THE INTERSTATE COMMISSION ON THE DELAWARE RIVER BASIN

PROCEEDINGS

INCODEL ANNUAL MEETING AND CONFERENCE

SHAWNEE-ON-DELAWARE, PENNSYLVANIA

SEPTEMBER 11-12, 1950

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* * *

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* * *

PROGRAM

INCODEL ANNUAL MEETING AND CONFERENCE
SHAWNEE INN, SHAWNEE-ON-DELAWARE, PENNSYLVANIA
SEPTEMBER 11-12, 1950

MONDAY, SEPTEMBER 11

10:30 A.M. - WELCOME AND ANNUAL REPORT

Mr. F. A. Pitkin, Chairman, Incodel.

11:00 A.M. - POLLUTION ABATEMENT PROGRAM

Mr. John Boardman, Engineer, Incodel.

11:30 A.M. - SOIL AND FOREST CONSERVATION PROGRAM

Mr. Harvey R. Frantz, Conservationist, Incodel.

12:00 Noon - DELAWARE BASIN FLOOD CONTROL SURVEY

Dr. Austin L. Patrick, Regional Director,
U. S. Soil Conservation Service.

12:30 P.M. - LUNCH

2:00 to 5:00 P.M.

INCODEL WATER PROJECT SURVEY

2:00 P.M. - REPORT OF CONSULTING ENGINEERS

Mr. Malcolm Pirnie.

2:45 P.M. - DISCUSSION OF REPORT OF CONSULTING ENGINEERS

3:30 P.M. - REPORT OF INCODEL COMPACT DRAFTING COMMITTEE

Miss M. Vashti Burr, Deputy Attorney General,
Commonwealth of Pennsylvania, Chairman.

4:15 P.M. - DISCUSSION OF REPORT OF COMPACT DRAFTING COMMITTEE

7:00 P.M. - INCODEL DINNER MEETING

Comments by Distinguished Guests.

8:30 P.M. - MOVIES AND ILLUSTRATED LECTURE

TUESDAY, SEPTEMBER 12

10:00 A.M. to Noon - A PANEL DISCUSSION ON NATIONAL WATER POLICY

Professor George R. Jenkins,
Lehigh University - Moderator;

Robert A. Harrier, Managing Director,
Lehigh Valley Flood Control Council;

James H. Allen, Executive Secretary,
Incodel;

John H. Jones, Secretary,
American Watershed Council.

12:30 P.M. - LUNCH

2:30 to 5:30 P.M. - INSPECTIONS, RECREATION, Etc.

THE INTERSTATE COMMISSION ON THE DELAWARE RIVER BASIN

REGISTRATION LIST

Incodel 1950 Annual Meeting
Shawnee-on-Delaware, Pennsylvania
September 11-12, 1950

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Anderson, Mrs. Floyd E.		Binghamton, N. Y.
Andrews, William R.	City Engineer	Gloucester, N. J.
Armstrong, Roger W.	Engineering Consultant	Basking Ridge, N. J.
Armstrong, Mrs. R. W.		Basking Ridge, N. J.
Ayer, Gordon R.	Engineer in charge United States Geological Survey	Ellenville, N. Y.
Banks, William G.	Engineer in charge Newark Water Supply	Newark, N. J.
Banks, Mrs. William G.		Newark, N. J.
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THE INTERSTATE COMMISSION ON THE DELAWARE RIVER BASIN

PROCEEDINGS

MONDAY SESSION

SEPTEMBER 11, 1950

* * *

INTERSTATE COMMISSION ON THE DELAWARE RIVER BASIN

ADDRESS OF WELCOME AT OPENING OF INCODEL ANNUAL MEETING

AT SHAWNEE INN, SHAWNEE-ON-DELAWARE, PENNSYLVANIA

September 11, 1950

By Mr. Francis A. Pitkin, Chairman

It is indeed a pleasure, ladies and gentlemen, to welcome you to Incodel's 1950 annual meeting.

As I look over the audience, I see among you many who have faithfully attended meetings of this kind ever since Incodel's inception, in 1936. Those of you who have so closely followed the Commission's activities and fortunes will agree with me, I am sure, that much progress has been made since that day when representatives of the state governments of New York, New Jersey, Pennsylvania and Delaware, meeting in Philadelphia, fourteen years ago, first agreed that the time had come for cooperative and harmonious action for development of the Delaware River watershed. At that time, the most immediate and pressing problem of common concern centered around the preparation of a unified program to stop the unwarranted pollution of the Delaware and its tributaries. That great progress has been made in this field will be attested by Mr. Boardman, who follows me on this program.

But I would recall to you that Incodel's accomplishments have never been easily attained. In the past, as now, Incodel has been ahead of public opinion in the matter of natural resources development. This fact largely accounted for the occasional characterization in days gone by of Commission spokesman as "idealistic dreamers" in predicting that the day

was not distant when the Delaware and such major tributaries as the Schuylkill would be restored to a degree of respectability consistent with the requirements and standards of this modern day and age. Yet, in the space of a few short years, that goal is now in sight.

Similarly, we regret to say, there are altogether too many persons today who are indifferent to the urgency and need of protecting and conserving the soil and forest resources of the Delaware Valley. Incodel has been chided in some quarters for advocating the establishment of county soil conservation districts throughout the entire Delaware watershed. However, it has been repeatedly and conclusively demonstrated that more rapid and more effective progress in soil conservation can be made through the Soil Conservation District mechanism, using the resources of both the Agricultural Extension Service and the U.S. Soil Conservation Service, than can be made through the Extension Service alone. Despite the fact, in Pennsylvania the Extension Service has gone out of its way to oppose this method of attacking the problem. It contends that the County Agent is qualified and has the facilities and time to handle all soil and forest conservation matters. Incodel agrees that the County Agents, in general, are well qualified, but it questions the adequacy of facilities and staff. Incodel has studied the Extension Service's carefully enunciated policy that the sole function of the Extension Service is to provide education - i.e., "to give information to those who inquire", and that the term "education" does not include "promotion" or "service". Incodel believes that this restrictive policy prevents prompt and effective solution of our soil

conservation problems since it fails to reach those who need conservation education the most. We also believe that the stimulating effect upon landowners of cooperation in the administration of the affairs of a Soil Conservation District is a value not to be discarded lightly. Incodel holds no special brief for the U.S. Soil Conservation Service and would be delighted if the Extension Service could and would handle the entire problem promptly and effectively. But it is certain that this is not the case at the present time, although it is a pleasure to note that under the pressure of rising public interest the Pennsylvania Agricultural Extension Service has strengthened its soil conservation activities in recent years. It is equally certain that the problem requires immediate attention. It is much later than we think. As long as these circumstances exist, Incodel intends to hold to its position that the only way to get the job done in time to be of value is through cooperative action and through effective working relationships between the two agencies. Mr. Frantz will tell you more about Incodel's activities in this field.

As most of you are aware, the highlight of Incodel's meeting this year will be submission of the findings, conclusions and recommendations of its consulting engineers and of its legal drafting committee regarding the development of an integrated water project in the Upper Delaware Basin for the benefit of the four states in which this all-important river basin system is located. This afternoon's entire session will be devoted to this subject. Mr. Pirnie will present a full explanation of the engineering features of this project. Miss M. Vashti Burr will inform you of the proposed provisions of a four-state compact to establish a Delaware Basin Water Commission to carry out the proposed water project.

A special water supply committee of Incodel, composed of Senator Anderson of New York, Senator Littell of New Jersey, Senator Phillips of Delaware, and myself, has kept in close touch with the formulation and development of both the engineering and legal aspects of this survey. While I cannot, of course, speak for the other members of the committee, I am confident that they will concur in my opinion that the proposed integrated water project which has been developed by our consulting engineers is one of the greatest water conservation programs ever conceived. All of the four basin states have a proprietary interest in the waters of the Delaware. The United States Supreme Court made this fact clear in its classic decree in the Delaware River Diversion Case, in 1931, when it stated that such waters were a necessity of life "that must be rationed among these (the states) who have power over it". These states have joined in a cooperative and sincere effort to develop a plan to carry out the dictum of the Supreme Court to reconcile their interests "as best they may be".

It seems obvious to me, and I think you will agree with me after the project has been explained to you in detail this afternoon, that the proposed comprehensive developments will result in great advantage to all of the four interested states. It will provide sorely needed sources of additional water supply to New York City and northeastern New Jersey and -- when,as and if desired-- a new source of water supply for Philadelphia. Each of these areas is the largest center of population, commerce and industry in its respective state. It is absolutely essential that adequate and suitable sources of water be continuously available to each of these regions. Otherwise, their growth and stability will be imperiled.

Regarding the diversion of water from the Delaware Basin to New York City and northeastern New Jersey, I am mindful that there are some people who contend that all of the rainfall which would naturally reach the streams of the Delaware River system must be allowed to flow down the river to the sea under any and all circumstances. This is an obsolete and short-sighted point of view, based on a lack of knowledge of the facts and a misinterpretation of realities. It is a theory which has been completely discarded in a number of cases by the highest court of the land. In the Delaware River Diversion Case, previously referred to, the court decreed that "the removal of water to a different watershed obviously must be allowed at times unless states are to be deprived of the most beneficial use on formal grounds".

A second benefit of great importance to all of the basin states will be the capture and storage of flood waters for the exclusive purpose of releasing the waters to overcome the devastating effects of the low natural flows during periods of later summer and early fall droughts. These benefits will be effective and enjoyed throughout the entire length of the river from Hancock to the sea.

No state, no municipality, no industry or no person in the lower river region will be harmed by the proposed project. To the contrary, all interests will be benefited. Reduction of flood flow in the spring and increase of depleted flows in summer and fall are two-fold blessings. Water in the river will be of better quality for municipal and industrial supplies.

And there will be far more of it in the river, when most needed in periods of low natural runoff, for the enhancement of recreation, for minimizing damages to manufactures by salinity invasions, for shellfish production, for the restoration of the shad and other anadromous fish, for the improvement of port facilities and for the appreciation of adjoining property values. These advantages cannot be attained unless there is cooperative and comprehensive development of storage capacity in the Upper Basin.

Critics representing special interests should acquaint themselves with the project in order to learn what it will accomplish and what its real effect will be on the interests which they represent. If they will do this with an open mind, I am confident there will be little to quarrel about.

The members of Incodel realize full well that the task of securing acceptance and adoption of the proposed integrated water project is going to be difficult. The road ahead is strewn with obstacles. But none of Incodel's assignments have been easy. That can never be the case in any pioneering job. Incodel prefers to formulate and campaign for sound, constructive and far-sighted programs even though they call for the exercise of great effort and energy in order to gain support. It is convinced that the proposed water project will become a reality because it is a public necessity. There is an urgent and immediate need for a program for the wise utilization of the water resources --yes, and of land and other natural resources --of the Delaware River Valley. The major question does not revolve around the need nor the soundness of the plan. The need is obvious and the soundness of the plan is guaranteed by the quality of the engineering talent used on this study. The principal question is: "Will the states

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exercise sufficient selfessness and political sagacity to enable them to act as an amicable unit in the planning, financing, construction and operation of the recommended project?" Their legislatures, all of which will be meeting concurrently in 1951, will soon have a chance to answer this query. Will they grasp-- or will they fumble--this wonderful opportunity to achieve a high standard in wise government? If they meet it by agreeing to pool their efforts and resources in solving their common water problems, they will be providing a tremendous service to the citizens of our four states and, more significantly, will be setting a new pattern for a national policy respecting the control and utilization of water resources of interstate regions. This is a subject of which a Commission appointed by the President is making a special study. The President's Water Resources Policy Commission is scheduled to file its report with the President in December of this year. It is expected that the problem, unless sidetracked by the war, will be deliberated at great length by the Congress next year. No greater contribution to the improvement of governmental administration in the field of river basin development could be accomplished than by adopting the Incodel procedure as a sound basis for a proper national water policy.

If, on the other hand, the states mishandle their chance and afford the federal government an opportunity to step in and do the job for them, they will have no one to blame but themselves.

We have, as I say, been at our tasks for a number of years. Now we are on the threshold of an unique accomplishment. The urgency for coordinated action is reflected in the recurring water shortages in New York

City and northern New Jersey, in the poor quality of Philadelphia's source of water supply, in the salinity of the lower Delaware during times of drought, and in the lack of full development of the recreational facilities along our waterways. Let us unite for a common purpose. Let our states work together to solve their problems in an orderly and effective fashion. And let those special interests who oppose us through ignorance or for ill-concealed selfish reasons think twice before they go against a project of benefit to all the people.

And when I say "the people" I mean the twenty million residents of this great area who will benefit by this project. They represent more than one-eighth of the population of the United States. Their needs and desires cannot be subordinated to the advantage of certain minority interests.

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THE INTERSTATE COMMISSION ON THE DELAWARE RIVER BASIN

INCODEL'S POLLUTION ABATEMENT PROGRAM

by
John Boardman, Engineer

Incodel Annual Meeting
Shawnee-on-Delaware, Pennsylvania
September 11, 1950

A few years ago, the Philadelphia City Planning Commission exhibited a scale model of improvements proposed for rehabilitation of the central city. Among numerous proposals was one for the development of a recreational area and yacht basin on the river from Market to Walnut Streets. Other yacht basins in the vicinity of Pennypack Creek in Northeast Philadelphia and near Fort Mifflin in the southwest also were proposed.

There were, on the part of those who saw the exhibit, various comments regarding the optimism of the Planning Commission, and the improvements in the quality of the river water which had to materialize before such a project would be advisable. Even we at Incodel viewed the plan with some skepticism.

It is true that many other large cities have similar recreational areas. Miami has a large area of this kind and Chicago's

Lake Shore has a number of yacht harbors between the Lake Shore Drive and the lake. There are many more cities with similar recreation areas.

To develop an area of this type in close proximity to the center city would be most desirable. But if the paint on the hulls of beautiful craft were to be stained and eaten away, if bright brass and chromium plating quickly tarnished, if mechanical equipment rapidly depreciated due to odorous gases from the river, and if yachtsmen were made ill before they reached the swell of the waves, such a project would be a total loss.

However, I am here to say that the Planning Commission's project can be accomplished sooner than we thought so far as abatement of pollution is concerned. In each succeeding week, month and year, a decided improvement in the water quality of the river has been recorded. Those of you who used the ferry to cross the river during the summer a few years ago did so by necessity, rather than by choice. Conditions which then existed have been described so thoroughly, and so often, I will not take time to repeat them. But, I do want to say that I made trips on the river early last month with two different groups of people and was more than pleased to find the boat ride thoroughly enjoyable and pleasant. Members of the two parties, totaling over thirty people, were pleased with the excursion but disappointed not to find sources of pollution they were looking for. In order to get a good pollution photograph, it was necessary

to back the boat into a slip where a sewer outfall discharged waste and then to spin the propeller to stir up the bottom. This was never necessary before.

Another indication that the water of the Delaware River is rapidly improving in quality was related to me by a riverboat captain who has been navigating on the river between Trenton and the sea for twenty-four years. He told me he was surprised several weeks ago to see a school of herring above the Delaware River Bridge. And he made it very clear they were not dead or dying fish, but very much alive. It is also reported that a school of porpoises was seen in the river this past spring. Fishermen in the upper river from Flatbrook up to Hancock report that for the last several seasons catches of shad and other fish have been better than any time within the last quarter of a century.

All the above statements lead to but one question: What has happened to bring about these changes in the river?

In the past, our sights were set upon thinking what a great day it would be, and what a fine river we would have, when Philadelphia had all of its three sewage treatment works in operation; when the city of Camden no longer opposed the inevitable and had its two treatment plants operating smoothly; when Gloucester City and the Delaware County Authorities poured clear effluents from the outfalls of their new treatment works into the river. Those days seemed in the distant future.

