

A: I don't think it was.

Q: That's in Arizona.

A: That may have been rebuilt.

Q: The Salt River Project.

A: This was the McClure Dam in New Mexico where they put on some special gates. I never heard of them before. There was a picture. It was in *Civil Engineering* several months ago. They put what they called fuse gates on it that apparently will fail when the water level gets so high. It works hydraulically, and they can set them differently so they don't all fail at once. Which reminds me. I don't know, are you familiar with Lake Barcroft?

Q: Just a little bit. Not very much.

A: Well, you know, there's a dam there. It failed once. The other lawyer that I admired was Armistead Booth, who was a member of a law firm founded by his father in Alexandria. I did a lot of consulting work for him when the reservoir that supplies Alexandria with water--oh, there've been all kind of housing developments built around it. I can't even think of the name of the stream.

Q: Occoquan?

A: Occoquan, yes. There's a big water supply dam on there. It was owned by a water company to begin with. They were increasing its capacity so they had to go all around the reservoir and buy additional land, and Armistead Booth was their attorney. They had a lot of law suits. I was always his expert witness. He was also involved in lawsuits on Lake Barcroft before it failed. One time there was a big flood and the people down in Alexandria got damaged. Its gates were hinged at the third point so that they would tip when overtopped.

The people downstream sued and claimed that all of the gates tipping at once and sending a flood wave downstream is what damaged them. These gates were wooden structures and as soon as one gate tips, why the water level will drop a little bit and

that releases the pressure on the others. There's no way that anyone can build those gates to tip physically at one time because of the friction on the side, and the way they were hinge. Particularly, because as soon as one tipped, the level dropped down and so it would be a little while before another one would tip.

But in the law suit, I think that was one we lost. There was an engineer on the jury, and we all thought, "Well, that will be good having an engineer on there. " We found out, Armistead Booth always knew everybody. He'd walk down the street in Alexandria and everybody in Alexandria knew him, but anyhow, he knew the bailiff, whoever took care of the jury. He found out that it was the engineer that lost us the case because he insisted if those gates were all hinged at a third point, if that's the way they were designed, they were all going to tip at once. Actually, there's just no way with something man-made like that that that would happen. But we lost that law suit. So you never know.

Q: Not at all. Well, do you want to call it a night?

A: What got me into that?

Q: Lake Barcroft. We're talking about dams.

A: Yes, yes.

Q: Maximum Probable Floods, and spillways. But if you'd like to call it a night. ..

A: Whatever your pleasure is.

### *Old Timers in Civil Works*

Q: Okay. Let me begin by going back and mentioning some names to see if these were the people who you were thinking about as the old timers in Civil Works.

A: Of course, I found them.

Q: Did you find those?

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A: I found those. Carl Giroux was one. McAlpine was, I think maybe McAlpine was chief of engineering, maybe before Slichter. I found an organization chart of the Construction Division in '42 and that had military officers as the heads of all of the branches. There may not have been an Engineering Division.

But after that, McAlpine, Giroux, and Hathaway, were all listed in different categories, but they were generally special assistants, although they called them something else back then. This one here in 1949 had McAlpine, Giroux, and Hathaway, Stuck, and Steele as the Board of Review. They'd all been chiefs of branches or divisions before they got into that special category. So I just couldn't find anyone ahead of Slichter when I went there. My 1942 chart, of which I have a copy for you, indicates there was no separate Civil Works engineering division. There was just a Construction Division with Brigadier General T.M. Robbins as Chief. Lieutenant Colonel J.M. Stratton was Chief of the Engineering Branch, and B.R. Wood and Giroux were the heads of the River and Harbor and Flood Control Sections.

Q: I also found that Carter Page was in planning. Do you remember him at all?

A: Oh, yes. I think he died rather early. George Beard followed him, and he was the one I knew better. Then he, later during his career, resigned and went out to Portland with the big power company out there. Of the people close to the front office, I knew Gene Weber better because he was on the International Joint Commission for many years when I was on all those working committees and boards.

Q: Now he was a special assistant to the Assistant Chief of Civil Works in the '50s, wasn't he?

A: Yes. Then he spent a lot of time with the International Joint Commission until he had to transfer. The geologist that I was trying to think of, his name of was. . .

Q: E. E. Burwell?

A: Ed Burwell, yes. Bousquet was in Project Planning. He went off to the committee up in Congress that held the Corps' budget hearings.

Q: Was it then called the Public Works Committee or Water and Power Committee?

A: I don't really remember. I just went up once to testify about something or other. The interesting story is Joe Tofani. The highest ranks in the office were [GS] 16s for the chiefs of divisions. Joe became the principal presenter of the Corps' budget. One time the committees wrote into the legislation that he had to be made a [GS] 17. That tickled everybody. There wasn't any other way he could get it, I guess.

Q: Yes, he told me that story.

A: Someone else told you?

Q: No, he told me.

A: Oh, he did. Oh, you talked to Joe.

Q: Yes, I talked to him some years ago about some other things.

