elizabethtown Water Company's interception dam near the confluence. In hot, dry weather, when incremental demand is highest, low-head pumpage over the Millstone-Bear Brook dams will come from the clear, cold resources of the underground aquifer. At such times, with reservoir levels at their lowest, to supplement the maximum deficiency in stream flow, pumping will be supplied from the low temperature storage of the capacious Pensauken beds.

Proven efficacy of the infiltration gallery principle is utilized in this project for a unique purpose. The sides and bottom areas of the four trenches expose an aggregate Pensauken section of about 5.7 million square feet. The Brooklyn Water Works galleries delivered more than 25 MGD by draining a 9 foot section of its infiltration area, totaling about 325,000 square feet. Evidently, therefore, groundwater inflow of only double that amount from 17 times the area offers no problem. Furthermore, groundwater levels behind the dams

would be elevated from five feet to 10 feet over a minimum area of 3200 acres. Assuming that under critical conditions the reservoir levels should be drawn down 20 feet below pool-full, or flow-line elevation, the storage of groundwater immediately available under the 3200 acres alone exceeds five billion gallons. In addition, the estimated surface storage behind the dams, including that of the excavated trenches, is nearly two billion gallons. This of course includes no recharge, nor does it consider the vast resources of the Pensauken aquifer beyond the immediate 3200 acre area. In view of the fact that Millstone-Bear Brook runoff exceeds that of Spruce Run by an average of nine million gallons daily, there can be no question that it has superior resources for sustaining the specified 150 million gallons daily at the confluence.

Another outstanding feature of this Millstone-Bear Brook reservoir project is that it makes provision for diverting excess storm runoff to rapid replenishment of the underground supply. With the crest of each dam standing 10 feet higher than spillway level, stream rise above the spillway cannot escape rapidly, because of the constricted capacity of the spillways. However, the bottoms and sides of the excavated trenches afford two-way travel, whereby water may percolate into the ground just as freely as it can be drawn out of the aquifer. In case of a flash summer storm, the runoff would accumulate behind the dams, building up the hydraulic head possibly 7 or 8 feet above pool-full level. Such a sudden increase of the reservoir level over the pumping level below the spillway would charge a major part of the flood water into depleted portions of

the surrounding aquifer.

Summary: It would have required about 6.5 billion gallons from reservoir storage to sustain a flow of 150 MGD at the Raritan-Millstone confluence from July 29, 1930 to November 14, 1930. Withdrawal of this amount from either Spruce Run or Stony Brook would have obviated any possibility of filling either one by the fall of 1932. Under such conditions neither of these reservoirs could provide 60 MGD for public consumption, yet sustain a 90 MGD flow to salt water for flushing purposes. Only the superior resources of an onstream-groundwater reservoir project in the Millstone headwaters would cope with the prescribed conditions through a crisis similar to the 1930-1932 drought. This is possible because the Pensauken sands and gravel have tremendous capacity to absorb (and hold in storage) percolating rainfall that averages 124 million gallons daily upon the 57 square mile area. Average daily runoff exceeds 50 million gallons daily, the presumable percolation to recharge being the same. Consequently, it is purely a question of qualified design and supervision to develop at least 50 million gallons daily of additional potable water to meet the rapidly increasing demands in Somerset, Middlesex and Union counties. This is a net increase for consumer use over and above the Advisory Committee's estimated natural flow without any reservoir.

In view of the obvious need for more detailed surveys, it would be a disservice to ask voter approval of either Spruce Run or Stony Brook reservoir. Preliminary testing and detailed engineering estimates and specifications

can be completed for the Millstone-Bear Brook reservoirs at approximately the same cost as for the Spruce Run project. The necessary facts to prove the available yield, construction, design and over-all cost of an onriver-groundwater-reservoir development of the buried Pensauken valley can be developed, under qualified supervision, in six to nine months' time. A pilot study is necessary by means of a simulated infiltration trench not over 1000 feet long. This should be constructed under the supervision of an experienced geologist and groundwater hydrologist who is qualified by previous responsibility for the development of large groundwater supplies. The trench should be excavated in the bed of the Millstone River, upstream of the power line right-of-way, to a depth of not less than 10 feet below the groundwater table. In any case, the lower five feet of trenching must penetrate highly permeable Pensauken sand and gravel. The rate of flow from the walls of the trench should be measured by pumping and discharging downstream of the right-of-way fill. At the same time, shallow observation wells should be drilled at strategic points, adjacent to the reservoir shores, to verify water level declines during the test. Most of these wells need only penetrate deep enough to reach the permeable beds. However, wells in certain selected locations should be drilled about 100 feet to verify the geologic character of the Pensauken beds.

(Applause)

SENATOR CRANE: Mr. Sanford, you'll admit for the record that we have talked about this previously many times in

my office in Elizabeth?

MR. SANFORD: Yes, sir.

SENATOR CRANE: Is this essentially the same plan as the one which you outlined to me at that time?

MR. SANFORD: Essentially, yes, sir.

SENATOR CRANE: It's the same method?

MR. SANFORD: Yes, sir.

SENATOR CRANE: I notice that you have included Bear Brook at this time. When we were talking, we were only talking of one dam, on the Millstone.

MR. SANFORD: That's right. My initial study was made for another purpose, as I believe I explained to you, and did not call for the quantities that on thorough investigation I find are readily available, and that of course assumes that Bear Brook must also be dammed.

SENATOR CRANE: Is this the same essentially as the plan that you outlined at a hearing of the Water Policy Commission?

MR. SANFORD: Well, it's a much more elaborate project but basically the concept has been refined, has been advanced or improved by additional studies, but I would say that basically it's the same idea.

SENATOR CRANE: Well, it has been brought to the attention of, shall we say, water authorities in New Jersey prior to this time, has it not?

MR. SANFORD: Yes, sir.

SENATOR CRANE: Has it been tested in New Jersey?

MR. SANFORD: It has not been tested in New Jersey other than I might say there are thousands of these small farm

ponds put in by inexperienced men that in certain cases have shown remarkable yields, because they happened to dig those farm ponds or dam a lower portion of the land and dig into sand and gravel below it so that they could pump large quantities out of it, but in New Jersey it has never been tested as a public supply development.

SENATOR DUMONT: As a feasible economic project engineeringwise, it has not been tested?

MR. SANFORD: It has been elsewhere, of course.

SENATOR CRANE: The figures which you forward for this project are purely your own, are they?

MR. SANFORD: Yes, sir.

SENATOR CRANE: You have given it your engineering background, of course?

Was this to your knowledge discussed in the TAMS Survey, which was a review of New Jersey water sources for the Legislature?

MR. SANFORD: No, sir. I have read the TAMS Report carefully. I find no indication whatsoever in there of developments of large quantities from excavating troughs in the river beds.

SENATOR CRANE: This is development of a groundwater source, is it not?

MR. SANFORD: Yes, plus, of course, the interception of a certain amount of surface water by the dams.

SENATOR CRANE: Do you know that Leggette, Brashears and Graham were the groundwater engineers for both TAMS and

the Smith Committee?

MR. SANFORD: To my knowledge, I believe that is true.

SENATOR CRANE: So that they are groundwater engineers?

MR. SANFORD: They are not engineers so far as I know. They have no registered or no licensed professional engineer in their organization.

SENATOR CRANE: You feel that you would have more knowledge of groundwater resources than they would?

MR. SANFORD: Well, I would rather that someone else would talk about it, but I have lived entirely by being successful in developing large supplies since 1920. I don't know any other hydrologist or engineer in the United States who has as long a record or who has covered as much area in the thing. Besides that, I took mining engineering and I spent six years as a practical operator, mine manager, and I built dams during that period when I was in Mexico - I had to, because I had no water; that's where I got into the groundwater game, as a matter of fact. Now, mining is essentially an earth-moving job. True, you use explosives and you haul it and you drive it, but you have to know a lot about earth moving in order to engage in deep-rock mining. I have had direct experience in the handling of dredges during that time and subsequent to it.

SENATOR CRANE: Well, these people rendered a groundwater report. Do you feel that it is unusual that they overlooked this?

MR. SANFORD: No, I don't think -- Their lack of experience in practical groundwater development is probably the reason for not giving consideration to this.

SENATOR CRANE: Do you wish to enter in the record that they have not had the proper experience?

MR. SANFORD: I am not wishing to say how much experience they have had. The word "proper" can be very contentious in that vein, but I do know this, that it takes a lot of years in a new field like hydrology and the application of it to constantly improving the amount of water that you can get from the ground. We have seen examples of that. Ranney have through a patient and hardworking series of years developed a means of putting down a big excavation or tube and driving out piping from the sides of that into the gravel-bearing beds to do essentially the same thing in a different way that I propose. Now, Ranney claims to have developed as much as, I believe, 80 million gallons a day,- I have one of their catalogs here in which they have a chart - in certain of their units or certain of their installations.

I am proposing here something that requires more than a theoretical knowledge of hydrology. It requires experience in actually getting water and going through the process and spending your own money to learn how to do it.

SENATOR CRANE: Have you ever heard criticism of your plan voiced by engineers?

MR. SANFORD: No, I haven't. Not myself, I haven't heard it, no. I would like to hear it. I would like to know what it is.

SENATOR CRANE: Have you ever known that it was at one time criticized without your knowledge?

MR. SANFORD: Well, I suspect it would be because it's beyond the ken of the conventional thinking man or engineer

engaged in water development - surface water development particularly. I might say this: I have, of course, discussed this thing, and I don't want to say anything, with a man whom I regard as a very close friend and have for a long time - we have discussed this pro and con and we haven't agreed on various factors, but we haven't arrived at a decision between us as yet; we have still to continue the discussion.

SENATOR CRANE: Well, you, youself, used the word "unusual" in describing this plan. It's not a routine plan.

MR. SANFORD: It is not routine. It combines re-charging like a battery in an automobile, which recharges whenever it's idling and discharges when the pressure is on. This is identically the same thing. Any rainfall that comes along is recharged into the ground because the minute you fill this up, you don't have to pump any water downstream. You see, the incremental makeup of a stream flow isn't pumping all the year round. It is only during the days when they are less than a given quantity. Now, on any of those days we have recharging going on; that is, when you are not pumping. And this device for doing that is unique.

SENATOR CRANE: It's unique and it has not been tested in this area, and what you are asking this Committee to do is to honestly provide funds to study this to see if it is feasible in this area; is that right?

MR. SANFORD: I am asking the Committee certainly to do so if, after they have considered all the facts, they are willing to do it. The idea, each and every phase of it, has been used somewhere, not necessarily within the geographic

bounds of New Jersey. For instance, an idea was adapted a number of years ago following one that, incidentally, I first suggested to a rayon plant that never was built up the South River. It's now the Duhernal program. Now, the Duhernal program uses wells, ordinary lane or other large gravel filtered wells to draw from the ground beneath a reservoir alongside of it water through the bed of the stream in order to augment the supply. That in reverse is exactly the same thing that I propose to do here, except that I don't propose to go to all the expense and the maintenance cost of wells.

SENATOR CRANE: Sir, very briefly, have you ever given credence to the fact that if you precipitate the flow of water through the ground, through this sponge, it might at some time clog with impurities and not deliver the same amount evenly over the years? I am talking purely of the water in the ground.

MR. SANFORD: That's been my business since 1920 as a hydrologist. I have studied every aspect of that. My personal opinion is that, since the flow is only the slow movement under a relatively low head, the only change that can come in the relationship of position between the finer sediments that you just mentioned in the sponge and the coarser ones that provide the interstices is that for a period of years at the onset the finer silts between the interstices of the coarser gravel or sand particles will be carried in and settle on the bottom of these trenches. Now, I contemplate taking care of that very simply by keeping a small dredge in there and about once a year, or once in six months, or once in two

years - because at the end of five or six years all of that movement will have ceased - and to use this egg beater dredge to suck this silt off the top and throw it up on the banks; have regular disposal areas to get rid of that. It isn't much in volume but it will require maybe five or six weeks a year.

SENATOR CRANE: That's in the ditch, sir. Where you're talking of the ground as a sponge, isn't there such a thing as silting in the sponge itself?

MR. SANFORD: No, sir. The velocity of the material is so low that you will not have any plugging up of the interstices back a very few feet away from the point where it emerges into the trough.

SENATOR CRANE: No matter how much you pump or speed it up?

MR. SANFORD: The volume has nothing to do with it. The head differential is so little - that's another feature, but that's been proven by infiltration galleries. The tendency to clog the formation up back beyond a few feet is relatively nothing. If a certain area should show any tendency and you want to stir it up, all you have to do is use your maintenance dredge to stir it up a little bit and let it resettle.

SENATOR CRANE: One last question: Since this plan is unusual, would you say that it would take less, the same amount, or more, in terms of dollars, maintenance cost than running a surface reservoir, since we have to dredge and all that?

MR. SANFORD: Two men can operate these two reservoirs completely, because it is only in short periods of time that they would have to move over and man the dredge and put it into

operation.

SENATOR CRANE: But essentially you have a capturing device, a basin, above the surface; wouldn't that require the same maintenance as an onriver reservoir?

MR. SANFORD: No. We are not depending upon the normal ground level; we are not depending on that at all; we are depending on the troughs for the movement of water from the ground into the trenches and from the trenches out into the ground. They are purposely cut through the permeable portion of the Pensauken, which, if you will read the state geologic record, consists largely of sand and gravel with a minor amount of silt. The very nature of the Pensauken would obviate the possibility of its clogging, as you have asked me earlier, other than within the first foot or so, which would gradually work out and could be eliminated.

SENATOR CRANE: That's all I have in the way of questioning, except, Senator Dumont, I would like to make a statement and a suggestion for the record. I know that Mr. Sanford was not being personal in his remarks directed to Leggette, Brashears and Graham, but I think, to maintain a full record and present everything in its proper perspective, we should request that that engineering firm submit its background so that we can judge for ourselves whether they are competent groundwater people.

SENATOR DUMONT: Is there anybody here from the Leggette firm?

MR. GEORGE F. SMITH: Mr. Leggette is here.

SENATOR DUMONT: All right. Then we can carry out

Senator Crane's suggestion.

I have a few questions here of Mr. Sanford:

Mr. Sanford, this may be a silly question, and I trust you will forgive my lack of engineering understanding, but suppose this idea of yours were adopted - is there any danger of the surface above this underground water being undermined much in the same way as happens in the coal regions of Pennsylvania when coal is taken out?

MR. SANFORD: No, sir. We are drawing upon 57 square miles, roughly, of permeable aquifer. Now, its thickness varies as far as its area is concerned. At a distance of - I don't know until we test it, because that's why I suggested at the end a system of proving just what will happen - but at a distance of, let me say, two miles, it is doubtful whether you will be able to measure beyond two or three inches of drop, maybe not even that much, of the water table. Now, in the interim you are only drawing out water that has happened in every well that has ever been put in. Remember, when you drill a well, you draw down 60 feet, 40 feet, 30 feet, 100 or 150 feet; you don't have any sinking down of the surface in that cone of influence. Now, we'll have a very flat but widespread area of influence because we only draw the water down - I don't think we are going to have to go much more than-- I figure that 30 feet below the water level is ample because I don't think we will ever have to go that low to get on emergency days an amount like 90 million gallons for a day or so.

SENATOR DUMONT: Have you any estimate as to what such water would cost in relation to development of surface water or

surface reservoirs? In other words, it has been estimated here, I believe, by Mr. Smith's Committee that they would be in a position, if Stony Brook and Spruce Run became a reality, to sell water, or the State would be selling it, at about $25 a million gallons. Have you any idea what the cost would be of water under the plan that you are suggesting?

MR. SANFORD: It's difficult without more time and more days to make anything. I wouldn't like to make any estimate of the cost, but I can say this: You certainly can deliver water from this lower over-all cost of installing and with two clear ways of getting good water to sources so that actually it is going to cost less to deliver to the users in potable condition, and it might be materially less. The water is ground water that we are getting, the water is essentially clear and it's free of contamination and the filth that gets into the Raritan River water in its lower reaches down near the confluence. Now, this water you can treat more of it in the existing filtration and treatment facilities that the Elizabethtown has because you haven't got so much treatment to get. I would say that it's going to cost less than the actual cost in any case.

SENATOR DUMONT: And this plan would not involve - check me if I'm wrong on this - the dispossession of any property owners? Is that correct?

MR. SANFORD: There isn't a dwelling on it. I would like to have another field survey if I may suggest it. Let's go over it and let me show it to you.

SENATOR DUMONT: Do you want your hydrologic plan here and the map introduced in evidence?

MR. SANFORD: Yes, I do.

SENATOR DUMONT: The hydrograph. Is that the proper name for it?

MR. SANFORD: The breakdown, as I have posted up there, which shows actually both the Millstone and Raritan flows during that 109 critical day period, rather than the two combined.

SENATOR DUMONT: They will be made a part of the record.

Are there any further questions to be asked of Mr. Sanford?

EX SENATOR O'MARA: I would like to ask a question.

Mr. Sanford, let me read to you from the letter of transmittal of the Smith Committee to Commissioner McLean. This letter is dated April 25, 1957, and I will read the last paragraph:

> "The Committee intends now to focus its attention on future reservoir sites and on plans to protect and increase the availability of the vast underground water supplies throughout the State, and especially in the southern part of New Jersey."

Am I right in saying that what you propose is to immediately undertake the study of the vast underground water supplies of the State and not wait for the development of reservoirs?

MR. SANFORD: That is right.

EX SENATOR O'MARA: Let me ask you another question:

Mr. Van Wegen, in his testimony, and I read from page 103-A of the record, in making recommendations made this recommendation:

> "6. A modest pilot study to test the Sanford theory for use of underground water of the Pensauken sand and gravel of the Upper Millstone. All indications point to a very valuable source of underground water supply for the Raritan Basin from this source."

During your testimony this morning, you, too, indicated that you thought that a modest pilot study should be made. Are you in a position to estimate the cost of that pilot study?

MR. SANFORD: The cost of the pilot study, I would have to make a guestimate rather than an estimate, but I would assume that the cost of a pilot study would run somewhere between $35,000 and $50,000.

EX SENATOR O'MARA: And how long would it take, sir?

MR. SANFORD: After work is initiated, because of the fact that we would want to continue pumping long enough to get stabilized conditions under a given rate, I would say it will take about six months.

EX SENATOR O'MARA: That's all.

SENATOR CRANE: Mr. Sanford, isn't it true that you met with Senator Harold W. Hannold of Gloucester County and myself here in Trenton, and you met with me several times personally to see if it were possible to have the Committee that would be set up by the Waddington-McCay bill undertake the study of this proposal, along with its contemplated state-wide hydrologic survey?

MR. SANFORD: Yes, Senator Crane. And I had other ideas in mind, too, but essentially that's right.

SENATOR CRANE: I mean, essentially you have brought this plan to the attention of the Senate at the time it was considering that bill.

MR. SANFORD: Well, I don't think I had a chance to bring it to their attention for this reason: We never had a chance to discuss with the plans before us. What I was trying to talk to Senator Hannold about, as I explained to you, was to show that here is a new approach to the water situation that is hand-fitted to South Jersey's needs, that it's applicable not only here but will develop the maximum feasible yield from the Wharton tract and can be used to induce industries to come into South Jersey along the streams that traverse the Cohansey sand wherever it's thick enough for this purpose in South Jersey.

SENATOR CRANE: Well, this is not personal, sir, but just so that we may have the facts straight - you did talk to me at quite some length -

MR. SANFORD: Yes, I enjoyed it.

SENATOR CRANE: - several times, and also you did have a chance to talk briefly with Senator Hannold, did you not?

MR. SANFORD: That's right.

SENATOR CRANE: And we did bring it to the attention of the group at the time we were studying the Waddington-McCay bill.

MR. SANFORD: I was hoping that we would have

another conference after these hearings. I didn't try to have any further discussions after these hearings commenced, because I thought we had better wait until they were over.

SENATOR CRANE: It was brought up before at a hearing of the Water Policy Commission, and it was brought up at the time of the consideration of the Waddington-McCay bill and, so far as you know, nothing was done with it.

MR. SANFORD: That's right.

SENATOR CRANE: And now you are asking us to consider as an alternative a survey of this project which you have offered?

MR. SANFORD: And a study of its merits.

SENATOR CRANE: Yes. And, again, you say it is rather unusual and beyond the average concept.

MR. SANFORD: It requires a knowledge of hydrology that very few people have.

SENATOR CRANE: Lastly, sir, you began by referring to a need for water. Do I see in that a tendency to disagree with Mr. Van Deventer who said he must be impressed that there is a water shortage, that as yet he had seen no evidence of one?

MR. SANFORD: Well, I cannot recall offhand what Mr. Van Deventer said. I would have to read his speech again, but I'll put myself on record that I thoroughly agree that steps should be taken to provide additional supplies, as I have stated in the earlier part of this report, to take care of the shortages that will overwhelm us, as a matter of fact, in Middlesex, Union, and Eastern Somerset, unless something is done to bring new water into the area.

SENATOR CRANE: Well, not prejudicing Mr. Van Deventer's case, because he wanted to point out that the Delaware and Raritan Canal had not been used to its fullest extent - the point you wish to make, sir, is the fact that we need to develop further facilities more than what we have now and their present capacities?

MR. SANFORD: I certainly do, and I have made a great deal of study of the Delaware and Raritan Canal. I can't quite agree with the optimistic feeling that the Delaware and Raritan Canal can even safely supply all the present additional grants that have been asked of it.

SENATOR CRANE: Thank you very much.

SENATOR DUMONT: Are there any other questions of Mr. Sanford?

There being none, apparently, I want to thank you very much, Mr. Sanford.

