

Rivers and Harbors Section, Office of the Chief of Engineers

Q: Did you find my problem within the Corps to this kind of work?

A: I don't think so. I guess that in the Corps of Engineers there were some minority few who were involved in just the military phase and didn't think too much of the civil works activity of the Corps. But conversely, I sensed that those of us who were involved in civil works, such as flood control and later on lock and dam construction, and subsequently in the Chief's Office in the Rivers and Harbors Section, I sort of sensed that those of us who were in civil works felt sort of a little superiority over those who were just involved in the Military Division.

I think that attitude grew within you because you saw that you were doing work of major responsibility and major expense and importance, as compared to what the engineers or other personnel in the military services were doing in peacetime on their military function. There they were limited in funds for their activities, and it seemed comparatively as just a sort of routine function in being with troops. So if anything, you seemed to sense that those who were involved in the civil works program might have looked down on the ones in the military as sort of a secondary group of personnel.

Q: Did flood control appear then to be as potentially significant for the Corps as it became after the Flood Control Act of 1936?

A: I don't think at that time the country was ripe for it. Only those of us who were involved in it—and there were very few at that time [who] really thought so—I think the Pittsburgh flood control survey was the only one that I know of as of that time. But being involved in it, I, and those in the review later, felt strongly that there was a field for the Corps of Engineers.

I think the way the Corps of Engineers is set up with districts, its divisions, its coverage of the country, its readiness to move trained and experienced personnel from one district to another as the need for specialized engineering or development occurs and its varied engineer experience, are all material factors in preparing the Corps of Engineers for such a function, as compared to establishing a brand new agency nationally or in any particular area.

Q: What was Jarvis Bain like?

A: He was a stubborn type commander. He did not seem to have a particularly likable personality. We sort of sensed that in some ways he was Scotch in nature. For example, we had limited funds, limited material, for our flood control survey. We had one small car that was used in connection with our field survey work. The tires on the car were shot. We put in a requisition to get four new tires. He turned it down and said that we should turn them in and get four used tires.

Here was an example of penny penury and pound foolish, because if you had that survey party out and with those used tires something conked out, you lost a half day or more of valuable time of the crew, and you had their expenses and so on, as compared to the savings of pennies in getting a used tire rather than a good new tire.

But at the same time, even though he was saving pennies, there he would sometimes take his car and a party, go up to the head of the Monongahela River, get on his inspection boat, and then come down the river on the inspection boat and the car would have to return to the district office empty. I mention that only as indicative of how he was sort of telling us to cut down and hold down here and there, and yet by his example he was doing something otherwise on his own. I didn't think that Jarvis Bain was one of the engineer officers under whom I served who would ultimately be Chief of Engineers or attain any major position in the Corps.

Q: How about Colonel C. W. Kutz, who was the division engineer?

A: Kutz. Colonel Kutz was a very able and respected officer. As division engineer, I had very little to do with him because at that time the district engineers were functioning rather independently. I think it was later on in General Brown's [Major General Lytle Brown] term as Chief that they adopted a new policy in the Chief's Office of building up the division offices and delegating a greater amount of control to them. In later years I sensed the division engineers were more active in control of their divisions than they were at that time where division engineers seemed to be more an office through which administrative papers and so on would be processed between the Chief's Office and the districts. I did not sense that the division engineer exercised any major direction or supervision of the activities that were going

on in the districts. So I had little to do with Colonel, later General, Kutz. Incidentally, he was father of the charming girl whom Tenney Ross, a classmate of ours, married. She's a wonderful person.

Q: While at Pittsburgh, were you engaged in any of the preliminary work for the comprehensive river basin surveys mandated by House Document 308?

A: Not at that time, but I was subsequently, in the Chief of Engineers' Office, very much involved. Because in the Rivers and Harbors Section we were in touch with all the divisions, all the districts, all the civil works activities of the Corps throughout the country; both on flood control and current developments, as well as on these continuing House Document 308 surveys.

I might add though, in connection with Pittsburgh, in case you're leaving that, that the second year after I had finished my flood control survey and submitted the report, I was engaged in supervision of construction. We were building a second lock on Lock 4 on the Monongahela; we were building a new lock and dam at Dams 6 and 7 or 7 and 8 on the Allegheny; and we were building the uppermost dam on the Ohio River. It was then called Deadman Island's Dam but later had its name changed to Dashields Dam. It was a very interesting assignment because I was involved there in the actual construction of locks and dams and other major structures in that important area.