Ten years ago, Jim Allen and Ellwood Turner would smile in their sleep when they dreamed about these fantastic accomplishments that seemed so remote.

But all these things are coming true just as rapidly as public officials, bankers, engineers and workmen can bring them about. The number of municipal treatment works now under construction in the Philadelphia metropolitan area accounts for part of this improvement. Concurrent progress by industry supplies the rest of the answer.

Let's look at the record to see what has been accomplished.

Two new municipal sewage treatment plants were completed and placed in operation in the southern New Jersey metropolitan area in the past year. Each of these is treating a substantial industrial waste load.

In the Pennsylvania metropolitan area, about a dozen industries and institutions, serving approximately 25,000 people, have constructed new and additional sewage treatment facilities. This shows how the little things count.

Now let us look to the industrial waste situation in the Northeast Philadelphia area. Virtually every industry discharging into the river or its tributaries thereabouts was given an order to stop polluting. Nearly all of them have either connected to the city

sewer or have permission to connect as soon as the city's Northeast Treatment Plant is put in operation. Those which have wastes unacceptable to the city will have to pretreat their wastes or do the treatment themselves. Some industries have already built plants. Those industries which have connected to the city's Northeast works are now having their wastes primary-treated. Formerly, these wastes were discharged untreated directly into the river. The few that are not planning to enter the city sewer are constructing industrial waste treatment plants. This has reduced the industrial waste load on the river in the Philadelphia area by a considerable degree.

Now, let us look to the Schuylkill River. First, I would like to state that not one industry within the city of Philadelphia is discharging wastes into the Schuylkill River above Fairmount Dam. This section of the river is the source of part of Philadelphia's water supply. Industries below Fairmount Dam are either planning on going into the city sewerage system or have made adequate provisions for handling their wastes. The City of Philadelphia incidentally has awarded contracts for the construction of intercepting sewers to receive wastes discharged below the Fairmount Dam. In fact, a large percentage of this work is already built. In another year or two, when these interceptors will have been entirely finished, the problem below Fairmount Dam will be at an end.

The above work, which comes under the jurisdiction of

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the Sanitary Water Board of the State Department of Health is an excellent supplement to the Schuylkill River Clearance Project being concurrently executed by the Water and Power Resources Board of the Department of Forests and Waters. This is an outstanding example of cooperation between administrative agencies of state government.

In the past year, I have had several opportunities to look at the clear water in the Little Schuylkill at Tamaqua, and the clear water in the Schuylkill River at Kernsville and Reading. The improvement which has taken place in a few short years is amazing. It is proof positive that the job can be done and <u>is</u> being done. As long as we have men like Governor Duff in America who have the courage of their convictions and the determination to carry out conservation projects of this nature, no one needs to lose faith in the future of America.

Under the joint federal-state program for cleaning up the Schuylkill which Incodel is proud to have initiated, more than fourteen million yards of coal culm and silt have been removed from the Schuylkill. Little, if any, is now entering the river at the coal mines. This compares with about two million tons a year formerly discharged from mining operations. This material not only clogged the Schuylkill River but was carried into the Delaware River and, because of tidal action, its effect was felt not only downstream but about five miles upstream as well.

I doubt whether anyone knows how much industrial waste actually has been removed from the Delaware and its tributaries in the Philadelphia area. Many industries, in fact, are cleaning up their problems voluntarily, without orders from agencies of state government.

But we do know that seven newly completed industrial waste treatment plants along the Schuylkill in the Philadelphia area have been put in operation and that three times as many now being constructed will soon be in operation. Comparable progress is being made in the New Jersey and Delaware section of the Philadelphia metropolitan region.

Oil refineries located on the Schuylkill and along the Delaware River, both in Pennsylvania and New Jersey, have made and are still making large expenditures for abating pollution and are doing an excellent job.

Then there is another factor accountable for the great improvement. Some industries have become so pollution-conscious that they have come to realize that the discharge of any waste is a loss of raw material and therefore a loss of profit. Consequently, a number of industries have made changes in their plant procedures which have resulted in substantial reductions in their industrial waste load. In many instances, this has paid dividends. For example, one chemical plant, by revising processing methods, has removed tons of acid formerly discharged into the river. Another chemical plant

is recovering and using phenols which were discharged to the river and creating a nuisance. A third is recovering zinc compounds which have a marketable value. I could cite numerous other examples.

Of course, not all installations for reducing industrial waste discharges into streams result in a profit, for investments, in many cases, are large. However, most industries now have concluded that the value of the good will created is an asset which helps to justify the expense involved and are willing to charge part of the cost to public relations.

It is estimated that the total cost of industrial waste treatment plants in the five Philadelphia metropolitan counties constructed since 1944, or presently under construction, amounts to about twenty-five million dollars.

I have directed attention to the problem in the Philadelphia metropolitan area because this section of the Delaware had acquired the unenviable reputation of being the most grossly polluted stream in the nation and was also specifically referred to as an area of dead water. Tests conducted in the last year between Bristol and Marcus Hook show a marked improvement in the water quality in this area.

The new Northeast Philadelphia Plant will soon be in operation and the City of Gloucester Plant will be operating before the year's end. These plants will result in a further material

improvement in the river. The City of Camden has already started construction of its project and it is expected that three Delaware County Authorities will start similar construction very shortly. Next spring, Wilmington, Delaware, is scheduled to join the ranks.

Municipalities along the river above Philadelphia are also making good progress. Bristol, in Pennsylvania, has had its plans approved for a new complete treatment works while Burlington, across the river in New Jersey, has plans under way for enlargement of the existing primary units and the installation of new secondary treatment works. Phillipsburg, New Jersey, has its new treatment works under construction. It is expected that it will be in operation before the end of the year; while Easton, across the river, has formed a municipal authority to finance, construct and operate a sewage treatment project. A financial program is now being prepared and, upon completion, bids for construction of the plant will be received.

The City of Bethlehem also has a new treatment plant under construction which, when completed, will help materially to improve the water of the Lehigh and Delaware Rivers. It will not be long before the water of the Lehigh and Delaware in the Bethlehem, Easton, Phillipsburg areas will be given a clean bill of health.

Last year, we were disappointed that we were unable to report the Port Jervis treatment works under construction. This year, we are happy to report, the facilities are on the way to completion.

While other areas of the country are just getting started on comprehensive basin-wide stream pollution abatement programs, we in the Delaware River Basin can point to outstanding progress toward attaining the final goal.

The job has been done through the wholehearted cooperation of the four states' Health Departments and Incodel. This has proved to be a very effective procedure. In the Delaware River Basin, in contrast, perhaps, to other sections of the country, there is absolutely no excuse for federal interference or intervention.

The four states of the Delaware River Basin, in cooperation with their industries and municipalities, and with the support of the people, are leading the nation in stream pollution abatement. They are also making substantial strides in the field of soil and forest conservation. These two activities are closely interrelated with the great water project program which will be discussed in detail this afternoon. There is no question in my mind that that program can be successfully executed by the use of the same principles of interstate cooperation as have been so successfully employed to bring about pollution abatement.

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THE INTERSTATE COMMISSION ON THE DELAWARE RIVER BASIN

THE SOIL AND FOREST CONSERVATION PROGRAM IN THE DELAWARE BASIN

By
Harvey R. Frantz, Conservationist

Incodel Annual Meeting
Shawnee-on-Delaware, Pennsylvania
September 11, 1950

For five years, Incodel has been striving to protect and conserve the soil and forest resources of the Delaware Basin. It is fitting here today to review the accomplishments and to evaluate the obstacles still confronting us.

Incodel's early studies in stream restoration indicated three major types of pollution: the odoriferous municipal sewage; the discoloring and contaminating factory and industrial wastes; and the coffee-brown silt from the eroding farms and cut-over woodlands.

As you know, dramatic and effective steps have been taken against the first two forms of pollution, but, ironically, the eroding of our precious surface soils has not been attacked so successfully. For one thing, while pollution abatement imposed legal obligations on municipalities and industries to take care of their sewage and industrial wastes, before discharging them into the streams, nothing was done on a mandatory basis with the silt pollution problem.

Soil erosion should not have to be legislated out of the rivers by law. Common Sense farm practices, supported by farmer education followed by technical assistance to the landowners should be sufficient to do the job. However, if a voluntary approach fails, then, in my judgment, the day will come when laws will be passed making it illegal for owners to mismanage their land to the detriment of the public interest. One has only to look at the rivers and streams after a rain to see the silt load they are carrying or

view the gullies in much of the crop lands and the mud on the highways to be convinced that voluntary cooperation has been inadequate in the past and that something has to be done. Further proof is given by the Soil Conservation Service Delaware River Basin Erosion survey figures and the Pennsylvania Extension Service estimates on the amount of erosion which has already taken place.

Recent figures for the Perkiomen Creek, a tributary of the Schuylkill River show that an average of over 3,000 tons of soil are moving down the creek every month, but during flood peaks three times this much will be swept away in 24 hours. This is typical of the Schuylkill River watershed in which the State of Pennsylvania is embarked on a thirty-five million dollar restoration project, a large part of which is to remove the top soil eroded from the farmlands of the region.

Similar figures on the Brandywine basin indicate a million tons of silt move down the stream to the navigable channel of the Christina River at Wilmington, which costs the taxpayers approximately $300,000 a year to remove.

The City of Philadelphia is required to maintain continuous dredging operations in the vicinity of its water works intake in order to protect its water supply taken from the Schuylkill River, while the Army Engineers are required to dredge more than two million tons of silt annually from the Delaware and Schuylkill Rivers to maintain the navigation channels. These operations cost the taxpayers approximately one-half million dollars per year. It can be readily seen that soil erosion is not only affecting the productivity of our land but is also imposing an added burden on the taxpayer.

Incodel was convinced that the best way to attack the soil erosion problem in the basin was by coordinating the activities of existing agricultural agencies already established in the states, namely the State Extension Services and the U.S. Soil Conservation Service. The Extension Service would

do the educational portion of the job, as they are set up by law to do, and the Soil Conservation Service through Soil Conservation districts would follow through and assist the landowners in putting the needed conservation practices on the farm.

New Jersey and Delaware had already established Soil Conservation districts in their portions of the basin. New York followed with Delaware County, and Pennsylvania came along with Berks, Lehigh, and Carbon Counties two years later. Chester County formed a Soil Conservation district about two years ago and this year Monroe County became an operating district. In Northampton and Bucks County there is still no Soil Conservation district, although both counties have large groups of farmers, sportsmen, and other organizations that have requested districts in these counties, but, to date, to no avail.

Unfortunately, the formation of Soil Conservation districts in Pennsylvania is bitterly opposed by the Pennsylvania Extension Service. Why, no one seems to know, but the Extension Service claims districts are not needed; that they can handle the job themselves and a district would be a duplication of effort. Anyone who will take the time to get the facts will quickly learn that this is not true. The experience of the Chester County Pennsylvania Soil Conservation District clearly refutes these claims. Let us apply Extension Service objections to the situation in that County and see what we find.

Take first the contention that a district is not needed. The Chester County Soil Conservation District is less than two years old but already has received from farmers 615 applications for conservation assistance on lands with a total area of 60,000 acres. Based upon this evidence it would appear that the farmers of Chester County strongly believe in the need of a District. Mind you, these 615 applications were all of a voluntary

nature.

The second point the Extension Service uses is that they can handle the job. Well, let's look at that. We understand that the Extension Service interprets the Smith-Lever Act of 1914, which created that agency, restricted the functions of the agency in the field of soil conservation to farm demonstrations and instruction. Consequently, it has no authority to lay out complete farm conservation plans. It seems obvious that adequate progress cannot be made without this service and the only agency which can provide it is the U.S. Soil Conservation Service working through County Soil Conservation Districts. In Chester County in less than two years Soil Conservation Service's technicians upon request of local farmers have prepared complete conservation plans for over 500 farms with an area of about 50,000 acres. Application of their recommendations is being rapidly carried out on the land.

The third point presented, which infers that Extension Service activities are placing conservation projects on the land, is not substantiated by the results accomplished. Incodel maintains that it will require the undivided efforts of all federal, state and local conservation agencies to bring about reasonable results before damages proceed to such an extent as to create a demand for compulsory regulations.

In contrast to the Pennsylvania situation, the New York, New Jersey and Delaware Extension Services and the Soil Conservation Service are working in cooperation through Soil Conservation Districts and doing a fine job in keeping the silt out of the rivers and the top soil on the farms.

In cooperation with their respective State Forestry Departments, the 29 soil conservation districts that are wholly or partially in the Delaware Basin were responsible for the planting of approximately a million trees last year.

One hundred and four farm ponds were established in soil conservation districts in the Delaware Basin last year. It might be mentioned that in some of the counties of the lower basin, the conservation problem is not in keeping water on the land in the form of ponds, but in draining the water off through drainage ditches. For instance, in one soil conservation district in Delaware last year, 61 miles of farm drainage ditch were constructed.

One of the main objectives of the Incodel soil and forest program has been the planning and development of conservation projects on the small watershed. Incodel is convinced that the best way to develop interest and activity in soil conservation is through small groups of landowners within the smaller watersheds. For this reason Incodel has actively cooperated with the Pocopsin Valley and the Swabia Creek watershed conservation projects in Pennsylvania. Initial contacts and plans have been made to introduce the small watershed development program in each of the Soil Conservation Districts in the Delaware Basin.

Although it would appear that Incodel is overly concerned about the soil and forest resources of the Delaware River Basin, we must not overlook the fact that a large percentage of the land area in the agricultural counties is in farm woodlots. It is the forest land which plays the important part in water resources regulation and control. The more land returned to its rightful use as forest, the less severe will be the flash floods and the less top soil will be carried into our streams.

The Commission is about to receive its consulting engineers report on the Utilization of the Water of the Delaware River which will recommend the construction of a number of large dams and reservoirs in the upper regions of the basin for water supply and power purposes. These reservoirs must be protected against unnecessary silting from soil erosion and given the protection of good forest cover to make them most effective. It is imperative that

every effort should be made to properly manage every acre of land. While the new project is only in the planning stage, now is the time to introduce more and intensify the existing conservation practices in the region.

There are more than two hundred municipal water supply systems in the Delaware River Basin of which seventy-one are surface supplies, fifty-two are surface supplies augmented by wells and eighty-six are artesian well supplies. The watersheds feeding these surface supplies encompass large areas of the land in the basin.

During the past five years Incodel has been endeavoring to promote good conservation practices on these lands in order to conserve and protect both the surface and underground water resources.

For this reason Incodel has taken an active part in promoting the restoration and proper management of the forest lands in the Delaware River Basin and has endeavored to coordinate the activities of all available agencies of government to bring about needed forest conservation projects.

Fortunately, two of the four states in the basin have gained national recognition for their forest practice operations. These are New York and New Jersey. Both states give outstanding service to their woodlot owners. While Pennsylvania and Delaware each provide similar forest service they lack the advantages of the Forest Practice Board of New York or the Timber Agent of New Jersey.

The U.S. Forest Service now maintains three research centers in the Delaware River Basin. One, in New Jersey is for the study of controlled burning in the oak-pine area of New Jersey. The two other centers are located in the Pocono Mountain section of Pennsylvania. The Pocono Experimental Forest is for the study of the northern hardwoods, while the Delaware-Lehigh Experimental Forest is studying the reconversion of the scrub-oak areas in the basin and the comparative water yield of a watershed of scrub-oak cover

versus a high forest cover. These studies should result in material improvement of more than two million acres of potential timber land with the resulting improvement of the surface and underground water resources.