A: He's down in Florida now. He was up in Harrisburg on that flood control study when I was there.

Q: He started working for the State of Pennsylvania, didn't he?

A: I think he had been with the Bureau of Reclamation for a short time. He got married while in Harrisburg. He married a girl that was a friend of my wife, and so we have had a certain amount of contact with them ever since then. I don't know how many by-pass operations he had. Everybody thought that he was the one who would go first. He lost his wife a few years back.

Q: He's remarried now.

A: Oh, yes. I still get Christmas cards.

Q: I gather he married his high school sweetheart or something like that.

A: We got a note from him about that.

Q: He's quite a character, isn't he?

A: Yes, he is. In the office, what they call Hall of Fame, generally, I guess they don't elect people until after they retire, but I've been retired quite a few years. Joe was on the committee with some officers that made those selections. Apparently my name came out, and Joe put that through without any delay.

Q: I think they call that "having a friend in court."

A: Yes.

Q: Well, he was up here as the President of the Water Resources Congress for a long time.

A: Yes, yes. The chap I was trying to think of that was head of structures and went over to the World Bank was Ralph Blour. The heads of all of those branches were pretty well-known or pretty competent in their fields.

Q: Well, they would have been pretty senior people, wouldn't they?

A: Yes.

Q: I mean they would have had a lot of experience, a lot of years of service.

A: The soils man was Middlebrooks. He was well-known in his field, too. I think it was Thomas Middlebrooks.

Q: What was McAlpine like?

A: He was kind of, he was a little bit like that Robert E. Horton I told you about. I never really had any business to speak of with him, so all I would see him was in the hall and what not. He was just observing from a distance, a rather stem, somber

looking individual? but we all did admire him. He was still playing tennis at quite an old age. That was more outstanding than anything else.

Q: How long ago did. ..

A: I got to know Carl Giroux some, but I never did know McAlpine to speak of.

Q: They weren't around much into the 50s, were they? They pretty much retired before that.

A: Right, they were before that.

Q: In the 1950s, did you have much to do with Colonel Starbird, [Alfred] Dodd Starbird?

A: Some. He had quite a career when he went over to the Atomic Energy Commission I just had the normal contacts, but after he went over to the Atomic Energy Commission, I forget who the head man was. He had a farm down some place in Virginia, and he wanted to build a small dam, so Starbird had me come over and talk to him. The designing of a small dam wasn't my field, so it ended up by someone else helping him out. But I was over to wherever the Atomic Commission people were then at Star-bird's suggestion.

Q: One of the reasons I ask you that is because in the mid-1950s Starbird was the Assistant Chief of Civil Works for Flood Control. That was a relatively unique position then. Was that something created for him or was there so much emphasis being placed on flood control that they created that position?

A: That surprises me a little bit because there were always several officers helping the Assistant Chief for Civil Works. In 1949, the chart shows an executive, a Deputy Chief for Rivers and Harbors, and a Deputy Chief for Flood Control. There were always reorganizing and changing titles. Colonel Starbird was always asking questions, so we had a file folder Labelled "Starbird Questions. "

Q: Now, he was more of an equivalent of an assistant to Itschner. He had his own little box under Itschner when Itschner was Assistant Chief for Civil Works.

A: I don't remember anything about that particularly.

Q: I want to ask you about some hydrologists that you may have dealt with in the '40s and '50s. One of them I want to ask you about is Garbis Keulegan. Remember him?

A: Keulegan, I recall him. I don't know the proper way to pronounce it, but he'd been with the Bureau of Standards for years and years, and then he was down at the Waterways Experiment Station. He was hydraulics not hydrology. I never knew him personally. I may have met him down at WES or someplace, but I did never know him personally. But I knew him by reputation. He's done a lot of writing on a special area. I don't remember just what it was now. He was wellknown.

Q: Let me ask you about somebody I know you know and that's Hunter Rouse.

A: Well, I just knew him. He was at the University of Iowa, which I mentioned before may have gotten into hydrology very early in the game. I knew him by reputation. I think I wrote a chapter in a book that he edited, or was it Vin T. Chow?

Q: Well, apparently it was his book, edited book, *Engineering Hydraulics*, and you did a piece on storm runoff.

A: Yes, I remember writing a chapter. I wasn't sure whether it was that one. Vin T. Chow was editor and got one out some years later, and wanted me to do a chapter but I just didn't feel like I was up to it at that time.

Q: What about Rouse. He's got a very central position in the development of hydrology, doesn't he?

A: Well, he was more in hydraulics.

Q: Not in hydrology?

A: A lot more in hydraulics. I don't really remember him at all as having a lot of hydrology. That doesn't mean that he didn't do hydrology, but I'm just not familiar

with it if he did. Being there at Iowa, of course, hydraulics was their outstanding field, and how they worked hydrology into it, I'm really not familiar with it.

**Q:** Okay. Another hydrology lab that was set up, I gather in the '30s and functioned in the '40s and '50s, was the Soil Conservation Service Lab at Cal Tech. Did you deal with any of the people out there like Hans Albert Einstein?