Few people realize that the little Monongahela River carried more traffic than the Panama Canal. It was very important, particularly to the steel industry, moving ore and steel and other bulk traffic through that relatively small stream.

Incidentally, when our flood control reservoirs were finally built later, we also had provided for joint use for some of the reservoirs so that they could store part of the flood waters and during the low-water season could release them to improve low-water flow. That was very important, particularly on the Monongahela River, because it had very heavy traffic but limited low-water flow, so that during periods of low-water, the shortage of water needed for the frequent lockages became critical. For instance, the Tygart River reservoir and the other reservoirs at the heads of the basin helped materially in providing an increase in the low-water flow during those critical low-water flow periods.

Q: How significant was the completion of the 9-foot navigation channel on the Ohio?

A: I think it was very, very important-particularly now, for instance, when you read of the shortages of energy, the difficulties of truck transportation, and the problems that the railroads have.

When you think that water transportation is the cheapest form of transportation of mass commodities, the provision of an improved system of waterways has been a major contribution toward the development of the country as well as in the improvement of commerce and in the saving of energy as well.

I know that there was a lot of criticism of the Corps in the early days about its development of the Ohio River for channelization, even with the 6-foot project, let alone the 9-foot project. But all those criticisms can be washed out by merely analyzing just what the annual commerce is on the Ohio and its tributaries, and figuring out both the fuel and money savings that are attained as compared to rail or truck travel and also considering the potential that it gave for development of that whole area as an industrial and economic development region.

Q: In 1929 you wrote a detailed article in *The Military Engineer* on Deadman's Island Lock and Dam. (See Appendix C.) What prompted you to write that article?

A: One thing, *The Military Engineer* was paying \$10 or \$20 or something like that for an article. I know it was some insignificant little fee. But principally I felt that it was desirable to put into the literature an example of one, at that time, relatively important engineer project of the Corps of Engineers. So I just took time off and wrote it; I haven't seen it for years and I don't even recall all that's in it. But I assembled all pertinent data in connection with its design and construction and prepared and wrote that article and submitted it, and they happened to publish it.

Q: Well, in your article you distinguish between movable and fixed dams. Could you explain the differences between the two?

A: Well, a fixed dam would be a concrete structure across a stream. It would have a spillway over it or through it depending on the height of the dam. A movable dam is one where you have some arrangement whereby if high water is approaching you can lower the structure or parts of the structure. For instance, if they have the movable bear-trap, they could open those during high flows; or if you had the wicket type of movable dams, you could lower the structures and the water then flowed through without obstruction and that would permit, for example, during high water, commerce to proceed across the lowered dam without having to go through the locks, eliminating the time-consuming period taken to go through a lock. They are feasible only where you are going to have long periods of navigable depth flow or sometimes where you might have so much high water that with the fixed dam, without an excessive amount of openings, you would be flooding the area upstream during flood flows.

At that time we had only the movable-type dams on the Ohio, basically the wicket and bear-trap type. Later on, when I went over to Germany, '33 to '35 on my research work there, I did an extensive amount of traveling to inspect the various hydraulic laboratories in Europe. I also took occasion to inspect, with personnel from the German government waterway groups, the locks and dams and so on that they had. They had developed much bigger structures for movable dams. They had the roller-type dam; they had the *Drei Guert Schutze*, a triangular-type device. The movable parts would be 100 to 150 feet or more long. I assembled plans and data on these various structures and sent them back to the Chief of Engineers' Office. Subsequently, and currently in the case of a movable-type navigation dam or for flow control through fixed dams, they're virtually all made now with these long roller-type structures and similar structures such as they had developed in Europe rather than the wicket and bear-trap type.

Q: At Deadman's Island, you noted the steel interlocking sheet pile caissons were used for the first time on the Ohio River. How significant was this use?

A: I hadn't recalled now that that was the first time, although I guess it was. But the matter of cofferdams is a very important phase of dam construction. In order to provide space to build a lock you have to unwater the area to work on the foundation and the structure itself. That requires provision of a barrier enclosure, permitting pumping out the enclosed area and holding

it dry during the construction phase. In building the cofferdam using interlocking sheet piling you could sink a series of adjacent sheet pile cylinders and interconnect them, filling them with excavated materials. That made an excellent type of cofferdam barrier to protect the working area inside. And after the structure was completed, you could retrieve the sheet piling for use again as a cofferdam on other structures.