Another Incodel effort to replenish the forest areas of the basin has been the promotion of "tree farms" or the management of timberland for the continuous growth of merchantable forest products. This program -- which is being supported by national and state agencies, forest product industries, their affiliated associations and private groups -- is being received with a great deal of enthusiasm and success.

The people of the Delaware River Basin have an enormous stake in the proper management of this thirteen thousand square miles of land area, which is not only the water supply of the more than five million people living within the basin, but an additional ten million people outside the basin who must look to the area for their water.

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DELAWARE BASIN FLOOD CONTROL SURVEY

by Dr. Austin L. Patrick
Regional Director,
United States Soil Conservation Service

at
Incodel Annual Meeting
Shawnee-on-Delaware, Pennsylvania
September 11, 1950

At last year's annual meeting of Incodel it was announced that the United States Department of Agriculture would undertake a watershed survey of the entire Delaware River watershed. This survey, made under the authority of the Flood Control Act of 1936, had as its primary objective the recommendation of a watershed program for runoff and water flow retardation and soil erosion prevention. The responsibility for making the survey was assigned by the Secretary of Agriculture to the Soil Conservation Service, with the Forest Service assisting.

I am glad to be able to tell you that during the past year the Delaware field survey was completed and a draft report prepared, which has been discussed with and reviewed by interested state and federal agencies. Their valuable comments and suggestions are now in our hands and the revised report will be ready for submission to the Secretary of Agriculture within the next few weeks. After his approval, the Secretary will submit the report to the Governors of the five states for formal approval, and finally to the Congress for consideration and possible authorization as a House Document. The actual installation of the recommended program on the lands and the drainageways of the watershed cannot be inaugurated until Congressional approval has been given and funds appropriated.

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That, briefly, brings you up to date on what has happened since our report to this group a year ago. Many in this audience have generously assisted and counseled with us during the many studies and steps that were involved in this survey. Incodel, through Jim Allen and his staff, the Lehigh Valley Flood Control Council through Bob Harrier, and the Brandywine Valley Association with Clayton Hoff, have all given us help and support. The various state agencies in New York, Pennsylvania, New Jersey, and Delaware have also been very cooperative in providing us with available data and in suggesting certain revisions to the report that were essential to bring the recommended program in line with existing state policies and procedures.

A brief review of the recommendations in the Delaware Report may be desirable. First, let me point out that there are five basic concepts on which the Department of Agriculture's program in aid of flood control are based:

1. A watershed survey must be made before flood control activities can be initiated on any watershed. This survey, made on a sampling basis, must definitely indicate that there is a need for such a program and that the benefit-cost ratio will be favorable.

2. The recommended program is designed to produce optimum water holding capacity of the soil of the watershed and minimum sediment production by soil erosion.

3. The recommended program is a combination of proper land use and management for every acre of watershed land plus

channel improvement and small runoff detention structures for the protection of local damage points.

4. The recommended program is not a substitute for large flood control structures but does supplement and protect the life of such structures.

5. The installation of the recommended land treatment measures is voluntary on the part of the landowners. Federal funds may be made available by the Congress to assist in installing those measures or structures that provide substantial community or downstream benefits.

In preparing the recommended program in line with these basic concepts, a great deal of study was necessary over the entire watershed. Soils were surveyed and their ability to absorb water under various cover, slope, and soil conditions was determined. This provided a sound basis for recommending the land use changes necessary to provide optimum water holding capacity. The existing type of cover on the watershed lands was determined and the hydrologic qualities evaluated. This applied particularly to the woodland and pasture areas where the condition of the cover has an important bearing on its water holding and erosion prevention qualities. Both floodwater and sediment damages were determined by field survey to provide a basis for determining the actual benefits of the recommended program. Also, a detailed hydrologic study and evaluation of the watershed was made under existing and proposed future conditions in order to provide data for measuring anticipated reductions in flood and sediment damages.

To clear up some of the questions raised during the review of the report there is one point I should like to emphasize with reference to the collecting of these watershed data. Obviously, it was not economically sound to survey the soils, slopes, or type and condition of the cover on every acre in the entire watershed. As you know, there are more than 8,100,000 acres in the watershed so some type of sampling process was essential. This sampling was done on a sound statistical basis and the results projected to the watershed. As a result, the report does not recommend a program for any specific acre in the watershed, but does show the total land use conversions and treatment necessary to provide optimum control. A little later, I will explain how the program is worked out for the individual area as a part of a subwatershed work plan, which is prepared when actual installation of the program gets under way.

The program that is recommended in the report includes sixteen separate measures, seven of which are applicable to open or farm land, and four to woodland. The remainder are structural measures recommended for both open and woodland.

I believe you will be interested in the sixteen measures.

The first is contour strip cropping, which I am sure most of you have seen on the farms of the Northeast. This is the practice of growing hay or other close-growing and soil conserving crops in contour strips, alternated with clean tilled crops, such as corn or potatoes. In addition to the effect that this measure has on reducing erosion and sediment production, the contour tillage operations which are necessary in carrying out this practice provide a very appreciable amount of surface

storage behind the little ridges thrown up by the drill or cultivator. 870,500 acres of strip cropping have been recommended in the report.

Next on the list is cover cropping. This is the practice of growing a temporary crop, such as ryegrass or crimson clover, to provide a vegetative cover on the land during the winter months. This temporary cover furnishes protection from erosion on what would otherwise be bare soil during the winter. In addition, when the cover crop is plowed under in the spring, it furnishes additional organic matter to the soil, which will increase its water holding capacity. It is estimated that 118,400 acres of cover crops are needed.

The next item listed is diversions and terraces. These are in reality two separate measures that are used under different conditions but, for the purposes of the report, were combined as one. Both of these measures have the same general function of intercepting surface runoff from sloping land and carrying it in properly designed and constructed channels across the slope to a safe disposal point, such as a protected waterway or constructed outlet. In addition to preventing heavy concentrations of runoff, terraces and diversions reduce gullying and sedimentation. Approximately 3,040 miles of these measures are needed in the watershed.

Next is outlets and waterways. This practice provides for the safe disposal of runoff water from terraces and diversions. In most cases the outlets used will be natural drainageways that have been protected by heavy vegetative cover. Occasionally, it will be necessary to actually construct a channel to adequately handle this water and, in rare

cases, certain types of erosion control structures will be required to protect these constructed channels from washing out. It is estimated that 6,500 acres of outlets and waterways are needed.

Next on the list of recommended practices is the establishment of perennial hay on lands not suitable for row crops in accordance with the capability of that land. This perennial hay is usually a mixture of long-lived grasses and legumes, properly seeded with adequate fertilizer and lime. In addition to using perennial hay on land not suitable for cultivation, it is also used to furnish vegetative protection to such measures as diversions, outlets and waterways. Since land under a perennial hay cover has a higher infiltration rate than that same area in a cultivated crop, runoff will be reduced. On the 281,400 acres recommended for perennial hay, sheet and gully erosion will also be reduced.

Pasture management, which is next, consists of the periodic mowing of pastures to remove weeds and mature grasses, the scattering of droppings, and the establishment of a system of controlled grazing. Pasture management will not only improve the type of grass cover but will also increase the density of cover, thereby increasing the infiltration rate and reducing the runoff.

Contour furrows on approximately 147,100 acres are recommended. I doubt whether many of you are familiar with this measure as very little of it has been done in this area. Level furrows, or small level terraces, are constructed across the slope on pasture land. They are spaced about twenty feet apart and are large enough to hold approximately one-half inch of runoff in detention storage. In addition to the

amount of runoff held in storage, contour furrows, by reducing the runoff, help to protect the areas below furrowed pasture fields from erosion.

Streambank Erosion Control is a measure or combination of measures designed to reduce bank erosion on the tributaries of the watershed. This is accomplished by sloping the banks approximately 2:1, protecting the lower part of this sloped bank with rock riprap, planting the upper part with shrubs, such as basket willow, and by excluding livestock. It is not always necessary to do all of these. There may be cases where sloping is all that is necessary, or perhaps fencing out the livestock will suffice. It all depends on the present condition of the bank and stream. It is estimated that 275 miles of streambank need protection.

Erosion Control Structures - the last openland measure recommended in the report includes such items as small check dams, gully structures, and culverts where they are a necessary part of the water disposal system or are required for gully stabilization. The concentration of runoff water by a water disposal system makes it necessary that special erosion control structures be used to protect the channels or natural drainageways from gullying and to furnish protection to railroad and highway ditches. New and larger culverts will be necessary to safely pass runoff water under railroad and highway fills. The establishment of these measures will reduce the rate of gully erosion in existing drainageways and permit the installation of adequate water disposal systems, which will materially reduce sheet and gully erosion on the fields protected. Approximately 9,800 erosion control structures are recommended.

Woodland Management - This activity includes a variety of measures and practices all aimed at improving woodland hydrologic

conditions. The main objective is the development and maintenance of well stocked, thrifty stands that offer good protective cover and reduce runoff and erosion. This cover provides for maximum infiltration and storage capacity.

The preparation of management plans for individual ownerships will include stand improvement work, stabilization of roads and trails, and utilization service. All of these practices must be applied as part of an integrated program if the objectives of the recommended program are to be met.

Tree and Shrub Planting - The Delaware River watershed contains 292,100 acres of openland that should be converted to woods in accordance with the needs and capabilities of the land. Planting of these areas will be necessary where they are not favorably located with respect to seed sources and will not restock naturally with desirable tree species, or where restocking is inadequate for quick protection of the soil.

In addition the planting of 23,700 acres of shrubs as border plantings between woods and cultivated or pastured fields has been recommended.

Protection of Woodland from Grazing - At present approximately 178,000 acres of farm woodland are being grazed by livestock. This grazing destroys reproduction and compacts the soil with a resultant decrease in the capacity of the soil profile to take up and store water. The elimination of grazing by the construction of fence on 136,300 acres of presently grazed woodland and on 144,500 acres of openland areas, scheduled for conversion to forest, has been recommended.

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Land Acquisition - Public acquisition is recommended for approximately 167,600 acres of critical forest land where watershed protection values are paramount and present owners cannot afford to install the necessary corrective treatments. These areas are characteristically the ridge top and upper slope localities which, because of their location and past use, have poor woodland cover and contribute materially to flood problems. In general they have suffered from repeated heavy cuttings and severe fires. It is expected that these lands will be purchased by state or local government and maintained as part of existing or new public forests or preserves.

Stream Channel Improvement is recommended on 423 miles of tributary streams. This measure will protect valuable bottomland from flooding, provide outlets for drainage works, and furnish flood protection for high value improvements, such as highways, railroads, bridges, and farm buildings.

133 Water Retarding Structures are recommended for installation in the watershed. These are small flood control dams with an average drainage area of less than two square miles. They will be located to furnish protection to local damage sites on the tributary streams. These structures will be earth fill dams through which a small, low elevation outlet conduit uncontrolled by gates or valves will be constructed to draw down the temporary storage. A spillway adapted to site conditions and meeting required design criteria will be used to provide an outlet for flood flow in excess of storage capacity provided by the structure. By providing temporary storage of runoff, flood damages will be reduced.

Diking, of which there are 18 miles recommended, provides protection from flooding of valuable bottomland and such improvements as highways and farm buildings where limitation of rights-of-ways and gradient prohibits the use of channel improvement. Floodways will be provided to safely carry flood flows of design frequency.

That is a brief on the measures recommended in the Delaware Report.

After the Survey Report has been approved by the Congress, provisions must be made for the actual installation of the recommended program on the watershed lands. The current policy of the Department of Agriculture is to assign this responsibility jointly to the Soil Conservation Service and Forest Service, with their assignments divided between the openland and the woodland programs. The Soil Conservation Service, as you know, operates through locally organized and governed soil conservation districts and the Forest Service through the forestry agencies in the respective states.

The first step in the installation program is the selection of subwatershed priorities. In this step the soil conservation districts and the state forestry agencies jointly determine the order in which subwatersheds will be brought into the program. Technical assistance in making this selection is provided by Soil Conservation Service and Forest Service technicians, the only requirement being that work must be initiated in headwater areas rather than in downstream reaches. This is essential for the protection of those structures and measures that are directly affected by the watershed above them. It would be foolish to build a

runoff retarding structure before adequate sediment control was in effect above it.

After the subwatershed priorities have been established, definite work plans are prepared for each such watershed. It is at this point that the recommended program for specific acres and stream reaches is developed. The work plans indicate not only the program but also the various local and state agencies that have agreed to accept the responsibility for certain phases of the recommended program. A recommended breakdown of costs is made on the basis of benefits, with the landowners expected to bear the predominate share for those measures that directly benefit them, and the state and federal governments for those measures that are installed primarily for community or downstream benefits. When all interested agencies indicate agreement with the work plan it becomes the guide for installation as well as the budget request to the Congress for federal flood control funds.

There is one last point I would like to make and that is the relationship between the Department of Agriculture's program in aid of flood control and the Incodel program for the utilization of the waters of the Delaware River Basin, which will be explained today. We believe that all of us who are interested in the Delaware will agree that it is extremely fortunate that the two proposed programs are in about the same stage of development--one directed at making maximum utilization of our water resources and the other directed not only at protecting our land resources but, in addition, aimed at preventing the products of erosion from shortening the life of those structures necessary for water resource

development. I believe you can be assured that the proposed program for the protection of the watershed lands can and will be so adjusted in the operation stages to provide maximum benefits to the water utilization project.

* * *

INTRODUCTION TO INCODEL REPORT

by
Mr. Malcolm Pirnie
Malcolm Pirnie Engineers

Incodel Annual Meeting
Shawnee-on-Delaware, Pennsylvania
September 11, 1950

During the past century, many engineers have studied the water resources of the Delaware River Basin and recorded their findings. Topography of the Basin and adequate records of its annual water crops had been established. General and considerable detailed geological data had also been assembled. Such applications of the engineering sciences to appraise the Delaware River Basin must have cost several million dollars.

Incodel's consulting engineers gratefully acknowledge the vision and recorded findings of their many predecessors. Without such accumulated facts, a recommended integrated water conservation project would have been impossible within the limited time available.

The Delaware River is a "treasure", requiring wholehearted cooperation of its four proprietary states to conserve its bounteous waters and use them for the benefit of all.

However, half of its water crops rush to the sea in only thirty per cent of the time, leaving less than average water flow in the river for seventy per cent of the time. Agricultural crops natural to the Delaware River Basin are stored in silos or barns when harvested and are withdrawn between harvests to satisfy the demand for their use. The water crops in the Delaware River Basin should be harvested in a similar manner.

To maintain the value of the Delaware River as a "treasure" in perpetuity it must be wisely administered and used.

The upper third of the Delaware River Basin above Wallpack Bend is sparsely settled and largely wooded. It is rugged land with a high yield of water. Because the underlying rocks are largely insoluble, the water flowing over them is ideally soft. The forest blanket on the steep slopes protects the soil cover from erosion, resulting in water with relatively little turbidity. The annual water crop from this area is of highest value for use as water supply and stream flow regulation. It can be collected at high elevations, permitting its delivery to centers of need by gravity.

There is immediate need for water supply and stream flow regulation. Studies of population, water consumption and capacity of available existing supplies indicate that within the next 30 years the northern New Jersey metropolitan district and the area served by New York City will need an additional 465 million gallons of water daily. Within a period of another 20 years (1980 to 2000) the requirements of these areas will probably increase by an equal quantity.

There is an immediate need for increasing the dry weather flow at Trenton to at least 4,000 cubic feet per second and possibly to about 4,800 cubic feet per second. Under present conditions, the natural summer flow at Trenton averages approximately 2,300 cubic feet per second, but often falls below 2,000 cubic feet per second.