Before we stop for lunch I want to read into the record a resolution which has been received from the Clinton Township Committee in Hunterdon County and which was passed on Saturday afternoon, July 6:

(Reading)

WHEREAS the State of New Jersey is now in the process of acquiring title to approximately 4,000 acres of land in connection with the Round Valley Reservoir project, and

WHEREAS all of this acreage lies solely within the Township of Clinton, and

WHEREAS the exemption of these lands and buildings from taxes removes from the tax rolls of the Township of Clinton some of its most valuable ratables, and

WHEREAS this tax exemption constitutes a serious financial blow to the Township of Clinton, and

WHEREAS the State of New Jersey owns approximately 750 acres of land in this Township which is used by the New Jersey Reformatory for Boys and which is wholly exempt from taxation, and

WHEREAS the State of New Jersey also owns a portion of the Gorge on the South Branch of the Raritan River under the control of the State Department of Conservation and Economic Development, and designated as the Ken Lockwood Public Fishing Grounds, which is also wholly exempt from taxation, and

WHEREAS the construction of the Clinton by-pass through our neighboring municipality, the Town of Clinton, will necessitat the acquisition of lands by the State Highway Dept. for a new traffic circle and approaches in the Township of Clinton, and will thus remove from the tax rolls of the Township of Clinton not only lands but also commercial buildings of considerable value, and

WHEREAS the Governor of this State vetoed Assembly Bill 612, introduced in 1956 by Assemblyman Raymond E. Bowkley of Hunterdon County, which would have reimbursed on a more equitable basis the Township of Clinton for loss of ratables caused by the proposed Round Valley project, and

WHEREAS it has now come to the attention of the governing body of the Township of Clinton that a huge new reservoir project of approximately 2,000 acres is under consideration for location chiefly within the Township of Union in the County of Hunterdon and, to a lesser degree, within this Township, the Township of Clinton, and to some small extent in the Township of Lebanon, and

WHEREAS the voters of the Township of Clinton have recently authorized the borrowing of the sum of $405,000. for the construction of a new elementary school and an addition to the old elementary school, and the issuance of school district bonds for the raising of such funds, and

WHEREAS the Township of Clinton is one of the component municipalities in the North Hunterdon Regional High School District, and

WHEREAS the North Hunterdon Regional High School District has school bonds outstanding in the amount of approximately $570,000., and the voters of this Regional High School District have recently authorized the borrowing of an additional sum of $1,900,000., and the issuance of Regional School District bonds for the raising of the funds which will be used in the construction of an addition to the existing high school building owned by the North Hunterdon Regional High School District, and

WHEREAS both the Township of Union and the Township of Clinton are component municipalities of this Regional High School District and the loss in ratables in either the Township of Clinton or the Township of Union, or both municipalities, will impose an additional financial burden upon the remaining taxpayers in the entire North Hunterdon Regional High School District, both within and without these two townships, and

WHEREAS the land taken in the Township of Clinton for the proposed Round Valley Reservoir and the lands proposed to be taken in the Township of Clinton and the Township of Union for the proposed Spruce Run Reservoir constitute some of the best agricultural acreage in the entire State of New Jersey and is the type of land which by no means is to be confused with some of the barren lands in other sections of the State of New Jersey, and

WHEREAS it would appear that the northern portion of Hunterdon County has already contributed more than its share of land to the State of New Jersey with the result that these lands and the buildings thereon disappear from the tax rolls, and

WHEREAS the burden of local government is bearing with increasing severity upon owners of local real estate, due chiefly to the increased cost of the operation of elementary schools and high schools in the County of Hunterdon, and undoubtedly the same is true in other counties with an agricultural base , and

WHEREAS it is argued that the Spruce Run Reservoir is necessary in order to release water in the Summertime so as to increase the flow in the South Branch of the Raritan River at Bound Brook and New Brunswick, and

WHEREAS it is argued that these increased flows are necessary to help industry in the Bound Brook - New Brunswick area, and

WHEREAS there is no net gain to the State of New Jersey through increasing the industrial attractiveness of one segment of the State, at the expense of destroying the ratables of another section of the State,

NOW THEREFORE BE IT RESOLVED by the Township Committee of the Township of Clinton, in the County of Hunterdon, that:

1. The Committee of the New Jersey State Senate which is holding hearings on Senate Bills 272 and 273 be informed that: in the event that the State of New Jersey is going into the water business for the purpose of supplying industrial water for the riparian owners of the lower Raritan River, the users of this industrial water should be willing to pay for a reasonable reimbursement to those municipalities which might lose ratables on lands and improvements due to any purchase of lands by the State of New Jersey for a proposed Spruce Run Reservoir.

2. Copies of this resolution be delivered to the Honorable Wayne Dumont, Chairman of said Senate Committee, with the request that the contents of this resolution be set forth in full in the transcript of the hearings of this Committee.

3. That the Senate Committee in its report to the Legislature of the State of New Jersey, make reference to the fact that the northern portion of Hunterdon County already contains more tax exempt acreage from various State owned facilities than probably any other section of the State of New Jersey.

SENATOR DUMONT: It now being one o'clock, we will recess until two o'clock for lunch.

(R E C E S S)

AFTERNOON SESSION

SENATOR DUMONT: We will start the afternoon session by calling Mr. Wilson O. Bachman as a witness.

WILSON O. BACHMAN: Senator Dumont, I am Wilson O. Bachman, Realtor. I reside in Pennington with my office in Trenton. I appear here today, to save time and repetition, as spokesman for a group of seven realtors in this area who have made some rapid but fairly accurate, we feel, studies of the land acquisition cost in the proposed Stony Brook Dam.

I would like to read the letter which is directed to you by that group of realtors.

"Dear Senator Dumont: We, the undersigned, are all realtors who have been active in selling, appraising, mortgaging and developing property in Mercer County generally, and specifically in the area around Pennington, Princeton and Lawrenceville.

"We first wish to state that we all recognize the growing importance of the development of the water resources of New Jersey; and we wish further to observe that we have no basic objection to the exploration and proper development of the resources of Stony Brook.

"We are concerned with the Plan now under consideration by the Legislature only because it is our considered opinion that the sum of money provided for property acquisition is grossly inadequate - three to four times the $2,400,000.00 contemplated will unquestionably be required, even if the project receives the unusual support and cooperation of the persons from whom property is to be acquired.

"There has not been sufficient time for us to make a complete study of the value of the land involved; however, among the group we have had direct professional contact - either selling, mortgaging or appraising - with a sufficient number of properties which will be involved to indicate that the acquisition of this land will probably cost from $7,500,000.00 to $10,000,000.00. Very truly yours." Signed by: Morton S. Kline, J. Morton Cole, John F. Rapp, Jr., Abe Weinroth, George H. Sand, Edward Foster and Wilson O. Bachman.

SENATOR DUMONT: Mr. Bachman, have you had considerable experience in the buying and selling of land in this particular area where the reservoir would be?

MR. BACHMAN: Yes, sir, I have.

SENATOR DUMONT: And you are personally familiar with a number of these properties which would either have to be purchased or condemned by the State if this reservoir became a reality?

MR. BACHMAN: That is right. You might be interested in the method of approach to value here.

SENATOR DUMONT: I would.

MR. BACHMAN: We had the map that is in this Smith Report, this booklet, plotted on a tax map. We ignored property entirely where the reservoir or lake merely touched vacant acreage. We found that there are 42 small properties that would be affected to the point where they would have to be totally acquired. These 42 properties average ten

acres or less. We found among the seven brokers who signed that letter that 19 of the 42 properties had either been mortgaged, appraised or sold within the reasonable recent past. Dividing the work up, the other 23 properties were visited and while they weren't completely appraised in the normal sense of appraisal, they were at least evaluated against the 19 where we had actual factual information.

It is our opinion that it is going to cost two and a half million dollars to acquire those.

There are 9 large estates that are affected very seriously in the Stony Brook Lake. Those 9 estates, none of them had been appraised by the group of 7 within the recent past. One of the estates had been appraised in part by two brokers a couple of years ago in connection with land acquisition by the Transcontinental Pipeline. We found nearly 400 acres of the remaining land that are presently under developmental plan, that is either developments that are under way or plans that have been approved, bonds filed, construction started on some. The balance of your taking is farmland. And in taking comparable sales, recent sales of the different categories of property it is our opinion that from seven and a half to ten million dollars will be the minimum sum required in order to acquire the lake area alone.

Now, I want to add one more thing. We have been told and understand that it will be necessary to acquire additional land. In other words, you don't stop buying at the exact edge of the lake. But the only information we had was the map

which is the lake. So that unquestionably, if there is a third more land to be acquired, if that plotting were extended, our figure would be increased.

SENATOR DUMONT: You are basing this estimate of seven and a half to ten million dollars only on the land that will be inundated. Is that correct?

MR. BACHMAN: That is right, sir.

SENATOR DUMONT: And if you have to acquire any marginal land that comes over and above what you estimated for the flooded land.

MR. BACHMAN: That is right. We didn't know how far to extend it because without a more accurate map it would be impossible to tell how much additional or marginal land you would acquire.

SENATOR DUMONT: Do you have a fairly accurate estimate as to how many property owners would be dispossessed if this project became a reality?

MR. BACHMAN: Yes. I would say 51, definitely. I have heard the figure 58. I wouldn't argue. I mean, 58 may be right. But our plotting of this lake on the tax map definitely takes 51, or dispossesses 51 families.

SENATOR DUMONT: Is this all residential or farming property which would be flooded? Is there any industrial property involved?

MR. BACHMAN: No, not unless the piece in the newspaper calling the Westinghouse Research Center an industrial enterprise is to be counted seriously.

SENATOR DUMONT: Is that in the area that would be flooded?

MR. BACHMAN: It touches. We did not count the Film Center as part of the land taken but the lake will touch a corner of it.

SENATOR DUMONT: You mean the Princeton Film Center?

MR. BACHMAN: Yes.

SENATOR DUMONT: Now you have limited your work, of course, to Stony Brook. You haven't made any estimates as to the cost of acquiring land at Spruce Run, have you?

MR. BACHMAN: No, sir. Incidentally, I don't think I answered your last question. The land is residential or farmland.

SENATOR DUMONT: Senator Crane.

SENATOR CRANE: Mr. Bachman, how many of the people living in this area to be taken have moved there since 1956, January, 1956? Would you know offhand?

MR. BACHMAN: No, I would not, sir, but of the 42 homes - I am just thinking back - I don't think - January, 1956 is a year and a half ago --

SENATOR CRANE: I will put it this way. Would you know of any who have moved in that area since 1956?

MR. BACHMAN: There are one or two brand new homes, but I would say that the overwhelming majority are well established and seasoned residences.

SENATOR CRANE: These new homes, are they with considerable land or are they on small plots?

MR. BACHMAN: They are on small plots, generally speaking.

SENATOR CRANE: What was the average price of those homes, do you know?

MR. BACHMAN: The new ones?

SENATOR CRANE: Yes.

MR. BACHMAN: Oh, I would say $25,000 to $30,000. Now the new ones that I noticed were over off the VanKirk Road Section. That's at the very tip end of the lake, toward the Pennington area. In the immediate Princeton area I don't recall any house that would be less than a year and a half old.

SENATOR CRANE: Are the average homes in that area surrounded by considerable land or are they also on small plots?

MR. BACHMAN: Well, as I said, the 42 homes averaged - let me give you the exact figure - the 42 homes comprise a total of 450 acres, so that the average was 10 acres, roughly, a little bit more than ten acres. Now, to break that down, I would say perhaps 30 of the 42 were on 1 and 2 acre plots and 12 properties were slightly more than ten acres.

SENATOR CRANE: A gentleman testified here on the first day that he felt that the land values were in excess, I believe, of $5,000 per acre. Do you feel your figures are in excess of that or in accord with that.

MR. BACHMAN: Well, our figures are much below $5,000 an acre, that is except for the small residence. In other words, your 42 small properties will run, in our opinion,

around two and a half million dollars. Now, take those out and your remaining acreage we have not valued at $5,000 an acre. But I will say that we haven't applied an average across-the-board in this work.

SENATOR CRANE: Well, are you acquainted with the fact that an Otto L. Nelson, Jr. of Lawrence Township, testified to that fact, that the average taking would be about $5,000 an acre in that area?

MR. BACHMAN: I remember reading something to that effect. I think his total was 14 million, was it not? Fourteen or fifteen millions?

SENATOR CRANE: Yes. You do not believe that that could be substantiated?

MR. BACHMAN: I think it is a conservatively high figure. Perhaps he knows more as to how much additional land you are going to take.

SENATOR CRANE: I admire your use of adjectives, sir.

MR. BACHMAN: Well it could very easily be 14 million dollars.

SENATOR CRANE: These properties have all been assessed, I believe, for tax purposes?

MR. BACHMAN: Oh, yes.

SENATOR CRANE: From the tax map or from the tax records, are these figures that you have submitted in accord with the assessments?

MR. BACHMAN: Oh, they're in harmony with them. I haven't quoted you assessed valuations, though.

SENATOR CRANE: Well, do you know the assessed valuations on these properties?

MR. BACHMAN: We did on the 19 properties that were appraised, yes.

SENATOR CRANE: Well, what was that on the 19 properties?

MR. BACHMAN: I say we knew them. I don't have the figures here, sir.

SENATOR CRANE: Was the assessed value comparable to the value that you affixed?

MR. BACHMAN: No. Again you have to get into something else.

SENATOR CRANE: Well I know that there are prorated assessments. I'm trying to fix something here. Was there any variance between the figures that you placed on the 19 properties and the figures that the tax assessors placed on these properties?

MR. BACHMAN: I think they were in harmony.

SENATOR CRANE: I'm not looking for harmony, I'm look for variance.

MR. BACHMAN: Well, our figures, as real estate appraisers and experts, we are not at all concerned with the assessor's opinion of the value of the property. I can say this, the 19 properties where we had appraisals, the appraisals were entirely consistent with the selling prices and with the mortgage values on those houses, and I think that would be a great deal more reliable than an assessment figure.

SENATOR CRANE: What's the ratio of assessment, on the average, for that area.

MR. BACHMAN: Well, in Hopewell Township they use one scale, I think it's about five to one; Princeton Township, I believe, is on the hundred percent scale; so in every municipality you go into you have got to apply a different scale entirely.

SENATOR CRANE: So you feel, making allowance for the ratios and all this, your figures now constitute true value?

MR. BACHMAN: Yes, sir, reasonable value.

SENATOR CRANE: You are thinking of sale value?

MR. BACHMAN: Reasonable value. What a willing buyer would be willing to pay a willing seller for these properties.

SENATOR CRANE: Do you have the actual figures that you used per property?

MR. BACHMAN: The detail of this I don't have with me but we do have it.

SENATOR CRANE: Would you be willing to submit it to this Committee?

MR. BACHMAN: Certainly. I would be happy to.

SENATOR CRANE: This is for the some 400 acres you were talking about? You said something about 400 and some acres were the ones that you had considered.

MR. BACHMAN: Oh, no. We considered the whole lake area. I said that in the taking for the lake area there is almost 400 acres of land that is presently under development.

SENATOR CRANE: Oh, that's where I picked that up. But this is for the entire lake development?

MR. BACHMAN: That is right.

SENATOR CRANE: The boundary of the actual lake.

MR. BACHMAN: That is right.

SENATOR CRANE: Would you be willing to submit those figures?

MR. BACHMAN: Anything that we have that will be helpful to you, Senator, we will be glad to give you.

SENATOR CRANE: Then will you submit them, please?

MR. BACHMAN: Yes, sir.

SENATOR CRANE: Are you aware of the amount estimated per acre for condemnation in, first of all, the Tippetts-Abbett-McCarthy-Stratton Report of 1955?

MR. BACHMAN: No, sir.

SENATOR CRANE: Are you aware of the amount that was allowed, which was an amount improving upon that allowed by the TAMS Survey, in the Advisory Committee Report?

MR. BACHMAN: Is that the Smith Report?

SENATOR CRANE: Yes.

MR. BACHMAN: $2,800,000?

SENATOR CRANE: I believe that was the figure.

MR. BACHMAN: Yes.

SENATOR CRANE: And you are saying that this is wholly inadequate?

MR. BACHMAN: That is right.

SENATOR CRANE: Are you cognizant of the firm or the person who did the estimate, as far as real estate value went, for the Smith Report?

MR. BACHMAN: No, sir. I believe Feist & Feist was the firm but I don't know who the person was.

SENATOR CRANE: Are you aware of the reputation of the firm?

MR. BACHMAN: Yes, sir.

SENATOR CRANE: Do you believe that they are competent realtors and appraisers?

MR. BACHMAN: I do, in their own area.

SENATOR CRANE: Would this firm stand to gain by submitting a false and baseless low estimate of property values?

MR. BACHMAN: No, I don't mean to suggest that they improperly submitted anything. I think they felt what they said was right but I disagree with them. So do my colleagues.

SENATOR CRANE: Is their estimate at variance with the tax records?

MR. BACHMAN: I believe that it would be but I don't know. We didn't make any test of that figure.

SENATOR CRANE: Well, you said that yours was in harmony with the tax records. That would say that this one is completely --

MR. BACHMAN: That's the reason I answer you as I do. But we didn't approach this as trying to approve or disapprove the Feist & Feist figures. We tried to find what this land was worth in our own opinion from our own local experience, without regard to what the TAMS Report had in it or the Smith Report, or the Engineer's Report which was

$3,100,000. We started from scratch and said "Here is the land. We are the men who have been mortgaging this land and selling this land and appraising this land. Now, what have we done?" and we went through our own files and, as I said, the ones that we didn't have anything on we went out and inspected. And you have there, sir, the opinion of seven brokers who have been active in this community.

SENATOR CRANE: Well, did you then come back and check those figures with the tax records?

MR. BACHMAN: Not property by property, no, sir.

SENATOR CRANE: Did you check a sufficient number with the tax records?

MR. BACHMAN: I told you that the 19 properties where appraisals were in our files, the tax information also is a part of every appraisal, so we had it in those. On those 19 properties there was harmony. The rest we didn't bother with.

SENATOR CRANE: Well, one last thing that I would like to find out. Is your description of harmony a variance of a few dollars, a few hundred dollars or a few thousand dollars?

MR. BACHMAN: Senator, I chose the word harmony for the reason that was a little later developed. You asked me if our figures were consistent with the assessments. Realizing that each one of the townships assess on a different basis, it would have been impossible for me to say that they agreed because they do not agree. But if you take the ratio of assessment to valuation that is employed by each one of the

townships, in the 19 properties where we had appraisals there was complete harmony, that is the ratio established by the township agreed with the appraisal figure.

SENATOR CRANE: Thank you very much.

SENATOR DUMONT: Princeton Township is the only municipality, is it not, Mr. Bachman, I believe in the whole State but I think it certainly is true in this area, that assesses 100 percent of true value?

MR. BACHMAN: That is right, as far as I know, sir.

SENATOR DUMONT: I think it is the only one in New Jersey, as a matter of fact.

MR. BACHMAN: I believe you're right on that.

SENATOR DUMONT: Any questions of Mr. Bachman?

EX SENATOR O'MARA: May I ask a question?

SENATOR DUMONT: Senator O'Mara.

SENATOR O'MARA: Mr. Bachman, just for the purpose of the record, Feist & Feist is a real estate company located in Newark, New Jersey, is it not?

MR. BACHMAN: That is right.

EX SENATOR O'MARA: To your knowledge, have any transactions in this area been handled by Feist & Feist?

MR. BACHMAN: Not in the recent past.

EX SENATOR O'MARA: And the gentlemen who have signed this letter, along with you, are real estate brokers who engage in the selling and mortgaging and appraising of property in this particular locality. Is that right?

MR. BACHMAN: Yes, sir.

EX SENATOR O'MARA: Now, you testified that your figure of from seven and a half million to ten million dollars contemplates only the value of the land that would be inundated according to the map which is contained in the Smith Committee Report. Is that right?

MR. BACHMAN: Yes, sir.

EX SENATOR O'MARA: And you have made no allowance for any additional land that it might be necessary to acquire. Is that right?

MR. BACHMAN: That is right.

EX SENATOR O'MARA: And, therefore, I take it that you have made no allowance for any consequential damages which might accrue against land which would only partly be taken or which would border upon the reservoir. Is that right?

MR. BACHMAN: That is so.

EX SENATOR O'MARA: Isn't it so, in your experience, that those consequential damages might reach a very large figure?

MR. BACHMAN: Yes, sir. That's the reason I said maybe Mr. Nelson was right.

EX SENATOR O'MARA: This estimate which you give of seven and a half to ten million dollars, which is limited to the property which will be inundated, is more than a spot-check, as I take it, of the values of the property.

MR. BACHMAN: Yes, sir. I would have considerable confidence in that figure.

EX SENATOR O'MARA: That's all.

SENATOR DUMONT: Any other questions?

FRED RASWEILER: Are you aware, Mr. Bachman, that there is a wide variance in the way properties are assessed in Hopewell Township?

MR. BACHMAN: Yes, sir.

MR. RASWEILER: Are you also aware that Hopewell Township is in the position right now of re-evaluation?

MR. BACHMAN: Yes, sir.

MR. RASWEILER: I just wanted to bring that fact out in case some of those figures should be used.

MR. BACHMAN: Another reason why I used the word harmony.

SENATOR DUMONT: Mr. Bachman, are these properties that would be flooded, or any portion of them, actually in or a part of a community? Is there a group of these homes that is actually a part of Pennington or some community such as that or are they scattered through the whole area?

MR. BACHMAN: Well, they are scattered through the whole area. The 42 properties are in Princeton Township, Lawrenceville, Hopewell - I don't think there is any residence in the Borough of Pennington in that estimate of ours.

SENATOR DUMONT: My recollection was that somebody testified here that a part of a community, and I thought it was Pennington, might be in serious danger of being flooded by this reservoir. Is that wrong?

MR. BACHMAN: Senator, I live in Pennington and you are going to do us serious damage, but not the kind of

damage that we could include in this appraisal report.

SENATOR DUMONT: But there is no part of the community that is actually going to be flooded by the reservoir? Is that correct?

MR. BACHMAN: Only half of our water supply.

SENATOR DUMONT: I see.

MR. BACHMAN: And that scares us.

SENATOR DUMONT: Senator O'Mara.

SENATOR O'MARA: Mr. Bachman, I want to clarify another point. I understood you to say in your testimony that 400 acres of this land is now under development?

MR. BACHMAN: Approximately that, sir.

EX SENATOR O'MARA: What kind of development?

MR. BACHMAN: Residential development. These are tracts of land where preliminary plans have been approved, subdivisional plans, in some cases, filed; and in one or two cases construction of roads actually underway; in other cases where bonds have been filed and construction is about to begin.

EX SENATOR O'MARA: Do your figures reflect any value except the land value of that 400 acres?

MR. BACHMAN: Yes, in a sense, Senator. We ascribe a higher acreage value to that land than we did the farmland, for instance, because of the money that had been spent in engineering and for construction.

EX SENATOR O'MARA: Do your figures make any projection of the value of that land when houses have been placed upon it?

MR. BACHMAN: Oh, no. Nor did it make any projection of what the acreage selling price will be when the development is finished. We did try to take a figure that would include the work for which this group would have to pay if they were to acquire the land at this time.

EX SENATOR O'MARA: Assume that the taking occurred six or seven months from now or even a year from now, in your opinion would the value of the 400 acres be greater than as testified to by your figures?

MR. BACHMAN: Yes, sir. Hence, the reason for our saying from seven and a half to ten million.

