WATER RESOURCES

28 November 1955

CONTENTS

	Page
INTRODUCTION--Major General R. P. Hollis, USA, Commandant, Industrial College of the Armed Forces	1
SPEAKER--Honorable Clarence A. Davis, Under Secretary of the Interior	1
GENERAL DISCUSSION	14

Publication No. L56-64

INDUSTRIAL COLLEGE OF THE ARMED FORCES

Washington, D. C.

Honorable Clarence A. Davis, Under Secretary of the Department of the Interior, was born at Beaver City, Nebraska on 21 November 1892. He received his A.B. degree from Nebraska Wesleyan University in 1913 and graduated from Harvard Law School (LL.B) in 1916. After practicing law from 1916 to 1917, he was elected Attorney General of Nebraska in 1918 and served until 1923. Mr. Davis' career has included being counsel to Nebraska in interstate water litigation and in preparation of Nebraska-Colorado Interstate Compact regarding South Platte River, member of Commission Compiling Nebraska Statutes, member Uniform Laws Commission, general practice in Holdrege, Nebraska and Lincoln, Nebraska; member of law firm of Davis, Healey, Davies & Wilson; General Counsel to Consumers Public Power District; counsel to Missouri Valley Development Association, lecturer on Administrative Law, University of Nebraska and Trustee, Nebraska Wesleyan University. He has been a member and officer of many bar associations and is presently a member of the committee of the American Bar Association on Civil Service and a member of the Federal Bar Association Committee on the same subject. He has been a director of the American Judicature Society since 1951 and is a member of the Institute of Judicial Administration and a member of the American Law Institute. He is a member of the Nebraska Reclamation Association, the National Reclamation Association, the American Public Power Association and a member of its Legislative Committee in 1952. Prior to 1 September 1954 he was the Solicitor of the Department of the Interior.

WATER RESOURCES

28 November 1955

GENERAL HOLLIS: Gentlemen: A professional American writer a few years ago made the observation that water first was used as padding between rowboats and the ground. Since that time, the advance of technology has influenced the supply of this very vital commodity to the point where it has become a serious national problem.

Our speaker this morning is perhaps uniquely qualified to talk on that situation, and it is a great honor to present to you the Honorable Clarence A. Davis, the Under Secretary of the Department of the Interior.

Mr. Davis.

SECRETARY DAVIS: General Hollis, Gentlemen: I was really complimented to be invited for the second year to address you on this subject of "Water Resources." It is a vast subject and I can only hope to alert you to some of the problems involved.

The importance of water resources to the economy of the United States can hardly be overstated. I should like to convey some notion of the widespread variety of the problems that are involved and of the implications of their solution upon our economy and upon the Government.

When we are dealing with water, we are dealing with one of the fundamental human wants. Along with land and air and food it is one of the necessities of life. Here in the United States, blessed with a continent of virgin soil, we lived more than 200 years before the water problem became generally acute, but we must remember that many ancient civilizations disappeared because of the absence or mismanagement of land and water.

The increase of our population, the raising of our living standards, the coming of our industrial era, and the increased application of water to land have now highlighted the problem until, in much of the Nation, there is a grave and increasing concern over water resources.

I should like to impress four things in the beginning; first, there is not a water problem, but there are many water problems; second, while these problems are nationwide, they are not necessarily national; third, that there is no magic formula which can be applied nationwide as a solution of these problems. Lastly, the policy we adopt goes to the heart of our national economy and ultimately to our very form of Government.

The water problems confronting us have three aspects, physical, financial, and organizational.

Physically, we have the problem of water shortages, irrigation, floods, pollution, and navigation. In the Southwest--New Mexico, Utah, Arizona, and Texas, we have the problem of inadequate supplies to maintain agriculture and grazing and in many cases to even provide domestic supplies. The great metropolitan region of southern California, with its recent influx of millions of people, despite large transfers of water from the Lower Colorado, still anticipates the most serious problem for even domestic water supplies.

The entire east slope of the Rockies, including the cities of Denver and Colorado Springs and their environments, is in an era where the natural water supply of the region, except as water, may be diverted from the west slope of the mountains, is about to become inadequate for domestic uses, and is a serious handicap to agricultural development. In New York, but five years ago, water supplies had decreased to the point where the whole metropolitan area was imperiled. We were trying to shave on a pint of water a day, and even drinking water was carefully hoarded. Additional sources and reservoirs have been constantly necessary.

We have vast supplies of underground water, the exact extent of which is unknown, but water uses in many areas is pulling down underground water tables faster than nature replenishes them. In some productive areas in California the underground water table is falling as much as 25 feet per year. Irrigation wells are now as much as 600 feet deep, and the water level is still declining. There is a constant but consistent decline in underground levels in many other parts of the country.

Local areas of both Virginia and Maryland, on either side of the District, during this last year have suffered from shortages of water, and in many other local situations throughout the country the problem of a domestic supply is becoming acute.

At the same time, many areas are suffering from devastating floods. The New England area is so recent that we are all familiar with it, but throughout our history the lower Mississippi has wrought millions of dollars of damage each year. The Missouri and its tributaries have frequently brought great devastation to the Middlewest. Within 10 years the Columbia has devastated wide areas, and the whole Southeast region suffers from occasional floods.