Some years, as in 1930 and 1931, the period of low flows lasts for six or seven months. The upstream storage required to maintain river flows at Trenton in summer and fall at 4,000 and 4,800 cubic feet per second

is 185 billion gallons and 285 billion gallons respectively. Storage of 131 billion gallons is required to furnish a water supply of 465 million gallons daily to New York City and the northern New Jersey metropolitan district, including the 31 billion gallons to be released during low flows in the river to compensate for diversion.

Thus a total storage of 316 billion gallons is needed for both purposes, if a minimum river flow of 4,000 cubic feet per second is maintained at Trenton, and 416 billion gallons is needed if a minimum flow of 4,800 cubic feet per second is maintained at Trenton.

Philadelphia's existing sources of supply from the Schuylkill River and the Delaware River are adequate in quantity but, because of pollution, inferior in quality. For the past thirty years a better source of upland water supply has been advocated for this city. Philadelphia may or may not desire to obtain water from an upland integrated water project in the immediate future.

On the one hand, the comprehensive water works improvement program which the city is now undertaking, coupled with pollution abatement and stream clearance projects presently under construction in the Philadelphia-South Jersey metropolitan region, will materially improve present sources of raw water.

On the other hand, construction of the new United States Steel Company plant at Morrisville will undoubtedly result in the establishment of many allied industries in the area on both sides of the river between Trenton and Philadelphia. These industrial developments, by their very nature, are likely to create objectionable taste and odor problems, even though their

wastes are treated to the greatest practicable extent, and will probably hasten the day when Philadelphia should be served by an upland project. The proposed integrated project has been designed to meet this situation by enabling Philadelphia to get its water from a new source. Five hundred million gallons daily have been allocated for this purpose. It is estimated that this quantity will be more than adequate to meet the demands of 1980 or beyond.

Similarly, it is expected that the rapidly growing suburban areas adjacent to Philadelphia and to the southern New Jersey metropolitan district extending from above Trenton to below Camden, will require supplemental sources of water supply in the foreseeable future. The recommended project provides for the following quantities in millions of gallons per day for these areas, if and when required:

Philadelphia Suburban Water Company	100 m.g.d.
Region between Easton and Philadelphia	50 m.g.d.
Southern New Jersey Metropolitan District	100 m.g.d.
Wilmington Area	50 m.g.d.

Other sections of New York, New Jersey and Pennsylvania in and near the Basin, in general, can be supplied with water from local sources, although the proposed project can be modified to meet additional needs which may develop in these areas.

Recommended Project

A number of alternate plans for supplying future water requirements of the four-state area have been considered, some of them advanced by other agencies. Most of them reflect extensive and thorough study and analyses of the problems. However, none, in our judgment, compares favorably

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with the recommended plans.

Two alternate methods are recommended to serve Philadelphia and adjacent areas when needed. Shown on Figure 13A, the first provides for the withdrawal of water from an intake on the Delaware River above Trenton; shown on Figure 13B, the second provides for the direct withdrawal of water from a reservoir on the Delaware River at Wallpack Bend, about 15 miles above Delaware Water Gap.

The overall recommended plan, designed to serve the needs of the four state areas, would be constructed in two or more stages.

Stage 1 of Recommended Project

Stage 1 is designed to provide 465 million gallons of water daily to meet estimated additional requirements of the northern New Jersey and New York City areas for the next 30 years. It will also provide storage adequate to permit release of sufficient water to maintain a minimum flow in the Delaware River at Trenton of 4,000 cubic feet per second without construction of a reservoir at Wallpack Bend, and 4,800 cubic feet per second with Wallpack Bend Reservoir. The reservoirs will retain lakes of about one-third maximum reservoir depths in the driest years.

Stage 1 of the project is comprised of the following elements:

(1) A storage reservoir on the West Branch of the Delaware River at Cannonsville with a total capacity of 118 billion gallons. This reservoir would be used primarily for the purpose of furnishing water in order to increase low river flows in the entire length of the river.

(2) A diversion dam on the main river near Barryville holding about 10 billion gallons. The major purpose of this dam will be to permit the diversion of flood flows for water supply and stream flow regulation.

(3) A storage reservoir with a total capacity of 278 billion gallons on the lower Neversink River and on Basher Kill extending from Godeffroy to Phillipsport. The principal function of this reservoir will be to store the flood flows which are captured at Barryville and transported therefrom by tunnel connection between the two structures.

(4) A transmission tunnel from the upper part of Godeffroy Reservoir to New York City's existing main supply tunnels in Brooklyn. From this common transmission tunnel, connections would be made to the major water supply systems of northern New Jersey.

(5) A storage reservoir on the main river at Wallpack Bend with a total capacity of 121 billion gallons. This reservoir is not included in Alternate A of Stage 1, which would provide stream flow regulation equivalent to a minimum of 4,000 cubic feet per second at Trenton, but is included in Alternate B of Stage 1, which provides stream flow regulation equivalent to a minimum of 4,800 cubic feet per second at Trenton.

Stage 1, Alternate A, total storage of 406 billion gallons will provide the following benefits. 131 billion gallons (32.2%) will furnish 465 million gallons per day water supply to New York and northeastern New Jersey and compensating releases to increase dry weather stream flow. 185 billion gallons (45.6%) will provide the additional releases needed to raise natural low stream flows at Trenton to 4,000 cubic feet per second in driest years. 90 billion gallons (22.2%) will provide minimum conservation lakes in the reservoirs of about one-third maximum reservoir depths.

Stage 1, Alternate B, total storage of 527 billion gallons will provide, as in Alternate A, 131 billion gallons (24.8%) for 465 million gallons per day of water supply to northeastern New Jersey and New York and compensating releases to increase dry weather stream flow. 285 billion gallons (54.1%) will provide the additional releases needed to raise natural low stream flows at Trenton to 4,800 cubic feet per second in driest years. 111 billion

gallons (21.1%) will be left in the reservoirs to provide minimum conservation lakes.

Provision for equalizing storage, chlorination and future filtration is made on the main tunnel in New Jersey east of the Ramapo River. Long storage is provided in the Godeffroy Reservoir to reduce the color and improve the general quality of the water. The rock tunnels, elastic earth dams and connections to transmission systems near centers of consumption provide, in the event of possible aggression, a substantial additional degree of security for water supplies within the areas served.

The total construction cost estimated at prices prevailing in midyear 1950 but excluding cost of construction of self-liquidating power facilities, and the amounts allocated to water supply and stream flow regulation for Alternates A and B of Stage 1 are as follows:

	Alternate A	Alternate B
ESTIMATED CONSTRUCTION COSTS	$516,932,100	$564,154,800
Allocation		
To Water Supply, including stream flow regulation to compensate for diversion	$415,503,100	$415,503,100
To Additional Stream Flow Regulation	$101,429,000	$148,651,700

The total estimated net average annual costs and the amounts allocated to water supply and stream flow regulation are as follows:

	Alternate A	Alternate B
ESTIMATED ANNUAL COSTS	$23,319,400	$25,848,700
Less Estimated Return on Power	700,000	1,000,000
Net Annual Cost	$22,619,400	$24,848,700
Allocation		
To Water Supply and Compensation for Diversion	18,095,500	18,095,500
To Additional Stream Flow Regulation	4,523,900	6,753,200

As shown in the above tabulation, the average cost to develop, compensate for diversion and deliver 465 million gallons per day would approximate $18,095,500 per year. Thus under both Alternates A and B of Stage 1, the cost of water at dependable yield capacity becomes about $106. per million gallons. If the Stage 2 works could be built and operated at present unit costs, to double the Stage 1 dependable yield capacity, the cost of water at design capacity of the works serving New York and northeastern New Jersey becomes about $70. per million gallons. This is only 40 per cent more than cost of Catskill water delivered to Hillview by works built when construction costs were about one-quarter 1950 costs.

At present day prices, this is low-cost water and contracts should easily be negotiated with prospective purchasers which will make the water supply, including compensation for diversion, feature of the integrated project self-liquidating.

It is recommended that the annual costs of $4,523,900 and $6,753,200 allocated for additional stream flow regulation should be borne by the four benefiting states in the following proportions:

	Stage 1 - Alternate A (Without Wallpack Bend)		Stage 1 - Alternate B (With Wallpack Bend)	
	Dollars	Per cent	Dollars	Per cent
New York	1,131,000	25	1,131,000	16.8
New Jersey	1,583,350	35	2,642,250	39.1
Pennsylvania	1,583,350	35	2,642,250	39.1
Delaware	226,200	5	337,700	5.0
Total	4,523,900	100	6,753,200	100.0

The difference in annual costs of $2,229,300 between Alternate B and Alternate A covers charges for the Wallpack Bend Reservoir from which New York would derive no benefits. It has been assumed that this additional sum would be distributed in the ratio of 47 1/2 per cent each to Pennsylvania and New Jersey and 5 per cent to Delaware. To collect these annual costs for river flow regulation, an interstate district might be authorized to assess abutting properties and water users in proportion to their benefits. (600 mile frontage, A = $1.43, B = $2.13 average per front foot)

Improvement in Sanitary and Salinity Conditions in Lower River

The proposed integrated water project provides for the storage of an adequate quantity of water in reservoirs throughout all stages of development and operation for the exclusive purpose of maintaining adequate stream flows for the benefit of downstream riparian owners during periods of low

runoff. The value of this phase of the project will be tremendous. River water will be more suitable for both municipal and industrial purposes. Increased flows in summer and fall, when most needed, will facilitate assimilation of effluents from sewage and industrial waste treatment plants. At the same time, recreational opportunities, as afforded by the river, will be enhanced and waterfront property values increased.

Probably the greatest benefits from this feature of the project, however, will accrue to the heavily industrialized sections of Pennsylvania and New Jersey between Philadelphia and Wilmington and to the oyster and shellfish industry in the lower river and bay along both the New Jersey and Delaware shores. This area is particularly vulnerable to the devastating effects of the encroachment of water from the ocean in seasons of deficient rainfall. The proposed program provides for the release of large quantities of impounded waters to minimize such occurrences. Its operation in this manner will go a long way toward eliminating the current periodic damages to manufacturers caused by salinity. These are estimated to amount to approximately three-quarters of a million dollars a year on the average; in some years this damage has reached an estimated $2,000,000. The multi-million dollar oyster industry in the lower river and bay should benefit to an equal or greater extent because maintenance of favorable salinity prevents the destruction of young oysters by their natural enemies.

The project will accelerate the program being currently prosecuted by the Atlantic States Marine Fisheries Commission for the restoration of shad fisheries, once one of the region's most important businesses.

The river regulation feature of the project will excellently supplement the effective stream pollution and stream clearance projects now

being prosecuted by the states in which the Delaware River Basin is located, as exemplified by the Commonwealth of Pennsylvania's Schuylkill River Restoration Project and general stream clearance program.

Power Development Possibilities in Concert with the Project

Studies indicate that a substantial amount of hydroelectric power can be developed from the water released at the proposed dam sites. In this study it has been assumed that the power features of the proposed project would be constructed and financed by the public agency representing the joint interests of the four Delaware River Basin states and that the power facilities would be leased to and operated by locally established privately owned power companies. This procedure, however, would not preclude arrangements to sell falling water to power companies, thus permitting them to finance, construct and operate the power installation. It is believed that the value of power under Stage 1 of Alternate A, not including Wallpack Bend, would be approximately $700,000 per year and under Stage 1, Alternate B, including Wallpack Bend, the net revenue would be about $1,000,000 per year. These estimated revenues from the sale of power, used in estimating the net annual costs set forth in this report, are considered to be conservative.

Subsequent Construction Stages

The initial stage of the project is so designed as to be expansible, if necessary to meet more distant requirements. The order of subsequent construction stages will depend upon the occurrence of expected future requirements and the time when Philadelphia and adjacent areas require water from the project.

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When a further additional supply, above the 465 million gallons a day provided by Stage 1, is required by northeastern New Jersey and New York City, it will be necessary to construct additional reservoirs. These include a storage reservoir at Fishs Eddy on the East Branch of the Delaware River, with a total capacity of 157 billion gallons; a storage reservoir on Flat Brook, a New Jersey tributary, with a total capacity of 84 billion gallons; and the Wallpack Bend Reservoir, if it has not been constructed previously as Alternate B of Stage 1.

When Philadelphia or the Philadelphia and southern New Jersey areas desire to obtain water from the integrated project, the Wallpack Bend Reservoir (which is optional in the first stage) will be needed. Water can be delivered from Wallpack Bend to these areas in either of two ways. Alternate A (shown on Figure 13A) provides for supplying Pennsylvania and other areas in the Lower Basin from an intake on the Delaware River above Trenton. Alternate B (shown on Figure 13B) provides for supplying these areas from an intake at the Wallpack Bend Reservoir. Both plans include tunnels, pipelines, and equalizing storage reservoir facilities constructed on the Neshaminy Creek and both plans contemplate using the existing filter plants in Philadelphia for treating the water.

Both Alternates A and B of Stage 2 involve withdrawal of water from the Delaware River above Trenton. Alternate A would be much lower in construction cost, but operating costs would be higher because more pumping would be required. Alternate B involves tunnel construction to transmit water from the Wallpack Bend Reservoir by gravity to Chalfont Reservoir and would provide water of better quality at higher elevation.

The first plan is favored because it avoids expensive tunnel construction. It would provide raw water of satisfactory quality for treatment at Philadelphia's existing filtration plants.

In general the overall water project calls for retention of flood waters during spring freshets and other periods of high stream flow for water supply and stream flow regulation purposes. The combined total storage provided by Stages 1 and 2 would be 767 billion gallons, of which at least 170 billion gallons would be held in the reservoirs at all times. These volumes of water, which otherwise would be wasted and damaging in their rush to the sea, would be conserved for water supply and other beneficial purposes. A substantial part of the quantities so stored would be used to provide a high grade source of potable water, sufficient to meet increased demands in New York City and northeastern New Jersey for at least the next fifty years and to make a new source of municipal supply available to Philadelphia, southeastern Pennsylvania and southwestern New Jersey, when and as desired.

Utilization of the Waters of the Delaware River

The Delaware River provides a water supply more than adequate for all of the estimated future needs. Each year, an enormous quantity of water flows down the Delaware River past Philadelphia and a comparatively small percentage of this water is actually used. Based on the average flow of the Delaware River during a normal year, Stage 1 of the project would utilize only 4 per cent of the fresh water in the river above the Pennsylvania-Delaware line for water supply diverted from the Basin; and based upon the full development of the project, including Stage 2, the percentage of utilization of the waters in the Delaware River for water supply diverted from the Basin above

the Pennsylvania-Delaware state line would be 8.7 per cent. The use of the fresh water within the Basin itself would be about 7 per cent of the flow above the Pennsylvania-Delaware line. Because of the water stored in reservoirs during the wet season for releases during the dry weather period, the flow in the river above the Pennsylvania-Delaware line would be materially increased by the releases of water from these proposed reservoirs. The Delaware, like all rivers, produces too much water in the spring when the snows are melting and river flows are high, and not enough during the late summer and fall when the river flow is low.

To correct this condition, it is obviously in the interest of the welfare, continued industrial growth and prosperity of the region below Trenton that some of the spring flood waters should be stored and used for release during the dry months. This is a major purpose of the reservoirs which are described in this report.

All of the reservoirs in Stage 1, except Wallpack Bend, are located in New York State. More than 75 per cent of the reservoir capacity provided under Stage 1, Alternate B, is to be used for release during the low flow periods. This water will be of enormous importance to New Jersey, Pennsylvania and to Philadelphia in both salinity control and assimilation of pollution. Actually, under this plan it is perfectly feasible to develop water for diversion to metropolitan areas without depriving any area in the four states. In fact, industries and communities in the lower river would be greatly benefited and the natural advantages of the area which have caused its present productive development would be substantially increased.