Q: Pittsburgh was your first civil works assignment. How important do you think this experience was for you personally and professionally?

A: Most important. I thought it was a wonderful opportunity to get into the type of engineering particularly that the Corps of Engineers was involved in. I had the opportunity for hydraulic research and study on flood control. For instance, in the annexes or appendices in that study I showed how to figure out the effect of valley storage in computing the effectiveness of reservoirs. You can put a reservoir on a tributary and maybe you're going to reduce, let's say, 5,000 cubic feet per second from that tributary from its peak flood flows. That's what you reduce at the dam, but you can't claim that much reduction further downstream because if that flood had continued on through the tributary, much of it would have remained in storage in the river valley before it got up to flood height some distance below. So the effect of holding back, say, 5,000 cubic feet per second up here might be only 2,000 or 3,000 cubic feet per second at some point below because of the intervening valley storage effect that you would have had during the flood, as compared to not having it with the reduced flow from the dam.

People could go wrong, for instance, when they're analyzing a series of reservoirs and their effect on flood control if they just found out the hydrography of the flood flow entering the reservoir in each of those dams, adding them all up and saying that you took that much off the flood peaks below. You wouldn't because you have to compensate, in determining the reduction in the peak flood flows, for the effect of valley storage in the intervening reaches. In an annex in my report I indicated a method to determine that valley storage effect.

Q: Was your work at Pittsburgh what resulted in your assignment to the Chief's Office in 1929?

A: I believe so. As I said, I was there and John Paul Dean was then in the Chief's Office. He was working with the Board of Engineers for Rivers and Harbors and particularly with Colonel [Ernest] Graves on Mississippi River flood control. I think possibly the recommendation of John Paul Dean or the fact that I'd worked on both flood control and lock and dam construction may have been factors. The Chief knew about my work on the Pittsburgh flood control study because I'd taken the report down when it was completed and we had hearings before the Board for Rivers and Harbors and before the Chief, so they knew of that. In any case, I was ordered there.

Q: From your previous comments I gather that you think that your experience in the Rivers and Harbors Section, the Civil Works Division, was crucial?

A: Very. I think that probably as far as civil works are concerned, it was one of the most important assignments that I had in my career. I was a relatively junior officer, but by reason of the assignment I had, I was sort of at the central point where everything pertaining to civil works came.

All reports, such as survey reports and preliminary examination reports, came through there. We had to prepare reviews on them for the Chief's action; requests and numerous items of correspondence from congressmen and senators in connection with projects in which they were interested came in, and we had to formulate replies to those for the Chief of Engineers' signature. I had adopted one policy, and that is that when something was referred to us I wouldn't go up and ask General Brown or General Pillsbury or Colonel Kingman or Colonel Daley what should we do on this. But I would formulate a reply or an endorsement or whatever indicating what I felt should be done.

They could change it or approve it. Well, it was rarely that we had any material changed in the type of action that was prepared. So it was a wonderful opportunity to have a review of all of the varied functions of the Chief's activities, not only on rivers and harbors improvement and flood control but also hydroelectric power. The applications and plans of private utilities seeking permits from the Federal Power Commission to develop hydroelectric power on our various navigable streams were always referred to the Chief of Engineers. We'd have to make a review and recommendation on them as to the effect on navigation and as to any

requirements that we might have to put in in connection with such development, insofar as navigation was concerned.

The district engineers often were coming in in connection with getting additional allotments for continuation of some of their studies and so on. For instance, I can recall General [Brehon B.] Somervell, who was then just a major, coming in to my office requesting increases in some funds that he required for his examinations and projects in the Washington District. He was district engineer in Washington at that time. Later on he was the supreme power on our 1941 construction program, and I was operating under his command.

Q: How much did you have to do with the Chief of Engineers at that time? Did you see the Chief of Engineers very much?

A: Not too frequently. I saw the Assistant Chief, General Pillsbury, much more because my office was right adjacent to his. I say "my" office; I mean the chief of the Rivers and Harbors Section, Colonel Daley, and later on Colonel Kingman. Our office was right adjacent to General Pillsbury, so we frequently stepped into his place or he stepped down to ours in connection with matters, and occasionally we would go in to see the Chief. Initially General Deakyne was the assistant chief, and then he was relieved by General Pillsbury. General Pillsbury was the assistant chief during most of my service there.

Q: What were your impressions of General Lytle Brown?