At the same time, in our congested areas we are rendering much water useless by reason of industrial and municipal pollution. Our own Potomac is the most obvious example, but there are serious pollution problems along the Ohio below Pittsburgh, in New York, New Jersey, and Pennsylvania. The Missouri below Omaha is affecting Kansas City, St. Louis, and the lower river. Chicago and the other cities adjacent to the Great Lakes have serious pollution problems, and there are innumerable individual communities throughout the country whose domestic water supplies will require pollution abatement in the foreseeable future.

Meantime, our needs and uses of water climb to astronomical figures. It is estimated that the average urban dweller uses more than 145 gallons of water per day, and, if you include the water uses that go into the manufacture of the things that he eats and wears and uses, his individual needs climb to some 1,200 gallons per day. New industrial uses, air conditioning and kindred uses, bid fair to double that requirement in the next 20 years.

Industrial uses have grown to even greater proportions, and the concentration of population in the cities has magnified the problem of providing a concentrated supply of water as against a supply that was adequate when population was more widely dispersed. These are some of the physical aspects of the problem.

The financial problems are of equal magnitude. No one has been able to estimate the total financial requirements necessary to meet the various water problems in the years ahead. It will suffice to say that it involves billions of dollars between the various levels of Government. It may perhaps be best illustrated by the estimate of HEW that keeping abreast of only the relatively small problem of pollution will require some 750 million dollars a year of somebody's money.

To give you a further glimpse, it is estimated that it will require 3 billion dollars just to keep abreast of the hydroelectric requirements

of the Columbia Basin alone during the next 10 years. The Tennessee Valley Authority indicates a need for at least 150 million dollars a year for an indefinite length of time to keep abreast of the growing electric needs of that area. How many hundreds of millions may be necessary for flood-control structures in New England and for similar structures in the Missouri Basin it is impossible to say, but I should like to impress you at this point with the fact that the dollar requirements are so great that a Federal assumption of responsibility for all of them will have a definite effect upon the Federal budget, even in these days of hundreds of billions of budgets and debts.

The development of water resources is further complicated by the large number of persons and organizations, State, local and Federal, which are engaged in various water resource activities.

In addition to private persons and cities and local public agencies, there are three great Federal agencies, the Corps of Engineers, the Bureau of Reclamation and the Department of Agriculture, actively engaged in various phases of water-resource development. Each of these agencies deals with a particular phase of the problem, and among them there has been inadequate cooperation and in many cases intense rivalries and jealousies throughout the years.

It is less than 20 years ago that any general Federal responsibility in this field of water resources was assumed. There has never been and is not now any general Federal assumption of responsibility for the supplying of water for domestic and industrial water uses. Water supplies for domestic uses have always been an assumption of individual or local responsibility. Industrial supplies have been the responsibility of communities or of industry.

Even in the field of irrigation it is interesting to note that, while there are approximately 28 million acres of irrigated land in the United States, less than 7 million acres of that have been irrigated under Federal sponsorship, and that prior to very recent years the hydroelectric potentialities of our rivers have been entirely developed by industry. Despite widespread Federal activity in recent years, this activity still constitutes only a very minor percentage of water resources development.

Much of this Federal participation has been on a hit-or-miss basis; much of it is represented by what has always been known as pork-barrel legislation; a great deal of it has been done under political pressures with small regard to national needs.

The Corps of Engineers, beginning 120 years ago when inland navigation was a more vital form of transportation than it is today, was charged with the responsibility of the development of rivers and harbors for navigation, but today, under the theory of the protection of navigation, has assumed the functions of flood control and so has extended its activities upstream until in many cases it is in direct conflict with the activities of both the Bureau of Reclamation and the Department of Agriculture.

The Bureau of Reclamation, originally designed to make productive the arid public lands of the West, has extended its activities until it is an active public power agency and is supplying supplemental water to thousands of acres of privately owned land that are far from arid.

The Department of Agriculture, on the theory that water should be conserved and stored on the land on which it falls, has envisaged for itself a great program of small dams and local water controls which supplement and in many cases conflict with the engineers' conception of flood control and the Reclamation Bureau's conceptions of irrigation.

And through the thinking of all three of these agencies is intruded the theory that, by the generation and marketing of hydroelectric power, revenue may be produced which justifies the further extensions of their programs.

The effect of the water policy determined by the Federal Government goes to the heart of our national economy and even to our form of government. What we do with reference to creating supplies of water determines the locations of great industries, to many of which a water supply is of more importance than either raw materials or freight rates. It determines the location of population which follows these industries. Our policies with relation to water may be a definite part of either the advancement or the liquidation of substantial areas of our country, especially if the Federal development contains elements of subsidy.

The control of water means the control of the land and people which depend upon the water. Hydroelectric power controls not only the location of industry, but through the rate schedules it establishes, and the selection of its customers controls, the economy of the region.

The concentration of the control of water in the Federal Government means ultimately the control of the land and the power and, consequently, the whole economy of the region and, of necessity, therefore, places large areas of the United States under the practical domination of Federal departments.

One of the first requirements in dealing with this problem is the same requirement with which we are confronted in every other thing we do; that is, to get the facts on which to base action.

We have not been as alert to securing adequate factual data with reference to water resources as we have been sometimes aggressive in the construction of some of the more spectacular projects.

Our country is relatively young. We do not know the cycle of recurrence of the recent floods in New England. Are they caused by nature's cycles or by man's interference with nature? Do they occur once every hundred years, every two hundred, or every thousand. We know that they are not annual affairs. The same is true of the floods in the Missouri Basin and in the Columbia.