EX SENATOR O'MARA: I see. But that ten million, that upper limit takes into consideration the possibility of development of this 400 acres, doesn't it?

MR. BACHMAN: In part, Senator. I don't like to quibble for words but this is it: Actually the figure of seven and a half to ten million dollars is predicated upon the assumption that acquisition would begin promptly and would be pursued with diligence. In other words, if this project were postponed for a year or two those limits would not hold.

EX SENATOR O'MARA: Well, assume that some of this property had to go to condemnation and that it would be impossible to acquire all of it by private negotiation, then the value of the property would be fixed as of the time of the declaration of taking or the filing of the complaint in the suit. Now, your figures allow some leeway between

seven and a half million and ten million dollars for a difference of opinion as to what the value of the property in its present state is and based upon the assumption that the taking would be a prompt one. Is that right?

MR. BACHMAN: Yes, sir. The two and a half million dollars, Senator, did not reflect any difference in opinion between the seven brokers who signed that letter. That spread figure was to take into account the time factor in acquiring plus the fact that a few properties would unquestionably have to be condemned and costs would be involved in a few. That two and a half million dollar spread was to cover all of those contingencies, and we feel that it was a minimum figure, a very conservative minimum figure.

EX SENATOR O'MARA: All right. Thank you.

SENATOR CRANE: Mr. Bachman, you said you had taken into account only the water area of the reservoir. What was the figure that you used? do you know?

MR. BACHMAN: You mean acreage figure?

SENATOR CRANE: Yes.

MR. BACHMAN: Again in total acreage, I think, it's around 1570. That came from the report there.

SENATOR CRANE: It says water area, here, 1520 acres. And you said that the figure suggested by Otto Nelson, Jr., was conservative, on the liberal side, - possibly that wasn't your wording, but he had said four to five thousand dollars an acre, I believe in his original testimony. If you take just the reservoir water area, sir, of 1520 acres

and divide it into your seven and a half million to ten million, you come up with a figure between five and six and a half thousand dollars an acre, which puts you above Mr. Nelson's figure. Then you disagree with him.

MR. BACHMAN: Sir, when you take our figure of seven and a half million dollars and divide it by 1520 acres, all I can say is you are overlooking several million dollars worth of beautiful buildings.

SENATOR CRANE: Well, we were talking acreage prices and I would say that in condemnation, sir, you certainly do take into account buildings. It is not our affair to overlook that but General Nelson was generalizing, just as you were on this seven and a half to ten million. You meant to include land and buildings. He broke it down into per acre, as I have and others have, and in doing that we come to, in your figures, five to six and a half thousand dollars per acre because his figures shocked some people and indeed this is rather shocking when we know what's been allowed for it.

MR. BACHMAN: Again, I didn't mean to be cute with that answer, Senator, but the fact is this - for instance, one of our recent developments is a tract called Campus Estates, Columbus Boy Choir School. It might interest you to know that we have sold land there for above $7,000 an acre - and, incidentally, it's within a good stone's throw of Stony Brook. You can't generalize completely. I think that's the trouble with the appraisal that was used here, too much generalization. Over on Carter Road we have sold

land at $4500 an acre, right alongside of land that for our purposes we appraised at $1500 an acre. But again, when you lump it all, I don't care what your figure comes to, you can't say $5,000 an acre is a fair figure until you know what's on the acres. You have too many million dollars worth of beautiful homes there that you have to buy in addition to acres. Then you will get down to a reasonable figure, if you do it that way.

SENATOR CRANE: Well, we were moved by the figure which I announced that Mr. Nelson had introduced and I found that yours was almost consistent with it and I wondered if you had given that any thought.

MR. BACHMAN: No, I had not. We didn't approach it on that broad a generalization and I think that's dangerous.

SENATOR CRANE: Well then, you are going to submit these figures that you did use per property and we will have them.

MR. BACHMAN: I will be very happy to.

SENATOR CRANE: Thank you.

EX SENATOR O'MARA: May I ask, Mr. Bachman, if I may have a copy too?

MR. BACHMAN: You certainly may. I'll see that you get it.

SENATOR DUMONT: A question by Mr. Van Deventer.

FRED VAN DEVENTER: Mr. Bachman, are you acquainted with the zoning ordinance of Princeton Township?

MR. BACHMAN: Somewhat.

MR. VAN DEVENTER: I think, for the benefit of the Committee, you might explain that the zoning ordinance of

Princeton Township is such that automatically it increases the value of the property in that area, for such purposes as you are describing, because of its elimination entirely -- well, you explain it to them.

MR. BACHMAN: Well, there are many factors. The zoning ordinance that Mr. Van Deventer referred to is one that governs the size of the lots in certain sections of the Township, because of water and waste disposal problems, and sets in some parts a two acre minimum on residential lots and, all in all, has created an area of growing beauty. I mean, it can't be affected and blighted by the small housing development.

SENATOR DUMONT: Any other questions? Thank you very much, Mr. Bachman.

(Applause)

SENATOR DUMONT: Dr. Charles Capen.

DR. CHARLES H. CAPEN: Senator Dumont, Senator Crane, Members of the Committee, and ladies and gentlemen: My name is Charles H. Capen. I reside at Green Pond, Morris County, New Jersey. I am a Consulting Engineer. I graduated in Civil Engineering from Cornell University in 1917, specializing in sanitary engineering, and have been engaged, almost continuously, since that time in the State of New Jersey - 7 years with the New Jersey State Department of Health, 30 years with the North Jersey District Water Supply Commission, and now in a consulting capacity which I have also carried on concurrently for about 30

years. I am a past-Chairman and Director of the New Jersey Section of the American Waterworks Association, and a past-President of the American Waterworks Association.

Water needs of northeastern New Jersey cannot be classed as a new topic. Records show that the subject has been considered by the Legislature for nearly a century. It is necessary for all those interested in water to carefully observe developments and to appraise annually the bills presented to that body.

Prior to the beginning of World War II it was recognized that the breathing spell afforded by the depression that began in 1929 would no longer be available. The speaker had charge of an interconnection survey which had two purposes, one to make efficient use of existing sources and later to set up a series of emergency connections in case of possible war-time dislocations.

As the end of the war approached it became evident that strong efforts should be made to provide additional water for northeastern New Jersey and as a result the then chief engineers of the State Water Policy Commission and the North Jersey District Water Supply Commission, namely Mr. Howard T. Critchlow and the speaker, were asked to formulate a joint report on the subject. This was done and was printed under date of February 5, 1945.

In that report Dock Watch Hollow Reservoir was recommended as the first step. It has since been eliminated, first, because the needs for water will evidently far exceed

its limited yield of 75 million gallons per day. At that time it was believed that there would be a temporary drop in water usage after the War but this did not occur. Secondly, it was evident that housing growths in that valley would soon make the property difficult to obtain.

Quoting from that 1945 report, the following is of note: "Construction of the second step -- Round Valley Project -- is a matter for the future -- the time for its commencement should depend on the business outlook 5 or 10 years after the War."

"Like Dock Watch Hollow, the Round Valley site in Hunterdon County is almost ideally suited for reservoir purposes."

"The project herein outlined is superior to those contemplated years ago at Chimney Rock and Long Valley (which is known as Bunnvale)."

When no tangible results were obtained in the next few years, the Water Policy Commission asked the group known as the Joint OPeration Board, consisting of five members, representing the largest operating water agencies in northeastern New Jersey, to report their findings and beliefs. These men were, Charles J. Alfke of the Hackensack Water Company; William G. Banks of Newark; Richard E. Bonyun of Passaic Valley Water Commission; Harold M. Ohland of Jersey City; and the speaker, then of the North Jersey District Water Supply Commission. The report, dated October 16, 1950, recommended Round Valley and eventual integration of that site with the Delaware River or Incodel plan.

It should be particularly noted that the preliminary Incodel report of 1950 included Round Valley as the New Jersey adjunct for Walpack Bend, but the final report did not. Apparently the lack of enthusiasm by Pennsylvania was largely responsible for this change.

Round Valley was and still is the best project. Eight interested municipalities, namely Bayonne, Bloomfield, Cedar Grove, Elizabeth, Hillside, Kearny, Newark and Orange, provided the funds for a complete study of the site, including field surveys and test borings, in 1954. Upon being satisfied of the feasibility of the plan they authorized an application to be made to the Division of Water Policy and Supply for the right to divert water at that site.

The counter proposals, first of the long-discarded Chimney Rock site in 1955, and now of the Spruce Run and Stony Brook sites, have merely served to accentuate the value of Round Valley which stands out in bold relief as the one that should be utilized.

Temporarily the municipalities that were interested have felt frustrated in their efforts. It is obvious that Newark felt that the Charlotteburg Reservoir, which it is now constructing, was at least a partial rebuttal to the denial of its right to participate in Round Valley. The Passaic ValleyWater Commission is now carefully re-estimating its Point View Reservoir plan. Jersey City has applied for permission to construct its Longwood Valley Reservoir. These are all helpful in certain areas but will not provide the volume of water that will eventually be required.

For summer use, cool water is desirable not only for palatability but also for economical use in air-conditioning. Stream temperatures in the summer are generally around 80° F. No practicable method for cooling large quantities of water may be found, other than that provided by nature in deep reservoirs or in wells. Water delivered into a stream many miles from an intake will be warm after being subjected to shallow flowage as in the Raritan River.

In the rock areas of the northerly upper portions of the Raritan watershed, water is clear and often sparkling. When it descends into southerly areas much silt is taken into the streams. While removal of this is practicable the end product frequently suffers, particularly where polluting materials are also received, as may easily be the case in the industrialized areas of the lower valley.

In spite of the supposed rigid watershed control that is exercised, many instances of unexpected chemical dumpings have occurred in the Passaic River watershed. Some of these have necessitated a complete shut-down of the water intake at Little Falls. On another occasion a truck loaded with alum crashed through a bridge over the water intake canal there and that source had to be shut off for two or three days.

There is no good reason why water development should have to be subsidized by the public. Those who use the water should pay for it. If a lean industrial year or a very wet summer occurs, deficits may accrue and the taxpayer appears to be the one who will foot the bill. Inasmuch as the plan proposed by the New Jersey Water Resources Advisory Committee

is primarily for the Raritan Valley, it is difficult to see why the entire state should be asked to contribute to such a cause.

There is no engineering rule, or even rule of thumb, that dictates or governs the 130 m.g.d. minimum river flow criterion set up in the New Jersey Water Resources Advisory Committee report. Obviously industries want and need more process water. Supposing that some storage is provided and that additional river flow is available, why should New Jersey sacrifice its Round Valley purchase by confiscating other valuable lands?

By taking advantage of the 70 m.g.d. yield of Round Valley from the South Branch, and looking to the Delaware for future additions thereto, the need of other large developments becomes nullified. Furthermore, Round Valley is planned to provide storage for additional compensation water.

It should be observed that most floods occur in other than summer dry periods. The natural condition of operation of a water supply reservoir is to keep it as full as possible -- the exact opposite of flood-control operation.

Questions:

1. Why is this apology for a potable water supply, which is far less than best, pressed on the public when no municipalities have supported it?

2. Who can justify high temperature water for potable purposes?

3. Has pollution and sediment of the Lower Raritan

Valley ever been explained to the public?

4. Who will pay for water in a lean year or a wet year?

5. Has silting effect on the proposed reservoirs been adequately studied?

6. Has evaporation been fully taken into account?

7. What happens when it requires more than a year to fill one of these reservoirs?

8. Should not industry pay its own way entirely instead of asking the State to finance its water needs?

9. How can the potable water plan be sold when municipalities have not supported this plan?

10. Will municipalities be permitted to have a voice in the matter.

11. Why purchase more land when Round Valley is already owned?

Conclusions:

1. The high summer temperature of the water at Bound Brook will not produce the type of water preferred by consumers.

2. Pollution problems in the lower Raritan Valley will increase with the years.

3. Annual costs of the Spruce Run and Stony Brook system may be estimated at not less than one million dollars or nearly $2,750 per day for the two reservoirs.

4. Actual withdrawal of water from the two proposed reservoirs may be expected to be practiced perhaps 200 days in a dry year, at an average rate up to 50 m.g.d. from each

reservoir if full storage capacity is to be utilized. The total sale of 20 billion gallons at $25 per m.g. will only yield $500,000 of revenue. Therefore, natural stream flow will have to produce an additional $500,000 which is very difficult to assess and collect.

5. In an extremely dry period the reservoirs will not fill up in one year so the financial deficit will be even greater.

6. In wet years it would be difficult to collect the amount of revenue required unless the potential users are assessed an annual amount, the total of which will pay all fixed charges plus operating costs, including taxes; in other words, about one million dollars annually.

7. The multiple storage basins proposed by the Stony Brook - Millstone Watersheds Association offer interesting possibilities that might well be studied further.

8. Round Valley still is the best reservoir plan and site. It is now state-owned and should be utilized before any other plan is promulgated. Its excess waters can be used for stream regulation until consumption catches up to supply and then other means for stream regulation can be adopted.

9. If industry needs stream regulation before Round Valley comes into operation, purchases of smaller reservoir sites could be arranged under state supervision, but the cost should be borne by industry.

10. Round Valley, in conjunction with storage on the Delaware River, such as at Tock's Island or Walpack

Bend, can produce up to 300 m. g.d. - a volume which is beyond that of any other project in that part of the State.

11. The initial cost of Round Valley will obviously be greater than Spruce Run and Stony Brook, but it will produce more and better water at a much higher elevation. Delivery to consumers, other than compensation or stream flow regulation, will be by gravity although some booster pump operation may be required in extremely dry years.

Recommendations:

1. If stream regulation is required at once, purchase small reservoir sites, for this purpose only, out of funds now existing, and assess those desiring such benefits for the entire cost of land, with construction and operation to be financed by those benefitted.

2. Omit any bond issue referendum for the present and solicit cooperation for direct financing of construction of Round Valley by those interested. Concurrently remove the restriction that now prevents diverting water from South Branch into Round Valley.

3. Solicit the confidence of the consumers and voters -- do not confuse them further.

(Applause)

SENATOR DUMONT: Now, Doctor, you don't mind my reviewing a couple of things that were mentioned this morning at the outset of the hearing. I just want to check these figures that were mentioned then and make sure I was accurate, based upon what you told us last week. At Hamden, you

indicated that the maximum amount that could be taken out of the South Branch of the Raritan on a daily average would be 70 million gallons. Is that right?

DR. CAPEN: Yes.

SENATOR DUMONT: And that that would have to be pumped in.

DR. CAPEN: Yes.

SENATOR DUMONT: To Round Valley. And it would cost about 11 million dollars for the tunnel and the pumping station, etc.?

DR. CAPEN: Pardon me, that's the one part of your comment that I think --

SENATOR DUMONT: Well, I wanted to be sure about it.

DR. CAPEN: -- should be explained a little bit. The estimated cost of the pumping station and pipeline - there wasn't a tunnel in that section --

SENATOR DUMONT: Oh, I see. I'm sorry.

DR. CAPEN: -- from Hamden to Round Valley would be five million dollars. In an extremely wet year, following a dry year, when pumping would be at a maximum, the estimated cost of pumping would be as high as $300,000 annually. Capitalizing that at 5 percent, which is the common way of evaluating these things, would produce a total capital cost of six million dollars which you would be justified in spending if you could divert that same volume of water by gravity instead of pumping it at Hamden. Actually, there is no point on the South Branch where you can divert as much as an average of 70 m.g.d. by gravity. So, if you compare

it with the Hoffman site for the tunnel, you are comparing two different volumes of water.

SENATOR DUMONT: Now, at Hamden there, of course, is the remains of the dam just as there is at Hoffman's.

DR. CAPEN: Yes, that is right.

SENATOR DUMONT: And also, as I recall it, on one side of that dam there is like a diversionary channel there that flows off away from the river. I don't know what it was intended for but there is something there.

DR. CAPEN: Yes. That was a raceway for an old mill operation.

SENATOR DUMONT: Now, in considering this as a possibility, that dam could be rehabilitated. Is that correct? without much expense?

DR. CAPEN: Yes.

SENATOR DUMONT: Can that raceway be used?

DR. CAPEN: It might be but I would prefer to see it enclosed, as a closed conduit, and carry it to a point a short distance below to a pumping station.

SENATOR DUMONT: Now, going back to Hoffman's, I think you told us last week that the most you could get there would be about 40 to 50 million gallons on the average per day. Is that correct?

DR. CAPEN: That is right.

SENATOR DUMONT: And that would be by a tunnel.

DR. CAPEN: Yes.

SENATOR DUMONT: Which would cost approximately seven million dollars. Is that right? over to Round Valley?

DR. CAPEN: Yes, that is right.

SENATOR DUMONT: Then I think you told us that the construction of a dam and two dykes in Round Valley, which as I understand it would be necessary no matter what the source of water supply for Round Valley would be, would cost about 15 million. Is that right?

DR. CAPEN: Yes, that is right. I might add that in the line from Hoffman's a good portion of it would be tunnel, the last part of it would be pipeline.

SENATOR DUMONT: And also at Hoffman's there's the remains of an old dam there which could be rehabilitated also. Is that correct?

DR. CAPEN: Yes.

SENATOR DUMONT: Now, the question has arisen many times that Round Valley would be designed largely to supply the northeastern part of New Jersey with water. How would you take care of the situation involved in the lower portions of the Raritan River out of Round Valley? Can you do anything about increasing the stream flow there or keeping it on a regulated level as far as Round Valley is concerned?

DR. CAPEN: Yes. Round Valley in its conception had nearly seven billion gallons of compensation water actually figured in the project. If desired, by raising the dam a nominal amount, and of course you would increase the cost too, we must say that, you can store tremendous quantities in addition in Round Valley. The top estimate of its capacity is approximately 90 billion gallons. The report figured it

for 50 billion gallons at the present time, but it could be made anything in between there.

SENATOR DUMONT: So it is your opinion that water could be let out of Round Valley, which was being stored there, perhaps through the Prescott Brook or some other source, to go back into the South Branch of the Raritan. Is that right? to maintain the stream flow to the south?

DR. CAPEN: Yes, that is right. That was the plan.

SENATOR DUMONT: And could you do that? Would you have enough water in Round Valley available to do that in addition to taking care of any needs of the northeastern part of the State out of Round Valley?

DR. CAPEN: Yes. As I said before, there was already nearly 7 billion gallons figured in it for compensation water. That can be increased tremendously, theoretically up to 40 billion gallons. I don't necessarily favor going that high but it could be done physically, and the water could be let down either Prescott Brook or back through the pipeline to Hamden. We considered both methods and left it open to be done either way.

SENATOR DUMONT: This was a plan, this plan dealing with the South Branch of the Raritan, which you advanced -- you were certainly one of those who advanced it some years ago, isn't that true?

DR. CAPEN: Yes. I have been advocating Round Valley for 30 or 40 years.

SENATOR DUMONT: Now, turning to the Ken Lockwood Gorge and the possibility of using that, am I right that the

State owns about three-fourths of that Gorge now? Approximately?

DR. CAPEN: That, I believe, is approximately correct. I have seen the signs there, I have never measured the actual acreage, but that sounds about right.

SENATOR DUMONT: How much water do you estimate could be stored in the Ken Lockwood Gorge? I realize that depends on where the dam would be located and how far back you would flood, but how much do you estimate could be stored there, without flooding Califon or perhaps going back only as far as Hoffman's?

DR. CAPEN: Well, actually, I made some estimates on that many years ago in connection with a study of the possible Bunvale site, and while the two dam sites , that of Bunvale and that of two locations of the Gorge, are not coincident, I would say that the figures that have been given here are substantially correct, probably. I haven't checked them in detail.

SENATOR DUMONT: You mean about 5 billion gallons storage capacity?

DR. CAPEN: That sounds reasonable.

SENATOR DUMONT: Now, where would the dam have to be located to get that much storage capacity? Near Lake Solitude?

DR. CAPEN: That would be near Lake Solitude, yes.

SENATOR DUMONT: And would that only flood back as far as the dam at Hoffman's, to provide that capacity?

DR. CAPEN: It would go back a little bit further,

I believe, because I think the flow line was considered at elevation 460 for that and Hoffman's elevation is around 450. So it would flood back about ten feet beyond that point.

SENATOR DUMONT: Beyond the dam.

DR. CAPEN: Yes.

SENATOR DUMONT: What is the total storage capacity of Round Valley? Is it a hundred billion gallons?

DR. CAPEN: The estimated maximum is about 90 billion gallons, and that's pretty nearly correct.

SENATOR DUMONT: And the maximum output would be 300 million gallons daily?

DR. CAPEN: Yes. I don't necessarily say that you would have to develop the full 90 billion gallons storage to get 300 million gallons a day, but you can get 300 million gallons a day out of it, with the Delaware.

SENATOR DUMONT: Is it your opinion that if 70 million gallons,maximum, per day were taken out of the South Branch at Hamden and stored in Round Valley, that alone would take care of the water needs at the present time, until such time as the Delaware River were developed as a source of water supply and storage?

DR. CAPEN: That is precisely the aim that was made in reporting to the cities in 1954.

SENATOR DUMONT: And do you believe that would provide enough water, without also damming the Ken Lockwood Gorge to provide a catch-basin so that water could be let down the South Branch in times of maintaining the flow?

DR. CAPEN: I think so, for this reason: For the first few years you would not be utilizing all of the potable water out of Round Valley and you would have that much more water available for stream regulation.

SENATOR DUMONT: Well, when you say you would not be utilizing all the potable water, you mean the northeastern part of the State or the northeastern part of the State and the lower Raritan Valley?

DR. CAPEN: Well, potable water needs are considered both in the Raritan Valley and in the other communities in northeastern New Jersey, the other areas.

SENATOR DUMONT: In other words, your feeling about Round Valley just doesn't limit it to the northeastern part of the State. Is that correct?

DR. CAPEN: That is right. We even studied pipelines from Round Valley to the south, at one time. Those were not reduced to factual report but they were studied.

SENATOR DUMONT: Now, suppose the Delaware is developed within, we'll say, 7 to 10 years. Have you ever done any estimating as to the relative cost of tunneling the water from, say, Walpack Bend or Tock's Island Reservoir directly to Round Valley, in contrast with pumping the water in from the river at Frenchtown to Round Valley?

DR. CAPEN: Yes. That was done.

SENATOR DUMONT: Is there a vast difference in those costs?

DR. CAPEN: Yes. The capital cost of a tunnel from Walpack Bend to Round Valley is rather high. The cost

of a direct line from Frenchtown plus the capitalized cost of pumping is less than the direct tunnel would be.

SENATOR DUMONT: Do you have any figures you can give us on that?