Based upon the facts developed, as set forth in the report, the

consulting engineers have reached the following conclusions:

(1) The construction of an integrated interstate water supply project on the Delaware River above Trenton is necessary, feasible and advisable.

(2) The Upper Delaware River Basin is admirably suited to the development of a major integrated interstate water supply system. Water of excellent quality at high elevation within a reasonable distance can be made available to satisfy existing critical water supply demands of large centers of population.

(3) Flood waters of the Delaware River that now discharge into the sea will be stored and made available to meet water supply needs within and without the Basin and needs for stream flow regulation.

(4) Initially the proposed project will make sufficient high quality water available to meet existing and future demands for water supply and stream flow regulation, and can be expanded step-by-step as required.

(5) The proposed project is capable of providing for the future water requirements of northeastern New Jersey, New York City, the southern New Jersey metropolitan district and the Philadelphia area of Pennsylvania beyond the year 2000 A.D.

(6) Critically needed high quality water will be delivered by gravity to points of maximum consumption in the metropolitan areas of northern New Jersey and New York City, practically eliminating need for reinforcement of transmission systems from existing supply sources.

(7) Stream flow regulation made possible by the proposed project will contribute greatly toward providing better quality water supplies to those taking water directly from the Delaware River for domestic and industrial use, and will greatly enhance the natural advantages of the area for continued industrial development and recreational use.

(8) The proposed project with its plan of releases for stream flow regulation to maintain substantially greater than natural minimum flows at Trenton will greatly alleviate costly and objectionable saline conditions between Philadelphia and the Pennsylvania-Delaware boundary which are experienced during the periods of low river flow in dry weather.

(9) Salinity conditions in the important shellfish propagation areas will be so improved as to reduce materially the damage caused by drills which feed upon and destroy young oysters.

(10) Improved stream conditions will promote aquatic life and be beneficial to commercial and recreational fishing interests.

(11) Reservoirs of considerable size will be created around which needed state and interstate parks can be developed for the use and enjoyment of a large concentration of the country's population.

(12) The magnitude of the proposed project will permit construction of works to provide stream flow regulation at a reasonable cost and water for domestic and industrial supplies at costs closely approximating those for water from existing upland sources built when costs for construction were substantially lower than at present.

(13) Approximately twelve years will be required to provide necessary legislation and to organize, plan, construct and place in operation Stage 1 of the project.

Recommendation

Based upon the conclusions set forth above, and the supporting details covered in the detailed engineering report, the consulting engineers recommend that immediate consideration be given to the establishment by compact of a Delaware River Water Commission, with appropriate representation from each of the four proprietary states, to which would be delegated power to plan, finance, construct and operate the Stage 1 integrated water project, to sell water service capacity to political subdivisions and other water supply agencies and to provide and receive supporting revenues for stream flow regulation which would benefit each of the proprietary states. The unusually attractive investment advantages offered by the project will interest those best qualified by experience in creating similar commissions and financing large projects. Their advice will be readily obtained and should be sought to prepare

legislation which will create the Commission, endow it with powers needed for most effective discharge of its duties and obtain lowest cost financing of its constructions.

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REPORT
OF THE COMMITTEE TO DRAFT THE PROPOSED INTERSTATE COMPACT
TO ESTABLISH THE DELAWARE RIVER BASIN WATER COMMISSION

by
Miss M. Vashti Burr, Deputy Attorney General
Commonwealth of Pennsylvania - Chairman

Incodel Annual Meeting
Shawnee-on-Delaware, Pennsylvania
September 11, 1950

In 1949 the legislatures of the States of New Jersey and New York and the Commonwealth of Pennsylvania, by reciprocal legislation, directed the Interstate Commission on the Delaware River Basin (INCODEL) to determine and report on the feasibility and advisability of the future construction of an integrated water supply project and to include in its report such draft or drafts of legislation as it may deem necessary or proper for enactment.

The Executive Committee of INCODEL designated as a drafting committee the Attorneys General, or their representatives, of each of the said States and the State of Delaware and invited the members of that committee to a meeting in the INCODEL offices on March 18, 1950. At that meeting the representatives of the several Attorneys General were requested to study a number of tentative drafts previously suggested as guides in the preparation of a draft interstate compact and to prepare and recommend a draft of enabling legislation in which the proposed compact would be embodied. The members of the drafting committee as formally constituted at that meeting are: Judge P. Warren Green of the State of Delaware; Deputy Attorney General Robert Peacock of New Jersey; Deputy Attorney General Edward C. Ryan of New York; and Deputy Attorney General M. Vashti Burr of Pennsylvania, chairman. Copies of the tentative drafts were given to each of the committee members on March 18.

The chairman of the drafting committee examined the several tentative drafts and also copies of all available existing compacts irrespective of their

purposes. The chairman then prepared a work draft, a copy of which was sent to each member of the committee, to Mr. James H. Allen, secretary-treasurer of INCODEL, and to Mr. Fred Zimmermann of New York who had been designated as a consultant for the committee. Beginning the first week of May, on separate occasions, Mr. Peacock, Judge Green, and Mr. Allen met with the chairman in Washington. The members of the committee, except Mr. Ryan, met at the INCODEL offices on June 8 and 9 and redrafted several provisions in the light of information regarding diversity in the laws of their respective States. Mimeographed copies of the revised work draft were supplied as a basis for reexamination on July 12 and 13 when all members of the committee met at the INCODEL offices. During the evening of July 12 Mr. Zimmermann met with the chairman to discuss certain provisions with respect to which recent court decisions and consent Acts of the Congress might be applicable. By providing specific information concerning New York laws, Mr. Ryan contributed much to the committee's efforts to have the provisions of the draft conform with the laws of all four States.

At the request of the committee, the chairman undertook to reexamine the draft, to coordinate revisions and new drafting in order to assure uniformity in style and form, and to revise various provisions in line with ideas agreed upon. All suggested changes were incorporated in a new draft which was remimeographed in order that each committee member might have a sufficient number of copies for circulation among interested officials of their respective States with a view to receiving suggestions from them. Reports of these suggestions were made at a meeting of all of the committee members at the INCODEL offices on August 30 when some further changes were approved, a few suggestions being held over until INCODEL has determined certain matters of policy.

On the basis of information available to the committee, and always bearing in mind that the draft can in no sense be taken as representing the official views of the States we represent, but merely the result of our concerted efforts, it is believed that the preliminary draft which has been prepared may well serve as a guide in determining what provisions should be included in the draft of legislation the Commission will report to the legislatures. The drafting committee desires to emphasize that it is impossible at this time to report a final draft of enabling legislation, in which the proposed compact will be incorporated, because we could not have had before us either the specific information and recommendations not heretofore reported by the engineers or a foreknowledge of matters of policy yet to be decided. Also, the committee wishes to express sincere gratitude and appreciation to all members of the INCODEL staff for their assistance in mimeographing work drafts, except the first one, and distributing them for us. We are especially indebted to Mr. Allen, without whose valuable technical knowledge and assistance we could not possibly have prepared the draft compact hereby submitted. Also, we appreciate very much having had the benefit of Mr. Zimmermann's valuable comments.

The draft compact contains a preamble and 15 articles, each article having a subject title to facilitate the finding of provisions relating to specific matters. The preamble indicates clearly the reasons for and the purposes of the compact. It refers to the common interest of the peoples of the participating States in the waters of the Delaware River Basin; the desirability of developing, utilizing, controlling, and conserving the water and water resources of the Delaware River and its tributaries; the need for meeting existing and prospective requirements of the people within New Jersey, New York,

and Pennsylvania for obtaining and maintaining an adequate and satisfactory supply of water, both for domestic and industrial purposes; the principle enunciated by the United States Supreme Court in the Delaware River Case that the use of waters of the upper Delaware River Basin for municipal water supply has precedence over all other purposes; the necessity for maintaining an adequate minimum flow for specified purposes; INCODEL, established jointly by the Commissions on Interstate Cooperation of the participating States to formulate and recommend integrated programs for the development, utilization, control, and conservation of the water resources of the Delaware River Basin; the findings, conclusions, and recommendations of INCODEL, concurred in by the several Commissions on Interstate Cooperation, that the future construction of integrated water projects in the Basin is feasible, advisable, and urgently needed, and can best be accomplished through a joint administrative agency created by agreement or compact between the States concerned; and the general consent given by the Congress of the United States in 1911, as amended in 1925, to the making of agreements or compacts between States for the purpose of conserving the forests and the water supply.

In reviewing briefly the substantive provisions of the committee's draft of a proposed interstate compact, each article will be dealt with separately, with such cross references as may be considered advisable.

Article I (Creation and Purposes of the Commission)

By this Article there is created a Commission, to be known as the Delaware River Basin Water Commission, as a public corporate instrumentality of the States of Delaware, New Jersey, and New York and the Commonwealth of Pennsylvania, and of each of those four States, to exercise an essential governmental function of each of the States. The purposes of the Commission, in

brief, are:

(a) To assure an adequate water supply (1) to meet domestic and industrial requirements; (2) to provide an adequate minimum flow for the protection of public health, for the benefit of industry and fisheries, including oysters, clams, and shellfish, for animal and aquatic life, for recreation, for general sanitary conditions, including the prevention and abatement of pollution, and for the prevention of undue salinity; and (3) to provide for such other incidental uses of water as navigation, flood control, production of hydroelectric power, and other related uses.

(b) To plan, finance, construct, operate, and maintain dams, reservoirs, and other appurtenant structures within the Delaware River Basin above Trenton Falls for the storage and effective regulation of water resources.

(c) To plan, finance, construct, operate, and maintain necessary water treatment plants, aqueducts, or other facilities within or without the Basin.

(d) To cooperate with all other bodies concerned with the development, utilization, control, and conservation of the water resources of the Delaware River.

(e) To procure any required consent from the federal government to effectuate the purposes of the compact.

Article II (Commissioners)

This Article provides for three commissioners from each State, who shall be paid by the Commission their necessary expenses and such compensation as may be fixed by the Commission. They must be citizens of the State which they represent and shall be appointed by the Governor of that State, by and with the consent of the Senate of that State unless the State constitution

provides otherwise. Each of the commissioners shall serve for 5 years, except that special provision is made respecting the terms of the first commissioners. They may be removed as provided by the laws of their State. In the event of a vacancy, the Governor is to appoint a successor for the unexpired term, subject to confirmation as stated above. The Federal government may be represented on the Commission by three advisory members, who shall be appointed or removed according to Federal laws, and they shall serve without compensation from the Commission.

Article III (Officers, Employees, Management, and Procedure)

This Article covers a multitude of administrative and functional matters. It is provided that the Commission shall have charge of its property and affairs, shall adopt an official seal and suitable by-laws, and shall promulgate rules and regulations for its management and control. A majority of the commissioners is prescribed as a quorum for the transaction of business, but the Commission cannot impose on any participating State or political subdivision therein any obligation, including any allocation of water for water supply or for the maintenance of an adequate minimum water flow, unless a majority of the commissioners from that State shall have voted in favor thereof.

The Commission shall elect annually a chairman and a vice-chairman, shall appoint a secretary and a treasurer who need not be members of the Commission, shall appoint and at its pleasure discharge counsel, an executive director, engineers, and such other agents and employees as it may require, and shall fix the qualifications, duties, and compensation of all elected or appointed officers and employees. The requirements regarding custody of the Commission's records, use of the official seal, and the making of disbursements are prescribed. The Commission shall maintain one or more offices for the

transaction of business and may meet at any time or place, but must meet at least once each year. The fiscal year shall be July 1 to June 30, inclusive.

The Commission shall keep accurate accounts, open to inspection and audit by authorized representatives of the participating States. The Commission shall report its operations and transactions annually to the Governor and legislature of each participating State and shall make recommendations for legislative action deemed essential to carry out the purposes of the compact. The Commission cannot pledge the credit of any of the participating States, except in the manner authorized by the constitution and statutes of the respective States, nor shall any such State be liable for the torts or other wrongful or negligent conduct of members of the Commission or its officers, agents, or employees. It is made a misdemeanor for a member, agent, or employee of the Commission to have a personal interest, either directly or indirectly, in any contract entered into by the Commission, including the sale to the Commission of any real or personal property.

Article IV (General Powers)

This Article contains precise statements, in 18 lettered subparagraphs, of powers of the Commission not provided for elsewhere in the compact. Care has been taken to have a specific statement of power to correspond to each and every one of the purposes as set forth in Article I and to make cross references, wherever necessary, to powers or limitations on the exercise of power provided for in other parts of the compact. Article IV includes those powers normally given to an interstate agency of the kind proposed.

Among the powers covered by Article IV are those relating to (a) perpetual succession; (b) suing and being sued, subject to certain requirements; (c) the acquisition, use and disposition of personal property; (d) the

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acquisition, use, and disposition of real property and the making of improvements thereon; (e) the granting of the use of property or facilities owned or controlled by the Commission and the making of charges therefor; (f) the exercise of the power of eminent domain, subject to provisions of Article V; (g) the borrowing of money and the making and issuing of negotiable bonds, notes, interim receipts, or temporary bonds for specified purposes, subject to provisions of Article VIII; (h) the levying and collecting of rentals, fees, or other charges for use of the Commission's facilities or services, in order to insure revenues at least adequate to defray expenses of operation and maintenance of such facilities and to pay interest on and principal of bonds issued by, or other obligations of, the Commission; (i) the acceptance of payments, appropriations, grants, gifts, loans, and other funds, properties, and services made available to the Commission by the Federal government, the participating States or their political subdivisions, or private agencies, corporations, or individuals; (j) the conducting of surveys of existing or proposed reservoir, dam, or conduit locations and the studying of sub-surface conditions affecting the selection of dam or reservoir sites, subject to certain requirements designed to save the participating States harmless from damages caused by surveys or by entry on lands or damage resulting therefrom; (k) the determination of the location and character of dams, reservoirs, and other appurtenant structures above Trenton Falls and of treatment plants, aqueducts, and other facilities deemed necessary to carry out the purposes of the compact, as well as the formulation of plans for, and the determination of all other matters in connection with, the construction, operation, and maintenance of such structures and facilities; (l) the determination and allocation to the participating States of an equitable apportionment of available water supply to meet domestic and

industrial requirements; (m) the determination of the quantity of water required to be released from storage to maintain an adequate minimum flow in the river during periods of low flow, and the making of provision for the release of such waters as required for specified purposes, subject to provisions of Article IX; (n) the determination of the manner, and providing for the means, of utilizing and controlling water resources of the Basin in cooperation with other appropriate agencies for incidental purposes such as navigation, flood control, production of hydroelectric power, and related uses; (o) the development, subject to provisions of Article X, of hydroelectric power and energy inherent in the development and use of the waters and incident to the control and conservation of such waters; (p) the entering into contracts with the Federal government, the participating States or their political subdivisions, public or private agencies, and corporations or individuals, including contracts for the sale of water for water supply, for the sale of falling water and hydroelectric power and energy subject to provisions of Article X, or for the sale of other services, and including contracts for payments by participating States for benefits resulting from water released from storage during periods of low flow; (q) the taking of measures necessary to guard and protect areas in which the Commission's facilities or developments are located or in which construction under the compact is in progress and to protect the Commission's facilities and developments from damage by pollution or otherwise, and the appointment by the Commission for that purpose of guards to have authority of police officers; and (r) generally, the exercise by the Commission of all other powers, not inconsistent with the constitutions of the participating States or the United States Constitution, which may be necessary or incidental to the carrying out of the Commission's authorized purposes or the exercise of

the foregoing powers, except the power to levy taxes or assessments.