We do not have records that are any too adequate even of precipitation. We have not completed our soil surveys in much of the country. We have not nearly completed our study of the underground water supplies. We do not always know the geological conditions which can make or mar prospective projects.

All of these things indicate the first need is for the collection and evaluation of much basic data in the field of meteorology, underground waters, sedimentation, geology, soils, and many other matters. Much of this is prosaic and nonspectacular. It doesn't have any direct political appeal, and, consequently, there has been frequently a tendency to cut appropriations in these activities where the damage done by curtailment is less obvious than if, for instance, we had curtailed the defense budget.

Many of these programs of data collection are proceeding at a pace that would require more than 50 years for their completion, and yet we can hardly proceed intelligently, nationwide, without the facts, and it is hoped that we can adopt an accelerated program that will be constant year after year to permit systematic collection and evaluation and coordination of the basic facts regarding water resources.

Another of the serious defects which we have in this field I have already indicated as the lack of adequate coordination between various activities, let alone adequate coordination with the States and local areas that are directly affected.

We have had some very distressing spectacles throughout the years of intense rivalries between different groups as to who should do what with reference to specific situations. For some reason there has always existed the urge of every bureau or agency of Government to expand itself. It is just as true in the county court houses as it is in the State Capitols or in Washington. Everybody wants to magnify the importance of his own job or his own department.

Because of this urge and conflicting laws and purposes of the Federal agencies, some of these conflicts have grown to the point where they have shaken confidence of many people about the whole merit of some of these programs. The Pick-Sloan Plan in the Missouri Basin is an example of a "shotgun wedding" of the Corps of Engineers and the Bureau of Reclamation, by which each of them secured for itself authorization for large construction programs which tended to keep their agencies expanded and active, although prior to the marriage they had been critical of each other.

Therefore, our thinking should be directed along the line of coordination of all our activities, probably compulsory coordination, some plan which prevents "empire building" by one agency without taking into account the fact that other agencies might accomplish the same purpose better or might contribute to the ultimate purpose if they were all consulted and all made their plans together.

It has been suggested many times, including one of the Hoover Commission reports, that the remedy for this is that all Federal water-resource developments and construction be consolidated into a single agency. Aside from the fact that it is commonly believed such a move is politically impractical, consolidation alone is not an answer to the problem because of the widely varying statutory objectives of different agencies.

The same lack of cooperation is apparent in several places where States and local groups have proposed construction of water facilities. There has not been adequate machinery by which their plans could be coordinated with Federal plans in the same region, and I think I am not going too far to say that in many cases the State agency has looked askance at Federal plans, and vice versa.

There is a host of questions that are not easy to answer, even though we assume complete cooperation between all of the interested parties. I mentioned some of them last year.

When is a dam primarily a flood-control structure, falling logically within the domain of the Corps of Engineers? When is it a storage dam, falling within the province of the Bureau of Reclamation? When it has both functions, in whose province is it? How big a dam may Agriculture build, on the theory of water conservation on the land? And will that encroach upon the functions of the other two agencies? Is it more economical to produce agricultural land by drainage or irrigation?

What provisions must be kept in mind for the protection of the unused water rights of the Indian tribes? Incidentally, they have tremendous water rights in the West, which should be developed. What provisions should be made for the preservation of the fish and wildlife habitat as civilization expands and these developments take place?

When should hydroelectric facilities be installed in these structures; and, if so, who shall install them?

Now, are these projects worthwhile? Does the flood-control dam prevent enough flood damage to justify its cost? Does the reclamation project which proposes to irrigate still more thousands of acres of desert land justify its construction, at a time when farm surpluses are a major national problem?

How much of the cost of these structures should be paid back by the people who are the beneficiaries? How much can they pay back, and how far is the Government justified in investing taxpayers' money?

What obligations does the Federal Government have toward preservation of fish and wildlife? How much is that sort of thing a State function, as contrasted with a Federal?

If part of the costs for these projects are to be reimbursed by the beneficiaries, who is to determine the amount reimbursable? What method is to be used in determining it?

Is the backwater from our control structures inundating and destroying as much productive capacity of land as we are gaining from the prospective newly irrigated land?

If we have hydroelectric power facilities, should that energy be sold on the basis of its bare cost or should it be sold at a price comparable to the going market, and those additional proceeds be applied to the liquidation of the cost of the project?

What provisions should be made, if any, to reimburse local units of the Government, first, for the value of local property which is rendered valueless and untaxable by inundation from the project; and, second, by reason of the enhanced community value of the construction of the project?

Our people as a whole are quite conservation conscious. From the days of Theodore Roosevelt and Gifford Pinchot in 1902 when the first Reclamation Act was passed and the public became aware of the rapid depletion, not to say wastage, of many of our natural resources, we have had thousands of individuals and literally dozens of organized societies interested in various phases of the water-resource problem.

The hydroelectric power group for public ownership is perhaps the most vocal. The irrigation interests are widely organized into the National Reclamation Association. The flood-control people are organized into the Rivers and Harbors Congress. The people who are interested in fish and wildlife preservation are organized into innumerable groups, such as the Izaac Walton League, to perpetuate life in the great outdoors, and, in addition to all of these, there are numerous groups and societies who are interested in preserving a state of nature in dozens of our scenic spots and who, therefore, oppose any tampering with water resources which has any effect upon the face of nature.