A: A very likable, very able, Chief. I don't think that Lytle Brown was the outstanding technical Chief, as compared to General Pillsbury. General Pillsbury, I think, knew more of the engineering problems and soon that the Corps had, and in particular the technical phases of river improvement, hydraulics, and so on. Whereas Lytle Brown was a wonderful personality with great ability to get along with congressmen or senators or groups coming in or in his contacts with people. And also he kept a very nice shop, you might say, of the personnel working under him. We were all a happy family and everybody respected and liked him.

Q: What was your impression of Colonel Daley?

A: Mick Daley was a most likable person. He was not one of the greater technicians of the Corps-he operated more in an administrative capacity. I doubt that he ever corrected anything that I had prepared for him, so he wasn't one who would adopt a different view on what we were preparing or proposing. It was too bad later, when he really had a great opportunity during the outbreak of World War II, when he was sent over to Europe-I don't know if he would have been a corps commander or such, but something happened and he was returned to the States. I think Colonel Daley was probably more suited for the military phase of operations, possibly, than the engineering or technical phase of the Corps of Engineers' work.

Q: How about Colonel John J. Kingman?

A: Colonel King man was a slower moving person. A very nice personality, very quiet. I think I told you the other day about the mooring bit? Did you want information on that, for example? At that time we were conducting the House Document 308 surveys and the plans and data were coming in on the Tennessee Valley development. That was going to involve a series of high dams, as compared to the lower dams that we had had on the Ohio and other streams. That was also going to be the case on the Columbia River, where we were going to have very high dams for joint hydroelectric power development and navigation.

They had had trouble shortly before that up on the St. Lawrence Waterway, where they also had high dams. They had trouble in transferring lines with the fixed mooring bits that they had on the inner walls of the locks; including drowning of personnel trapped in making such transfers. Any ship entering the lock chamber was subject to terrific surges during the filling or emptying process in the lock. It was therefore necessary to secure it to these fixed bits along the sides and then transfer the lines up or down as the vessel rose or was lowered during different stages of the lockage. Colonel Kingman said he was much concerned about that with our projected high dams. I thought there might be a solution to it, so I sat down and worked up some sketches and thought it over for a day or so, and then came up with the concept of a floating-type mooring bit. It would consist of a tank with rollers or wheels on both sides, operating on tracks in a recess in the lock

wall, with the mooring bit attached to the top of this floating tank. In that way, as the water raised or lowered, why the tank would rise or sink, always keeping the same relative elevation above the water level, no matter whether it was rising or falling with the variation in water levels.

Kingman was quite impressed with it, so he had me make further detailed plans and write-up. At that time the Corps of Engineers was being sued by a former Engineer Department employee for royalties on a development he had made in connection with bank revetment. So Colonel Kingman said, " We've got to get out a patent on this to protect the government so we won't be subject to royalty patent claims. " So he said, "We'll get a patent. " This was just before I was due to leave for Germany. I had been awarded this Freeman Fellowship for Hydraulic Research, so I left. But about a month or so after I arrived in Europe, I got an application for a patent on this floating mooring bit for my signature and so on, which I signed. I noticed it was a patent in the name of John J. Kingman and Hugh J. Casey, in that order. But his contribution had been mainly in getting our legal group and our draftsman to effect the patent application on my original concept. I noticed that later on it was referred to as the "Kingman floating mooring bit, " but as I say, I happen to know just who it was that did develop it.

Q: Was Colonel Graves then the chief of the Civil Division?

A: No, he wasn't the chief of the Civil Division. He was a retired officer who had been called back to active duty and his function was being in charge of the Mississippi River Flood Control Section. That was his primary, principal job, so all matters pertaining to the Mississippi River flood control, and there were many, were handled through his office, with John Paul Dean as his assistant on most of the technical phases of any reviews and problems that they had.

Q: Who was the chief of the Civil Division at that time?

A: That's a fair question. I believe the Assistant Chief of Engineers (then Brigadier General George B. Pillsbury) sort of acted in that capacity. I don't have any recollection of anyone other than the chief of the Rivers and Harbors Section and the Assistant Chief of Engineers.

Q: OCE [Office of the Chief of Engineers] had a relatively small staff of engineer officers at that time. Who were some of the people there besides yourself?

A: Well, Dinty Moore was there. I think he was involved with legal matters in connection with accounting and legal reviews, particularly involving contracts. I think he was in the division that handled contracts. There was John Paul Dean, as I stated previously, and there was also A. B. Jones. He was with the Rivers and Harbors Board, and also a very able officer and a fine technical engineer. He was very active in the review of reports that came in from the divisions and districts prior to action by the Board of Engineers for Rivers and Harbors.