**A:** Yes, we dealt here in Washington with the Soil Conservation Service, but the one that the Corps dealt with a lot more was Einstein at the. .. I have trouble with those California universities.

**Q:** Cal Tech, wasn't he?

**A:** Where all of the radical students are outside of San Francisco.

**Q:** Oh, that's Berkeley, UCB.

**A:** Berkeley. That's where Einstein was. Was that Cal Tech?

**Q:** No, Cal Tech was down south.

**A:** This was at Berkeley where Einstein was. He was on a consulting group for the Mississippi Basin Model, so I got to know Einstein pretty well. He always had lived in the shadow of his father. I remember one time after a meeting in Vicksburg we flew together to Memphis and when we got off the plane there were some reporters there wanting to talk to him.

One time when that International Union of Geodesy and Geophysics held their meeting in Berkeley, Ralph Wilson from the office and his family drove out there. I drove out there with Mary and our three children. Mary, she always liked to get people together, so she gave a little reception for people there at the meeting and we invited the Einsteins to come. They came, and they brought a box of candy for Gregory and signed it for him. Greg kept that for a long time, but I don't think he has it anymore. But Einstein died early. Let's see. His name was Hans Albert. I guess that was his father's name.

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Q: Albert, yes.

A: I don't know which way it was. One time I was calling him either Hans or Albert and he says, "Why don't you call me the other one? That's what my friends call me." I forget which way it was and why it made any difference, whether it was Hans or Albert or not, but it always struck me as interesting. He, or the University, had the contract for developing the electronic flood operations model for the Missouri River Division. Hans was, of course, quite an expert in the sedimentation field, which was one of the problems of the model. They had to worry about the effects, how the real sedimentation would have affected the model results. They developed some material that was supposed to act the same as the sediments in the river.

Q: For use in the models?

A: Yes.

Q: Now, apparently Einstein was involved in some work on the Old River Control Structure in the early 1950s with WES. Were you involved in any of that work?

A: What was it?

Q: The Old River Control Structure?

A: Oh, I guess, maybe. Mostly, it was just reviewing. I don't remember being involved in any model studies. But I guess it was mainly because our office had some concerns about it when we were reviewing the reports in the Chief's Office. I don't remember ever actually working on it as far as the experiment station was concerned, or with Einstein. I think Jake Douma, probably, in the design of the structure and everything, Jake Douma was probably involved in that more than I would have been. There wasn't a great deal of hydrology other than sedimentation in that. I guess you know during that one flood they almost had a disaster there.

Q: '73?

A: Yes.

Q: It almost went out.

A: Yes.

Q: Well, apparently Einstein had done some sedimentation studies and developed some kind of format.

A: Well, yes, that was one of the major concerns as to how the sediments would divide up in addition to the way the water would. They could control the water, but they couldn't necessarily control the sediments. It was a problem. I don't remember the details of it, but it was a factor that they were concerned about quite a bit when they built the structure.

Q: It apparently was primarily a sediment problem, where it would go down the Atchafalaya or down the Mississippi.

A: Down the river, yes.

Q: How about Arthur Ippen?

A: He was MIT, I guess. I don't remember having any direct relationships with him. It might have been at meetings, at technical meetings, but it was nothing--I had no direct relationship with him.

Q: How about Vito Vanoni?

A: No, I think he was in sedimentation.

Q: Well, these are some figures that we're trying to ..

A: **Yes**, yes.

Q: Lorenze Straub.

A: I knew him and probably had some meetings with him, but other than that I had no relationship. We had, I didn't mention before, but one of the things that the office was involved was inter-agency committees. First, the Federal Inter-Agency River Basin Committee, then it was an Interagency Committee. Later on, it was the Water Resources Council, I believe.

### *Water Resources Council*

They had subcommittees on sedimentation, and hydrology, and power among others. Al Cochran handled the subcommittee on sedimentation, and I had the subcommittee on hydrology. There were representatives on the subcommittees similar to the main committee. The chairmanship rotated each year between the different agencies. So there were times when I was chairman of that subcommittee just like everybody else was. The subcommittee on sedimentation set up a field operation-- I forget its name--in Minneapolis... was Straub there?

Q: There was a St. Anthony's Hydraulic Lab in Minneapolis.

A: The agency set up a project to develop equipment for measuring sedimentation in the rivers, and I think Straub was involved. He was there at the university that had that laboratory. But I don't recall that he was active in this project that I mentioned. His name was, I think, involved in that operation. I don't remember who ran project.

Q: Now, what kind of things did your subcommittee deal with?

A: Well, I suppose basically the idea was to coordinate activities so that nobody got too far ahead of the rest of the pack or they could eliminate problems before they developed. You might ask what was the main committee, too. But that was their function also. The members of the main committee were the secretaries, but the people that actually operated were their representatives. But the members were really the agency secretaries, or the department secretaries. So it was a fairly high-level committee.