These pose a host of other problems. Shall we build a dam across a canyon and create a great artificial lake for flood control, irrigation, and power, thereby imperiling the natural beauties of the canyon? Is the irrigation more important than the scenery? Shall we make elaborate provisions for the permanent storage of water and for the permanent flow of a limited amount in the streams to preserve the fish and wildlife, at the possible expense of minimizing the water storage possibilities?

What provision shall we make for public recreation around the projects that we build? Is that a Federal obligation or State obligation? Is it large enough to have admitted value as a national recreation area, as probably exists around Hoover Dam and many large structures in other parts of the country, or is it a project which will be enjoyed largely

by residents of a relatively small area and, therefore, hardly a matter justifying Federal expenditures?

I have long since discovered that it is completely impossible to reconcile these various conflicting viewpoints about the use of water resources. It is not possible to do all of these at the same time and in the same place, and, therefore, the friction between various conflicting groups in itself has sometimes delayed Federal action.

There are other conflicts that are still more fundamental, the first example of which is the great legal controversy that is raging over the water rights of individuals and local organizations in the waters of our streams, about which you will probably hear much discussion in the forthcoming Congress.

In most of the 31 Eastern States the law of riparian rights has prevailed from the very beginning of their settlement. This is a doctrine inherited from the English common law, which, in substance, holds that the owners of land adjacent to a stream have the right to have the stream continue to flow past their property, reasonably unimpaired either in quantity or quality by upstream owners.

As the West was settled, this doctrine was hardly applicable, since many of the resources of the West were not adjacent to the stream and since the use of water was an absolute essential to the development of the land and mineral resources of the West. Consequently, the early customs of the West ripened into the law of appropriations, which is that whoever first puts water to beneficial use has a first claim on it, whether he has any land adjacent to the stream or not; that first in time is first in right; and that the right to utilize the waters of the stream is a valid property right, protected by law as much as is the title to the land itself. The whole economy of many of the Western States is bottomed upon the doctrine of property rights to use water.

On the other hand, the development by the Federal Government of some of these great multipurpose structures, particularly in the West, in recent years has led to the assertion of the paramount rights of the Federal Government in the waters of our streams. This doctrine, of course, is bottomed upon constitutional grounds of powers specifically delegated to the Federal Government, namely, that the Federal Government is vested with the right and power to develop navigation, with control of interstate commerce, with power to provide for the national defense, and with the power to control and dispose of Government property.

It is obvious that, in a situation in which the waters of a stream have all been appropriated by private landowners, manufacturing enterprises and other private uses, the assertion of these Federal powers, however much justified, creates a very disturbing situation to the supposed vested property rights of thousands of people.

I shall not at this time undertake to discuss the merits of these respective contentions, except to alert you to the fact that there have been many accusations of lack of local cooperation with Government on the one side and equally loud accusations of the arbitrary and dictatorial conduct of Government officials on the other.

The problem of stream pollution to which I have previously referred is, of course, a rapidly growing problem. It has not been acute until relatively recent years, but it bids fair to become one of our major water problems, and it is a particularly difficult problem, because it frequently affects more than one State and sometimes literally dozens of cities and towns.

What is the obligation of a municipality or an industry with reference to stream pollution? One would suppose that as a matter of ordinary fair dealing whoever is responsible for the pollution of a stream should take care of whatever costs are involved in remedying that pollution. So far, that is the avenue upon which it has been approached.

Usually, the municipal sewage systems or the industrial waste systems which are the primary causes of pollution are readily identifiable and, therefore, make the fixing of responsibility relatively simple. But suppose a city doesn't vote the bonds for the sewage-treatment plants? Or suppose, as in some rather complicated situations, you have three or four States bordering upon the river, all of which may be guilty of stream pollution in varying degrees, and being in different States, the enforcement of ordinary legal process is at least complicated, to put it mildly. At what stage of the proceeding is the Federal Government justified in entering the picture? What should be its procedures? Should it simply do the job and pay the bills without reimbursement, or should it endeavor to collect back its money from the responsible persons or agencies?

Here arises another whole series of policy questions which I suspect will arise to vex us in the years to come.

And, finally, the problem confronts us constantly of the allocation of costs to the various functions performed by some of these structures. Here is a dam that is so constructed that half its capacity is supposed to be vacant to absorb and hold back flood waters. The other half stores water for domestic water supplies or is run through turbines and generates hydroelectric power at certain seasons and then goes on down through ditches for the irrigation of land.

In connection with that project we have designed elaborate fishways. We have perhaps built auxiliary reservoirs for the protection not only of sport fishing but frequently for the protection of the fishing industry as a commercial venture. We have taken sizable areas around the project for the purpose of public recreation.

Now, how do we determine the proportions of the cost of that project which would be allocated to these various functions? This is especially a delicate problem, because some of these items, such as irrigation, are reimbursable to the Federal Government, and others may be planned to be assumed by the States, such as the recreation facilities. The power will be distributed and sold, and, quite naturally and quite humanly, each of these various contending users will endeavor to shift as much of the cost as possible over onto the other user--the power user to cut the power rate--the irrigator to cut his water cost and so on.