Article V (Condemnation Proceedings)

By this Article all condemnation proceedings in connection with the exercise by the Commission of the power of eminent domain, including the ascertainment of damages which shall be paid by the Commission out of its own funds, shall be prosecuted in accordance with the provisions of the condemnation laws in force in the State or States in which the condemned property is located; or, if there is no general condemnation law in any of the participating States, then the proceedings shall be pursuant to the law of that State for condemning property for State highway purposes.

Article VI (Conveyance of Lands and Relocation of Public Facilities)

By this Article each participating State consents to the acquisition, use, and occupation by the Commission of real property, including privately owned lands lying under water and lands already devoted to public use, necessary or convenient to carry out the authorized purposes of the compact. The officers, agencies, departments, commissions, or bodies of any such State having jurisdiction are authorized to grant and convey such property to the Commission in accordance with the laws of that State. Similarly, all political subdivisions of each participating State may, for the same reasons and upon reasonable terms and conditions, convey such real property to the Commission upon its request but not otherwise. The term "real property" is defined, and it is also provided that any highway, sewer, public utility, or other public facility dislocated by reason of constructions authorized by the compact shall be relocated, at the expense of the Commission, in the manner provided for by the laws of the respective participating States.

Article VII (Taxes and Payments in Lieu of Taxes)

Since the Commission, if established, will perform essential governmental functions, the bonds or other securities or obligations issued by the Commission and the income therefrom, or any profits made on the sale thereof, are exempted by this Article from taxation by the participating States, except for transfer and inheritance taxes.

Tax districts in which lands acquired by the Commission are located are accorded two alternatives, either to receive taxes or to receive payments in lieu of taxes, as follows:

(1) Each tax district shall tax such lands at the average value as improved on the date of acquisition, based on the average assessed value as improved for the immediately previous five-year period, and shall review the assessed value of such lands at the end of each succeeding five-year period thereafter and increase or decrease the assessed value percentagewise as the average assessed valuation of all the other lands in the tax district has increased or decreased in such period.

(2) The Commission and any tax district are authorized and empowered to enter into an agreement for payment of a fair and reasonable sum in lieu of taxes, in which case payment or payments made by the Commission may be on an annual basis or in a lump sum or sums, or over a stated period of years; provided, however, that in any case the payment or payments shall not be in excess of the amount of taxes upon such lands when last assessed prior to the time of its acquisition by the Commission.

None of the dams, aqueducts or other structures, or their appurtenances, to be built in accordance with the authority conferred by the compact shall be taxable, nor shall the assessed value of the lands upon which such

structures are built be increased by reason of their presence thereon. The Commission shall be liable, however, for any special assessments for local improvements or benefits pursuant to the laws of the respective States.

Article VIII (Financing)

In this Article the powers of the Commission with respect to financing, and limitations on the exercise of those powers, are set forth as precisely as possible, it being understood that the specific methods of financing a project authorized by the compact will be provided for in the recommended draft of enabling legislation which will embody the compact.

As set forth in Article IV (g), the Commission may borrow money and issue bonds, notes, interim receipts, or temporary bonds for specified purposes. It is provided in Article VIII that bonds issued by the Commission shall be negotiable, shall mature at such time or times as may be determined by the Commission, not exceeding 50 years from the date of issue, and shall be retired from the proceeds of the operation of the facilities constructed and operated by the Commission or from any other funds available to the Commission. The Commission may enter into any deed of trust, indenture, or other agreement, containing the provisions customary in such instruments, as security for such bonds and may assign and pledge thereby all or any of the property, revenues, or receipts of the Commission. The Commission must record any such instrument.

Any and all bonds of the Commission are made securities in which all public offices and bodies, insurance companies and associations, savings banks and savings institutions, administrators, executors, guardians, trustees, committees of the properties of incompetent persons, and other fiduciaries may properly and legally invest funds in their control. Holders of bonds and the trustee under any deed of trust may, by civil action, protect and enforce their

rights and may compel performance of all duties required by the compact, or by any deed of trust or resolution, to be performed by the Commission or by any of its officers.

The participating States also agree with each other and with the holders of bonds or other securities or obligations of the Commission for which the Commission's revenues or properties may or shall be pledged that, so long as such obligations are unpaid and unless and until adequate protection by law is provided for those advancing money upon such obligations, the States will not diminish or impair the power of the Commission to own, operate, or control its property or to derive revenue therefrom.

Provision is also made for the making of grants or loans to the Commission by any or all of the participating States. The Commission is empowered to repay any loan within such period and upon such terms as may be agreed upon between the Commission and the State advancing the funds.

Article IX (Release of Stored Waters)

By this Article the participating States agree with each other not to diminish or obstruct the flow of waters released by the Commission from storage to maintain an adequate minimum flow in the Delaware River during periods of low flow, and pledge payment to the Commission for the proportionate benefits received by the States from such release waters.

Prior to the completion of the project authorized by the legislation establishing the compact, the Commission shall release such quantities of water as may be feasible and reasonable considering the stage of progress in the construction of the project. After completion of the project, sufficient water shall be released from storage to maintain a daily mean rate of flow (1) of at least 1800 cubic feet per second, as measured at the stream gaging station at

Port Jervis, New York, and (2) of at least 4800 cubic feet per second, as measured at the stream gaging station at Trenton, New Jersey, from the non-tidal section of the river above Trenton into the tidal estuary of the river below Trenton. The Commission may, however, reduce the requirement for such flow if called upon to use part of the waters, which would otherwise flow in the Delaware River at Trenton, to meet domestic and industrial requirements of political subdivisions and metropolitan areas wholly within that section of the Delaware River Basin extending from the confluence of the Delaware and Lehigh Rivers to the confluence of the Delaware and Schuylkill Rivers.

Article X (Hydroelectric Power and Energy)

Pursuant to this Article the Commission, in exercising its power to develop hydroelectric power and energy, shall use no water in addition to that which would otherwise be developed and used by the Commission for water supply and for water required to be released from storage during periods of low flow in the Delaware River. The Commission shall not engage in the transmission and distribution of power and energy except for its own use. The development and sale by the Commission of hydroelectric power and energy within any participating State shall be subject to all laws of that State vesting jurisdiction in or control by the Public Service or Public Utilities Commission or other agency and to all laws vesting jurisdiction in or control by Federal agencies with respect to the development and sale of such power and energy. However, in any case where the agencies of two or more participating States have jurisdiction, such development and sale may be made subject to controls established by agreements between such agencies.

Article XI (Formulation and Approval of Plans)

Pursuant to this Article the Commission, upon its own initiative or

upon request by two or more participating States, shall prepare and submit a report to the legislatures of the participating States covering plans for, and the method of financing, any new project or any expansion of the project authorized by the legislation establishing the compact.

Prior to submitting such a report the Commission shall transmit a tentative draft to the appropriate water agencies of each participating State, as specified, and to INCODEL, to give those agencies an opportunity to submit written statements of their views and recommendations, and those views and recommendations, if any, are to be included in the Commission's report to the respective legislatures. If the Commission's report is approved by the legislatures of all the participating States or by the legislatures of New Jersey, New York, and Pennsylvania, the Commission may proceed with the project proposed in the said report. The Commission must also, prior to submitting its report, conduct investigations so as to give due consideration to the interrelation of the proposed projects with other projects and programs concerning the development, utilization, control, and conservation of the water resources of the Basin.

Prior to proceeding with any construction of any part of an approved project, detailed plans and specifications therefor must be submitted to and approved by the appropriate agency of each of the States within which such construction is a necessary part of the approved project.

Article XII (Non-Impairment of State Powers)

The first paragraph of this Article provides, in effect, that the powers of any participating State with respect to the water resources of the upper Delaware River Basin within the boundaries of such State shall remain unimpaired, subject to the proviso that the exercise of such powers by that

State shall not conflict with the Commission's power as established by the compact with respect to those water resources authorized to be developed, improved, utilized, controlled, or conserved by the Commission.

The second paragraph of this Article provides, in effect, that no supply of water can be taken from the Commission in any participating State unless and until all laws of that State have been complied with and the approval of such taking has been secured from the appropriate State agency or agencies having jurisdiction over the taking of water supplies.

Article XIII (Existing Rights, Developments, and Compacts)

This Article provides, in effect, that rights and authority heretofore acquired or granted to develop and use the waters of the Delaware River and its tributaries for public water supply and other purposes shall not be modified, affected, or impaired by anything in the compact.

It is provided also that nothing in any existing compact between two or more of the States shall be impaired or invalidated by any of the provisions of the compact here under consideration.

Article XIV (Construction and Severability)

This Article contains the customary provision regarding the severability of the provisions of the compact, or of agreements thereunder, in the event that any phrase, clause, sentence, or provision is declared to be unconstitutional or the applicability thereof to any State, agency, or person is held invalid. It is stated to be the legislative intent that the provisions of the compact be reasonably and liberally construed.

Article XV (Effective Date)

This Article contains precise provisions relating to the procedure for bringing the compact into force and relating to the effective date thereof.

All four States may participate by taking the requisite steps, but it is provided that the compact shall enter into force and become effective and binding between New Jersey, New York, and Pennsylvania when (1) their respective legislatures have adopted it and enacted it into law, and (2) their respective Governors, after legislative authorization, have signed it, and it has been attested by the Secretary of State of each and the Seal of each has been affixed, and (3) the Congress of the United States has consented thereto. The compact shall become effective and binding with respect to Delaware either at the same time and in the same manner it becomes effective and binding for New Jersey, New York, and Pennsylvania or at any time thereafter, when Delaware has taken the prescribed steps.

The compact is to be signed, attested, and sealed in five originals, one to be forwarded to the Governor of each signatory State for filing in accordance with the laws of that State and one to be deposited in the archives of the Commission upon its establishment.

Conclusion

In concluding this report, the chairman of the committee wishes to express appreciation for the active interest, enthusiastic cooperation, and diligent efforts of all members of the committee.

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THE INTERSTATE COMMISSION ON THE DELAWARE RIVER BASIN

PROCEEDINGS

TUESDAY SESSION

SEPTEMBER 12, 1950

* * *

A PANEL DISCUSSION ON NATIONAL WATER POLICY

THE RECOMMENDATIONS OF THE ENGINEERS JOINT COUNCIL

BY ROBERT A. HARRIER, MANAGING DIRECTOR
LEHIGH VALLEY FLOOD CONTROL COUNCIL

INTERSTATE COMMISSION ON THE DELAWARE RIVER BASIN ANNUAL MEETING
SHAWNEE-ON-DELAWARE, PENNSYLVANIA SEPTEMBER 12, 1950

The Chairman has indicated that the formulation of a sound national water policy is a matter of vital concern to all of us. I fully agree with him and also believe that, aside from the present war emergency, no other subject more fully deserves the intelligent consideration of all taxpaying citizens, because the conservation and development of the nation's water and related land resources deal with basic ingredients of our economy. The attitudes and the understanding of the job that needs to be done across the whole conservation front is of tremendous importance to our future welfare, not only in terms of dollars, but also in terms of our political, social, and economic rights as individuals. I shall not attempt to discuss these "intangibles" other than to recall what Dr. Millard C. Faught, writer and consultant on economic, social and business subjects, told me the other evening in discussing his thesis that our whole free enterprise system is dying of ignorance. He pointed out that Jefferson's classic observation "the price of freedom is eternal vigilance" has become another one of those eternal verities that we take for granted without realizing that you can't be vigilant about protecting something you don't recognize when you see it.

That, unfortunately, seems to be true of the subject we deal with this morning. The point I wish to make is that there is impelling reason for all of us to become informed concerning all aspects of river basin development at this particular time.

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At this point I had better take my cue from the old negro preacher who is known to have said that "the trouble with organized religion is that too many metaphysicians don't know how to tangibilitate".

Perhaps I should start my tangibilitating by informing you that the development, construction and operation of water resources projects is today a big business with the Federal Government. Federal water development projects presently under construction involve an expenditure of approximately five billion dollars. This is a greater expenditure than the aggregate for similar works in all previous years of the Nation's existence. In addition projects proposed by Federal agencies which are not yet under construction but in the blueprint stage will cost, at present price levels, another twenty billion dollars. About a year ago the Chief of Army Engineers estimated that contemplated Federal programs for river basin development will exceed fifty-seven billion dollars over a period of years. New water projects are being authorized at a rate of almost a billion dollars a year. We in the East are paying a disproportionately large share of the cost of these projects and are getting very little in return. If for no other than purely selfish reasons, therefore, we have a large stake in future national water policy.

Federal activity in water development programs is of relatively recent origin. Prior to 1920, most water projects were undertaken primarily by individuals and agencies of local government, subject to the laws of the States. At that time, Federal participation in water development projects was quite limited. Under the Commerce clause of the Constitution, the Federal Government had assumed responsibility for the maintenance of channels in the interest of navigation and for protection against flood damage to interstate commerce, primarily along the lower Mississippi River.

These were then the principal civil works functions of the Army Engineers. The Federal Government was also developing a reclamation program for public lands in the West through the Bureau of Reclamation of the Department of Interior. But expenditures for these purposes were then being made on the premise that the costs would be repaid by water users. The only other activity in which the Government was engaged was in connection with the licensing of hydro-electric power developments on so-called navigable streams and on public lands.

Since 1920, however, and particularly in the last few years, the central government has entered the water resources development field on a wholesale scale. With the advent of multiple purpose development, projects have increased in number, size, complexity, functions and cost. The increase in functions has seen a corresponding increase in number of Federal agencies dealing with the problems. These agencies, in turn, have so grown in stature, and without benefit of a coordinated plan, that their functions now overlap and competition among some of the agencies for more "business" is, to say the least, expensive to the taxpayers, if not a national disgrace.

Similarly, there is much confusion and competition among Congressional Committees which are required to pass judgment on the merit of water development programs advanced by overly ambitious planners.

This chaotic situation was brought forcibly to the attention of a number of interests outside the province of Federal Government, including Incodel, in 1944. At that time, Congress was being urged to pass omnibus flood control, river and harbor and reclamation bills calling for the authorization of projects of all shades of justifiability in almost every conceivable nook and corner of the nation. This circumstance led to the successful campaign, in which Incodel played an important part, for a Congressional declaration of policy to recognize and protect the interest of

state and local governments. Procedurely, Federal agencies, in particular the Army Engineers and the Bureau of Reclamation, now must afford an opportunity to the governors of states affected by a proposed Federal project to file a statement of views thereon for the information of the Congress. This is an important step in the right direction, but, obviously, it does not get to the core of the problem. The Governors of States affected are allowed 90 days to study a federal proposal before submitting comment. It is true that it gives States a greater opportunity to protest against a project which would be directly detrimental to their interests. However, it does not afford state and local interests opportunity to participate fully in the planning and it has no influence whatever on the prevailing pork barrel method of advancing some projects.

Bills calling for an intensive study of water development policies by a specially created agency responsible to the Congress were ready for introduction in Congress before it convened last January. For the most part, they were inspired by recommendtaions of the National Water Conservation Conference. The President, however, forestalled this approach by establishing a temporary Water Resources Policy Commission, responsible to him, with a directive to report its findings by December of this year. The President took this step on January 3rd, 1950, a day before Congress went into session.

Morris L. Cooke of Philadelphia, is Chairman of this Commission. Its other members are:

Gilbert White, President of Haverford College, Vice-Chairman
R. R. Renne, President of Montana State College
Lewis W. Jones, President of University of Arkansas
Samuel B. Morris, Dept. of Water and Power, Los Angeles, Calif.
Paul S. Burgess, Dean, College of Agriculture, University of Arizona
Leland Olds of New York, former chairman of the Federal Power Commission

There is much conjecture as to the kind of report the Commission will make. There are many who believe the report will be strongly flavored

with propositions for increased Federal activity. Others think the report will call for greater responsibility and participation in Federal water projects by state and local governments and private enterprise. Everyone agrees that unless the war sidetracks other matters, the subject of National Water Policy will be hotly debated in Congress in 1951. That is why the public should be informed concerning the essential elements of a sound national policy.