DR. CAPEN: I haven't figures here. I know where they are. I have made them but I haven't them here.

SENATOR DUMONT: Do you suppose you could write a letter in, giving us those figures --

DR. CAPEN: Yes.

SENATOR DUMONT: -- so we can make it a part of the record?

DR. CAPEN: Yes, that could be done.

SENATOR DUMONT: Isn't it true that right at the moment the Passaic Valley Water Commission is circularizing its 45,000 customers, pointing out to them that they are probably going to have to develop the Point View Reservoir and Pancake Hollow and, therefore, that they are going to have to raise their water rates to their customers?

DR. CAPEN: I know that they are actively engaged in trying to promote that project. I haven't seen the details of it.

SENATOR DUMONT: Well I actually saw a form letter that they sent out showing a diagram of Point View Reservoir and the amount of land that would have to be flooded and properties purchased or condemned and the fact that they are preparing their customers apparently for a water rate increase.

Is it your feeling, in saying that Round Valley would

provide enough water until the Delaware were developed, that is taking the water in the meantime from the South Branch of the Raritan - is part of your feeling based on the fact that Newark and Jersey City and now the Passaic Valley Water Commission are developing other sources of supplies for themselves?

DR. CAPEN: Yes, very definitely. Actually, Jersey City was planning its development regardless, because they have had their own needs and have been desirous of fulfilling them for many years. But both Newark and the Passaic Valley Water Commission deliberately withheld action for some time in the anticipation that if Round Valley became activated they might not do the same things that they would be forced to do otherwise.

SENATOR DUMONT: Now, you mentioned here that industry ought to pay for its own water needs. How, as a practical matter, would you go about such a procedure of actually assessing anybody, whether it be industry or private customer or whatever it might be? Do you have some idea of assessing the riparian owners, or just the users of the water?

DR. CAPEN: I think you would have to confine that very largely to the users. I don't see how you can very well assess the riparian owners unless they actually use the water.

SENATOR DUMONT: In your second recommendation about omitting any bond issue referendum and soliciting cooperation for direct financing, what exactly do you have in mind there, so far as the construction is concerned? Are you suggesting

that the State ought to take several millions of dollars out of any reserve funds we might have for starting such a project, or are you suggesting that private financing ought to be arrange, or just what did you have in mind? the financing part of it.

DR. CAPEN: Well, there are two or three methods that have been proposed and I should think that either one of them would work. I will outline two of them briefly. One was proposed around 1954 or early part of 1955, whereby the State would issue the bonds and would make a loan to the North Jersey District Water Supply Commission, which then had the cities applying for the water; the cities in turn would repay the State through the agency of the North Jersey Water Commission in the same manner that cities now pay their own bonds on the Wanaque system. That was one method. The other method was the possible State bond issue and the State doing the work, just as was proposed for Chimney Rock. That is another method. Those aren't the only methods but I am a firm believer in those that get the water should pay for it.

SENATOR DUMONT: Mr. Capen, you are no longer with the North Jersey District Water Supply Commission, is that right?

DR. CAPEN: That is right.

SENATOR DUMONT: You are now a private Consulting Engineer.

DR. CAPEN: Yes.

SENATOR DUMONT: Over how many years have you been familiar with these various projects in northcentral and northwestern New Jersey and the needs of other parts of the State?

DR. CAPEN: My interest actually started 40 years ago, but I have been actively engaged in the matter of seeking and developing major water supplies since 1925.

SENATOR CRANE: Dr. Capen, your first question - "Why is this apology for a potable water supply, which is far less than best, pressed on the public when no municipalities have supported it?" -- Are you implying, sir, that there would be no municipalities that would benefit from this or would want water from it?

DR. CAPEN: No. I say that none of them have applied or have evinced actual interest in it. I don't say that they would not be interested, but that they have not come forward and said so.

SENATOR CRANE: Well, you admit they are consumers --

DR. CAPEN: Oh, yes.

SENATOR CRANE: -- potential consumers.

DR. CAPEN: Yes.

SENATOR CRANE: Do you feel that this plan is entirely without public support?

DR. CAPEN: So far as I have been able to observe, yes.

SENATOR CRANE: On what did you base your observation?

DR. CAPEN: On the fact that I have not heard any municipality publicly, either in these hearings or any other place, express an interest in this particular project.

SENATOR CRANE: I just want to make this point for the record - Why do you stress municipalities, sir?

DR. CAPEN: Mainly because they have been the ones who have pressed large developments in the past. I do not mean to

exclude private company developments and I have felt all along that there should be more cooperation between private company operation and public operation.

SENATOR CRANE: Well, we had some representatives here from Middlesex and, I believe, Somerset Counties - please correct me if I am wrong - who set forth their approval of the plan. You feel that they are entirely apart from the municipalities and therefore do not constitute good endorsement?

DR. CAPEN: I think I heard those gentlemen, but I don't recall that any of them said that they definitely represented a municipality in their speaking.

SENATOR CRANE: Oh, you are tying it back to municipalities, what I am trying to point our, sir, is - do you feel that a countywide endorsement is not as good as a municipality in this matter? Is that what you are trying to say?

DR. CAPEN: That's always the way it has worked in the past, yes.

SENATOR CRANE: You made one other point, I think, by asking a question - "Should not industry pay its own way entirely instead of asking the State to finance its water needs?" Do you visualize this as, what you might say, an industry benefit, without benefit to anyone else?

DR. CAPEN: No, but industry obviously would be the first one to benefit from such a plan.

SENATOR CRANE: How about the farmers that divert water in the summertime?

DR. CAPEN: Well, I have never heard any of the farmers

complain about the lack of water. They seem to do all right.

SENATOR CRANE: No, but it is diverted by other people than by industry, isn't that true?

DR. CAPEN: Oh, yes, that's so.

SENATOR CRANE: So that this could not conceivably be stated as just an industry plan?

DR. CAPEN: Well, I think it very largely is because I have never heard any farmers complain about a lack of water that they might wish to divert.

SENATOR CRANE: Well, how about the companies that would buy water - water companies?

DR. CAPEN: Yes, they have had a very definite reason to ask for more water. That is correct.

SENATOR CRANE: Well, don't you feel, if we tackle this problem of charging riparian owners to use the water, that they would be paying their own freight?

DR. CAPEN: Yes, if they are charged correctly, yes. That is true.

SENATOR CRANE: Do you believe that it would be worthwhile to make a study of riparian use and possible charges?

DR. CAPEN: Well, the question of riparian use might require a little definition. If you are thinking, for example, of a farmer along the stream, I question whether any farmer would look kindly on being charged for something that he might have used for many years.

SENATOR CRANE: Well, it is hard to find anybody who looks kindly on a suggestion but what I am pointing out is - do you believe that a study of this should be undertaken?

DR. CAPEN: Yes,I think that's very proper, regardless of what type of development might be considered on the Raritan River.

SENATOR CRANE: Are you aware of the fact that the Water Policy Commission is making some such study?

DR. CAPEN: I know that they have done work on that in the past, yes.

SENATOR CRANE: Do you believe, sir, based on your long knowledge of water supply and water problems, that there exists a need for water, more than can be supplied in just local areas? In other words, can the northeastern section supply itself in the northeast?

DR. CAPEN: Well, I'll put it this way - I'm not sure just what area you might refer to. We refer to the northeast district, of course, but there is no question in my mind but that more water is needed in the northern half of New Jersey.

SENATOR CRANE: Than it can supply of itself.

DR. CAPEN: Than it can supply from present sources that are developed.

SENATOR CRANE: Yes. Your main contention seems to be development of Round Valley and, eventually, the Delaware. That's what I gather from this report. Is that true?

DR. CAPEN: That is right.

SENATOR CRANE: And you have long been an advocate of that plan.

DR. CAPEN: That is right.

SENATOR CRANE: Do you believe, sir, that if we do

just that, if we develop Round Valley and also go to the Delaware that we can skip the development of the Raritan River?

DR. CAPEN: I would rephrase that by saying that Round Valley can be the development for the Raritan River and in that case you can do exactly that - you can provide the water by means of Round Valley and the Delaware.

SENATOR CRANE: For the Raritan Basin?

DR. CAPEN: Yes.

SENATOR CRANE: Or the Raritan Valley?

DR. CAPEN: Well, those terms are used rather loosely. I refer to the downstream Raritan River, in particular, because that's where industry and usage is located.

DR. CAPEN: Well, you believe that all this can be done without any other development of the Raritan River? For instance, could this be done without the Ken Lockwood Gorge, which has been suggested by Senator Dumont?

DR. CAPEN: Yes. The Ken Lockwood Gorge is a small development in itself which can produce some water but I am not convinced that it's necessary if you build Round Valley.

SENATOR CRANE: How about the various municipalities in the Raritan Valley, would they be able to be served from Round Valley as well as the northeastern section of the State?

DR. CAPEN: Yes, and as a matter of fact, when the Round Valley study was first initiated in 1953, about, I say first - that was the culmination of a long number of years of preliminary study - but in 1953 or '54, as soon as it was noticed in the press, we had requests from

different municipalities in the Raritan River area for information on whether they might look to that supply for future water.

SENATOR CRANE: Sir, your projection of Round Valley, does it entail the use of pipelines for transmission? In other words, delivering water from Round Valley, is it through the pipeline transmission system?

DR. CAPEN: Yes. For potable purposes, yes.

SENATOR CRANE: You would not let it down into the Raritan again.

DR. CAPEN: No, except for stream regulation or compensation.

SENATOR CRANE: Would the payment for those pipelines be made by the municipalities or the private companies that draw the water, or is the State to take over the pipeline?

DR. CAPEN: Well, I still believe that the people who get the water should pay for it.

SENATOR CRANE: Would you say that that would raise the cost of water?

DR. CAPEN: Oh, yes, this water costs money. You can't get it as cheaply as you could in the past, but once your bond issues are paid off then you get it very cheap.

SENATOR CRANE: Would you say that you could get it as cheaply as you could get it out of your two on-river reserviors suggested by the Smith Committee?

DR. CAPEN: Not as far as delivery at Bound Brook is concerned. As far as ultimate cost is concerned, yes.

SENATOR CRANE: That's through transmission of other pipelines and existing facilities. Is that what you are talking about?

DR. CAPEN: Yes, and through gradual amortization of the bond issues.

SENATOR CRANE: Do you feel there are sufficient purchasers immediately available to make Round Valley as self-sustaining as people seem to want Stony Brook and Spruce Run?

DR. CAPEN: Yes. As a matter of fact, in 1954 the cities who applied for the application before the Water Policy Council had designated a request for something greater than 60 million gallons a day. Obviously, they wouldn't use that all in the first year but eventually they figured on using that.

SENATOR CRANE: Do you believe that there are insufficient customers and immediate purchasers for water from the Spruce Run and Stony Brook that they would not be self-sustaining?

DR. CAPEN: No, I haven't said that. I have said that the application of the fees for that would be very difficult, particularly in a wet year, under the method that has been suggested - under the method of let-down that has been suggested.

SENATOR CRANE: Your point seems to be then that the Round Valley would be more stable.

DR. CAPEN: That is a very good word, yes.

SENATOR CRANE: Are you what is termed a water engineer?

DR. CAPEN: I call myself a sanitary engineer.

SENATOR CRANE: Well, I wasn't trying to make any differentiation but I mean, commonly when we refer to water engineer, you are a person who deals with water engineering problems.

DR. CAPEN: Yes. That is right.

SENATOR CRANE: Do you feel that your view -- I know you feel personally that it's well taken, as you should feel, -- Do you think that all engineers would draw the same conclusion or would you admit to some different views being harbored by others?

DR. CAPEN: Oh, there are always different views but I know that a majority of the water engineers that I have had close association with in the State have favored Round Valley.

SENATOR CRANE: They have favored it to the exclusion of any development of the Raritan other than Round Valley?

DR. CAPEN: They haven't said that but they believe, as I do, that the development of Round Valley would eliminate the necessity of other developments such as Spruce Run and Stony Brook.

SENATOR CRANE: Well then, in your conclusions, point 7 - "The multiple storage basins proposed by the Stony Brook - Millstone Watersheds Association offer interesting possibilities that might well be studied further." - what were the interesting possibilities that provoked your thought?

DR. CAPEN: Actually, some of those ideas were those brought out in these hearings where they spoke of soil erosion, stream regulation in a minor degree, such as has been proposed by the Stony Brook Watershed Association. I knew in general of their work but I hadn't followed it in any detail.

SENATOR CRANE: Did you consult with them prior to the development of this plan and the submission of it to the Legislature?

DR. CAPEN: No, I did not.

SENATOR CRANE: Did you confer in any way with any of those interested in the Raritan on-river dam proposal at any time in your career? Have you ever talked to the engineers of Elizabethtown Water Company?

DR. CAPEN: Yes, on various occasions in the past.

SENATOR CRANE: In what capacity was that?

DR. CAPEN: Primarily, I tried to interest them in Round Valley many years ago.

SENATOR CRANE: Have you consulted with any others about the Raritan?

DR. CAPEN: Yes, I have consulted with the engineers of practically all of the large water supplies in northeastern New Jersey at one time or another on this very subject.

SENATOR CRANE: Sir, you seem quite familiar with our water system, our water needs, do you have any idea as to the number of years it would take to develop Round Valley?

DR. CAPEN: Yes, it would take about 5 years.

SENATOR CRANE: Do you have any ideas as to how long it would take to develop either Tock's Island or Walpack Bend?

DR. CAPEN: That is a subject on which I hesitate to hazard a guess. I had wished in 1950 that it would start immediately. It has not done so and 7 years have passed. I hope that it doesn't take too long.

SENATOR CRANE: Do you think the Army Engineer's estimates are correct when they state 1967?

DR. CAPEN: It can't be done in less than that, I don't believe.

SENATOR CRANE: That would be ten years then?

DR. CAPEN: Yes.

SENATOR CRANE: Well, sir, if it took five years to develop Round Valley and 10 years to develop the Delaware, do you feel that we can safely wait 5 years without developing any other water resources?

DR. CAPEN: That depends a good deal on how fully developments are made, such as Newark's Charlotteburg Reservoir, which is actually under construction right now; Passaic Valley's Point View Reservoir; and Jersey City's Longwood Valley Reservoir.

SENATOR CRANE: Do you think this will alleviate needs and pressure?

DR. CAPEN: Not entirely. There probably will be other needs and that is one of the reasons why I specifically

put in my recommendations consideration of some of the smaller reservoirs in the Raritan Basin, such as we mentioned before, like Stony Brook Watershed Association.

SENATOR CRANE: One last question because, of course, this involves me personally - when you are talking of potential consumers, did you regard Elizabeth, New Jersey, a potential consumer for Round Valley?

DR. CAPEN: Yes. They were one of the ones who helped pay for that report.

SENATOR CRANE: And you feel that they still would be, since they are depending upon Wanaque?

DR. CAPEN: Yes.

SENATOR CRANE: Do you feel that they could ever be a potential consumer for water from the two small on-river dams proposed by the Smith Committee?

DR. CAPEN: That's always possible, yes.

SENATOR CRANE: Through existing pipelines.

DR. CAPEN: Yes.

SENATOR CRANE: Are you aware of the evaluation of the prices to be charged, the evaluation made by Mr. Kean who is President of the Elizabethtown Water Company?

DR. CAPEN: Well now, I don't know what prices you refer to.

SENATOR CRANE: He was referring to the $25 per million gallon price placed on the small river dams program.

DR. CAPEN: Well, that is certainly a modest price and my own feeling is that that price will not pay for the cost of the development.

SENATOR CRANE: Do you feel that's a low or high price?

DR. CAPEN: I think it's too low.

SENATOR CRANE: How do you feel it is in comparison to other charges made for water?

DR. CAPEN: It is certainly not far from the price of the water from the Delaware and Raritan Canal, but my point in saying that it is low is that I can't conceive how you can only charge $25 a million gallons to those who use the water and meet the amortization and operating expenses of the proposed development.

SENATOR CRANE: Now, if the State were to charge - make a charge after due study and deliberation - for use by riparian owners, you seem to have placed simply another $500,000 on it, do you think that is an adequate reflection of what would be charged and what would be realized? I mean, you allowed for this point yourself in your conjecture here.

DR. CAPEN: That is right. I don't know that this is a direct answer to your question but I will try to answer it as I see it. In my estimation, the charge of $25 per million gallons for the water that will actually be let down under this plan will not be sufficient to pay for the annual charges on the cost of the project.

SENATOR CRANE: That's your opinion.

DR. CAPEN: That is right.

SENATOR CRANE: And it is shared by others in your same circumstance?

DR. CAPEN: I can't answer that. That is my opinion and it is based on many years of sad experiences in trying to collect money for water. All of which I think is charged for at too low a price.

SENATOR CRANE: All right. Thank you.

SENATOR DUMONT: I want to note the presence of Senator Sido Ridolfi of Mercer County. Senator Ridolfi, do you have any questions?

SENATOR RIDOLFI: No, thank you.

SENATOR DUMONT: Dr. Capen, you were here, I believe, this morning when Mr. Sanford was testifying. Do you have any opinion as to, not necessarily as to any plan that he advanced in its novelty or anything, but have you ever thought of that particular plan that he advanced in relation to whether it would be a possibility for a solution to the water supply needs of New Jersey?

DR. CAPEN: Well, I have seen a very successful operation of the Duhernal Supply at South River which has some similar aspects. I have never considered it in the light of this particular area and, frankly, at the moment I haven't studied that area sufficiently to be able to pass an opinion on it. But it offers very interesting possibilities.

SENATOR DUMONT: Has it been used, to your knowledge, in other areas, just the way he outlined it in the particular area that he described this morning.

DR. CAPEN: The nearest parallel that I know is, as I said, at the Duhernal Supply at South River, New Jersey.

SENATOR DUMONT: So it is a possibility then, in your opinion. Is that correct?

DR. CAPEN: Yes. It would just depend on several factors which he outlined and I don't think they need repeating.

SENATOR DUMONT: Did I understand you to say that you believe that if Round Valley were developed the water out of there could be purchased by a consumer at $25 per million gallons or at least in reasonable parallel to the price stipulated by the Citizens Committee in their proposal?

DR. CAPEN: Well, no. If I gave that impression, I didn't intend to. The actual cost of delivered water from Round Valley was considerably more than that, of course. As far as the compensation water from Round Valley was concerned, the original concept of the plan did not intend to charge anything for the compensation water. If, however, Round Valley were enlarged to provide additional compensation water, over and above potable needs, then I think a charge might properly be considered. That has never been figured so I couldn't give you a dollar price.

SENATOR DUMONT: Well, when you talk about the actual cost of water delivered, you are not talking then about the Raritan River but more about the northeastern part of New Jersey?

DR. CAPEN: Well, it could apply to the entire Round Valley. As a matter of fact, in the Round Valley study we considered carrying water all the way over to Perth Amboy.

SENATOR DUMONT: Have you any estimates as to what the cost of water delivered out of Round Valley would be in contrast to this $25 figure that they have indicated?

DR. CAPEN: Well, you would be comparing apples and oranges, so to speak, but the Round Valley Report distinctly gives the price estimated for the two projects delivered at the City line under pressure, potable water, which is an entirely different thing than river water at Bound Brook. It's under pressure, it's been purified and delivered and those prices vary from $116 per million gallons to $151 per million.

SENATOR DUMONT: That's for drinking water, is that right?

DR. CAPEN: That is right.

SENATOR DUMONT: But do you have any figures on industrial water for Round Valley?

DR. CAPEN: No. As I said, the concept of putting more storage into Round Valley for river regulation in addition to stream flow compensation has never been figured out, to my knowledge.

SENATOR DUMONT: So that, if you did let water out of Round Valley that wasn't needed for potable drinking purposes and let it down the Raritan for industrial use, you don't have any figures that you can compare with the $25 figure per million gallon submitted by the Citizens Committee. Is that right?

DR. CAPEN: That is right. I know this, that Round Valley is going to cost more money initially than this other

plan. We all know that but it is a question of whether you want to do what I consider the best or whether you want to do something else.

SENATOR DUMONT: When you say it will cost more initially, do you mean in developing Round Valley or in the actual cost of the water to consumers?

DR. CAPEN: Developing Round Valley. I believe that the Round Valley plan as outlined in this report will eventually result in less cost for water to consumers than any other plan and I will back that up by saying that the City of Newark, for example, which is the largest participant in the Wanaque, will start the complete amortization of its initial bond issue three years from now and ten years from that time, that is by 1970, they will be getting Wanaque water delivered at the city line for about $30 a million gallons, potable water under pressure.

SENATOR DUMONT: What do they pay now for that?

DR. CAPEN: Their actual cost at the present time is probably around $100. The courts decided, in a very lengthy battle we had, $95 a million gallons, and I think that's a pretty fair figure. My own figure was slightly over a hundred dollars.

SENATOR DUMONT: Now, do you recommend the use of the South Branch as an alternate for both Spruce Run and Stony Brook or as an alternate for either one of them?

DR. CAPEN: I offer it as an alternate for both.

SENATOR DUMONT: For both of them. And you believe

also that it would supply enough water without necessarily, at this time at least, damming the Ken Lockwood Gorge. Is that correct?

DR. CAPEN: Yes.

SENATOR DUMONT: Any other questions? Senator O'Mara.

EX SENATOR O'MARA: Doctor, you testified that water from Round Valley could be let into the South Branch of the river. Could it also be let into the North Branch?

DR. CAPEN: I believe it could. As a matter of fact, the dyke at the northwest end of the Valley is across a small branch of what is known as the South Branch of Rockaway Creek which, in turn, is a tributary of the North Branch. I have never studied that particular water course with the idea of letting water down it but I am perfectly sure - I have seen it many, many times, and I am perfectly sure that it could be enlarged to carry a reasonable flow in that direction.

EX SENATOR O'MARA: And would that be important as far as the control of the river is concerned, the Raritan River?

DR. CAPEN: It might be. It depends, of course, on who wants the water and where.

EX SENATOR O'MARA: Now, getting back to the cost of water from Stoney Brook and Spruce Run, as compared to the cost of water from Round Valley - I want to refer to page 13-A of the record where, when Mr. Ritter was testifying, Senator Lance asked him this question:

"SENATOR LANCE: I don't know whether this is an engineering question or a question for an economist, it goes to cost of water. Assuming that the Legislature should remove the restriction on Round Valley so that Round Valley could use Raritan waters, what would be the cost of Round Valley water using Raritan waters?