I discussed this briefly last year, at which time I mentioned that the three principal Federal agencies, Agriculture, the Corps of Engineers, and the Bureau of Reclamation, have made much progress and have devised a formula for the determination of the proportion of these various costs, but I mention the problem again because it is one that recurs in every water-resource development which we have.

This same conflict arises in the operation of the project. Quite naturally, downstream cities and other interests which have suffered from floods would like to have the dams kept as nearly empty as possible to save space for future flood protection. The irrigationist, on the other hand, who lives in perpetual fear of a water shortage that will destroy his crops, takes the opposite view. The power-minded people believe that Government hydroelectric plants should be operated at whatever cost and regardless of the effect upon other water users of the stream. And our fish and wildlife people do not look with favor on wide fluctuations in the water levels and feel a constant stream must be maintained even though it cuts down the power output or makes irrigation works short of water.

The Department of the Interior lives squarely in the middle of all these problems. It is a target of criticism of all these contending groups, and no one can satisfy them all. When you mix in some politics and see the great political potential of traveling about the country and telling each of these groups what they want to hear, you will realize something of our problem.

The wisest and best use of our water resources is the goal we strive to attain. We must in many cases balance the needs between adequate domestic and individual supplies for our cities, the demands of agriculture for water for irrigation, and the operation of hydroelectric facilities. We must protect as far as consistent with other uses our fish and wildlife resources. We recognize as well as anyone else the benefits of large recreational areas that provide a wholesome outdoors for our growing millions.

I have asked a very great many questions. I have answered very few, not because I have any hesitation in answering them, but only because, if I had undertaken to answer and explain, I would have had to omit many of the large number of problems.

Of one thing I am sure. The situations are too numerous, the problem is too vast, there are too many local people affected, too much money is required, for our water-resource development to be solely a Federal problem. We have a very great national interest in water resources which no one will deny, but we also have tremendous individual and local interests in water resources. After all, the primary benefits of most water-resource projects are local, or at the most, regional. For that reason, unless the national need is extremely great, we should not ruthlessly tramp over the wishes and the desires, not to mention the property rights, of local people. They live with these projects, and they are entitled to a reasonable voice in their planning and their execution. I am afraid there have been some projects in the past in which they have not had that voice.

By the same token, of course, since the benefits are frequently local and are substantial, it would seem there is little reason why machinery should not be set up to collect back to the Government at least some portion of the benefits bestowed from the beneficiaries. This, of course, is a very painful suggestion especially in some cases in which there have been large benefits from Government expenditures without any reimbursement whatever from those directly benefited. But there is a wide variation between the amount of reimbursement,

required by the Corps of Engineers, the Bureau of Reclamation, and the Department of Agriculture, on the one hand, and the total payment of costs which must be made for projects developed at the State and local level.

Quite naturally, if the Federal Government will do it free or cheaper, people will seek to have it done that way. The consequence of that, however, is, first, obvious discrimination and favoritism in the location of the projects which we undertake to develop; and, secondly, an acceleration of the centralization of power and control in the hands of the Federal Government, a thing which is now commonly decried by all persons familiar with our governmental structure.

It is for these reasons that we have been insisting that, as far as feasible, the responsibility for the construction and the management of water projects be moved away from the Federal Government to other governmental levels. We think that is a sound philosophy, not only with relation to water resources, but in other areas of government as well. We think the fallacy of complete reliance upon the Federal Government for water-resource development is amply demonstrated in the struggles of the Tennessee Valley to wangle enough money from Congress to keep itself in operation and in the Pacific Northwest, where the Government has dominated the situation, with a resulting power-shortage threat overhanging the area. We think that the people of a region have a better conception of the needs of their region than anyone else can.

With this general philosophy in mind, we shall continue to go forward, urging the development of water resources by individuals, by cities, by States and their agencies, all with the firm understanding that, when the projects are so complicated or the financial needs are so great that they cannot be handled otherwise, the Federal Government, if it is a sound project, will assume the burden. We believe that joint effort and cooperation is the solution of these problems. The task will require the best efforts and resources of all of us.

Thank you, gentlemen.

CAPTAIN THORSON: The Under Secretary is now ready for your questions, gentlemen.

QUESTION: Mr. Secretary, is any department charged specifically with water responsibility under mobilization?

SECRETARY DAVIS: In the sense that there is a direct delegation with reference to, for instance, the amount of water needed in the military field, and things of that nature? If there is, I don't know. I think there is not. I am not familiar with it, anyhow.

QUESTION: Sir, mine is rather a double-barreled question. Am I right, first, in assuming that there is no charge made to the beneficiaries of navigation, that the barges and so on do not pay for the benefits from the inland waterways?

SECRETARY DAVIS: You are right.

STUDENT: The second part of the question is, if that is correct, I understand a great deal of the maritime cost, perhaps deliberately because of that, is charged to navigation. I wonder why there is no charge there, under the philosophy that you mention, that the beneficiaries should pay.

SECRETARY DAVIS: Of course it is a purely historic situation. In the beginning, in colonial days, where water transportation was about the only transportation of any consequence, under the constitutional delegation to Congress of the power over interstate commerce which included navigation, it was perfectly natural and logical that a pattern be set up for improving rivers and harbors as a national benefit. We simply carried it on forward to the present time. Since that time other means of transportation--rails, air, etcetera--have had substantial aid, too.

Of course there are contributions, in the sense of where, I believe, in the flood-control projects, the right of way, and things of that nature, are usually required to be contributed by the local people. But so far as cash, monetary reimbursements for the project or the use of it are concerned, no.