Well, you've got a good question there. We published a set of river basin maps for the country showing the hydrologic stations. We also controlled the assignment of radio frequencies set aside for transmission of hydrologic data. I remember one time the frequency of floods was a problem. The frequency is a major factor in the economic studies and the different agencies were using different procedures and

getting different answers for the same hydrologic data. Much of the initial pressure for standardizing frequency procedures came from non-federal sources. The problem was first referred to the subcommittee in 1956. We bounced it back, but over the years it came up several more times.

We hired some experts in the field of statistics, not in hydrology, but in the field of statistics. When they realized what a small set of data we had, why they just said there's no way you could come up with a good answer.

We were lucky if we had 50 years of data. Then when you start getting figures for 100-year floods, they can be pretty wild. So we made a lot of people unhappy, I guess, but we insisted that you couldn't say that one procedure was better than another because the data itself were inadequate. The various methods would give essentially the same results for frequency of floods of the same duration as the period of record. The difficulties arose when the data were extrapolated to longer durations for various purposes. In the meantime, a subcommittee work group prepared a study of the various flow frequency methods. In 1966, the subcommittee received a rather specific assignment from the Council on the matter. Before I retired from the Corps that year as chairman, I established the panel or working group that was to achieve standardization.

Q: Was that what eventually led to the Water Resources Council issuing that what, "Principles and Standards" or something?

A: It could well be. I'm not sure just what the mechanics were for getting out the flood frequency mandate. When something was agreed to by everybody, it was usually up to each agency to pass the word on to their own field offices. But there might well have been another action. The council could well have adopted the subcommittee report and put their cover on it as a document.

Q: I think this was after the introduction of the NEPA, the National Environmental Policy Act, wasn't it? Reuben Johnson was there. He'd been in the Corps of Engineers.

A: Now, that's a familiar name. I'm trying to remember.

Q: He'd been out in the San Francisco District, and then the San Francisco Bay Model. He was out in planning out there.

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- A: Of course, another problem was beginning to surface. I had retired by the time they started hassling with flood insurance, when Congress passed that law. I'm sure the interagency groups hassled with that for some time.
- Q: I think one of the problems they were having was trying to set up uniform guidelines because of the differences in cost-benefit analysis for water projects with the Corps doing it one way, and then BUREC doing it another way, and Interior a different way.
- A: Yes. That certainly was a factor on the flood frequency business. Of course, on the question of spillway designs, I think we had some studies on it. There were always people attacking, taking a dir-n view of the Corps' procedure because it gave pretty severe results. I don't remember when that got to the interagency group. It did later on. I think they did finally publish, I think either the subcommittee or the main agency published some reports on those spillway design problems. But Bob Buehler, an engineer that I worked with in Knoxville, became quite active in the group and insisted that you could do it on an economic basis by assigning a value for life and that sort of thing--deciding from economics how large the spillway should be.
- Q: Were you involved in any other kind of interagency groups?
- A: Well, I probably was, but I don't remember. This Water Resources Council and its predecessors were the main interagency activity for a large number of years.
- Q: Okay. Let me go on to another question. In the late 1940s and the early 1950s, the Corps of Engineers and the Department of Agriculture were involved in an upstream-downstream controversy. This was largely fought out in the Federal Interagency River Basin Commission. Did you have any involvement in this?
- A: I don't believe so, no.
- Q: Did you have any views on it?
- A: I think it was more political than anything else.

Q: Did you have any knowledge of what was going on and any views of what the controversy was about?

A: Well, of course, I don't know whether it's a matter of history or not. I remember it as a big argument, but, there was some sort of an agreement. I believe it was actually legislative rather than a mutual agreement. The Corps and the SCS kind of split the game up. In other words, they handled projects of a certain size, with certain objectives, and the Corps took the bigger ones. I'm not sure just what the language was. Had you run into that before?

Q: I know there was some kind of size discrimination made between the Corps and the Soil Conservation Service on those flood conservation service projects.

A: I think it was mainly legislative. There was some legislature covering it, dividing the territory up.

Q: Well, apparently as a result of this controversy Howard Cook and Richard Hertzler left the Department of Agriculture and joined the Corps of Engineers.

A: Who was the second one?

Q: Richard Hertzler.

A: Oh, yes, both of those were friends of mine. Howard Cook, I think, was married to Robert E. Horton's daughter. He had worked at the laboratory up in New York where Robert E. Horton was. I think Howard worked for him before he got into the Federal activities. I'd known him before he came to the Corps. Then after he came to the Corps, I got to know him better. Richard Hertzler, I forget. I think maybe I met him in Pennsylvania. I've forgotten just what my relationship with Richard Hertzler was, but I remember when he was on the Washington scene. Where did he work?

Q: I guess he must have worked in OCE.

A: I think maybe it was in the office of the Assistant Chief of Army for Civil Works.

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Q: Well, I'll have to check that.

A: He must have moved on. I think he went back up to Pennsylvania on some activity. Another chap I knew well that worked for the Corps for a long time and then went to the Bonneville Power Administration was Morgan Dubrow. He had quite a career moving around from one job to another. Another well-known in the field, not only in hydrology but government activities, was Schad. I'm trying to think of his. . .