Q: What about John Bragdon?

A: Yes, Bragdon was there. I am trying to think of just what it was that he did. I don't know if he was in the contract section along with Dinty Moore, or—

Q: Apparently he was in the Finance Division.

A: Yes, I think he was in the Finance Division. I think he handled the finance end of it. I know that Dinty Moore would deal with him in connection with legal reviews of contract matters.

Q: Leslie Groves was in the Military Division?

A: Groves was in the Military Division. I don't think he was doing anything particularly outstanding that I can recall. At that time those of us in the Civil Works Division sort of—I wouldn't say looked down on those in the Military Division, but we felt that they weren't doing as important work as was being handled in the Civil Works Division. You must recall that this was in the period of '29 to '33 and the country had just gone through the crash of '29. The economy was down, and the administration decided that there was need for an accelerated and expanded public works program. So the Corps of Engineers was given much bigger appropriations than they had had in the past, with the view of spreading work around to the various communities throughout the country. As a result, the Civil Works Division

was far more active during that period than they had been before. Congressmen and senators were continuously coming in, pressing for projects to be developed in their various areas. Our office was extremely busy reviewing reports, plans and specifications, and allotting funds.

At that time Patrick J. Hurley was Secretary of War and MacArthur was Chief of Staff. On some matters our correspondence had to go up to the Secretary of War's Office in connection with a number of the projects and, though I didn't have personal contact with the Secretary of War's Office, our Chief did. But by reason of the general economic depression that prevailed throughout the country, there was a very great acceleration of Engineer Department activity in rivers and harbors and flood control. We were getting increased funds and making increased allotments and pursuing a much more active construction program throughout the country. This was not the situation at that time in the Military Division where Groves served.

Q: Do you believe that such public works or civil works as then engaged in by the Corps of Engineers was the way to reduce the burden of the depression?

A: Well, it certainly helped. I don't think that the solution to pulling the country out of a depression is by a massive public works program, but I do feel that there should be a bit more balancing of it. For instance, if the economy is riding high and the government is getting large tax income, there is an inclination on the part of many agencies, including the Chief's Office as well as others, and pressure from various communities along the lines of, 'As long as we have the money, then let's get it now, ' and "Let's build this or that. "

In doing so, we are competing with private enterprise at a time of high prices and therefore at high cost. But what we should do is to regulate it; not in detail, but generally. When you have a period of prosperity, it is not the time to be pushing a public works program, even though there is a tendency to do that because funds are available, and all the agencies are getting increased funds. And they go out and compete against each other as well as against the private sector and the prices go up and you get less per dollar expended. Now, if some of that is deferred to a period of depression, such as we are approaching now, why then is a time to take some of these projects and put them into the pot at that time, and that would tend to equalize it.

But I do not think that just because we are in a period of depression we should reach out and scoop up every potential project and then get all the funds possible and then pour it in as a solution to an economic depression. That applies not only to the Corps but also to the Interior Department, the Bureau of Reclamation, the Highway Department, and other public agencies. We should concentrate on studies and plans for needed development during periods of high economic activity so that such plans would be ready for execution during periods of recession.

Q: How much change was there in the Rivers and Harbors Section from the administration of Herbert C. Hoover to that of FDR?

A: Not any material ones. It just meant that, I think, those of us who were there worked harder. For instance, we'd be working into the night in the Civil Works Division. Of course, the Military Division, they were leaving promptly at 4 o'clock, or whatever time they terminated. We also frequently worked on weekends. It was a case of personnel working a bit more rather than by expansion of personnel.

Q: When Roosevelt launched his large public works program, how important was it that you had available some of the early 308 reports to allow you to begin to plot out a project?

A: The whole program of House Document 308 reports was excellent. Here you prepared the groundwork, doing the basic engineering in advance in a calm, relatively calm, period, not under great pressure. Later on there was great pressure to complete them, but the whole basic program of preparing in a timely fashion potentials for development of the various river basins was a wonderful concept. Later on the availability of these reports made it possible for the Congress and the Senate and soon to reach in and pick their favorite projects and get authorization and funding for them, and to permit their execution promptly rather than getting the funding and then maybe waiting a year or more in engineering investigation and planning before you are able to do the work for which the money is provided.