QUESTION: Sir, one of our previous speakers touched on the feasibility of replenishing the underground or subterranean water supply. I got the impression that, while they had concluded it was feasible, very little was being done on that problem. Can you comment on that?

SECRETARY DAVIS: Well, I would comment this way. So far as actually putting water directly back into the ground is concerned, I think you have rather a limited situation. So far as the physical facts are concerned, tremendous amounts of irrigation waters, especially in the

sandy soils in the West, do go back to the underground water supply. As far as the streams are concerned, there is considerable replenishment.

As you probably know, I am a lawyer from Nebraska, so I can give you some geographical background, and tell you that, as you go up, for instance, the Platte River from Omaha toward Denver, and get up into the small streams there, the rapid replenishment, or the return flow, is really an amazing and interesting thing to watch. There will be a place where an irrigation diversion dam will dry up a tributary stream as dry as this floor, but seven or eight miles down the stream you have a sizable stream again of water that has gone down and worked its way back into the stream.

Now, the underground thing is a little different. Ordinarily we would say underground water is much deeper and not so readily replenished as the surface return flows I mentioned. However, there is a project right now in the Middle West where one of the arguments for it is that it will have the effect of helping to replenish the underground water supply by wide distribution of the surface water, which in turn will replenish the underground water supply.

The thing that has impressed me the most is the lack of real, firm data in connection with some of these problems of underground water. In the drought period of the thirties in the Middle West area, the water table dropped very materially, and it was said that we had robbed nature, and that never again would the water restore itself, and that our land was gone completely to the "bow-wows," and all that kind of talk. In two or three years the rain brought that water table back to where it was in the first place. We say: "Where does that water come from?" I believe the geologists say there is a great river of water that starts in Montana and comes down through eastern Wyoming, Nebraska, and Kansas, clear down across the country into the Mississippi basin. It is something that I would expect would require tremendous amounts of research and study before we know exactly what happens.

QUESTION: Mr. Secretary, in relation to this control of some of this drought, how about the program of seeding rain clouds, or causing rain by seeding clouds? The effect downstream might be resulting floods on this dry land, with water running off.

SECRETARY DAVIS: The cloud seeding thing of course is very interesting. I told all I know about it last year, so I dropped it out of

this discussion today. But, on the theory that maybe most of you were not here last year, I will repeat a little of it.

There is a committee of the Government working on the problem of weather control, or more properly, weather modification. Some of the reported results are very interesting. The period of observation is far too short to merit any firm conclusions. After all, anything can happen for four or five years, as we know.

It is interesting that in some of the local areas in which cloud seeding has been taking place, at least for the observation period, the rainfall has been increased. It begins to appear as though, from strictly a local standpoint, if there is the right kind of a cloud up there, with X percent of moisture in it, and so forth, it is possible to precipitate that moisture on a local basis.

Going on to the next implication that you raise about what happens elsewhere, of course, as I have said repeatedly, my own thought is that, if you precipitate moisture out of a particular cloud here on this area or this State, and you know that the wind currents are such that normally the precipitation would be in the other State, have you a right to deplete--shall we say--rob--one to keep the other? In other words, applying it again to my own area, where a lot of it, incidentally, is going on, suppose we take the clouds that come over the crest of the Rockies into eastern Wyoming, eastern Colorado, and western Nebraska, where there are tremendous wheat fields, and we precipitate that moisture on that area, which is a God-send to the wheat, just at the right time, are we robbing clouds that would ordinarily help to raise Iowa corn?

That is your question. As you know, there has already been a lot of litigation about it in the West, where someone has hired somebody to go up and seed clouds for the benefit of one crop, and where the moisture was totally destructive of another crop in an adjacent field.

There is that sort of thing. I think we are still in the realm of great speculation, but the smattering of evidence we have of the possibility of weather modification should justify our proceeding further with the program. That is what we are doing.

QUESTION: Mr. Secretary, I believe a major assist in the water problem in certain areas would be the economic large-scale conversion of sea water. Would you care to comment on whether we will see such conversion in our time? Or is it generally feasible?

SECRETARY DAVIS: Yes, I will be glad to comment on that one. Interior, as you probably know, is getting some 400,000 dollars a year to work on a sea-water or salt-water conversion program. That is all being granted to various colleges and scientific and industrial research organizations in the United States. They are getting all the way from 2,000 or 3,000 dollars up to 15,000 or 20,000 dollars in grants to aid them. There are a lot of organizations, 15 or 20 of them, working on various aspects of that problem. They are making quite consistent and considerable progress.

The last report--I was asking somebody if we had another one--was last July, but it indicates that some of these processes--which I am not able to describe to you--are now successful enough that it is estimated, if my memory serves me right, that you can take salt water and demineralize it down to the point where it is usable for domestic use. I won't give you the figure, because I am not sure, but at any rate I will say that the figure is now at the point where, if you confine it to your strictly personal uses of water drinking, bath, and household uses, the price is not prohibitive.

But you would hate to pay it. We all treat water as though it was substantially free. There is nothing as low in cost as water in the United States. The per-gallon cost of demineralized water is down to the point where, for a bill that would be no larger perhaps than some of your other utility bills, you could have that water. But when you come to the question of large supplies of water, the tremendous supplies for industry, and the irrigation supplies, you are not anywhere near a cost that either could afford to pay at present prices for their products.