"MR. RITTER: As near as we can figure it, sir, it would be at least double in cost, assuming Round Valley would develop and a two hundred million gallon pumping station was installed at Hamden and a pipeline I think some three miles from Hamden to the Round Valley Reservoir, and a thirty million gallon reservoir taking only the flood waters of the Raritan, that would develop about 50 m.g.d. of safe yield. The cost of that project is in the category of $55.00 a million gallons in the reservoir, on a comparable basis to the $25.00 that has been suggested here for the water in the bed of the stream."

Now, I ask you, Doctor, is that a sound basis of comparison, to compare water from Round Valley at $55 as against water from these proposed projects at $25 per million gallons?

DR. CAPEN: Not in my belief, because Round Valley was proposed originally and still is primarily for potable water delivered under pressure. Understand, it has a flow line for 70 m.g.d. development, for example, of 380 feet above sea level, and would deliver water by gravity to cities which you can't do, of course, from Bound Brook.

EX SENATOR O'MARA: And in your opinion, would the cost of pumping and treating the water from Bound Brook amount to at least $20 to $30 per million gallon?

DR. CAPEN: I'm sure it would amount to more than that. But perhaps I should point out that I would believe that the $55 price, which you just mentioned, at Round Valley was considered as water delivered directly to the river. I have not figured that so I can't tell you whether I would agree with it or not.

EX SENATOR O'MARA: All right, sir. Now, is that little blue book that you have before you the report that was made on Round Valley in 1954?

DR. CAPEN: Yes. It was made under my direction.

EX SENATOR O'MARA: I wonder if that is part of the record, Senator Dumont. If it isn't, I think it would be helpful to have it.

SENATOR DUMONT: It hasn't been part of the record but there is no harm in making it such, I wouldn't think. It probably would help us in trying to examine all the possibilities here.

EX SENATOR O'MARA: Would you be good enough to deliver a copy of that report to Senator Dumont, Dr. Capen?

DR. CAPEN: I will do so right now.

SENATOR DUMONT: Thank you, Doctor. It will be made part of the record.

(For Report referred to, see conclusion of testimony)

EX SENATOR O'MARA: Getting back to a subject which was given considerable treatment in some of the earlier hearings, I would be interested in knowing, Doctor, did you make any detailed studies of Round Valley before you made the recommendation for the development of that Reservoir?

DR. CAPEN: Yes. There was a good many years of preliminary preparation made in that and a very intensive study for a period of probably more than a year before that report was issued, in which time detailed topographical surveys of the dam sites were made; a complete appraisal of all the properties was made; core borings of the dam sites were made; and a great deal of the exploratory work was done

in estimating the cost and feasibility of the water supply.

EX SENATOR O'MARA: One other question, Doctor. Do you consider the water supply that would be afforded from the projects now under consideration a first class water supply?

DR. CAPEN: Not for potable purposes, no.

EX SENATOR O'MARA: I think that's all.

SENATOR DUMONT: Dr. Capen, one more point about the possibility of using the Ken Lockwood Gorge. Over that Gorge is a railroad trestle of the Jersey Central. Assuming that you use a level of 450 or 460 feet for the water, if the Gorge were dammed up, do you have any idea as to how much of that railroad track, the trestle plus track on both sides of the Gorge, would have to be replaced or relocated?

DR. CAPEN: Actually, I can't tell you precisely with the plan of a 460 flow line. I do know that I made very extensive studies of it many years ago when we talked of the possibility of the Bunvale project. But it is my belief that you would probably have to relocate a substantial piece of that trackage, possibly a mile when you consider the approaches and the trackage itself which would otherwise be under water. But I haven't made a detailed study of it at that elevation.

SENATOR DUMONT: Do you remember whether you made any estimate of the cost of that at the time?

DR. CAPEN: Oh, yes. In 1930, about, we made very detailed estimates of the cost.

SENATOR DUMONT: I guess that cost of 1930 wouldn't help us too much at this point.

DR. CAPEN: I don't think they would be very helpful.

SENATOR DUMONT: You mention among your recommendations removing the restriction from the Round Valley legislation, which, of course, when Round Valley was purchased limited the storage of water there to impounding Delaware River water. Would you recommend that the restriction be taken out entirely or that there be a limitation to the South Branch of the Raritan along with the Delaware River?

DR. CAPEN: I am not too concerned about just how it would be done, the main thing is to get water. Just what limitations might be made is a matter of judgment, I think, for the Legislature.

SENATOR DUMONT: You see no harm in taking out the restriction entirely then, and just leaving it open to impound water from any source in Round Valley.

DR. CAPEN: That is right, because, after all, before any diversion right could be obtained an application would have to be made to the State Division of Water Policy and Supply and they would act on it.

SENATOR DUMONT: Any further questions of Dr. Capen? Thank you very much.

(Applause)

SENATOR DUMONT: Colonel John M. Fasoli.

JOHN M. FASOLI: My name is John M. Fasoli. I live in Bridgewater Township and I am Resident Counsel, with offices at Bound Brook, Somerset County, New Jersey, of

the Organic Chemicals Division of the American Cyanamid Company in behalf of which I present the following statement:

American Cyanamid Company and its predecessor in title, since 1915, have operated a large plant for the manufacture of chemicals and allied products on the north bank of the Raritan River in Bridgewater Township, Somerset County, New Jersey.

The plant is located less than one mile south of the confluence of the Raritan and Millstone Rivers. The present manufacturing plant covers 121 acres of a 604 acre riparian land tract on the Raritan River. At normal full capacity, it employes 4,000 people. It has a monthly payroll of well over a million dollars and represents a large capital investment.

The continued operation and expansion of this plant depend entirely upon the Raritan River as a source of industrial water supply. In the exercise of its vested, legal rights as a riparian owner, the Company withdraws from the Raritan River for plant operation an average on weekdays of approximately 20 million gallons a day. This industrial use at times reaches a peak usage of 23 million gallons a day.

All of this water is returned to the Raritan River after treatment, except for minor losses resulting from evaporation and spills. Most of this volume is used as cooling water and the company has installed and operates modern, efficient equipment for the maximum recirculation

and reuse of water, thereby substantially reducing the quantity of water which would otherwise be withdrawn.

The flow of the Raritan River has been adequate to supply the requirements of the Company as a riparian owner.

Mr. V. E. Atkins, General Manager of the Organic Chemicals Division and in charge of the operation of this plant at Bound Brook, is a member of the New Jersey Water Resources Advisory Committee. The Company favors the proposal of the Advisory Committee.

If the Spruce Run and Stony Brook reservoirs, proposed by the Advisory Committee, be constructed, it is understood that the low flow of the Raritan River would be improved in dry weather periods. Without waiving its riparian rights, the Company has authorized me to say that, as a matter of policy, it would be willing to make compensation upon reasonable terms for any volume of water released from the proposed Spruce Run and Stony Brook reservoirs to improve low flows and withdrawn by the Company from the river in excess of its present riparian usage.

SENATOR DUMONT: Colonel, you are a member, I believe, of the Citizens Water Resources Advisory Committee, is that right?

MR. FASOLI: No, I'm not but Mr. Atkins is.

SENATOR DUMONT: I see. Well, we certainly commend you and all the others who have voluntarily put so much time and effort into this work and report.

Any questions?

SENATOR CRANE: Mr. Fasoli, do you know of any others in the Advisory Committee that might have this same willingness to pay for water?

MR. FASOLI: I don't know of any others on the Advisory Committee who may be from our area, but I know that our Chairman, as well as a number of members, have discussed in some detail, for some time, the equitable basis upon which riparian owners might contribute to this project. And we feel that the position we have taken is a fair one and one based on equity. It should be borne in mind that the riparian owner who uses the water is obligated to return the water to the river in substantially the same quantity and quality, and, hence, is in a somewhat different position from a user who pays for the water but who might dispose of it in some other watershed or elsewhere. And we felt that if our usage should increase and the river is improved to that extent and we actually take the water, we would be willing to pay for it on such terms as might be developed reasonably.

SENATOR DUMONT: Any other questions?

EX SENATOR O'MARA: Mr. Fasoli, just a question or two. Did I understand you to say that the present flow of the river is adequate for your purposes?

MR. FASOLI: Yes, sir.

EX SENATOR O'MARA: Have you any idea what you mean by reasonable terms for additional water?

MR. FASOLI: I have no specific idea at the present time.

EX SENATOR O'MARA: As far as you know or are able to say today, you don't know what the requirements of your company would be for additional water, do you?

MR. FASOLI: We don't know at the present time.

EX SENATOR O'MARA: That's all.

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

I have a statement here from the Princeton Township Committee to be read into the record:

The Princeton Township Committee has an awareness of the future water needs of the State of New Jersey. It also has an awareness and a duty to protect its present and future residents against any local requirements for water.

If the statewide and provincial approaches to the problem are in conflict, the local need must first be guarded. Thus a firm protection for all future requirements should be whether the water is to be used by residential or industrial uses. A first priority locally would give protection against economic strangulation of the Princeton area. Any New Jersey community certainly would not desire to control anothers future nor does Princeton Township.

However, Princeton Township does not desire to have water at its front door but the well dry when it attempts to use the water. Any commitment of the Raritan Basin waters from any reservoir in the Raritan River Basin should be a conditional commitment first to the area in which the reservoir is located and secondly to the Raritan River Basin and third and last to the area outside of the Raritan River Basin.

In particular in regard to Stony Brook Reservoir -- the Princeton Township Committee is concerned with:

1. Loss of Ratables. From existing information and examination of the tax rolls it appears that as of October 1, 1956, $401,300 of buildings and $323,000 of land would be taken for the reservoir. This is incomplete but does effect 18 separate assessments and 14 owners in Princeton Township. It represents $724,300 of our total ratables of $66,562,601.

   These ratables -- or about 1.1% of the ratables -- are assessed at 100% of true value under a revaluation program completed in 1956. This would mean that each taxpayer in Princeton Township with a present tax bill of $500.00, would be asked to pay $5.50 per year for the inconvenience of having a reservoir in his community. This can be cured by proper legislative safeguard.

2. Loss, damage and disruption to our residents in and near the reservoir site. Those near the site may possibly be damaged without any right to compensation. This would be esthetic damage to property not taken in whole or in part and the damage in disruption of the present circulation of traffic to and from other parts of the Princeton Community. This is more difficult to cure by legislation. Beauty is not something that is measured in dollars.

3. Increased municipal problems of providing services to this area of the Township. The reservoir would divide the northwestern part of the Township into two parts by a body of water. This might be minimized by proper legislative safeguards for roads, bridges, etc.

4. Potential loss in beauty in the community by possible future disruption in the municipality by pipe lines to and from the reservoirs. This might be cured by proper legislative safeguards.

5. Loss of existing roads and costs of relocating these roads. This we understand is to be guarded aginst by amendment to the bill.

6. Loss forever of a beautiful section of Princeton. This cannot be cured by dollars or safeguards. Princeton is a university community. We are proud of our pleasant living conditions, and an orderly growth. We hope to maintain this orderly growth and trust that the esthetic beauty of the community will be maintained. We living there will do all we can toward this goal.

We on the Princeton Township Committee realize that the introduction of the study of a problem as large as the water problem of New Jersey will result in some controversy. We also realize that a report after any study will bring further discussion, and we hope that these discussions and these hearings will bring about the best solution to any present or future water requirements for the State of New Jersey. It is important that in the solution of this, any present or possible future water needs that the area which yields the water is not forgotten. The requirements of this area (and Princeton Township in particular) we respectfully urge must be protected now and for the future.

That was submitted by the Princeton Township Committee and will be made a part of the record.

Now, are there any witnesses who haven't been given an opportunity to testify who want to testify? This is a situation of doing so now or forever holding your peace, at least I trust that we won't have to hold other water hearings and that we can find a solution out of these.

Senator Crane.

SENATOR CRANE: Senator Dumont, I believe that there is one whom we should hear from - I referred to this earlier this morning and I have since consulted with the gentleman and he stated that he would make some remarks for the record. I refer to Mr. Leggette of Leggette, Brashears and Graham, to state his background in ground water surveys.

Mr. Leggette, this morning Mr. Sanford stated that you were not a water engineer, it is recognized that you are a geologist with some dealings in ground water. Would you please state for the record your qualifications as well as the merits of your organization in this work?

R. M. LEGGETTE: My name is R. M. Leggette. Mr. Sanford is right in that I am not a ground water engineer, I am a ground water geologist. I am a partner in the firm of Leggette, Brashears & Graham. We are retained by the Water Advisory Committee to advise them on matters pertaining to ground water only. We are not engineers and are only geologists specializing in the water phase of geology alone.

I am a graduate geologist from the University of

Chicago in 1923. Upon finishing three years of graduate work, I went with the U. S. Geological Survey, in 1928, and since that time have spent full time on nothing but ground water type of work in geologic fields of water supply.

My two partners have had comparable educational background and both of them were also with the U. S. Geological Survey in responsible charge of ground water studies for a period comparable with that of myself.

Our firm has a combined full-time ground water experience of something on the order of 90 years.

SENATOR CRANE: Sir, are you commonly called upon to render supplementary reports wherein water programs are considered? public water programs?

MR. LEGGETTE: Yes. I should say that perhaps 90% of our private practice has to do with water supply, either public or industrial.

SENATOR CRANE: You foreworded the ground water report for the T.A.M.S. Survey?

MR. LEGGETTE: Yes, we did.

SENATOR CRANE: You foreworded the ground water report for the Smith Committee?

MR. LEGGETTE: Yes, we did.

SENATOR CRANE: Are you presently conducting any further activities for the Smith Committee as far as ground water goes?

MR. LEGGETTE: We are at present in the process of outlining a program for recommendation to the Smith Committee on what we consider to be a proper long-time

program of ground water study in the State of New Jersey.

SENATOR CRANE: Are you aware of the Waddington-McCay Bill which had for its purpose a study of the ground water of the State?

MR. LEGGETTE: In a general way, yes.

SENATOR CRANE: It's a bill which appropriated $10,000 a year for that purpose?

MR. LEGGETTE: I believe that is correct.

SENATOR CRANE: In any event, is your mind closed to any project stated here today, either as a major project or its alternative?

MR. LEGGETTE: Is my mind closed,did you way?

SENATOR CRANE: Yes.

MR. LEGGETTE: No, by no means. I am highly in favor of any possible ground water program that appears to have merit that has been sufficiently outlined and studied to make it tenable for the study or carrying out.

SENATOR CRANE: Have you attended all the hearings, sir?

MR. LEGGETTE: I attended all but the first hearing which was attended by one of my partners.

SENATOR CRANE: Do you feel that you have heard anything here or read anything here that would tend to prejudice the nature of your report where you would wish to change your consideration or recommendation?

MR. LEGGETTE: Our report to the Smith Committee, do you have in mind, for example?

SENATOR CRANE: Yes.

MR. LEGGETTE: No. Our report to the Smith Committee is a generalized approach to the statewide ground water problem which, because of the nature of ground water studies, involves long-time study. You cannot factualize and make sound the ground water resources of an area by an intensive study in a period of a few months and at the same time make it statewide in scope.

SENATOR CRANE: Was your background on that, sir, developed substantially during the period when you made research for the T.A.M.S. Report?

MR. LEGGETTE: Well, it's based on that and perhaps detailed studies of various ground water supply problems involved in applications in the State of New Jersey before the Water Policy Council during the last 12 years or so.

SENATOR CRANE: In your opinion, sir, do you believe that the survey of ground water and the report rendered is sufficient, compared to other reports having been rendered, perhaps in other states or other areas when the public was to take under advisement whether to institute a plan of action or not?

MR. LEGGETTE: Well, there are few states in the country that have made as much progress in attempting to study their ground water conditions as the State of New Jersey. It should be recognized that since the 1920's, perhaps '23 or so, New Jersey in cooperation with the U. S. Geological Survey has been carrying on intensive ground water investigations in the areas in which there were localized intense problems. Of necessity, those studies,

which I believe have been continued since the early to middle 20's, have been directed toward the problem areas and have not been able to give much attention to the ground water potential in other parts of the State, large as they are in parts of the State, because there was not an immediate problem in that local area. So I would say that New Jersey has been perhaps more intensely studying its ground water problems than certainly most states in this country.

SENATOR CRANE: As I understand it, you are continuing to study and further reports will be rendered.

MR. LEGGETTE: That is correct, yes.

SENATOR CRANE: And the ground water potential is not being overlooked?

MR. LEGGETTE: That is correct. Our report, however, will not be a study, that is, as advisers to this Water Advisory Committee our report will not be the results of investigations that we will make. We are at the present time advising them as to what we think the intelligent approach to a study of the statewide ground water problem should be, county by county, area by area, problem by problem.

SENATOR CRANE: Would you care to qualify your work for the T.A.M.S. group? Was that a study, a survey, or simply advisory?

MR. LEGGETTE: That was more or less a summary of the ground water conditions in the State, based on what was known, what we knew from our own work, and bringing it together in an over-all statewide approach to the problem.

SENATOR CRANE: Do you believe it was thorough?

MR. LEGGETTE: I think so. Perhaps I am prejudiced.

SENATOR CRANE: That's all I have.

SENATOR DUMONT: Mr. Leggette, in preparing your part of the report for the Citizens Committee, did your firm limit itself to consideration of Spruce Run and Stony Brook or did you call upon the general knowledge which you have acquired in your studies in New Jersey during the years that you have been working on projects here?

MR. LEGGETTE: As I previously pointed out, Senator, our work for the Advisory Committee has had to do entirely with the ground water phases. Stony Brook and Spruce Run are surface water projects, and I am in no sense informed on those studies because they are outside of my field.

SENATOR DUMONT: You heard Mr. Sanford's testimony this morning, did you not?

MR. LEGGETTE: I did.

SENATOR DUMONT: Do you have any opinion about the practicality of the idea that he suggested or advanced in his testimony, Mr. Leggette?

MR. LEGGETTE: I am in no position to venture an opinion on that because, as previously labeled, Mr. Sanford's idea is the so-called Sanford Theory. Now, I think the theory is perhaps good, as all theories are; on the other hand, I have not been in a position to evaluate his proposal since I have had no opportunity to study any report which outlines the details of his proposal with the factual data behind the theory. I do not know whether the theory is

tenable. I would hesitate to recommend to the Water Advisory Committee that they get behind even a pilot study of that until I had an opportunity to study in detail a sound, comprehensive and coherent report on his proposal.

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

EX SENATOR O'MARA: No, thank you.

SENATOR DUMONT: Mr.Crooks, do you have a question?

MR. CROOKS: Yes. Mr. Leggette, in your wide experience have you come across any other instances in which underground reservoirs were developed similar to the type proposed by Mr. Sanford?

MR. LEGGETTE: I have come across many projects in which ground water developments were made by installations - either vertical wells or horizontal collectors or buried galleries which utilized river infiltration. However, the proposal, as I heard from Mr. Sanford this morning, involves utilizing a dredged channel of the river. His analogy to the infiltration galleries on the South Shore of Long Island in the old Brooklyn Water Supply System to his proposal, is not too sound,first, because the infiltration galleries on the South Shore of Long Island have at no time had above them any flowing surface waters or any flood waters that might have high turbidities; they are essentially nothing but an elongate horizontal well. On three different projects that my firms have been involved in recent years, features similar to what I understand the Sanford proposal to involve lead me to believe,

however, that perhaps one of the weaknesses that he seems to minimize is the ability for his dredged channel to remain open and permeable. We, for example, ran dredging experiments in the Miami Valley, in the Dayton, Ohio area, where we actually dredged the river. We found clearly that by dredging the river we allowed a rather striking increase in river infiltration because of that dredging. However, we found that some 2 or 3 days after our dredging a minor flood came along the stream and inside of a few hours to a day or so our increased infiltration that we had brought about by dredging was essentially nullified by the silting of the dredged channel.

MR. CROOKS: What was the drainage area, roughly, above that particular area? do you recall? because that, of course, has a major influence.

MR. LEGGETTE: Well, the silt characteristics of any stream depends on, of course, the size of the drainage area as well as the topographic conditions --

MR. CROOKS: As well as the type of soil.

MR. LEGGETTE: That is correct. The drainage area - I'm not sure that I can remember, but it involved two or three hundred square miles of drainage area, perhaps.

MR. CROOKS: Yes, which is considerably larger. You mentioned that the difference between the Long Island case, which was sited, and the proposal for the Upper Millstone was that there was not water over the gallery. Is it true that with existence of water over the gallery and, therefore, a head of water, there would tend to be a greater infiltration into the ground of the surface

water and of the stream water?

MR. LEGGETTE: It is correct that one of the elements that determines how much ground water could be developed by such a scheme is the element of head, but another - and this is important if, perhaps, not more important - is the permeability of the material overlying your installation or into which water must percolate or out of which, in Mr. Sanford's case, it must percolate. And if you decrease that permeability, as you apparently would enormously in any flood stage of almost any river, you would lose infiltration capacity rather rapidly.

MR. CROOKS: Because of silting.

MR. LEGGETTE: That's correct.

MR. CROOKS: The permeability - there is not too much question, is there, on the permeability of the Pensauken sands and gravels, as such?

MR. LEGGETTE: In places that is correct, but the Pensauken gravels are not a uniform deposit. They are quite variable, and in places they are highly permeable and in other places they are not so highly permeable.

MR. CROOKS: Correct. I guess that is all. Thank you.

EX SENATOR O'MARA: May I ask a question?

SENATOR DUMONT: Senator O'Mara.

EX SENATOR O'MARA: In this Miami project that you spoke about, was there a dam below that, Mr. Leggette?

MR. LEGGETTE: There was a low dam of a power company of a few feet high which, prior to our experiments, had been lowered for certain construction work; so that the area in which our dredging took place had more or less normal stream

velocities.

EX SENATOR O'MARA: So that the dam, in your opinion, had no effect on the project at all.

MR. LEGGETTE: No. The dam caused nothing more or less than a set of ripples in the stream.

EX SENATOR O'MARA: All right.

SENATOR DUMONT: Anything else? Mr. Crooks.

MR. CROOKS: I thought of a question which I did not ask before. The cost of dredging to maintain the permeability of that area would be a major or a minor factor, as far as the cost of water thereby developed?

MR. LEGGETTE: Well, I am not an engineer and, as such, we are not involved with cost studies. On the other hand, based on analogy with the dredging that would have been required to maintain good infiltration on this Miami River setup, I would think that you would have to keep a number of dredges going to cover a dredged channel a mile long, 600 feet or so on the sides, because the whole channel area would tend to be clogged, more or less depending on the turbidities involved during flood stages.

MR. CROOKS: In other words, it would be your opinion then that before a test is made of such a proposal as much investigation as possible, prior to that, should be made of the maintenance operations, such as dredging?