Q: In the 308 reports, did you find generally that the Corps officers involved in preparing them were thinking of civil works in a much wider framework than they had in the past?

A: Oh, definitely, because prior to the 308 reports, why, the whole concept—as I sensed it—of the Chief [of] Engineers' Office was for navigation improvement and Mississippi River flood control and the Sacramento River flood control, such as it was. The whole concept had been basically one of improvement for navigation or reviewing projects of the Federal Power Commission affecting navigation. If they were getting ready to grant a permit for hydroelectric power development to some private utility, the proposed project was referred to the Chief's Office and we reviewed them mainly from its impact on navigation as to what requirements should be met. But with the 308 document the districts were required to analyze the potential development of a whole river basin, not just the navigation phase but what were the possibilities for hydroelectric power development or for irrigation—even though that was primarily the field of the Bureau of Reclamation of the Interior Department, but it was still a function that we reviewed. We had to consider power development, irrigation, flood control, and navigation.

Q: Do you think that the Corps may have lost some major projects, like Grand Coulee, because of the reluctance of some of the leadership to forge ahead with new areas of water resource work?

A: Well, I don't know; it's hard to say whether it's that or to what extent it's the pressure of some local interest groups. Of course, as to Grand Coulee, I think we had started its concept in a 308 survey. We took a big step forward as compared to the Interior Department and their Bureau of Reclamation. They were concerned primarily with irrigation—they sort of were stuck with that. When they saw the Corps of Engineers get in and start our 308 surveys, there was an intense spirit of concern and competition engendered by that, and I think they went out and tried to grab as much of it as they could. I think that was one factor that probably influenced the Grand Coulee.

As far as the Tennessee Valley development was concerned, I think you had a group of outsiders who figured they wanted to get in on the kill, and through local organization and political support they set up the Tennessee

Valley Authority, which took the development away from the Corps right in the middle. Here we had developed the plans and the whole concept, and part of the structures initiated-and then they setup this independent agency. Of course, the TVA then got great acclaim for what they had done in transforming the Tennessee River basin, yet basically it had been initiated by the Corps of Engineers.

Q: Basically, then, TVA was the 308 report for the Tennessee Valley?

A: Yes. I mean, they sort of took it over with a separate agency doing the development.

Q: In reviewing the 308 reports, were you particularly impressed by any of the personnel who prepared these in various districts and who went on to have subsequent important careers in the Corps?

A: Yes. Who was it on the Tennessee report? I was impressed with him and the reports they were making. I was impressed, too, with A. B. Jones in connection with his review of these reports for the Rivers and Harbors Board. But I don't recall anybody in particular as of that time who contributed something special or outstanding. I thought that the 308 surveys that came in from the Tennessee Valley were among the best. I am trying to think who the district engineer was, and who some of the civilians were who were working on that. I thought they were generally among the best.

Q: What was your opinion of Harold L. Ickes, Secretary of the Interior?

A: Well, I didn't have too much of an opinion. I didn't admire or think too much of him. I know that Ickes was thinking of Ickes continually on the various activities in which he was engaged. He was a power seeker and was quite active in advancing every cause or movement in which he was interested. I didn't think he had any particularly outstanding technical ability that contributed to any of the developments in which he was interested or pushing.

Q: What important civilians in the Chief's Office did you get to know while you were there?

A: Well, old Mr. Gerig, who had been there for years and years. He had been the recognized expert in the dredging field. Mr. Giroux was the efficient head of the Marine Design Division in the Chief's Office. We were preparing plans for different types of dredges, such as pipeline and sea-going hopper dredges, and other critical floating plants.

Q: What about Judge Koonce?

A: Judge Koonce was outstanding. He was in charge of our Legal Division, and I think he was the outstanding authority in America at that time in the field of law as it affected navigation and navigation improvement. There were many problems that would come up, particularly on permits for structures affecting navigation—for instance, when people had to build a highway or railway bridge or they were going to build a hydroelectric power project. Questions would come up as to whether or not it was necessary for a power project to go through the Federal Power Commission to get its permit, and the only basis we had was whether or not it affected navigation and to what extent. There were questions of fact and law in the resolution of these problems. But in connection with any legal problem that came up with contracts or permits or authorizations for projects, why Judge Koonce was the final authority as far as we were concerned.

Q: Did you have any work at all at that time in the area of pollution control?