Q: Ted Schad?

A: Yes. I got to know him. He's a member of the Cosmos Club. He was at the Library of Congress when I first met him. He was active on the Washington scene. That's how I remember. Ray Linsley, I suppose you've run into his name.

Q: No, I haven't.

A: He was down in Knoxville when I was there, and he was in the group that did the river forecasting.

Q: He was the one you couldn't remember his name last time?

A: No.

Q: Well, that's a new name for me.

A: Oh, the one that became chairman of the TVA was John "Red" Wagner. That wasn't Ray Linsley. But after I joined the Weather Bureau, I think Linsley came to the Weather Bureau via the SCS, but anyhow, Merrill Bernard hired him for the Weather Bureau and sent him out to Sacramento to set up a river forecasting district out there. Linsley became a, heck, he was one of the outstanding hydrologists of the country. He was on several presidential commissions. After he left the government, he became a professor at the university just south of San Francisco.

Q: Stanford?

A: I think it must have been Stanford. He was first the head of civil engineering, and then I think he became the head of engineering, but he started doing a lot of consulting work. He developed some models, river forecasting models, and what not. He started a company, a consulting engineering company.

One thing I mentioned, the Corps was building a project that was going to affect the campus. The president of the university was quite concerned about it, and he wrote the Chief a letter about his complaints and said he had the outstanding expert of the world, Professor Linsley, who was going to straighten this out. It didn't phase the Corps very much. I forget what the problem was, but it was a hydrologic problem of some sort that one of our projects was going to affect the university's property. Ray died a few years back.

Another chap at the Weather Bureau was Max Kohler. He was the first president of the Commission of Hydro-meteorology of the WMO. He was the Weather Bureau representative, and I forget who the Geological Survey representative was. The three of us were on it. So Max Kohler is one of my very good friends. Max was a field rider taking care of rain gauges or something out in the Los Angeles area. Bernard met him and brought him into Washington. He became an outstanding figure in the field.

Q: Were most of these people who came into hydrology meteorologists?

A: I don't believe so.

Q: Were they mostly civil engineers?

A: Probably. I forget what Max's basic training was, but I think it was engineering. Meteorology is a big part of hydrology. You might argue whether meteorology includes hydrology, but I think the other way around, hydrology would include meteorology. But I belong to the American Meteorological Society and a lot of the hydrologists do. I'm sure Max Kohler, particularly people working for the Weather Bureau, would be inclined to. Then, as time went on, the American Meteorological Society started having an interest in hydrology. It's quite proper that they do. So getting back to your questions, now one of the men in the office, Dwight Nunn, left the office and went over with the Nuclear Power, what do they call the commission?

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Q: Nuclear Regulatory Commission?

A: Yes, and he developed probable maximum floods for them, because when they build a plant, generally along a river or a lake, and they're just as concerned about the probable maximum flood as anybody else. Now, I think he was a civil engineer to begin with, but during the war he went into meteorology. He was trained as a meteorologist, so he worked through the war as a meteorological officer. So to answer your question, I would say there are probably more hydrologists other than the ones that came through the engineering route, there's probably more of them came from other sciences than did from meteorology, although certainly there's probably a fair number of hydrologists that had meteorological training.

Q: I gather there is somewhat of a discussion about whether hydrology is a true engineering science or is a skill.

A: Yes. Now, it's pretty well a dead issue. There's still, every so often somebody wants to set up a project to demonstrate, I guess, that it's a science, but I think it's pretty well accepted as such. At any rate, it's pretty well accepted now by all of the organizations as a field of its own.

Now the people that write papers for the American Geophysical Union Section of Hydrology used to discuss that problem. There were always people wanting to set up projects to help make it more of a science, but I don't know what you have to do to make it a science. That's a problem that never bothered me. I didn't care what they called it, whether it was a science or not.

It does draw on many different fields. In other words, the groundwater, it involves the soils people, it involves the rainfall, it involves the meteorologist. It involves the sediment, which brings in the sediment people. It does involve so many fields, I guess that's why it's difficult to call it a science by itself.

Q: Much more of an argument in the '40s and '50s than about exactly what it was?

A: Yes, I was not concerned about it, and I certainly didn't get involved in it. There was always a discussion of it, but I don't know of any reason why there should have any strong feelings about it one way or another. I don't see that it makes a whole lot of difference except possibly in getting research money. There were discussions of it, but I don't remember any severe difficulties involved in it one way or another.

Q: Okay. What were the main issues facing you as a Corps hydrologist in the 1950s?

A: You mean technical?

Q: Technical, organizational--technical, first.

A: Well, we had procedures for routing floods in the rivers and for synthesizing the hydrographs and what not, but the main thing that I was interested in, that you might say concerned about, was developing relations, given the amount of rainfall, trying to determine how much runoff there would be. That was the thing that intrigued me more than anything else, and I did a lot of research. I've got files downstairs, if I didn't give them away, I've got files on projects that I started investigating, some river basin here or there which I never had time to finish. Collecting the rainfall data and the stream flow data, and trying to relate the two. So that was my main interest I would say outside of the routine.