MR. LEGGETTE: Well, if the theory, when the facts are present, appears tenable, then I think the pilot study should be made; but until there is a basis, at least in my opinion before I would make such a recommendation it

would have to appear tenable, and I don't have the basis, as of now, as I indicated, to know whether it does or not.

SENATOR DUMONT: Any other questions? Thank you very much, Mr. Leggette.

EX SENATOR O'MARA: Senator Dumont, Mr. Sanford would like to resume the stand for a few moments to address himself to Mr. Leggette's remarks.

SENATOR DUMONT: All right. I think it is only fair then, if I give Mr. Leggette an opportunity to rebut further if he so desires.

MR. SANFORD: I attempted to make clear, in my report, the fact that the determination of the factors that enter into this construction, this unique construction that I proposed, can only be evaluated by a person who has done a lot of work of that kind. I think I made that clear and I think everybody probably understands it.

Now, as to the infiltration galleries on the South Shore of Long Island, if you will read my report you will find I referred to that to determine an actual case, in which a definite quantity of water that flows into an exposed section cut through the water bearing sand and gravels or beds to be determined, and came up with the facts that have been reported by the City of New York that over a total area of 325,000 square feet it was practically proven, year in and year out, that they could get over 25 million gallons per day. That has nothing to do with whether there is water over it or not. There actually was ground water over it, the pipe was never exposed, it was always under water.

Now, as to the valley from Dayton down to Cincinnati, Miami Valley, I happen to be familiar with that Valley too. In the first place, you may have read, that is a flashy sort of a Valley and it is glacial sediment with many flats and there is a lot of silt and sediment carried down when the velocity of the water is increased by large rainfalls. Therefore, the common phenomenon that the Germans discovered many years ago, known as schmutzdecke -- schmutzdeke means mud cover -- this phenomenon of schmutzdecke, and there is no other word that I know for it, is the deposition of silt in the bed of a stream which tends to purify or to develop antibodies to eat up the bacterial content of water when it percolates through it. Whenever a stream gets into high velocities, scour will cut that out and deposit it somewhere else. So you have a constant shifting in the erosion of the bed of a river.

However, the proposition I am talking about has no relation and no comparison at all with an open cut dredged in a river valley. What I propose to do is to provide a dam with sufficient capacity to let the bottom of this long series of four trenches, which are 30 feet deep, accumulate that very deposition that comes in with any occasional floods or that's washed in with the movement of ground water into the area in that large amount. And then, at regular intervals - and I can say from practical experience in hydraulic mining and work - to remove that silt which may be several inches, six inches or a foot, thick at the bottom

about once every six months. You just let the dredge pass over and pick up the silt only. The feeder of the arm that holds the pump that sucks it up is just held off the bottom high enough to just pick that up, suck it and shoot it through the pipe over to the shore and deposit it.

Now, after a certain period of time relatively little of that silt comes in from the formations that have been penetrated or cut through. The only silt you get will be that which is carried in by occasional flash storms. But flash storms are not nearly as frequent and the volume of water is not - that is, the high water levels are not nearly as high in that highly permeable area as they are in Stony Brook, for instance. That's why I suggested that a trip be made over the area. You will find by examining the old bridge structures and everything that they're low. The water never does get very high because it is mostly soaked into the ground before it gets a chance to run off. The amount of water that actually runs off, above where the dam we propose is to be, is not enough but what an ordinary, say a ten gallon or ten yard dredge, ten ton dredge will clear it up in four, five or six weeks' work during a year's time. It isn't difficult to get that silt off the top. If you are going to dredge to a great depth, that's different, you have to stay in one spot a long time. But I got a lot of information from the Army Engineers, with whom I worked before I went into this, as to these dredging operations to keep channels open. It doesn't take them a terrible lot of time to keep the silt that fills the channels in the Delaware

River, for instance. They are working all the time, it's true, but they have a tremendous length of channel to keep open.

I think that is all I have.

SENATOR DUMONT: Any questions of Mr. Sanford? Mr. Leggette, do you want to say anything in reply?

MR. LEGGETTE: No.

SENATOR DUMONT: Any other witnesses?

Now, Senator Crane, you had some questions you wanted to ask.

SENATOR CRANE: Well, I will ask them through Senator O'Mara or, if he likes, just to the three persons whom I felt gave engineering testimony - there is one question that I failed to ask each of them. It does not imply anything personal nor does it imply any wrongdoing nor am I inferring payment or monetary gain, but I would like to know first if their views here were solicited in any way by the Committee for a Sound Water Policy or the Stony Brook - Millstone Watershed Association, members of the Princeton Community, the County of Hunterdon, officials of the State or members of the Legislature, or by contrast, without any prompting, did they appear at this hearing as a result of their own public interest.

EX SENATOR O'MARA: What are the names of the persons to whom --

SENATOR CRANE: Werner Schmidt, Homer Sanford and Dr. Capen.

EX SENATOR O'MARA: Will you give me just a moment to confer with them?

SENATOR CRANE: Go right ahead.

EX SENATOR O'MARA: As to Dr. Schmidt, he was asked his views on this question by Mr. Test. He gave his views. He undertook a study of the matter and came here and gave his views without any compensation from anybody, purely as a matter of public service.

As to Mr. Sanford, Mr. Sanford first came in contact with this problem through the Watershed Commission. He was asked his views on that and on the problem of underground water as a solution for the problem to which these bills are addressed, and he gave that opinion to the Watershed Commission. That opinion became available to Mr. Test who asked him to testify here and he is being compensated for his time in testifying. The views that he expressed at the hearing were views that he expressed to the Watershed Commission before he was asked by Mr. Test to come here and testify.

As to Dr. Capen, he, as the record discloses, has long been interested in the development of water supply in this State as the preparation of the 1954 report on Round Valley indicates. On May 12th of this year he made a speech in Atlantic City - it was on a panel discussion, he was a member of a panel discussion, of which Governor Meyner and Mr. Baumer were also members. At that time he expressed the views which he has long advocated and which he has advocated here today. As a result of his speech on May 12th in Atlantic City, which I think was prior to the date of introduction of these bills, Mr. Test asked Dr. Capen to testify here. His views as expressed here are the

views that he expressed on May 12th and many times prior to that time. He is being compensated for his time.

SENATOR CRANE: Thank you very much, Senator O'Mara. I just thought it would be fair since our engineering advice was exposed that we also see those who were for the other side. There was no wrongdoing implied in my question.

EX SENATOR O'MARA: Oh, I understand that, Senator. You don't think testimony could be purchased, I know.

SENATOR DUMONT: Now, as I understand it, there has been an agreement reached - correct me if I'm wrong on this, gentlemen, - between Senator Crane and Senator O'Mara that what would be presented as a rebuttal or by way of summary of the points by the two sides, they will prepare in writing and send in and that will be made a part of the record. Is that correct?

EX SENATOR O'MARA: Yes, sir.

SENATOR DUMONT: In other words, Senator O'Mara will sum up for the opponents and Senator Crane will sum up for the proponents. Is that correct?

SENATOR CRANE: Yes.

EX SENATOR O'MARA: Yes, sir.

SENATOR DUMONT: They will exchange their memoranda and will also submit to the Committee copies of it and likewise to the press so that the people of the State can be adequately informed as to the summing up procedure on both sides.

EX SENATOR O'MARA: I should add to that, if the

Committee would like to hear oral argument on it when the memoranda are ready, I am sure that Senator Crane and myself will be very willing to oblige.

SENATOR DUMONT: Well, that's an interesting thought.

SENATOR CRANE: Thank you, Senator.

SENATOR DUMONT: Is there anything anybody desires to offer at this point?

EX SENATOR O'MARA: May I ask one more question?

SENATOR DUMONT: Yes, sir.

EX SENATOR O'MARA: I am thinking about the timing of the summations. First we should know, I suppose, when the record will be complete of today's hearing. We have the record up to today. I have my copy of the previous hearings. I wonder if we could have any idea when the record will be ready?

SENATOR DUMONT: A week or 10 days.

SENATOR CRANE: I was thinking of August 1st.

EX SENATOR O'MARA: August 1st, that will be all right.

SENATOR DUMONT: Well, I think that would be a good date, August 1st, because I am going to be away, as I mentioned, at Camp Drum and I don't think I can get this tour of the Delaware River organized until probably some time during the first week of August which, of course, would be one of the things we would want to do, and other field trips that it appears we ought to make we can also arrange. But I think that's a must.

Now, beyond that, you will probably be interested in how we would proceed. I can only give you some ideas about

that. I can't give you anything too definite.

When this Committee has before it the summaries, as well as the testimony of the record, and has completed its field trips, such as the one of the Delaware River, then it would be in a position to report to the entire Legislature.

Now, reports of committees are sometimes unanimous and sometimes they are split. I have no idea how this would be because, as you know, not all of our membership has been present at the hearings and, therefore, I don't imagine either Senator Crane or I have any idea what two-fifths of the members of the Committee are thinking at the moment, in any event.

After such a report is made, there are two ways, I suppose, this problem could be handled. One, is by, in the event that legislation had to be passed, submitting a referendum in November and then, of course, the Legislature would have to be called back into session. While theoretically the Legislature is recessed until sometime - I think it's the third Monday in November if my memory is correct, at the same time there is nothing to prevent the President of the Senate and the Speaker of the Assembly from calling the Legislature back at any time because we are in continuous session all year round. We never adjourn sine die until just a few minutes before the new session begins, the second Tuesday of January. Therefore, the leadership of both Houses can call those two Houses back at anytime they desire.

In the event - and I am merely pointing these out as possibilities, not as probabilities -- in the event that the Committee should decide that a referendum was not necessary, that there might be a solution which could be financed at least in the beginning stages by drawing from certain reserve funds, then it would not be necessary to have the Legislature return, we'll say, in August or in early September, as would be required for a referendum. It could return later than that, it could even return in November, before the end of the year and pass legislation, a supplemental appropriations bill designating the project and the source from which the money is to be taken in order to start the project.

In the case of a referendum, we have to pass the legislation in time so that the question can be sent out to the County Clerks - Senator O'Mara says 45 days and I am sure he is right because he was the dean of all of us not too far back - that question has to be sent out to the Clerks in time to be placed on the ballot as a public question, 45 days before the election.

So those are the possibilities that exist and we will try to keep you informed, of course, through the press and otherwise as to what is going on.

I might say that this subject will be one of continuing action because the Legislative television report on this Sunday coming up, over Channel 13, from 6 to 6:30, is to be devoted to the subject of Water.

Now, it seems to me that these hearings have been particularly productive in one respect, among others, namely

that the plan suggested by a committee that worked long and hard, namely the Citizens Committee, under good leadership, - the plan that they have suggested here has not been the subject of being necessarily on trial by itself, without any other constructive alternatives being presented. I think, too often when an idea comes in that hearings are devoted to showing that that idea is either good or bad and there is nothing else suggested as a possible substitute or modification of it. We have had many different ideas brought in here. It's our responsibility and it is going to be quite a task to try to review them and figure out, if we can, at least by a majority of the Committee, which recommendation would be made to the Legislature as a whole. Then, of course, we can't possibly at any time speak for what the Legislature as a whole might do with anything we might suggest. They might follow it or they might take up something entirely different. That has happened both ways.

But in any event I would, particularly on behalf of the Committee, like to thank all of the people who have participated - the Citizens Committee for the report that started these hearings in progress, after bills were introduced by Senator Crane in support of their recommendations, and became the subject of a hearing. And I would like particularly not only to thank them but also all the witnesses who have been here, who have testified and given us their honest opinion about ideas of their own or whether they thought this report of the Committee was a good report or ought

to be modified, or ought to be replaced by some other solution.

It has been a most productive series of hearings and on behalf of the Committee, and also I think on behalf of the entire population of the State of New Jersey who owe you folks and all of the witnesses a debt of gratitude because of the time and effort you spent on this very important subject, I think we ought to thank you most deeply and humbly.

Now, Senator Crane, do you want to add anything before we close the hearing?

(Applause)

SENATOR CRANE: I have this to say, Senator Dumont: I also want to thank everyone here present for their contribution, I think, to the State of New Jersey. Particularly I want to salute the opponents of the measure, so ably led by Senator O'Mara, Mr. Test and his associates, and the Stony Brook-Millstone Watersheds Association. They have, indeed, supplied us with much additional information. The tenor of their remarks has been very just and though I haven't, perhaps for good reason, drawn any applause from the gallery I at least want to thank everyone here present for their very friendly personal treatment of me, despite the stand that I have taken.

I want to assure these good people that, in regard to the bills that we have under consideration, I as their sponsor am indeed impressed that there is need for several amendments even before they are brought to final consideration

by the Committee. Number one, specifically, reimbursement in view of the loss of ratables in communities; number two, I think there should be a more definite provision for specific obligations as to who is to restore or relocate highways and utilities and the like; and number three, there has been some talk about a change in the language with regard to funding, that which the bond experts demand that we place in State bills wherever we undertake bonded indebtedness. Also there are many specific technical amendments as to language, of course, that will be made.

Now, as to the first three that I did mention, as to amendments, I made an open request of everyone here to submit possible language for incorporation in these bills. Of course, we shall ask our Law Revision group to look into the matter and present their own language. But I still want to keep the way open if anyone has any specific ideas as to reimbursement in view of loss of ratables, any language for specific obligation as to restoration or relocation of roads and highways, utilities and the like, or the funding principles, would they please send them to me at my office in Elizabeth, New Jersey. I would be very happy to receive them.

I do feel that out of all of this we, as the Legislature, should undertake a study of riparian rights and uses and charges to put New Jersey on the road to water progress so that in the future all will bear their fair share of the water cost burden.

So, with those few words, I also would like to go on record as thanking everyone here for their marvelous contribution and their spirit.

(Applause)

SENATOR DUMONT: I guess that's all. The hearing stands adjourned.

* * * * * * *

ROUND VALLEY PROJECT

For the

Metropolitan Section Of The North Jersey Water Supply District

Prepared for the Municipalities of

BAYONNE
ELIZABETH
HILLSIDE
KEARNY
NEWARK

by the

North Jersey District Water Supply Commission

November 1, 1954

Round Valley Project
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NORTH JERSEY DISTRICT WATER SUPPLY COMMISSION
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State of New Jersey

COMMISSIONERS

WILLIAM P. FURREY, *Chairman*
JOHN G. FLANIGAN
W. HOWARD LEE
HARRY V. SCHOEN
H. KERMIT GREEN

Office of the Commission
Wanaque, New Jersey

November 1, 1954

TABLE OF CONTENTS

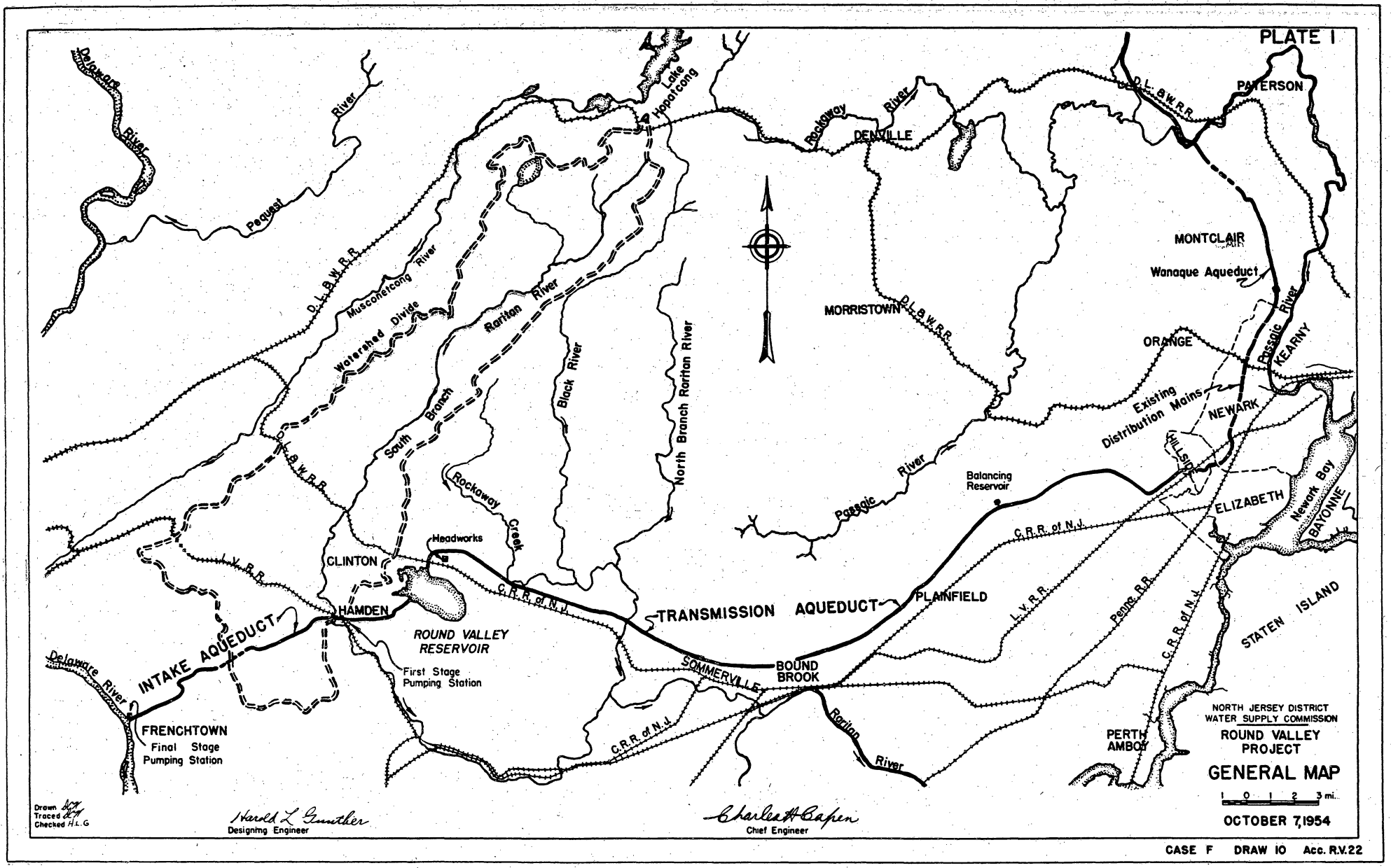


PLATE I
Delaware River
Pequest River
Lake Hopatcong
Rockaway River
DENVILLE
D.L.&W.R.R.
PATERSON
MONTCLAIR
Wanaque Aqueduct
Passaic River
KEARNY
ORANGE
MORRISTOWN
Musconetcong River
Watershed Divide
Raritan River
South Branch
Black River
North Branch Raritan River
Existing Distribution Mains
NEWARK
HILLSIDE
Rockaway Creek
Passaic River
Balancing Reservoir
ELIZABETH
Newark Bay
BAYONNE
Headworks
CLINTON
C.R.R. of N.J.
L.V.R.R.
HAMDEN
TRANSMISSION AQUEDUCT
PLAINFIELD
Penns R.R.
INTAKE AQUEDUCT
ROUND VALLEY RESERVOIR
First Stage Pumping Station
SOMMERVILLE
BOUND BROOK
STATEN ISLAND
Delaware River
FRENCHTOWN
Final Stage Pumping Station
Raritan River
PERTH AMBOY
NORTH JERSEY DISTRICT WATER SUPPLY COMMISSION
ROUND VALLEY PROJECT
GENERAL MAP
1 0 1 2 3 mi.
OCTOBER 7, 1954
Drawn WCT
Traced EM
Checked H.L.G
Harold L. Gunther
Designing Engineer
Charles A. Capen
Chief Engineer
CASE F DRAW 10 Acc. R.V.22

INTRODUCTION

In accordance with the resolutions of the cities of Elizabeth and Newark and the Township of Hillside, and following conferences with representatives of these municipalities, the North Jersey District Water Supply Commission has studied the subject of an additional water supply. These municipalities were subsequently joined by the City of Bayonne and the Town of Kearny. The Town of Bloomfield adopted a resolution on February 7, 1955, authorizing participation by that municipality. These studies have been completed and the resulting findings are given in the following summary, which outlines in brief form the conclusions reached.

I

SUMMARY

1. Water needs of the northeastern metropolitan area of New Jersey are increasing and a new large water supply is urgently required to meet these growing demands.

2. Inspections of the various areas proposed for a reservoir site in the past, to serve the area requesting this report, have brought the conviction that only Round Valley remains reasonably obtainable.

3. Water to fill Round Valley can be most economically diverted into the reservoir by establishing a pumping station at Hamden on the South Branch of the Raritan River.

4. The watershed area of the South Branch at Hamden is 140 square miles.

5. An initial yield of 50 million gallons per day (m.g.d.) or 70 m.g.d., can be economically developed by building the dams for a flow line elevation of 350 and 380 respectively.

6. By pumping at the maximum rate of 200 m.g.d. from the river during favorable times, a yield of 70 m.g.d.

is possible with the storage provided, and at the same time it will be possible to permit a reasonable flow to go downstream.

7. To develop the system beyond 70 m.g.d., it will be necessary to establish another pumping station on the Delaware River just above Frenchtown.

8. For a development of 200 m.g.d., a flow line elevation of 380 and a storage of 50 billion gallons will be required.

9. Delivery would be at Elevation 235 at the south terminus of the Newark-Elizabeth 60-inch pipe line, or at such slightly higher elevation as may be required to send water into the South Orange Avenue reservoir in Newark. Flow will be principally by gravity.

10. Cost of construction and development for 50 m.g.d. is estimated at $47,803,250, exclusive of interest during construction.

11. Cost of construction and development for 70 m.g.d. is estimated at $54,345,165, exclusive of interest during construction.

12. The development of an additional 130 m.g.d. can similarly be accomplished in stages. Since the construction of the additional part of the system from this source may not be initiated for at least 10 years, no detailed estimate has been made for it. The rough estimate for this development at this time would indicate an approximate cost of $26,000,000. The cost per m.g.d. developed will be materially reduced as the volume of water diverted from the Delaware River increases. This stage does not require a new reservoir site, nor duplication of rights-of-way.

HISTORICAL

No one connected with the water supply situation in northeastern New Jersey can help being aware of the many occasions on which various sources of supply have been ad-

vocated and reported upon. The North Jersey District Water Supply Commission has, both by legal requirements and custom, taken a leading part in helping to bring a solution to some of these problems by presenting viewpoints gathered in the course of nearly 40 years of experience.