A: Not particularly. Certainly nothing like what it is now. For instance, it was considered perfectly proper for us in hopper dredging to scoop up material from the channel bottom, take it out to sea, and dump it, but not necessarily taking it out a hundred miles or so, but just dumping it when you got it out of the way. We did not then have any project for soil conservation, you know, including beach protection and erosion.

If, for example, we were going to build a large dam and reservoir, possibly involving flooding of private lands, relocation of roads or railroads, we would always arrange a public hearing and proponents and those who opposed any such developments had an opportunity to be heard, and their

views were considered in connection with the action that was to be taken. But insofar as considering pollution, or correcting pollution, it was not a determining factor. We did, however, consider it in connection with the Monongahela River improvement. There was a lot of pollution in that stream, because the various steel industries were pouring out waste into the waters, and the Monongahela River was really a mess, and our proposed flood control reservoirs were planned to effect some improvement in control of pollution as well.

We had no authority then to take any action to correct the outpouring of any such materials, but we did take into consideration the fact that reservoirs on that waterway would, by providing increased flow during low water periods, assist to a degree in reducing the pollution problem. But insofar as projects for correction of pollution per se were concerned, it was not a factor nor a responsibility nor an authority that the Corps had.

Q: How did the River and Harbors Section function with the Mississippi River Commission?

A: The Mississippi River Commission was under the Chief of Engineers. Matters pertaining to Mississippi flood control in connection with the authorizations and so on would have to come from the Mississippi River Commission to the Chief of Engineers' Office. Principally they would be referred to Colonel Ernest "Pot" Graves and his section, and then to our section, too, for action by the Chief. But the Mississippi River Commission, although it was largely independent in many phases of details, was still under the authority, direction, and supervision of the Chief's Office.

Q: Did you have any direct connection with the congressional committees that handled public works?

A: Usually in the hearings before the congressional committees either the Chief of Engineers and sometimes the Assistant Chief of Engineers, but mainly the Chief of Engineers would appear. Sometimes he would take assistants with him, usually taking the chief of the Rivers and Harbors Section, let's say, Colonel Daley or Colonel Kingman, and occasionally I was taken up on some matter of special concern. Colonel Graves would be pulled up if it were a matter affecting flood control. Colonel Graves had one special

qualification that gave him an advantage in some of the hearings. Colonel Graves was hard of hearing. In fact, he had been retired for a hearing disability. But if there was a hearing in front of a committee, and some question came up which was maybe a little embarrassing or something that he didn't particularly like, Colonel Graves would raise his hand to his ear and have the man repeat it maybe once or twice, which helped to disarm that particular person in connection with his query. But, he would also be sitting there, and up at the far end of the table some senator or congressman would say something maybe a little adverse about something and Colonel Graves, down at the far end of the table and deaf as he was, could immediately rise and give a response to it. That possibly disarmed him in the eyes of some people as to the extent of hearing disability that he had. He was a grand old guy.

Q: Can you tell me a little about Colonel Graves?

A: Well, he was big and husky. He had been an outstanding lineman and later the line coach up at West Point on the football squad. As I said, he had been retired for physical disability and had been called to active duty and assigned to head up the Flood Control Section in the Chief's Office. I don't know what particular experience he had had prior to that that gave him that qualification. I think he had served on the Mississippi River Commission before that. He was not a master of the King's English. For instance, if something came in and he prepared an endorsement on it, it would be terse, blunt, and brisk. On occasion I would take it back to him and would suggest some different wording to tone it down. He would say, "No, but leave it as it is. "

Well, sometimes we would leave it as it was, send it up to General Pillsbury, and Pillsbury would cross the thing out and then we would have to reword it in a little more tempered tone, maybe giving the same ultimate answer, but not as abruptly and directly as old 'Pot' Graves would give. He was one who came out with a direct answer, a blunt answer, and you might say that his action and correspondence typified what his actions would be as a line football coach on the football team.

Q: Apparently he was quite involved in things like *The Military Engineer* and the Society of American Military Engineers (SAME). He was one of the founding members of the society.

A: Yes, but I don't know that he took any special activity on that. I know that he did make a very good homemade wine. It was during Prohibition. Occasionally he would invite you down to his place for some of his wine, and it was potent, though not a vintage variety.

Q: What other Army officers did you meet or become friendly with during your time in Washington?