Q: Beside the regular work you were doing. Now, you were still in the Reservoir Regulations Section at that time?

A: Yes.

Q: So you did this as an additional. . .

A: Well, to regulate the reservoirs you have to know how much runoff you're going to get and you get the rainfall reports, but you have to go from the rainfall to the runoff and develop the flood before you can determine how to regulate it. Because that's why, when I was at Pittsburgh, I developed, I never did quite understand why it worked, I developed a relationship going directly from the rainfall to the river stage without figuring out how much runoff there was going to be. It was a real empirical thing, but on the few rivers I used it on, it worked pretty good. It was just a coincidence, I guess.

Q: Now, how would you work that out? How would you develop that figure you would use, or ratio, or whatever to figure that out?

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- A: It was a graphical relationship. It would just be a matter of, for a given area, determining how many inches of rainfall and plotting that against how much change in a river stage occurred at a particular gauge that rainfall fell above. It's just a case of accumulating the data and just plotting it out to see if there was a relationship. It was just like those flood relation charts for the Rhine River. It was just a matter of plotting the data and drawing lines through them, a graphical analysis I guess you would call it. There wasn't any great--well, it took a certain amount of skill to know when you could disregard something and when you'd have to worry about it. No matter--there's always some points that don't plot good, particularly on the flood frequency business.
- Q: Something that goes off somewhere. ..
- A: Yes. They call them "outliers", I guess, in the flood frequency analysis.
- Q: Those they ignore as the abnormal piece of information?
- A: Oh, well, that's one way of handling it. The other way is to handle it, too, I guess. You can't completely ignore it, but ordinarily you'd have to theorize a little bit about it.
- Q: Did they really give you much time to do these kinds of things with your procedures?
- A: When I was in the Chief's Office?
- Q: Yes.
- A: No, not much before I was married. Most of that was done when I was with the TVA and with the Weather Bureau. I guess I mentioned before that I met my wife in Harrisburg. We were married in Pennsylvania. I still did some at home when I was with the Corps. I think I must have written some while I was with the Corps. I suppose I snuck a little bit in at the office, but not like that chap I was telling you about the other day that was studying the transport of fluids and we couldn't get him to do anything in the office.

But I suppose some of it was strictly in the reservoir regulation business. Some of that was strictly business, trying to develop procedures for handling the reservoirs. When we developed something that we wanted to send into the field, I forget what we called it, but I remember sending one, it wasn't a directive, it was just a procedure that was recommended for use. It was a procedure for determining how much of your reservoir surcharge storage it was safe to use on any given flood with the threat of possibly a bigger one coming along later on. I don't even know whether I have a copy of it anymore. But, of course, we also sent out directives. It was things like that I had to do research on before we could send them to the field.

Q: Well, they had things called *Engineer Circulars* and *Engineer Letters*.

A: Yes. *Engineer Letters*.

### ***Hydraulics and Hydrology***

Q: What about the changes in the organization of hydraulics and hydrology? Hydrology remained a portion or a part of hydraulics in the Corps of Engineers in Civil Works in the '50s.

A: Yes. I'm trying to think of who, whether Hathaway had a hand when they split it. It didn't come back together until after I was gone.

Q: I thought it was together. I thought hydrology and hydraulics were together.

A: Until when?

Q: In the '50s, weren't they? I know they were in the '60s, the late '60s and the '70s, they were together.

A: Well, yes. The branch was called "Hydrology and Hydraulics." See, I retired in '67. It was after I retired that they came back together again. What makes the organizational situation confusing is that there are two kinds of hydraulics. The hydraulics involved with structural design, which was Douma's field. The other hydraulics is that involved with river flow. The latter was always combined with hydrology. The structural hydraulics is what was shifted back and forth.

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Q: Came back together?

A: Yes. When they separated, I think it was during my early days there. I'll really confuse you. Bill Cave's name. He was the head of the Electrical Mechanical Branch. I don't know that he was well-known nationally, but he ran the branch. Well, now this says Hydrology and Hydraulics Branch with Al Cochran as chief. The darn thing doesn't have a date on it, but Potter was the acting head of Civil Works.

Q: Bill Potter was the Assistant Chief of Engineers for Civil Works from April '49 to February '51.

A: Yes, Potter, and Arnold. I'm trying to--I forget when Douma came in to the Chief's Office.

Q: Late '40's, I think.

A: Late '40s.

Q: Because he had been in the Los Angeles District.

A: Yes, yes.

Q: I think Cochran brought him in.

A: Oh, Cochran is still the chief here on this chart. I'm trying to figure out where some other people were at that time. There were some hydraulic people, John Harrold for one, that were interested in the model studies and that sort of stuff that was going on down at Vicksburg. I don't think they were in our branch. I don't remember whether Douma was in our branch to begin with before he went to structures.

Q: I'd have to go back and look at his interview, but I thought he was.

A: I'm a little hazy about that.

Q: Because he worked for Cochran for a short time.