But the trick in the thing is the development of low-cost energy for several of these processes. That of course has led these people over to experimentation with solar energy, and other sources, and all that sort of thing, which is itself very much worthwhile. That, apart from the solution of the water demineralizing problem, is a field on which we are making progress. Congress is enthusiastic about it. We got even more money this year than last. The potentialities of conversion of salt water to usable water would have a great worldwide effect on world food supplies and living conditions.

QUESTION: Mr. Secretary, I wonder if you would comment on what is happening to the underground water which is disappearing. Where is it going? The sea is not rising. The atmosphere is not getting denser.

SECRETARY DAVIS: I am afraid I can't make a very helpful comment on that. The kind of disappearance that I am talking about is the water drawn down for human consumption. A lot of the critical areas are in south central California, for instance, where there is a very large area where the water table has dropped tremendously. That is due to nothing more or less than irrigation uses. You have those big wells drawing it out. There are tremendous streams of water filling irrigation ditches. There seems to be a limit to the replenishing power of the water. Again, geologically, I don't know why this is true, but it seems to be.

Most of the troubles are manmade. To give you an idea--again, going back to my own State, where a lot of these things are, of course, rather acute--there are 9,000 now, and they anticipate there will be in the next year and a half 14,000 irrigation wells in a stretch of only about 100 miles along the Platte Valley, along the Union Pacific Railroad in central Nebraska. You can't have 14,000 wells pulling four- to six-inch streams of water out of the ground there for two or three months at a time in the summer without affecting the underground levels. You would almost drop the level of the ocean with all of those pumps working on it.

Your problem is some form of regulation of the outtake that can be made. That is where we are headed, unquestionably, for regulation of the amount of water which you can pull out for these various purposes.

QUESTION: One of the most interesting areas for water resources is the Northwest, north of Oregon and Washington, which is the Alaskan area, which is in our province. Unfortunately, a great deal of the water seems to fall in Canada before it gets to where we want to use it. We have numerous problems with respect to that border.

Will you comment on the provisions that might be made, similar to the Fire Project on the controlling of the water of the Columbia River before it gets to the United States?

SECRETARY DAVIS: Yes. The project is a little on the negative side at the moment. Our Canadian friends have as good a conception of the American dollar as we do. We seem to be in a little difficulty.

Of course, again, I am not intimately familiar with the details of our international treaty with Canada on the waters of the Columbia

River and other streams that cross the border. We would like to build dams which back the water into Canada, inundating some of their land. There are about five cooperative committees on this problem. There has already been discussion by General McNaughtin, representing Canada, and former Governor Jordan of Idaho, representing the United States. They are both members of the International Joint Commission, which, by the Canadian treaty, has jurisdiction of the matter. General McNaughtin is hoping that, instead of accepting money for the storage areas, he will have the privilege of building dams in Canada and let the water come into the United States. He would also like a percentage in perpetuity of the profits of the hydroelectric energy produced by the water Canada stores. It would he a very good deal for Canada. We have said, "No." At the moment, that is where the matter stands.

QUESTION: Mr. Secretary, this may be a little too detailed a question, but you mentioned the wells which are at 600 feet and which may come to the point where perhaps it will be uneconomic to bring up the water. Can you give us an idea of approximately what water is worth an acre or a foot, anywhere within a rough approximation, the maximum at which somebody could pay for it?

SECRETARY DAVIS: It is a very painful question to answer. If I could be sure you would never quote me, I would give you an example of what we could pay. I know of one project involving about 50,000 acres, where all of the land could have been bought originally for about 50 or 60 dollars an acre. It was already all being farmed. It produced perhaps 50 bushels per acre of corn--sometimes.

It is now all completely irrigated, with a very ample supply of water. Hybrid corn has entered into the picture. The other day I noticed that they held a prize corn contest out there. There were six contestants who have raised more than 100 bushels per acre, and any number who raised 90 bushels per acre on that land.

In view of the fact of this obvious increase of up towards 100 dollars an acre in productivity, you tell me what they could pay. I think if they paid 10 or 20 dollars an acre it would still leave a large profit the way prices are now. The Board, in its control of water rates the other day, raised the rate from $3.50 to $4.25 an acre, and they all had to leave town.

QUESTION: In view of the value of water, is there much effort being made to try to discover the underground stream via the method of oil discoveries?

SECRETARY DAVIS: Yes, Geological Survey and other organizations are constantly engaged in that. It goes back to the matter of additional money to the scientific and research organizations necessary to accelerate those studies.

QUESTION: Mr. Secretary, I believe certain cities are extremely vulnerable to an attack on their water supply. Perhaps Los Angeles and New York are good examples. How would these cities be provided with water in the event they were attacked and their passageways disrupted? Who would have the responsibility for providing water to those cities?

SECRETARY DAVIS: In California, for instance, as you may know, there is the Metropolitan Water District of Southern California, which comprises Los Angeles and a half-dozen other cities in a sizable area. They built an aqueduct there which brings water from Hoover Dam--that sort of thing. It has always been a municipal responsibility in that big water district.

If you asked me what would happen if Hoover Dam were suddenly eliminated, I don't suppose anybody knows the answer. It would be a very critical situation, of course. There is no doubt about it.

QUESTION: Mr. Secretary, in these deep wells, is there danger of salt-water infiltration?