In the past there have been studies made of such projects as Stony Brook, Long Hill, Chimney Rock, Bunnvale, Dock Watch Hollow, Round Valley, and, on an interstate basis, the plan promoted by the Interstate Commission on the Delaware River Basin (Incodel). All of those listed in New Jersey, with the exception of Round Valley, have in effect been eliminated largely by the growth of population in the areas. The Incodel plan became improbable of accomplishment when Pennsylvania failed to approve the interstate proposal and New York City subsequently made separate plans which preclude economical joint action.

There are very few left who cannot be convinced that the other sites mentioned are not usable because of the growth in those areas. On the other hand, Round Valley has not been subject to the type of growth prevalent in the other locations. There have been a very few new homes built in the Valley in the last two or three years. This is indicative of what may happen to eliminate this one last natural valley from consideration.

It may be noted that the foregoing comments do not apply to such projects as the Longwood Valley Reservoir proposed by Jersey City, the Point View Reservoir proposed by the Passaic Valley Water Commission, and the West Livingston Reservoir now being advanced by the Commonwealth Water Company. All of these have a justifiable engineering background and may well furnish some portion of the additional water that will be required or is already needed.

Presently about fifty residences exist in the Valley, mostly connected with farms. To utilize the area for reservoir purposes will require purchasing about 3,500 acres of land, of which about 2,200 acres will eventually be covered with water.

The present studies were initiated by the cities of Elizabeth and Newark and the Township of Hillside. These three municipalities, by resolution, originally authorized this study to be made by the North Jersey District Water Supply Commission. They were subsequently joined by the City of Bayonne and the Town of Kearny. The vision and courage of the municipalities are noteworthy and commendable, and will unquestionably expedite the ultimate solution of this pressing problem. In the past, every municipality that joined in the Wanaque and Ramapo Projects (completed in 1930 and 1953 respectively by the Commission) has felt amply repaid for its foresight.

By no means does this action and study limit the ultimate use of Round Valley water to those three municipalities. The design and capacity will accommodate many others. It is also expected that arrangements will be made so that private water companies and industries may take water from this source when they desire to do so. The complete Round Valley system will meet the needs of northeastern New Jersey for most of the balance of the Century.

III

ROUND VALLEY PROJECT — FIRST STAGE

General Features

It is well to understand that the principal components of a large water supply of this nature consist of (1) intercepting the flow of one or more streams from a suitable catchment area; (2) storing the water in an impounding reservoir; and (3) transporting the water through a large conduit or transmission line to the potential consumers. In the present instance these would be accomplished as follows:

(1) The flows of the South Branch of the Raritan River, exclusive of extreme flood flows and normally required minimum flows, would be intercepted at Hamden at which point pumps would be installed to send the water through a large force main to Round Valley.

(2) The valley would be formed into an impounding reservoir by means of suitable dams.

(3) A treatment plant would be located on the north side of the reservoir from which a transmission main would transport the water to the terminal point at the Newark-Elizabeth line, with required take-off points en route.

Inlet Works

The existing low dam at Hamden, originally constructed for the operation of a flour and grist mill by water power, diverts water into the raceway formerly used by the mill. It will not be necessary to reconstruct the dam but the raceway would be enlarged and enclosed in a pressure pipe to the pumping station. Pumps would consist of four units, each capable of delivering 50 million gallons daily against a static head of about 200 feet. The motors necessary to operate these pumps would have a total capacity of 9,000 horsepower (H.P.).

Force Main

A force main consisting of twin pipes, each of 6 feet diameter, would traverse a distance of 3.3 miles between Hamden and the southwesterly corner of the reservoir. Other points of diversion were considered but this was found most economical.

Reservoir

Round Valley is well described by its name. It is located in Clinton Township, Hunterdon County, and is slightly oval in shape with the general floor of the valley being 2.6 miles long by 1.5 miles wide. Enclosing most of the valley is Cushetunk Mountain, composed entirely of diabase, (trap rock). This rock formation forms an ideal enclosure, and, at the points where it is required that foundations for dams be established, the stability and density of the rock is excellent.

The floor of the reservoir is derived from a red sandstone formation but no important structures rest thereon and no special engineering problems arise because of this condition.

Two small streams originate in the valley. The larger is Prescott Brook which flows out the southwest corner of the valley to empty into the South Branch of the Raritan River below Stanton. The smaller stream flows out of the northern side of the valley and is a tributary of the South Branch of Rockaway Creek which in turn flows into the North Branch of the Raritan River.

In order to form a reservoir it is necessary to place a dam across each of the streams. The one across Prescott Brook has been termed the South Dam. The force main from Hamden is planned to enter the reservoir at this point. Provisions are included to permit a let-down of water to maintain a constant flow in Prescott Brook.

At the northerly pass from the valley the North Dam would be constructed across the small stream at that location. The outlet works would be situated to the northeast of this structure.

In addition to the dams mentioned, it will be necessary to prevent escape of water from the northwest corner of the reservoir area by construction of a dike across the low saddle at that point.

It is contemplated that sufficient lands will be obtained to control the quality of any waters flowing directly into the reservoir. As a further means of improving the quality of the water, it is planned to clear all vegetation within the reservoir flow line and to remove stumps and roots.

The arrangement of inflow and outflow assures a maximum storage time across the deep end of the reservoir, thus giving the utmost advantages for improvement of water quality and temperature that are imparted by prolonged storage and depth.

Dams

The South Dam and the North Dam would cross the road between Lebanon and McPherson. The South Dam would be across Prescott Brook at McPherson, while the

North Dam would be across the tributary of Rockaway Creek a short distance south of the Central Railroad of New Jersey. The dike (or Northwest Dam) would be located across the saddle that exists approximately fifteen hundred feet west of the location of the North Dam.

Engineering studies have established the desirabilty of designing the dams as earth fill structures with concrete core-walls. Typical cross-sections of these dams are shown on Plates II, III and IV in the Report.

Geology

Because of the many interesting features of the geologic formation at Round Valley, a special effort has been made to explore the underground conditions at the locations of the two dams and the dike.

From the start the explorations have been pursued in close cooperation with State Geologist Meredith E. Johnson and his staff. A contract was awarded to Sprague and Henwood, Inc., for making a series of core borings along the centerline of the proposed three structures.

There is a geologic fault line that traverses up the Prescott Brook and crosses the valley to the northwest through the dike site. The location of the fault and the respective rocks forming it have been found and plotted, as a result of which it is reasonable to state that with a concrete core-wall and suitable grouting, excellent dams may be constructed.

Surveys

In order to establish a basis for computation of quantities of materials required for dams, field surveys were made at the locations of the proposed structures. These were accomplished by Studer and McEldowney, Civil Engineers and Surveyors of Clinton, New Jersey. The resulting topography is shown on the respective maps of the two dams and the dike, Plates II, III and IV.

Outlet Works

At the North Dam a gate house would be constructed which would control the flow of water out of the reservoir to the ultimate consumers and would permit a regulated flow to go down the stream presently emerging at that point.

Near this same location the main headworks will consist of a combined chemical treatment building and filter plant, an administration building, and a general utility building that will house a garage, carpenter shop, paint shop and storehouse. In addition there would be a standby or booster pumping station which would maintain pressures on the transmission main when the elevation of the water surface in the reservoir is too low to insure the desired pressure.

Transmission Main

The initial transmission main, for either a 50 m.g.d. or 70 m.g.d. development, will be a 72-inch pipe traversing a route somewhat parallel to State Highway No. 22. It is planned that a number of take-offs will be provided, some to be used as soon as those who desire to do so connect to the system and others to be located at intervals for future possible connections.

This pipe will be a pressure line throughout its entire length, a distance of 38 miles. In the first stage, water will be available at a maximum elevation of almost 350 at the reservoir, reducing to about 235 at the Newark-Elizabeth boundary line. This is ample head for any users throughout the area to be served with the possible exception of a few communities in Hunterdon County which may require a small booster station to make available sufficient head for their present and future needs.

Balancing Reservoir

Because of the fact that peak demands for water are sometimes as much as 75% more than the annual average, a balancing reservoir will be built to "float" on the line near the areas to be served. This will hold the size of most of the

aqueduct to that made necessary by the amount of the average daily draft. The balancing reservoir would be a covered reinforced concrete structure containing 20 million gallons, sufficient water to meet peak demands. An available site has been tentatively selected.

Utilities

The New Jersey Power and Light Company has a 33,000-volt transmission line traversing the northwesterly portion of the valley and leading from Lebanon toward Flemington. This, together with a multi-pair cable telephone line, will have to be relocated outside the reservoir area. The cost of such removal is not great and is included in the estimates.

Highways

Traffic on the road leading from Lebanon south and traversing the westerly side of the valley toward McPherson would be diverted outside the reservoir area. The same would be true of traffic on the east-west road that traverses the middle of the valley. Similar instances in the past have resulted in better roads than those originally existing. The cost of these new roads is also included in the estimates.

Quality of Water

Because of the long storage provided, namely a minimum of 250 days in the final stage and considerably more than that at first, the water will be of such high quality that it could be delivered to consumers with very little treatment. With the knowledge, however, that the public is becoming increasingly conscious of water quality, the extra safeguard of filtration has been considered advisable. This will be done by pressure filters without the necessity of coagulation basins because the long storage makes further settling unnecessary.

The great depth of the water in the reservoir, even in the first stage, averaging fifty feet or more (and eighty feet in the second stage), is such that water of a desirable low temperature can be delivered.

All of these features make it possible to predict that the water to be obtained from this source will be equal in quality to the best of the large sources now available in this part of the State.

Real Estate

It is quite natural that those residing in the Round Valley area have a deep interest in trying to learn the outcome of the proposal to acquire their properties for this purpose. In fairness to them it is highly desirable that a decision be made as soon as practicable.

While no one can definitely apply a general term to the attitude of the valley residents, it seems, from investigations made thus far, that the owners will be willing to accept the greater needs of public water supply as inevitable, provided that they can be assured of obtaining fair prices. In general they appear to be aware that purchases for the Wanaque and Ramapo projects, as examples of past developments, have been equitable. Little opposition has therefore come from the owners.

IV

STAGES

First Diversion

It is practicable to develop the Round Valley project for 50 m.g.d. or 70 m.g.d. This can be done either by developing only 50 m.g.d. at present, and expanding to the larger amount later, or it can all be done initially. Decision as to which course to pursue will depend on the amount of water which the potential consumers indicate that they will need and for which they will contract.

Final Stage

The final stage entails diverting water from New Jersey's share of the Delaware River. Studies have shown that this may be admirably combined with the Hamden diversion

point by constructing a pumping station just north of Frenchtown. An intake would carry water from the Delaware River to the pumping station in which either four or six units, having a total capacity of 200 m.g.d., would take water during the periods when such diversion would not adversely affect the flow to downstream riparian owners. The motors for these pumps would have a total rating of 14,000 horsepower.

By pumping at a rate of about 200 m.g.d. over a period of 250 days or less, the ultimate yield of the system can be increased to a total of 200 m.g.d., i.e., the 130 m.g.d. yield from this source will supplement the 70 m.g.d. yield from the South Branch.

When demand for this water is evident, capital costs will be less per m.g.d. than for any development on the South Branch alone. Thus, as in many other endeavors, water supply benefits by lower production costs when the quantity of output is increased.

It may also be noted that it is not essential to develop the entire 130 m.g.d. from the Delaware River at once. By using step development, the same economy of quantity production will be available and the ultimate production costs will be about half of the initial cost of a 50 m.g.d. project.

Force Main

To carry the water from the Delaware River to Round Valley, it will be necessary to install a large size pipe line or two smaller ones. In order not to increase the head by taking the water over the highest point of the route, part of the force main will be in tunnel section. There is approximately 12 miles of open cut and 2.2 miles of tunnel.

Transmission Line

It will be necessary at some time in the future to install some additional transmission facilities, to those areas where water is needed.

Appurtenances

The filter plant and possibly the balancing reservoir will have to be increased in size later to take care of the increased amount of water to be handled.

Estimates of Cost

Estimates of cost for the 50 and the 70 m.g.d. alternates, for diversion of water from the South Branch of the Raritan River, are contained in Tables I and II annexed.

V

NEED FOR WATER

No one connected with daily water supply problems in this area can help being impressed with the increasing demands for water and the almost annual occurrence of shortages in one section or another. True, the cause is not always a lack of supply, but there are so many signs pointing the way to an ultimate severe shortage that the warning cannot be neglected.

During the period between 1940 and the present the daily demand in the northeastern part of New Jersey has increased more than fifty per cent, or at the rate of 11 m.g.d. per year. The means being taken to meet this increase are by no stretch of the imagination considered adequate.

Experience has shown that the results obtained from efforts to curtail the use of water are temporary. They continue for some time after a water shortage, but within a year or less, consumption resumes its former pace.

As an example of increases in usage the modern housewife, in seeking a new home, requests all the new water-consuming gadgets that make housework less burdensome. The male side of the family wants an air-conditioned office (a large source of water usage) so as to work more efficiently. And last, but by no means least, who will say "No" to the many new industries that wish to locate in New Jersey or to existing ones that wish to expand?

There is no indication that water consumption will diminish or even level off eventually. Quite to the contrary, it is evident that the use of water is expanding. Those whose duty it is to try to foresee these increased needs would be remiss in their duty indeed if they failed to bring their findings before those who may be in a position to translate these requirements into positive action.

A projected estimate of population for the six counties of Bergen, Essex, Hudson, Middlesex, Passaic and Union, the principal counties of the North Jersey Water Supply District, was made by the Research and Statistics Section of the New Jersey Department of Conservation and Economic Development. This projection indicates an increase of 13.2% between 1950 and 1960. For the entire State there is a projected increase of 20.2%.

If only 50% of the anticipated demand in northeastern New Jersey occurs, it will require an additional supply of 55 m.g.d. in the next 10 years. The minimum first stage of the project, calculated to produce 50 m.g.d., would therefore furnish only the minimum margin of safety for future water supply in the District, with the opportunity for further expansion, if the demand should be greater than 50%.

VI

VALIDITY OF THE PLAN

There is no need to dwell on the merits of Round Valley or to compare it in general with other plans. There is no other project suitable or available that can produce the amount and quality of water that can be had from Round Valley at anything like the cost and with so little disruption of existing establishments.

For once, perhaps the first time in more than 30 years, engineers are pretty well agreed on the general features and desirability of this plan. The mere fact that a few people are outspoken in their opposition to this project has little weight insofar as the merits are concerned.

It is important to note that no new additional legislation is required if the present applicants and additional municipalities decide to finance the project. Neither is there any prohibition on the taking of waters from any of the tributaries of the Delaware River if the plan should ever be revised.

The first stages represent a taking from the South Branch of the Raritan River and only the ultimate stages contemplate taking from the Delaware River.

The course is clear, the plan is valid. All that is needed is the concerted action of interested parties to start the necessary wheels in motion.

VII
FINANCIAL ASPECTS

The Incodel proposals and engineering reports indicate that the first stage of their development would provide 240 m.g.d. for New York and 225 m.g.d. for northern New Jersey, or a total of 465 m.g.d. The cost of that project, estimated in 1950, was $516,932,100. It would therefore appear that New Jersey's share of the Incodel Project would have been approximately $250,000,000 for a supply of 225 m.g.d. Comparing this with the total estimated cost of the complete Round Valley Project for the ultimate production of 200 m.g.d., indicates that the Incodel estimates of cost represent approximately three times the estimated cost of the Round Valley Project for almost the same quantity of water.

The sponsors of this Report have made application for the following quantities of water:

BAYONNE	15	M.G.D.
ELIZABETH	15	M.G.D.
HILLSIDE	2½	M.G.D.
KEARNY	3	M.G.D.
NEWARK	5 to 15	M.G.D.

Since this report was first issued the Village of South Orange indicated that it would like to obtain an additional permanent supply of water and that it may be interested in joining in a formal application for the Round Valley Project. Inquiries were received from other interested municipalities as

well. The Town of Bloomfield adopted a resolution on February 7, 1955, authorizing participation by that municipality to the extent of 10 M.g.d.

In order to provide sufficient capital investment for the initial stage of the Round Valley Project, it will be necessary to secure the cooperation of other municipalities until 50 m.g.d. has been subscribed. It is the considered opinion of the Commission that because of the anticipated increased demand, heretofore reviewed, applications from additional users will be forthcoming to subscribe to the balance of the 50 m.g.d. required for the initial stage of the project.

Under the legislation governing the Commission and the municipalities, Title 58, Chapter 5, each municipality is required to finance its respective share of the total capital investment. The average interest rate will therefore vary with the credit responsibility of each municipality. Bonds for this project may be issued by municipalities extending over a 40-year period, pursuant to R. S. 40:1-34. It is estimated that construction would consume a period of 5 years and that moneys during the period of construction can be obtained at approximately 2% interest, because they would be borrowed on a shorter term basis. The following example will illustrate the cost per million gallons, based on a uniform debt service with interest rates of 2½% and 3%, and for the development of the project for 50 m.g.d. and 70 m.g.d.:

Yield of Project M.G.D.	* Total Cost	Interest Rate %	** Annual Debt Service	Annual Cost of Operation	Cost per M.G.
50	$50,000,000	3	$2,163,000	$600,000	$151
		2.5	1,992,000	600,000	142
70	$57,000,000	3	$2,465,820	$700,000	$124
		2.5	2,270,880	700,000	116

* Total Cost includes estimated interest during construction.

** 40-year period.

The foregoing illustrates that the ultimate cost per million gallons will depend upon interest rates obtained by the various municipalities and the extent of the development. The additional stages from the Delaware River will similarly substantially reduce the unit cost. The project therefore provides the prospective users with a definite assurance of lower unit costs commensurate with greater usage.

It is important to the present applicants and to prospective applicants that municipal financing at the present time enjoys favorable interest rates. Whether this condition will continue is difficult to forecast. Any increase in interest rates for self-liquidating municipal projects and any increase in construction costs would work adversely to those interested in securing a supply of water.

VIII

CONCLUSION

When New Jersey was coming into its own as one of the great manufacturing states in this country, there were many who opposed some of the large water developments that have proven so necessary. It behooves those of vision, however, to circumvent these obstacles by acting in accordance with this pressing public need. Unless this is done, northern New Jersey will forfeit part of its birthright.

The Round Valley Project is sound, feasible, and most important, available. Its development can and should be started at once. The Commission therefore urges the present applicants to assist in securing the cooperation of other users to join as early as possible in the initiation of this important water supply project.

TABLE I

ROUND VALLEY PROJECT

1954 Estimate of Cost

Yield: 50 M.g.d. Delivery at Elizabeth at Elev. 235.

ROUND VALLEY RESERVOIR (Flow line elevation 350, with available storage capacity of 30,000 M.G.)

North Dam	$ 2,800,000
South Dam	4,700,000
Northwest Dam (Dike)	3,600,000
Clearing and Grubbing	216,000
Fencing	216,750
Relocation of Roads and Utilities	460,000
	$11,992,750

INTAKE AQUEDUCT

Pumping Station at Hamden	$ 1,350,000
Force Main from Hamden to Round Valley	2,118,000
	$ 3,468,000

HEADWORKS

Filter Plant	$ 1,514,000
Chemical Building	429,000
Administration Building	150,000
Lower Gate House	303,600
Garage and Miscellaneous Buildings	200,000
Booster Pumping Station	880,000
	$ 3,476,600

TRANSMISSION MAIN	
Pipe Line (38 miles of 72-inch pipe)	$21,700,000
Balancing Reservoir	1,100,000
	$22,800,000
Real Estate for Reservoir, Pumping Station, Headworks, and Rights-of-Way for Pipe Lines	$ 3,270,000
Engineering, Legal and Administrative	2,595,900
Miscellaneous Costs	200,000
	$ 6,065,900
GRAND TOTAL	$47,803,250

TABLE II

ROUND VALLEY PROJECT

1954 Estimate of Cost

Alternate Plan

Yield: 70 M.g.d. Delivery at Elizabeth at Elev. 235.

ROUND VALLEY RESERVOIR (Flow line elevation 380, with available storage capacity of 50,000 M.G.)