A: He did?

Q: Eventually, he was doing structural.

A: That's where they were. The Structures Branch had a group that were interested in the hydraulics of the structural design on the dams. In other words, Douma was probably in structures most of the time.

Q: I'd have to check, but I think he was.

A: Yes. That's where they were. I said I was sure there were some hydraulic people that weren't in our branch. Our hydraulics was mostly river hydraulics, where the hydraulics in designing the gates, the passages, and stuff through the dam, was in the Structures Branch.

John Harrold, who was probably over Jake to begin with, had a brother, Lloyd, that was on that project that I was on in the Geological Survey. There were two brothers and both in hydraulics and hydrology. When I went to the Corps, I'm not sure where John Harrold was at the time.

Q: Okay. So there were really, there were hydraulic engineers in other places besides your branch.

A: I think that's the way they kept people happy.

Q: But there weren't any hydrologists anywhere else.

A: No.

Q: You had all of them in hydrology.

## Water Resources: Hydraulics and Hydrology

- A: Civil Works hydrology was all there at that time. Whether originally all hydraulics was in that branch or not, and as things developed, some of the people to get ahead maybe were in the structures or whether the structures had it all of the time, I'm just not clear. However, OCE was instrumental in the establishment of a Military Hydrology Unit. They put out a lot of studies on the application of hydrology to military operations. I don't remember whom they reported to. Based on what happened in Bosnia, the Army must have forgotten about hydrology.
- Q: Was that part of the development of hydrology itself, that it was assumed to be a subordinate part of hydraulics and hydraulic engineering, and then as it matured, it broke out?
- A: I suppose so from an organizational viewpoint, from the people up front that had to approve the organizations. To begin with, it was hydraulics. There wasn't any such thing as hydrology. But it eventually found its own notch. The branch that had the river hydraulics had hydrology. I think though maybe sometime to give Douma or somebody their rating, they set up a hydraulics branch.
- Q: Yes, because I believe there were two.
- A: Huh?
- Q: It was called hydraulics and hydrology. I think there was a hydraulics branch and a hydrology branch, but that may have been after you left.
- A: Yes.
- Q: Because I think Jake Douma had the one branch, and Vern Hagen had the other.
- A: Yes, yes.
- Q: And there was a question about who would be the division chief.
- A: But I think a Hydraulics Branch Design Unit in Structures was there when Cochran was there.

Q: I think you're right.

A: When I was still there. In other words, Douma was always separate. Whether he was ever under Co&an--he said he worked for Cochran?

Q: I think so.

A: I just don't remember the details of that. But for years he had his own separate unit and for awhile, the man in charge was John Harrold. He would have been Douma's boss in the structures. I believe he was senior to Douma for awhile. I don't know whether he retired or what.

Q: The last time we talked about paralleling the changes in OCE, and you said a lot of the districts, a lot of the divisions especially, had hydrologists, like MRD. Did that become a permanent part of the field structure to have a hydrology office?

A: Well, I think it was the same thing. It was in hydraulics. Just like the Chief's Office, they probably had hydraulics branches in the engineering division. As the work developed for hydrologists, I'm just sort of theorizing a little bit, they sprouted up in the hydraulics branches, and if they got strong enough, they got separate. Otherwise they probably were kept, or maybe they gained a joint name like hydraulics and hydrology, or actually had separate branches or sections. I never worked in a field office, so I'm not too sure. But I'm sure, I do feel that a lot of people that I worked with in the field were hydraulics people as well as hydrologists.

Q: Besides MRD, and I think last time we mentioned the North Pacific Division, were there any other divisions that had very strong hydrology programs, with hydrologists in the division offices?

A: Yes, they did. The South Pacific Division did. But getting back to the North Pacific Division, they had, other than the routine work where they needed hydrologists for the functional spillway design and what not, the operation of all of those Columbia River dams which required a hydrologist to set up their forecasting procedures and what not. They had quite an operation going there.

Here, again, Mark Nelson was the head of the operation, but he was an operator. There was a younger chap who did most of the hydrology work there. The division

## Water Resources: Hydraulics and Hydrology

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sort of ran the dam operations rather than the district. Of course, there was a Portland District, too, at the same time. I think I generally visited the division office, though, rather than the district office.

Q: Would that have been because the Columbia River ran across several districts in order to give unified forecasting, you'd have to deal with all three districts?

A: Yes, the Willamette Basin was in the Portland District.

Q: Was it?

A: Yes.

Q: Was Walla all in the. . .

A: I remember that district.

Q: Well, that's still there.

A: Is it? It was involved with the nuclear work?

Q: No, it had the upper part of the Columbia, the Snake, and all of that.

A: Oh, yes. The Snake River goes way over into Canada. That's funny. I don't remember ever visiting the Walla Walla District.

Q: It had everything east of the mountains, I think.

A: Yes. I'm sure I've gotten in touch with them, but it wasn't any major activity that I had with them. There was a period when I went around to all of the division offices, and we held, I don't know what you'd call it, seminars or conferences where all of the district people came in. In connection with reservoir operations, reservoir regulations, we had sort of training sessions for the various offices.