SECRETARY DAVIS: Apparently not, except along the coast. There is some infiltration there which I am not competent to discuss. There is salt-water infiltration along our coast now. How extensive it is, I don't know. Roy, would you like to answer that?

MR. MORSE, INTERIOR DEPARTMENT: There is a good deal of infiltration of salt water in southern California.

SECRETARY DAVIS: That is one of the things responsible for a great deal of pressure which is being brought for another major project in southern California. Unless they stop pumping and get the surface water to go down to help replenish the supply, the salt water infiltration is going to be serious.

That is another scientific factor. Nobody knows the answer to it.

QUESTION: Sir, the Port of New York Authority, for instance, was a capitalist organization setup, I think, to control the approaches

to New York, in the development projects which were in keeping with the times and to meet the needs. I understand that this is not only a self-supporting activity but a highly successful one. They are actually in the market to find new projects to put money into.

Would such an approach to the water system on a national scale be feasible?

SECRETARY DAVIS: I don't know how it would work on a national scale, but certainly regionally it offers possibilities; there is no doubt about it. The Port of New York Authority is one. A similar organization, the Metropolitan Water District of Southern California, is another. It is on a slightly different scale. It is set up as a nonprofit organization. It is part of the Government, as is the New York Port Authority. It is set up at State level. The Port of New York Authority had the approval of Congress, but otherwise it is operated at State level. It is tax exempt as a State agency, which is one element in its success.

Consequently, it has had a market for its bonds, as have many of these other outfits, which can sell bonds at about the going rate of money to the Treasury. Any number of these State tax-exempt agencies have borrowed money, sometimes at a little less than 2 percent, sometimes just around 2 percent. So far as the financial requirements are concerned, they can get money just as readily as can the Federal Government; in fact, more so, right now. There are hundreds of millions of dollars of private money ready to go into those revenue bonds with which they are all financed.

In general, the thinking back of this new proposal, which I have not even read, but which has been in the newspapers, is of putting the Tennessee Valley on a self-sustaining basis, and there are a lot of measures pending to do the same thing in the Pacific Northwest; because, actually, these dams, especially in the Northwest, are liquidating themselves on a perfectly sound basis, according to the bond experts. Why in the world then should Uncle Sam continue to shell out money? Why shouldn't they be put in a position to get their own money?

QUESTION: Sir, referring to the pollution problem and to the specific situation we have right around here, can you outline, by the way of a case history, a theoretical, or, shall we say, an ideal, solution of that, in view of the interest involved in the three States?

SECRETARY DAVIS: Frankly, I can't. I am no expert on the District of Columbia or the Potomac River, either one. It is obvious, of course, that there is a situation in which there should be some very substantial Federal participation in the picture. After all, the Federal District is one of the heavy contributing factors to the pollution, as I understand it. I can't tell you anything about the situation, because it has been brewing here for years, and it is highly complicated.

Interior, as such, has had very little to do with it. So I will pass.

QUESTION: Sir, we have talked a great deal about all the trouble spots. Is it not true that there are many bright spots on the water map, which have an abundance of water, and populations are just not there?

SECRETARY DAVIS: Yes, that is true. That is true, and, of course, some of those will probably result in some shifts in population. You simply can't tell. For instance, the Upper Colorado Bill, which has been kicked around in Congress during the last session, the one which has the Echo Park Dam, and so forth, covers a project which will be built over a long period of years--minimum, 20, maximum, 50. Of course, there is an enormous amount of water in the upper Colorado which will be put in storage at various dams. That will be kept, and utilized, either agriculturewise, industrywise, or hydroelectric power-wise--or all three.

In that same area, of course, there have been a lot of the discoveries of uranium and other critical metals which we are all talking about. I don't think anybody can foresee with any exactitude what will happen. It is not too hard for me to imagine that, if our metal program continues to be critical and we continue our exploration processes, and we get together elements of hydroelectric power and ample water out there, we might end up with quite an industrial empire right in that particular spot.

I have no doubt that there are other areas where the same thing is true.

QUESTION: Mr. Secretary, do you feel that weather modification will develop to where it may be of military value? We know the Soviets are maximizing the development of their land in wheat, with a very low rainfall. I think, if I remember, that the wind currents carry rain across Western Europe into Russia. I am not sure.

SECRETARY DAVIS: Well, I think that so far we are pretty much in the realm of fantasy when we come to that point; that is, to say exactly that we can do this or can't do that. But we are, of course, engaged in worldwide studies of that general nature--not only the United States, but all of our friends throughout the world, going clear down to Australia, and coming up to the West, and to the East.

Again, I should not be talking about this. It is a highly scientific thing. I don't know anything about it, except as I glean information here and there from hearing discussions. I glean that people are looking in the direction that you are talking about, trying to get some kind of preliminary information on which to pursue further studies.

It is not being neglected, by a long ways. It has also a rather large cost. It takes a lot of money to do all the observation you need to do. You need to do it contemporaneously in various spots at the same time. To get programs of that nature coordinated amongst a lot of nations in this world is quite an undertaking. We have made some progress, and we are looking ahead down the road.

CAPTAIN THORSON: Mr. Secretary, on behalf of the College, I want to thank you for another outstanding presentation.

SECRETARY DAVIS: Thank you very much. I enjoyed it.

(23 Mar 1956--450)O/sgh