The Commission has asked a large number of agencies dealing with water development problems to give it the benefit of its views. Probably the most exhaustive and impartial analysis of any submitted has been made by the Engineers Joint Council. The constituent members of the Council are:

American Society of Civil Engineers
American Society of Mining and Metallurgical Engineers
American Society of Mechanical Engineers
American Institute of Electric Engineers
American Institute of Chemical Engineers

On July 1st, the Council submitted a report to the President's Commission entitled "A Statement of Desirable Policy With Respect to the Conservation, Development and Use of The National Water Resources". Because the report is so comprehensive and represents the views of a group of men who are most able and eager to assist in the formulation of a sound national policy, it deserves special attention from all who are concerned with this situation. This report presents the results of six months of intensive investigation by nine Task Force Committees and a Coordinating Committee with a total aggregate membership of over eighty outstanding representatives of the engineering profession, including your Chairman, Mr. Pitkin, and Mr. Allen, your Executive Secretary. The study was made on a distinctly objective basis. It is especially significant to note that there was unanimous agreement on the part of the entire membership of all Task Force

Committees as to essential basic principles, even though individual members, in their personal affairs, often represented a wide divergency of interest.

I desire to review this report very briefly.

In addition to finding that the Federal Government was in the water development business on an unwarranted scale, the Engineers Joint Council, among others, arrived at the two following major conclusions:

1. Many projects constructed primarily for a special function for the benefit of a particular region, are being paid for largely by the country as a whole instead of those most directly benefitted.

2. Water projects are often evaluated on an unrealistic basis, benefits being greatly exaggerated and costs grossly underestimated.

Some of the major policies of general applicability which the Engineers Joint Council recommends for adoption are:

1. Water resources development should, wherever feasible, be undertaken by local enterprise -- governmental or private.

2. The present rate of planning and Congressionally authorizing water resources developments is excessive and economically unsound.

3. In the appraisal of a water resources development and its component functions (if the development be multi-purpose) the benefits should be expressed in average annual monetary terms.

4. To the maximum feasible extent, the beneficiaries of Federal water resources developments should be required to reimburse the Government, and hence the nation's taxpayers, for the benefits accruing directly to them.

5. Costs to be taken into account for Federal water resources developments should be thoroughly inclusive. Where one deals with estimates,

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as distinguished from actual expenditures, the estimates should be completely realistic.

6. The charge made for the use of money should cover all aspects of all such costs.

7. In computing the costs of Federal water developments to determine economic justification, or for any other purpose, there should be included amounts equivalent to the taxes which would have to be paid were the lands, physical improvements and business, if any, not exempt from taxation.

8. There is pressing need for ascertaining the costs of fulfilling the respective functions of a Federal multi-purpose water development. (The Engineers have found that unreasonable portions of the cost of constructing and operating a multipurpose project are allocated to functions that are non-reimbursable and fall upon the taxpayer.)

9. In order that Federal water resources projects may qualify as being economically justified, the ratio of tangible benefits to cost should not be less than 4 to 3, and where costs cannot be estimated closely, not less than 2 to 1.

10. Authorization of Federal water developments should be solely by Congress and should not be in blanket form. (It should be noted in connection with this point that some Federal agencies seek to obtain broad authorization and abuse the privilege of selecting and undertaking indiviudal projects.)

11. A board should be created for the impartial analysis and appraisal of Federal water projects and its review and report thereon should beprerequisite to the authorization of, or appropriations by Congress for such projects.

I have referred to only eleven of the broad general conclusions of the Engineers' Joint Council which have general applicability and which, if countenanced, go far to correct the present situation.

The Joint Council concludes its summary of recommended policies with the following quotation by its Committee on Irrigation which is most interesting:

"It is notorious that standards of feasibility of public projects have progressively been lowered by exaggeration of the benefits claimed as off-sets to cost of construction of works for the conservation and control of water. Unless this trend be reversed, estimates of benefits will soon become mere excuses for justification, not valid reasons for construction of projects."

The report includes an enumeration of the General Conclusions of each of its nine Task Force Committees. It is truly amazing how closely these Committees agree on basic considerations.

The Engineers Joint Council maintains that most of the unsatisfactory situations which exist in respect to federal activity in water resources development would disappear if the major policies and recommendations set forth in its report to the President's Commission were in force and wholeheartedly accepted.

There seems to be little reason to doubt this contention.

I would like to conclude with a personal observation. We seem to be in the 11th hour on this question of formulating a much needed national water policy. It is my conviction that unless state and local interests become fully informed and accept their full responsibility in a spirit of complete cooperation, they will lend aid and comfort to those master-minds

who are interested primarily in bureaucratic aggrandizement. Incodel can establish the pattern for the nation in bringing about the kind of cooperation needed to protect our democratic institutions in this vitally important field of activity.

A PANEL DISCUSSIO ON NATIONAL WATER POLICY

INCODEL'S POINTS OF VIEW

BY JAMES H. ALLEN, EXECUTIVE SECRETARY
THE INTERSTATE COMMISSION ON THE DELAWARE RIVER BASIN

AT INCODEL ANNUAL MEETING
SHAWNEE-ON-DELAWARE, PENNSYLVANIA SEPTEMBER 12, 1950

The preceding speaker has given you an enlightened explanation of the views of the Engineers Joint Council on National Water Policy. He refers to the statement of that organization as probably the most exhaustive and impartial analysis of this subject made by any group. This is a well deserved compliment.

Incodel, too, prepared and filed a statement of views with the President's Water Resources Policy Commission. While not as exhaustive and detailed as the Engineers Joint Council's, Incodel is proud of its report. It is brief, forthright and reliable. Many complimentary comments concerning it have come from all over the country and a number of newspapers wrote extremely gratifying editorials.

The incodel statement was submitted to the President's Commission on March 29 and, in substance, set forth the same conclusions as were recorded in the Engineer Joint Council's report completed three nomths later

In its statement, Incodel, at the outset, informed the President's Commission that the following basic convictions underlie all of its views:

1. That no program for the development, utilization and conservation of water resources should be formulated on the basis of that resource alone. Land, soils, forests and waters are an integral part of the same problem. All must be considered together.

2. That watersheds of rivers and their tributary streams usually constitute the most logical and desirable unit for the planning and execution of programs for the development, utilization and conservation of water, land and forest resources. This, however, does not mean that the problems cannot be handled on a cooperative basis by established agencies of government, local, state and federal.

3. The development, utilization and conservation of ground water resources should be given equal consideration with surface water resources.

4. Duplication by and competition among Federal agencies now charged with development and control of water resources programs should be promptly stopped. These agencies should be required to coordinate their activities.

Incodel next presented its answers to four policy questions specifically raised by the President's Commission. Those questions, and the answers, were:

QUESTION (a): "The extent and character of Federal government participation in major water resources programs;"

INCODEL'S ANSWER:

It is only possible for this Commission presently to express views concerning this question in terms of general principles.

The function of government should be to provide desirable and necessary public services and facilities that are beyond the interest, scope and capacity of private enterprise. Programs which must be handled by government should be handled at the lowest level of government that can perform them with reasonable efficiency and promptness.

Intergovernmental cooperation and participation in water resources programs is especially indicated and desirable.

The extent and character of Federal participation, therefore, depends largely upon the particular program and project in question. Basically, Federal responsibility and participation in respect to planning, financing, control and operation, where required, should be in reasonable proportion to the benefits resulting from the program that are, in fact, in the national interest. In order to apply this principle, it is, of course, necessary to define "national interest." National defense obviously comes within this category. It is highly questionable whether some other purposes and benefits of water resources programs now usually considered to be in the national interest, thus making the allocable costs thereof non-reimbursable, are properly classified. No attempt will be made to define the term.

QUESTION (b): "An appraisal of the priority of water resources programs from the standpoint of economic and social need;"

INCODEL'S ANSWER

As in the case of item (a), this question can only be discussed in terms of general principles.

The first objective of water resources programs should be directed toward the protection and conservation of existing water resources and developments. The use of water for domestic and industrial water supply and other beneficial consumptive purposes should be given priority over

its use for all other purposes.

QUESTION (c):

"Criteria and standards for evaluating the feasibility of water resources projects;"

INCODEL'S ANSWER

The present standard of considering that water resources projects are "justified" if the annual "benefits" exceed the annual "cost" would be a generally satisfactory criterion, if "benefits" and "costs" were properly computed.

But the practice has been to overestimate benefits, direct and indirect, tangible and intangible. Frequently, costs are undervalued and many cost items are disregarded or not charged directly to the project. Uppermost in this category are taxes or adequate payment in lieu thereof, depreciation and interest.

Improvements in methods for allocating "benefits" and "costs" to the various purposes of water resources projects are urgently needed.

A system should be established requiring the cost of projects and their component parts to be distributed in reasonable relation to the benefits and to be borne primarily by those directly benefited.

The present practice of classifying projects such as flood control, salinity control, silt control, fish and wildlife, and recreation as being exclusively in the national interest and non-reimbursable, thus requiring the taxpayers of the country to bear the entire cost, is unsound and should be modified.

There should be no marked distinction in respect to the availability of Federal funds to cover project costs allocated to reimbursable features of water resources programs. All project purposes for which costs are, or should be, reimbursable should be treated alike in the matter of interest charges, repayment period and other considerations. The policy of according the privilege of interest-free money and long periods for the repayment of principal to reclamation projects does not appear to be proper. As long as it persists, the same policy should be applicable to water resources projects for public water supply and abatement of stream pollution.

QUESTION (d): "Desirable legislation or changes in existing legislation relating to the development, utilization and conservation of water resources;"

INCODEL'S ANSWER

Such desirable legislation or changes in existing legislation relating to the development, utilization and conservation of water resources as are necessary to effectuate the above basic policies and other desirable objectives should be enacted.

Later, at a public hearing held by the President's Commission in Columbus, Ohio, July 24, 1950, to receive testimony from ten states, including Pennsylvania, your speaker advanced the following concrete proposal.

"As regards the development of the water resources of interstate regions, the interests of the nation will be best served in the long run by the passage of a national water conservation law, one of the first provisions of which would consist of a clear-cut declaration of the following principles by the Congress of the United States:

(1) To recognize the urgent need for prompt effectuation of sound water resources programs throughout the nation and to provide for appropriate assistance in their accomplishment;

(2) To recognize the advisability of active and responsible participation in the planning, execution and operation of such water resources programs by representatives of the state and local governments in the regions directly affected, and to encourage such procedure.

The measure should stipulate that, except for works that are clearly and primarily for national defense and certain river and harbor projects clearly and primarily related to navigation, no federal services, facilities or funds will be made available for any conservation program unless and until the group of states in the interstate region where the project is to be located and which the project will serve have met the following requirements:

1. Established by reciprocal agreement or interstate compact, an effective agency (or agencies), composed of citizens of the region affected with power and authority to plan

and to execute water resources development projects in cooperation with, wherever advisable, established agencies of government on all levels;

2. Agreed, as to any specific project involving federal expenditures, before commencement of construction, to bear such part of the reimbursable cost of that project as properly reflects the benefits to be derived therefrom by the region affected.

Another provision of the law should set up general standards for evaluating the feasibility and economic justification of all projects involving the expenditure of federal funds. An impartial board responsible to the Congress should be created for the application and administration of those standards. No project should receive federal authorization unless and until it meets the test of feasibility and justification as determined by said board. Such a board should be composed of men of the highest professional capacity and integrity, removed from political control by long tenure. Such board should have no part in planning, constructing or operating such projects.

Another section should define conditions governing the availability of federal funds. This section should provide inducements for positive and constructive action by the States and local governments, and include such specifications as are necessary to prevent any marked discrimination between the various sections of the country in the matter of interest charges, repayment period and other privileges applicable to costs covering reimbursable features of water resources programs.

I would like now to work out a simple problem in arithmetic with you in order to give you a clearer picture of the extent of the inequities of the existing situation. Some of the figures I will use are admittedly approximate, but I assure you that they are sufficiently

accurate for the purpose of illustrating the magnitude of the "licking" that the Delaware Basin States are taking in footing the bill for Federal water programs.

Presently about $1,000,000,000 a year is being appropriated by Congress for water resources programs. Of this amount it is conservative to assume that not more than 30 per cent is eventually paid back to the Federal Treasury, leaving 70 per cent, or $700,000,000 to be paid for by all of the taxpayers of the nation. Between 90 and 95 per cent of this sum of $700,000,000, or about $650,000,000, is expended in other sections of the country, notably the West and the South. Only about $50,000,000 is spent in the Delaware Basin States.

However, the same Delaware Basin States contribute a total of 30 per cent to the national budget. Applying this ratio to $650,000,000 means that these four states are paying almost $200,000,000 per year toward the financing of water projects in other sections of the United States.

Even after crediting this sum of $200,000,000 with the $50,000,000 being spent within their own borders (30 per cent of this credit is their own money) there remains a net amount of $150,000,000 a year.

This is an approximation of the net amount the four Delaware Basin States are paying for water projects in other sections of the country. Now it should be clearly understood that I do not mean to imply that these states should be relieved of all responsibility for helping to develop other less economically fortunate sections of the nation. But I do contend that we are being "shortchanged" far beyond reason and that by the adoption of a sound national water policy we should be relieved of this burden to an extent of at least $100,000,000 per year.

It should be noted that only a fraction of this amount, between

$4,500,000 and $6,750,000, is required to amortize the river regulation feature of the integrated water project proposed by Incodel's consulting engineers. If the States had the $100,000,000 in their own hands, there would be no problem at all in taking care of this item.

* * *

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WATER

THE PROBLEMS INVOLVED AND THE JOB AHEAD

by
Mr. John H. Jones
Manager
Upper Monongahela Valley Association

at
Incodel Annual Meeting
Shawnee-on-Delaware, Pennsylvania
September 12, 1950

Discussions preceding this one have made it crystal clear that we need a sound land and water policy in these United States. Obtaining one which everyone will agree to may not be as tough a job as solving our difficulties with Russia, but I am certain about one thing — we urgently need a reliable perspective on the entire matter and it is reasonable to say that we are not going to do the job overnight.

I have been asked to "tangibilitate" a little on the scope of this situation and to fit small watershed organizations into the framework of the national problem of both developing and implementing a sound land and water policy.

One way to bring this matter into proper focus which appeals to me is to pose some thought-provoking questions about water.

1 - The first question I would like to pose is quite simple but highly significant: Why is there so much confusion about the care and handling of water in these United States?

Perhaps if we get an objective answer to this, it will tell us why we have so many tax propelled rowboats putt-putting along on so many

different courses in this stream of confusion. Perhaps we will also get a few clues as to why V.I.P. (and I mean the very important public) are <u>just beginning</u> to become aware of what water means to them.

A. Today's confusion surrounding water in my humble opinion is not entirely the fault of Government. We may properly criticize what Government has done and the lack of coordination, but I think it is fair to say that at least they are doing something; regardless of what, regardless of why, and regardless of cost. This we know for sure!

B. Secondly, it is not the fault of the people in the United States, because here there is evidence of some things being done which certainly meet every requirement of sound and logical thinking in the American manner. I am inclined to think it is more or less a case of a little boy wanting to become a big boy just as soon as possible. This is a rich and naturally optimistic country and as all the evidence clearly seems to indicate, we really don't get rolling on a problem until the seriousness of the situation is blowing hot on our necks. It is equally important to remember that we are

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a young nation and very rich in resources. Consequently we have used our natural heritage freely, indeed wastefully, and we seem to assume that as long as the supplies are on the shelf our warehouses are filled too. And because we are young and rich and optimistic the "put off until tomorrow attitude" has prevailed public-wise in considering our land and water resources.