North Dam	$ 3,900,000
South Dam	5,700,000
Northwest Dam (Dike)	5,200,000
Clearing and Grubbing	216,000
Fencing	216,750
Relocation of Roads and Utilities	460,000
	$15,692,750

INTAKE AQUEDUCT

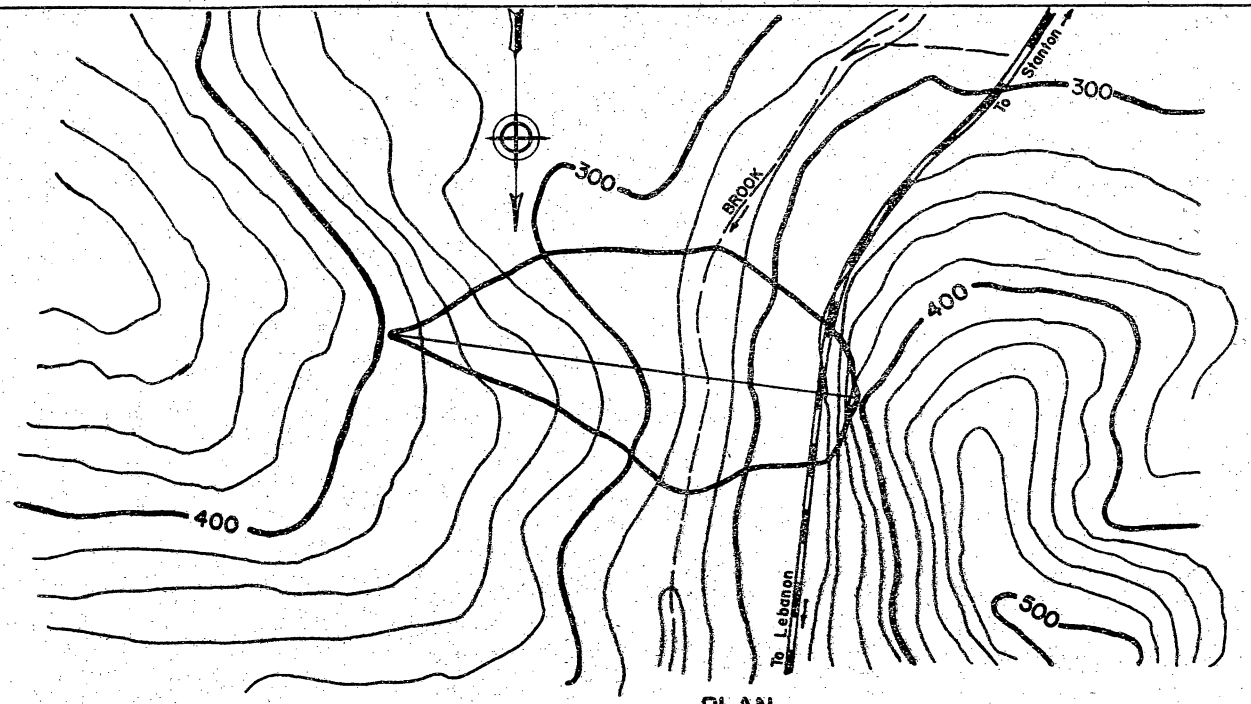
Pumping Station at Hamden	$ 1,350,000
Force Main from Hamden to Round Valley	3,794,750
	$ 5,144,750

HEADWORKS

Filter Plant	$ 1,870,690
Chemical Building	508,375
Administration Building	150,000
Lower Gate House	303,600
Garage and Miscellaneous Buildings	200,000
Booster Pumping Station	880,000
	$ 3,912,665

TRANSMISSION MAIN	
Pipe Line (38 miles of 72-inch pipe)	$21,700,000
Balancing Reservoir	1,100,000
	$22,800,000
Real Estate for Reservoir, Pumping Station, Headworks, and Rights-of-Way for Pipe Lines	$ 3,270,000
Engineering, Legal and Administrative	3,325,000
Miscellaneous Costs	200,000
	$ 6,795,000
GRAND TOTAL	$54,345,165

PLATE 2



PLAN

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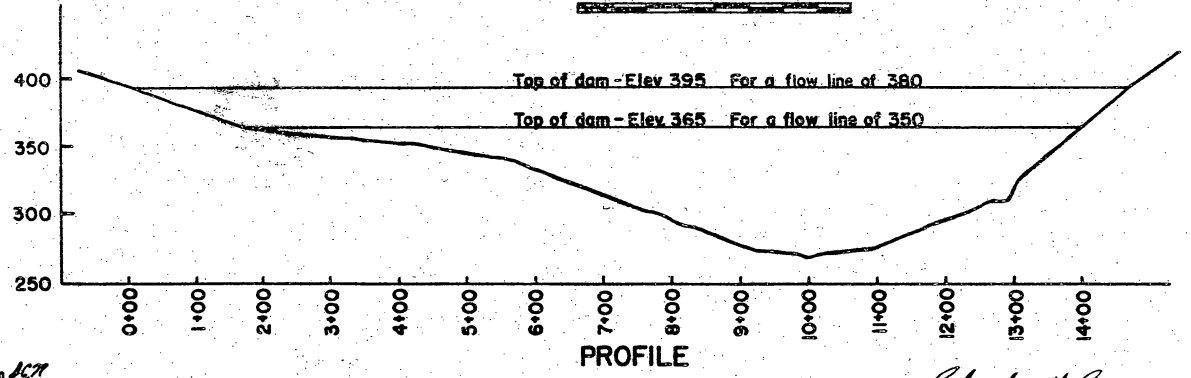
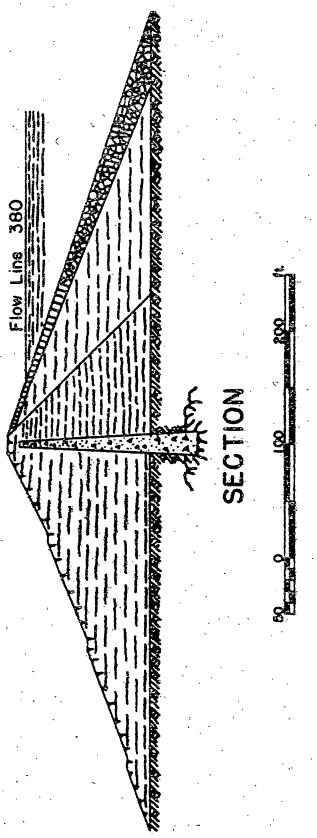


PROFILE



NORTH JERSEY DISTRICT
WATER SUPPLY COMMISSION

ROUND VALLEY PROJECT

NORTH DAM

PLAN, PROFILE and SECTION

OCTOBER 18, 1954

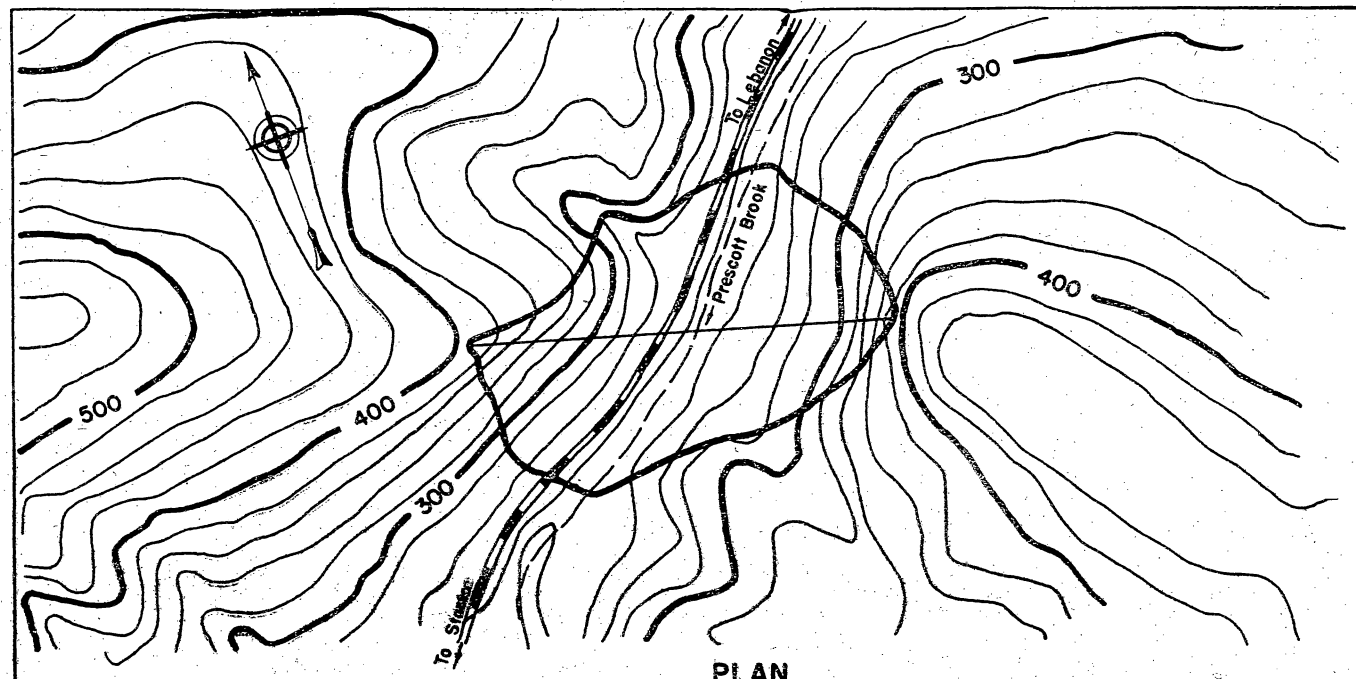
Drawn W.C.M.
Traced W.C.M.
Checked N.L.G.

Herald L. Gruntler
Designing Engineer

Charles H. Capen
Chief Engineer

CASE F DRAW 10 Acc. R.V. 23

PLATE 3



PLAN

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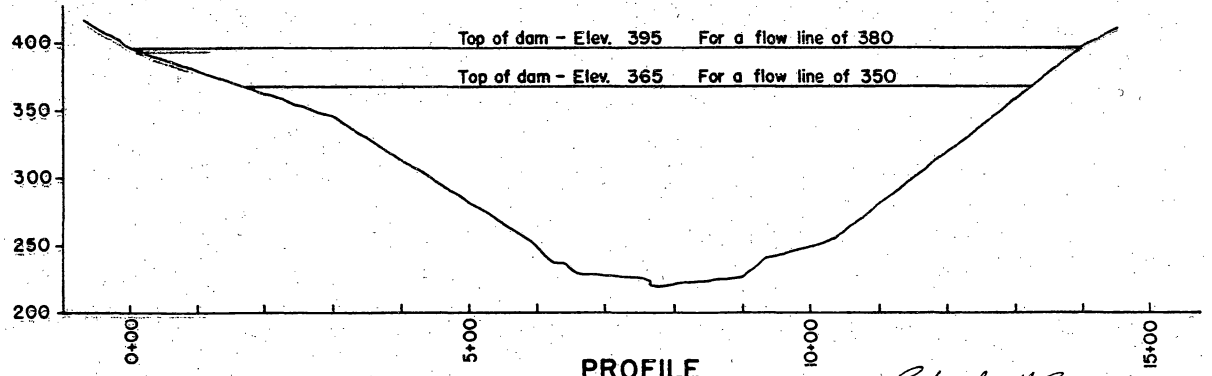
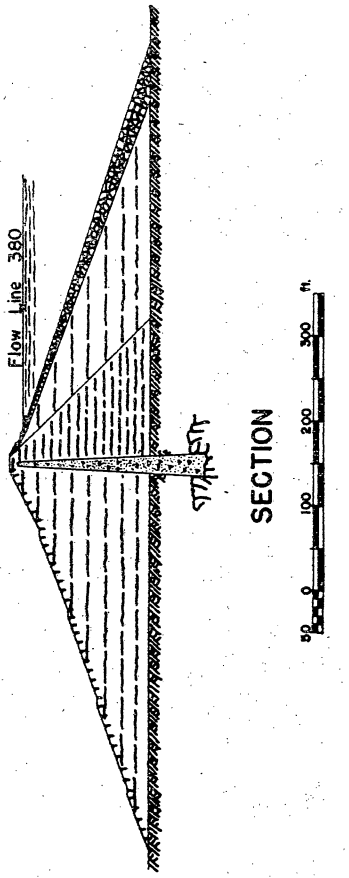


PROFILE



Drawn
Traced
Checked H.L.G.

Harold L. Gunther
Designing Engineer

Charles H. Capen
Chief Engineer

NORTH JERSEY DISTRICT
WATER SUPPLY COMMISSION
ROUND VALLEY PROJECT

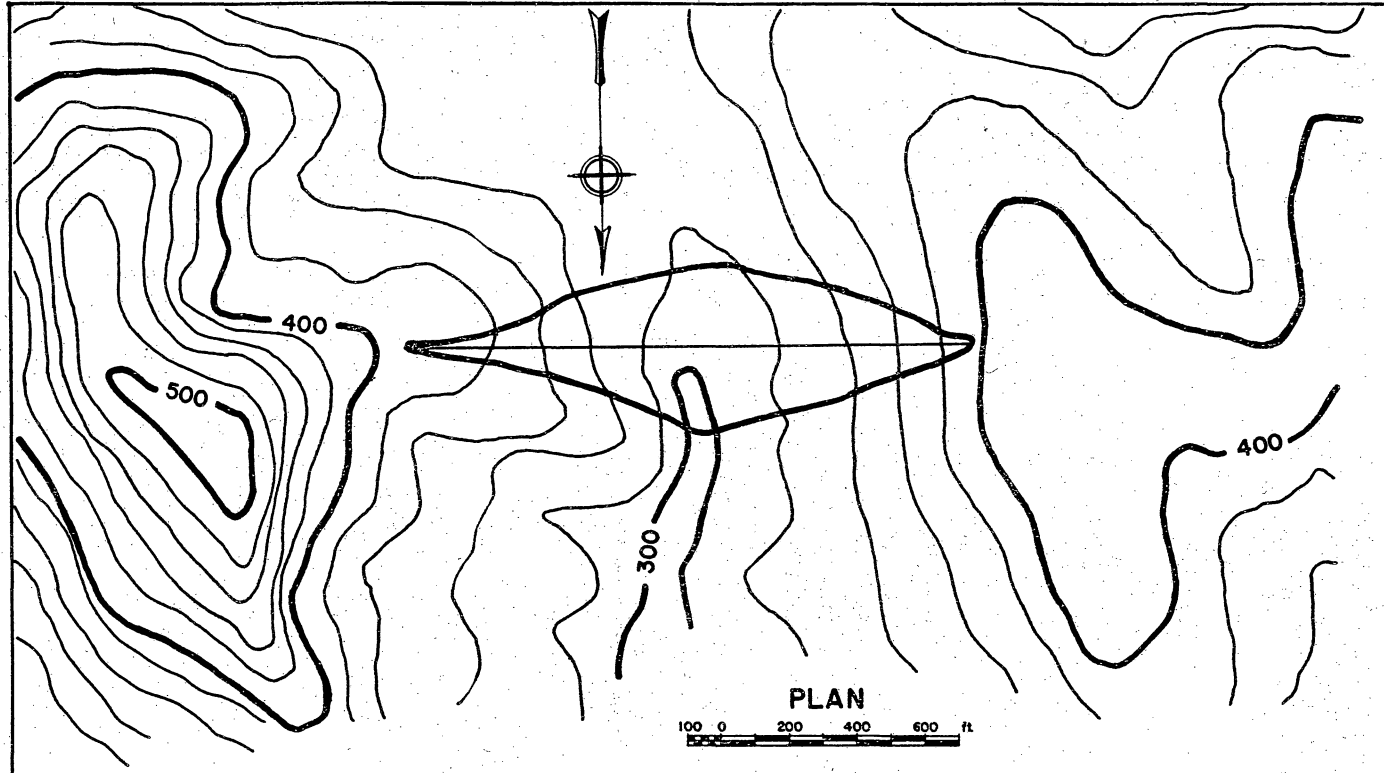
SOUTH DAM

PLAN, PROFILE and SECTION

OCTOBER 18, 1954

CASE F DRAW 10 Acc. R.V. 24

PLATE 4



PLAN

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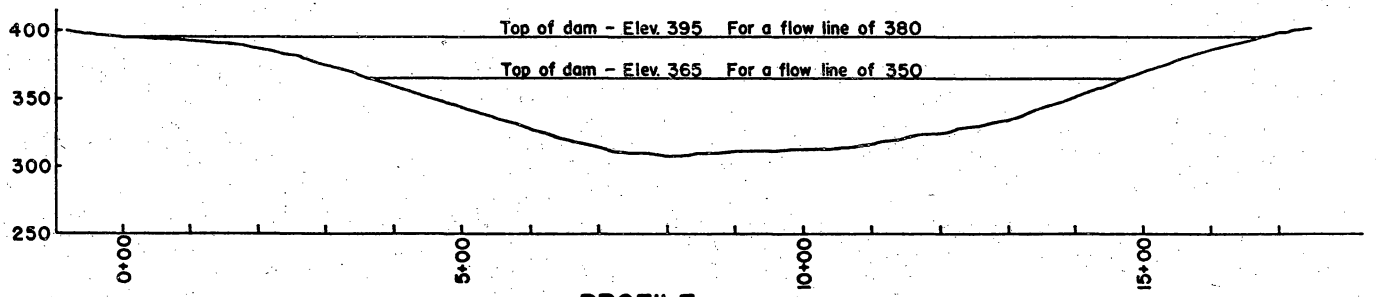
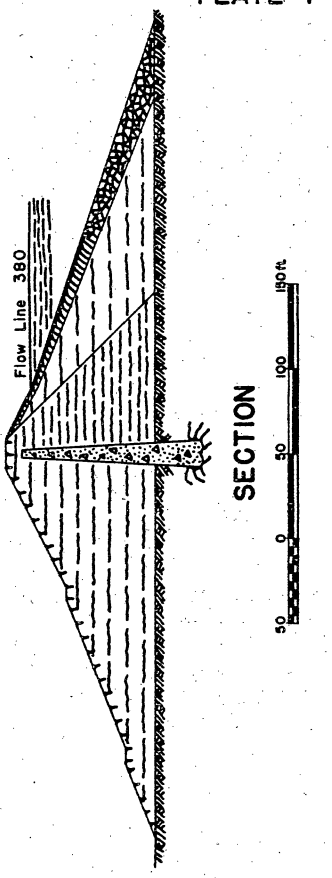


PROFILE



Drawn KCA
Traced KCA
Checked H.L.G.

Harold L. Gunther
Designing Engineer

Charles H. Capen
Chief Engineer

NORTH JERSEY DISTRICT
WATER SUPPLY COMMISSION

ROUND VALLEY PROJECT

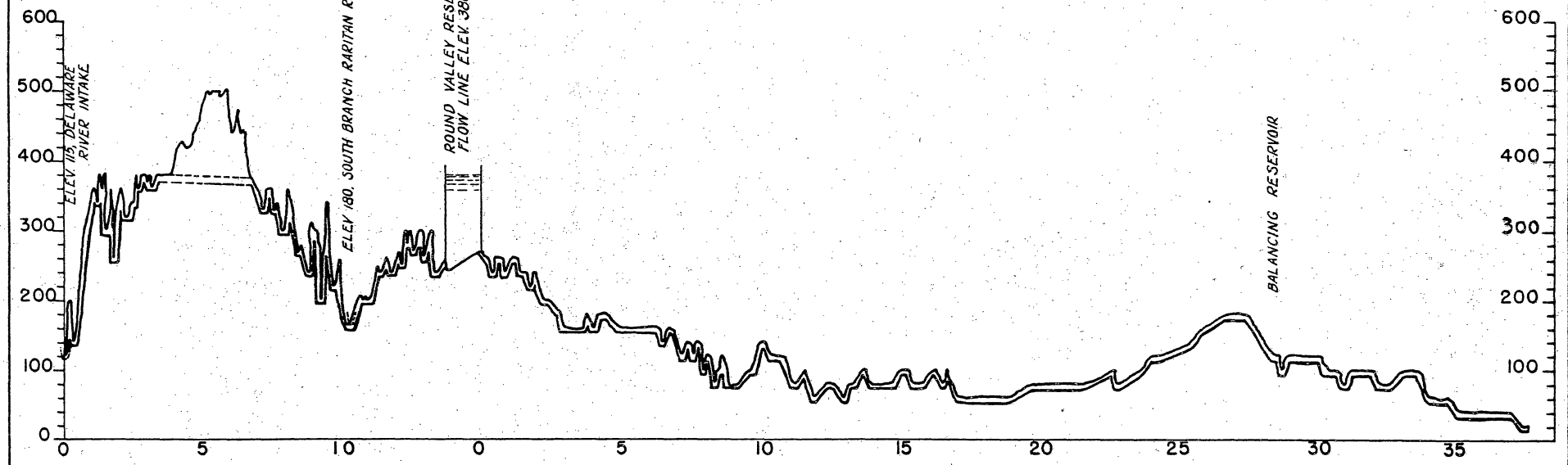
DIKE

PLAN, PROFILE and SECTION

OCTOBER 18, 1954

CASE F DRAW 10 Acc. R.V. 25

PLATE 5



MILES OF AQUEDUCT

NORTH JERSEY DISTRICT
WATER SUPPLY COMMISSION

ROUND VALLEY PROJECT

PROFILE

INTAKE AND TRANSMISSION AQUEDUCTS

OCTOBER 18, 1954

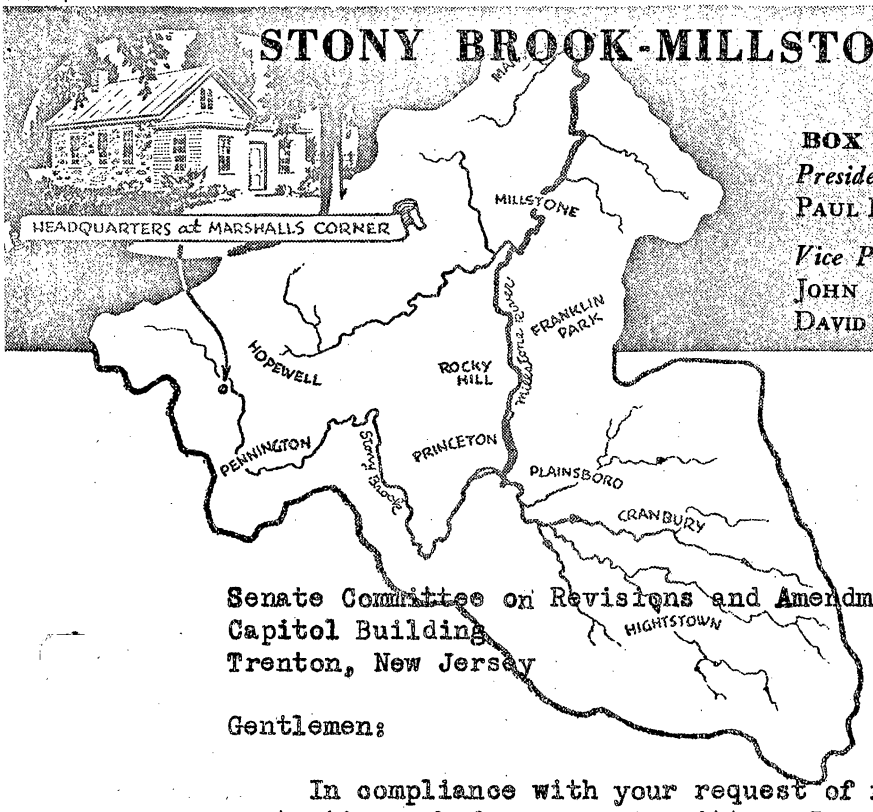
Drawn HLG
Traced HLG
Checked ACP

Harold L. Gunther
Designing Engineer

Charles H. Capen
Chief Engineer

CASE F DRAW 10 ACC. R.V.26

TO PROMOTE WISE RESOURCE USE & MANAGEMENT AND ORDERLY COMMUNITY GROWTH



STONY BROOK-MILLSTONE WATERSHEDS ASSOCIATION, INC.

BOX 171, PENNINGTON, N. J. HOPEWELL 6-0738

July 19, 1957

Senate Committee on Revisions and Amendments
Capitol Building
Trenton, New Jersey

Gentlemen:

In compliance with your request of me during the cross-examination of my testimony before your Committee, I am sending you a chart of the run-off from Stony Brook obtained from actual measurements and official data of the U. S. Geological Survey from the Stony Brook Gauging Station the first year of its operation. These gaugings have been adjusted to read in million gallons per day and refer to the run-off at the proposed Reservoir site.

I would like to point out three facts that are indicated by this chart:

1. There is very little run-off between the first part of June and the latter part of November.
2. There is an average yield of only 17.2 m.g.d. for the 3 years.
3. There were 135 days (88% of the period) from June 1 to November 1, when the estimated evaporation exceeded the run-off. This is the period when supplement to the water supply would be required, further lowering the reservoir during the time when recreation needs are at their leak.

Yours very truly,

I. Russell Riker

I. Russell Riker

IRR:cm

STONY BROOK FLOW 1954

BASED ON 38 SQ. MILES OF DRAINAGE AREA

COMPUTED FROM U.S.G.S. GAUGING STATION ON STONY BROOK