A: Well, we met officers of other branches. I don't recall anybody who later developed into any outstanding role in one of the other branches. General MacArthur was Chief of Staff, and I know one time I was assigned to a military board where we were to review the rifle and ammunition that the Army was using, and we came up with the recommendation that we adopt a smaller-type cartridge and a lighter-type weapon, figuring that it would be lighter to carry in combat and so on, and the ammunition would be easier to procure and develop in quantity and whatnot. Actually, later on during World War II we did develop such a weapon. But when we sent our report in, even though the board unanimously agreed on it, it went up to General MacArthur and he disapproved it completely. He wanted us to continue with the Springfield rifle and the .30 caliber ammunition that we were using at that time.

Q: General Leslie Groves wrote some comments shortly before his death dealing with a number of different subjects. One of his comments concerned you, Lucius Clay, and himself. He said that when the three of you were serving in the Chief's Office in the early 1930s, you three decided that if things didn't go terribly wrong for any of you that you would be on top in the Corps of Engineers before the end of your careers. Is this so?

A: Certainly as far as that time was concerned, I did not consider that Lucius Clay was going to be on the top because up to then he had just been in military duties. Subsequently he succeeded me up in the Pittsburgh District as assistant to the district engineer up there, and at that time doing routine

work, including continuation of the lock and dam construction program. There was no flood control activity thereat the time.

Later on, I think, after Lucius had served in the Chief's Office and also had been out with me in the Pacific, I felt that Lucius was headed toward the top. I did not think that I was qualified or had the potential, certainly at that time to which Groves refers, to attain the top, and I definitely did not think that "Goo-goon Groves was going to be one of those three. I think that later on, as he got in with Somervell on construction and then particularly later in the Manhattan Project, I would have such views as to him, but prior to that I did not. I think I should have thought more of Groves' potential as of that time if that is what he thought of us. I can conceive of his making these comments later, by reason of our later activities, but certainly, in my views, not as of that time.

Q: So then it's a case of Groves making a slight exaggeration?

A: Well, as I said, these comments that he made probably were post, after the fact. He certainly never made such comments to me around that time that he thought that we three were probably the ones that were going to get to the top, because I don't think he thought so then, and I certainly didn't think so then.

Q: But you sort of still knew each other by your nicknames?

A: Yes. I mean, I was a "Pat" when I went up to West Point. I was not a "Pat" before then, but "Pat" seemed to be an appropriate name to go with Casey. Then my brother, when he went up to West Point, he was Martin Charles Casey, but "Pat" seemed to be an appropriate name for him, so they called him "Pat" Casey, so there were two "Pat" Caseys in the Army, both brothers, and it was pretty hard to tell which was which. Lucius didn't pick up any particular nickname, but a lot of others did. Pat Tansey was a "Pat," Pat Timothy was a "Pat." Cecil Moore was a "Dinty"-some of these nicknames are given to people and then stick with them.

Q: In 1933 you wrote an article—again, for *The Military Engineer—on* waterways and flood control that outlined what we talked about, your

concept of how to remove the ills of depression by public works. (See Appendix D.) Do you remember what prompted that article?

A: Well, I think it was based on my experience there in the Chief's Office. Here we were on a vastly expanded public works program, and we saw how helpful its impact was. Now, I don't remember what my final conclusion was; I haven't seen that article for years. But generally I believe it said that major projects should be kept in cold storage during peak economic periods so that you could pull them out and do them during periods of depression. With that, I think, I would still agree. But if I was saying that every time you had a depression you reached in and you did all the public works you possibly could do as a corrective factor, why, I don't think that that is the basic thought that I would try to get across.

Scholarship and Advanced Engineering Studies in Germany _____

Q: How did you get the John R. Freeman scholarship, and what exactly was it?

A: Well, [Herbert D.] Vogel was over in Europe at the time on hydraulic laboratory research. Having been four years in the Chief's Office and also knowing about the hydraulic laboratory that we had down on the Mississippi River and sensing its importance, I thought it would be desirable to find out further and to do graduate work in that field and see what we could do in the hydraulic laboratory at Vicksburg in connection with solving many of our problems in river control. Such problems might embrace river regulation, control of excessive silting, and spillway control structures.

Europe had a number of hydraulic laboratories. I still have a large book by Dr. Freeman on hydraulic laboratory practice in Europe which covered a number of the laboratories there and the work they were doing. So I thought it would be desirable if I could research that field. So I applied for a Freeman fellowship. Three engineer societies were awarding them: the Boston Society of Civil Engineers, the American Society of Civil Engineers, and the American Society of Mechanical Engineers.

So I applied to all three. Two weren't giving them that year, but I was selected to receive the Mechanical Engineers' Society award. It was to be