C. I honestly think this is the fundamental reason for much of the confusion today. Expressed in another way we are just beginning to get the word on the situation and by "we" I mean people in America. This, however, is no excuse for not getting busy right now to correct a rather fouled up national situation. We have permitted the relatively few interested people to proceed full steam ahead with little regard for what everyone else thinks. A national land and water policy is a "must", but by itself it won't be worth printing if it isn't a document expressive of basic fundamentals <u>understood by the people</u> in America and implemented with a follow-through that

means something on Main Street in every community throughout the land.

2 - As a second question I would ask, What do we actually know about developing and conserving water resources?

The splendid reports and the evidence presented at the regional hearings throughout the United States held by the President's Water Resources Policy Commission clearly show that a considerable amount of progress has been made in our technical and hydrological considerations of water. We have learned that a watershed or drainage area is a logical geographical area suitable for dealing with our land and water resources problems.

We have learned, I believe, that water cannot be separated from other resources when we attack the problem in a watershed and that water is part and parcel to all the planning and activity carried on in connection with the industrial, commercial, agricultural, recreational and social life in America and in each watershed. We are beginning to point up tangible and understandable connections that mean something to industrialists, business men, and farmers in their dealing with their particular problems. I think this is extremely important.

There is evidence that we are beginning to learn that no "master plan" for developing water resources conceived anywhere will work in our different watersheds in all cases or even in a small percentage of cases. To say this differently, we are learning that each watershed is different in its character and human needs and that each region and each locality must be treated individually.

We are slowly appreciating the fact that the development of our

urban areas cannot be separated from the development and problems of our rural areas.

And last, and probably most important of all, the citizens of the United States are beginning to take an interest in their own water and land problems. As a consequence of this, there is definitely a growing national realization that land and watershed development problems can best be studied, can best be programmed, and can best be handled by the people who live with the problems in the watersheds in cooperation with such technical, financial and advisory services as may be required from the federal government which these same people support for such purposes in the District of Columbia.

I have a very sincere hope that a national land and water policy, when we get one, will express what we have learned in the past. We have certainly explored by this time just about every conceivable method of doing different parts of the job of watershed development in different places with federal funds and there seems to be some desire (although waning, I believe) for the federal government to do every conceivable job in a few more places.

The next question I would like to pose very closely relates to this matter or relating what we have learned in the past to a land and water policy.

3 - The third question is: What don't we know about development of our water resources?

This is where I leave the trunk of the tree and crawl out on the limb with a few personal observations which seem extremely important to me. For one thing, I don't think we know how to talk about water. I am not

being theoretical when I say this. Most all the seven-year-olds in the United States will be able to recognize the 1951 Ford or Chevrolet within a matter of hours after the new models are unwrapped. Yet in the case of water, we have enjoyed it, wasted, used it, polluted it from the days when Narcissus used a pool for a mirror and we are only now beginning to place an appealing wrapper on the product.

In spite of all our talent for selling, merchandising and publicizing our American products, we have not done an adequate job of taking water out of the "something for free" status it occupies in the minds of most people. I propose that all of us who are directly related to water development affairs begin to think of it as a perishable commodity. And that from the time the drops fall on the land, we treat it generally with the same type of businesslike thinking we use in producing, handling, transporting, advertising, merchandising and marketing perishable foods—or, for that matter, any American product. If we think and treat water in this fashion, I predict it won't be such a stupendous job to cause the American public to do likewise. Perhaps we then can say that water is as important as penicillin and the American public will immediately know that that is the truth. To my way of thinking, the impact of this kind of an approach would be tremendous. The authorities on how to go about it are probably knee-high to howdy-doody today, so all of us who deal with water have the responsibility (to a varying degree, of course) of learning how to talk about water and how to merchandise the product.

COMMUNITY ORGANIZATIONS

I for one don't want the federal government to do this sales

job for me and I truly believe most people share this viewpoint. Thus, we are faced with the problem of designing the right station selector in our communications machine. This raises a series of "how to do it" questions. I am convinced that to be most effective and to reach the most people at the least expense in the shortest possible time, we must do this communication job of transmitting the importance of water to all people on a very short wave length. In other words, we must do the job at home. Since we are realizing that our technical water development problems are best solved within a watershed by the people in the watershed, let's do the merchandising job in the watershed, too.

It follows then that the viewing tube in this communications problem is a local watershed organization. This is certainly not a new idea. You all know about the Brandywine Valley Association, which is a model for the entire United States and doing the type of job I would like to discuss a little. It is telling the people about their own problems and at the same time it is contributing to defining the problems so that when money is spent to correct a situation it is spent soundly. I suspect the Brandywine Valley Association is one of the most carefully watched, carefully analyzed and discussed watershed organizations in the United States.

In this immediate vicinity, the Lehigh Valley Flood Control Council is another splendid example of a watershed organization. It is one of such with a special objective being handled with a great deal of efficiency and attention. As a personal observation I would like to say that I hope some day the Council will broaden its base to include some of the other phases of river basin development which go hand in hand with the fine work that they are now doing. I am sure that a move in the direction of a broader dissemination

of information on all watershed problems as they relate to industry, business and recreation would gain greater support for the work now going on and also (just as important) would render real service to the people in the Lehigh Valley.

Another bright spot is the Muskingum Conservancy District in Ohio, a governmental agency that has the unique distinction of being able to collect taxes, but not doing so, and being able to avoid taxes, but choosing to pay them. This phenomenal result came about from the profitable sale of water services that were by-products of what started out to be simply a flood control program. There is not time to consider the details of the District. Suffice it to say that through the enabling Act which permitted the District to be formed, to have political entity, to make assessments against and tax property, to assume debts, to acquire lands for public purposes, to plan, construct, and operate water controlling structures, and to promote soil conservation and reforestation, the State of Ohio engendered what is today the best example we have of effective land and water resource development. It bears testimony to the wisdom of those who would build from the solid foundation of local recognition of problems and opportunities, and local assumption of responsibility.

There are about ninety other watershed organizations in the country. My remark that watersheds are different and a "master plan" won't work is clearly evidenced by the fact that these ninety organizations are so different in organization, in sponsorship, in the work they do, how they are financed and in how they go about doing their particular job.

Probably one of the most important considerations in these

community organizations is leadership; after, I class public information as the second vital necessity. It is regrettable that there are now only ninety organizations, although I suspect some day the number may run into the hundreds

To keep this talk on a chapter and verse basis, I would like to highlight some of the things that a watershed organization can do. It can be the center of communications, planning, programming and activity of all watershed development problems, in its area of influence. (You might say this is the desirable mission of such an organization.)

1 - Part of the job is fact finding and research in character. Let's call it an assignment of determining the assets and liabilities within a watershed.

2 - The second part is testing and determining practices and the improvements suited to meeting the needs of a watershed.

3 - A most important part is providing public information as to the importance of watershed development to everyone. This includes information on all aspects of a national water policy which concerns local people.

4 - Stemming from this portion of the work is the matter of developing leadership and while there is no ironclad formula for pin-pointing people who lead the way, the percentage of likely candidates increases with the knowledge disseminated in a watershed.

5 - The last part of the role I am going to mention (although there are others) has to do with education. Here we have the opportunity to spark-plug the work of the future as well as help people today. As an example, conservation workshops for teachers have proved very successful. We need far more attention to this part of the overall job. There is a tremendous

assortment of tools at our disposal although I am inclined to think some are possibly a bit rusty.

The other day I looked over a check-off list of communication media in connection with the distribution of information concerning a new program. It listed: printing, booklets, radios, television, newspapers, news releases, billboards, displays (both window displays and displays for conventions), fairs and exhibitions, direct mail, employee bulletin boards, house organs, speeches before service clubs, meetings, films, slides, etc. I include this list here because it raises the question as to whether or not we are using these tools in dealing with water problems. Any local watershed organization has these mechanical devices and human talents available and within budgetary limitations should use them. They relate directly to causing the American public to place the proper price tag on water.

What have we got to talk about? And here again I think a check-off list will best suit the instance:

1 - We have the relationship of water to water supply for industrial and commercial use and recreational use.

2 - We specifically have the relationship of water to industrial development and the retention and expansion of existing industry.

3 - We have the relationship of water to agriculture. This is probably best recognized by the public. It is a major factor in our soil conservation programs.

4 - And very important, the relationship of water to the gross sales of our drug stores, gas stations, department stores, grocery stores and all other commercial organizations. A comparison in dollar value would be very revealing.

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We cannot find anything in rural or urban life that water does not directly concern and saying so and proving it, to my way of thinking, is the big role of community watershed organizations.

I am not going to discuss here the organizational requirements or the legislative implementation needed in connection with different types of watershed organization. This is a complete subject in itself. But, I would like to say that it needs thorough analyzing and exploring because it relates directly to a national policy and to the implementation of a national policy within states and/or on an interstate basis. These things will work themselves out if thoughtfully considered and should not present insurmountable problems.

THE AMERICAN WATERSHED COUNCIL

The American Watershed Council, which I have been asked to comment upon, is a new organization which came about in a very natural fashion to meet the need of developing leadership and providing a communication center for local watershed organizations.

It started off with a panel discussion at the National Planning Conference in New York in 1948. Your own Clayt Hoff and Bob Harrier were members of the panel. The National Rivers and Harbors Congress asked us to come down and repeat our little road show at their next annual meeting in Washington and we did so. I think it is honest to report that we were all curious as to the immediate and widespread interest in the now more clearly stated idea of "complete development" of land and water resources on a watershed basis.

It seemed logical to us to assume that because watersheds are all different, that the people who live in them know them best, and that the programming of improvements and the exploration work of determining what

improvements are needed could best be done in the watershed. We offered the idea that what works in one watershed necessarily will not work in another and that all types of dams and all types of practices such as soil conservation, forestry, farm ponds, etc., were really nothing more than tools to be used to do a particular job in a particular situation. We ended up by calling this "complete watershed development" and cast out the hope that perhaps the many different governmental agencies and regional interests who used these different tools individually might go along with the idea that they all tied in together —but that all were not necessarily needed in each watershed and that individually these tools could not solve the problems by themselves. This concept cannot be very popular with those whose eyeglasses cause them to see the problems on the basis of using only one particular tool such as a dam or a land use practice, but it seems definitely to appeal to people and the result has been that the A.W.C. is in the process of being incorporated.

The American Watershed Council is obviously not a lobby organization. It has nothing to sell and can best be described, I believe, as a communications center for information for grass-root watershed organizations and as an educational and research organization.

What the Council does in the future will express the membership as it develops. Membership is open to local organizations dealing with watershed development problems along with associate memberships for individuals and organizations interested in the Council, subject to the approval of the Executive Committee. Temporary offices have been established in Washington, D. C., through the courtesy of the Interstate Commission on the Potomac River Basin. Mr. Clayton M. Hoff is chairman; Robert A. Harrier is vice chairman; I am

secretary; Gale Gibson, of the Saginaw Valley Regional Planning Commission, in Michigan, and Raymond Long of the Planning and Economic Division of the State of Virginia, and Edwin Cotton of the Interstate Commission on the Potomac River Basin, make up the Executive Committee. All of us want to do the things that will be helpful to local organizations and to encourage more of the same. I think educational work, research and just being a hub for interchange of ideas and information will constitute the basic program. As an example, a report on all existing community organizations, how they are organized and their objectives and procedures will help all of us. A guide book on procedures such as has proven successful in community relations should appeal greatly. An easily read document on how to run a workshop on conservation by Clayt Hoff would be a real contribution. This is the type of thing we are interested in and hope future members will share our enthusiasm. In themselves they may not be large and costly projects but in the aggregate I am sure they will do a tremendous amount of good.

Probably the biggest event in the Council's short life has been its meeting with the President's Water Resources Policy Commission. As far as I know, this has been the only meeting of its kind held to date and the result was a splendid two-way exchange of ideas and cooperation. The Committee was asked to write up what it suggested at the meeting and we have done so.

The thought I would like to leave with you is that the development of the American Watershed Council has been spontaneous. It seems to have developed because there was a need for such an organization. There certainly was no effort to plan a Council ahead of time. It just seems to have happened and probably because that is the case it has a strong chance for being of real value and service.

In concluding my remarks I would chiefly like to leave with the thought that the development of a sound national land and water policy, if it is to endure, must reflect the people in all our watersheds. This takes in just about everyone and there is a real challenge ahead of us to do the immediate job of telling more people what water means to them.

* * *

PANEL DISCUSSION ON A NATIONAL WATER POLICY

CONCLUDING REMARKS

by
Professor George R. Jenkins
Department of Geology
Lehigh University

at
Incodel Annual Meeting
Shawnee-on-Delaware, Pennsylvania
September 12, 1950

It seems to me that the speakers in this panel have very adequately fulfilled the hope that they would give us better understanding of the role of national water policy. It is especially gratifying to note that, although they considered water policy from three distinct points of view, they were in substantial agreement on a number of fundamental considerations. Having had opportunity to study their remarks, I would like to point out the most important areas of agreement.

All of the papers agreed to certain principles that should guide our approach to consideration of National Water Policy. In broad terms, these principles can be expressed as follows:

1. No program for the development, utilization, and conservation of water resources should be formulated on the basis of that resource alone. Soils, forests, and waters, both surface and underground, are each an integral part of a single broad problem. All must be considered together.

2. Watersheds of rivers and their tributary streams usually constitute the most logical and desirable units for the planning and execution

of programs for the development, utilization, and conservation of water, soil and forest resources.

3. Broader public understanding of land and water resources problems as they relate to agriculture, business, industry, recreation, and the individual citizen, is essential to the establishment of a sound national water policy.

These three principles, in turn, are the foundation upon which specific steps in the reformation of our national water policy must be built. Again, in broad terms, the many specific recommendations contained in the papers may be summarized as follows:

1. The federal government, through its executive agencies and the Congress, must thoroughly review and realistically define the essential meaning of the public interest as it applies to land and water resources development.

2. The Congress must review and revise legislative authorizations pertaining to the functions of federal agencies in order to harmonize and coordinate the activities of these agencies in land and water resource programs.

3. The Congress must assume responsibility for the adoption of a national policy regarding water and related land uses which will:

A. Include a statement of principles and criteria establishing uniform and sound standards for evaluating benefits, costs, and economic justification of land and water programs.

B. Provide for the creation of a board of review, responsible to Congress, for the impartial and competent analysis and appraisal of federal projects. Its review and report should be prerequisite to the authorization of or appropriations for a project of this kind by Congress.

C. Affirm the principle that federal programs must be participated in by state and local agencies in planning, execution, operation, and financing, with few exceptions.

4. State and local participation requires that organizations be created on the basis of watersheds, that are representatives of the interests therein, and can coordinate the activities and services of all agencies and interests in the formulation of plans and their execution. In furtherance of this requirement, states should review and revise as necessary the legislation pertaining to the formation of responsible watershed organizations and to state participation in interstate compacts. Communities, in turn, must assume responsibility and obligations equal to their rights and privileges in obtaining the benefits from sound resource development.

Because the question of national policy is controversial and yet one of vital concern to us all, I would like to suggest that these points of agreement deserve thorough consideration. They are clearly consistent with the traditional American approach to problems of wide concern to the public. It may even be appropriate to suggest that Incodel should consider the adoption

of these or some other statements of broad principles as a resolution, distinct from, but embodying the fundamental considerations which guided the detailed statements to the President's Water Policy Commission by the groups represented in this panel. Although national water policy is being studied by the executive branch of the federal government, Congress must ultimately review whatever recommendations are made by the President, and probably undertake independent investigation before taking legislative action. Incodel and other organizations should make their views known to Congress and the public in broad, brief, understandable terms.

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