Q: Because **you** had training sessions, was that after **you** had issued your Engineer Manual on reservoir regulation?

A: I would think probably, yes. I got four folders of travel orders downstairs.

Q: You were going somewhere.

A: My daughter always wants me to write a history. If I could find my diaries, I would try to do that for her. If I can't find those diaries-I could go through all of those travel vouchers and figure out a lot of stuff that happened. But getting back to your question, I'm not sure. I think we rewrote the manual once, so I don't remember when it went out the first time. I've got copies downstairs that are probably dated. It might well be that those training sessions were before the manual went out. But I don't really remember.

### ***Regulating Reservoirs***

Q: Did you find that there was any opposition to setting up a standardized set of procedures for regulating reservoirs? You had mentioned before that, like with the Weather Service, there was a lot of local knowledge kind of thing but not a lot written down on reservoir operation.

A: No, I didn't. I don't remember any. If there was any, it was pretty well hidden. There certainly wasn't anything in the open. In the case of the Weather Bureau River Districts, they'd been going on for years and years. Whereas this was all a little new to the people in the Corps' office so they were sort of in at the beginning of it. And, oh, I'm sure some of the offices had some old timers that thought they knew how to do things better than the new people did, but they were probably not involved in our activities because I don't remember any difficulty in that area at all.

Q: So it was pretty much accepted?

A: Yes, yes. The procedures weren't standardized, but they were, you might say, systematized. I mean they were approaches that needed to be considered, but there never was any standard that said, "You have to do it this way. " There never was any of that to begin with.

Q: So it was just a system, how to regulate reservoirs, and factors you should consider in doing it.

A: Yes. A matter of analyzing past floods. One factor is the effect of a reservoir on the concentration of flood waters. I don't know whether I ever sent out a paper other than the manual on that or not. It's involved in operation, but also has a significance in the design. Suppose you're building a reservoir at a place where you've got a river gauge. Well, you can study, get your unit hydrographs at that river gauge, and everything. They wouldn't do you any good for design or operation other than providing the coefficients for use in that synthetic procedure.

You see, when you build a reservoir, it provides a deep body of water. So when the floods come down the tributaries, they travel rapidly through that reservoir. The velocity equals the square root of  $gD$  much faster than in the natural channel. When you get an inflow of water from a tributary at a deep point, it's effect is found almost immediately down at the dam so that changes the whole time of concentration of your flood. So when you study the reservoir then you have to develop unit graphs, unit hydrographs, for the tributaries where they hit the reservoir. Not down at the dam site, but where they hit the reservoir. It makes the computed flow at the dam higher than it would have been before the dam was built. That was just one factor. I don't know how I got into that.

Q: Let me go back and ask you now to explain to me what the square root of  $gD$  is?

A: Well, that's the velocity of waves in deep water. That's the way, when you have an earthquake out in the ocean, they have those, what do you call them--I can never . . .

Q: Tsunamis?

A: Well, that's the velocity. It's just like Force = MA. It's just a physical fact. It's the velocity of waves in deep water. That's the speed with which they propagate across the ocean. There may be a little friction factor in the reservoir. In other words, maybe it's only 95 percent of that, but the inflow still travels very rapidly through the reservoir.

Q: Now that's G as in George or V as in Victor?

A: No,  $g$  is gravity, whatever units you're working in.  $D$  is the depth. So the deeper it is, the faster it goes.

Q: All right. I'm a completely blank slate here. You've got to explain these things to me.

A: Fine.

Q: But it didn't take long for you to get this whole procedure accepted, a systematized procedure for reservoir management?

A: No, the procedures for presenting a report and designing a spillway capacity that was almost standardized. That got accepted pretty early in the game. We didn't have any arguments about it. The field offices had to do it that way. They had to come in and request a study from our unit over in the Weather Bureau to develop a Probable Maximum Precipitation for the area that they were working on. They just started off of that.

I don't know whether I mentioned it before, but one of the projects that Hathaway started with the Weather Bureau was a storm study program, where all of the large storms of record were studied. The field offices would develop the data with standard instructions on how to present it, and then it would go over to the Weather Bureau for a review. After it got straightened out, it was published as a storm study with all of the data for that particular storm. The data was presented in usable form so that the field offices could use it then in design studies and frequency studies. I suppose that's still going on.

Of course, when you go back through the records, in addition to doing it for current storms, they gradually were doing it for all of the old storms. So that became a tremendous task, it was quite a project. It took a lot of money to do all of those studies. But that data was available for the field offices and Weather Bureau when they were studying a reservoir project. The reservoir business has gone by the board now, or has been for some years.

Q: Well, basically in the hydrology you were working for the Operations Division people as far as helping them with regulating reservoirs?

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A: I'm trying to think how the field offices were organized. I suspect that most of the field offices, the Engineering Divisions had a say in this functional operation. Of course, the province of the operations people was to provide maintenance and operating personnel. I imagine that in most of the offices the forecasting and the functional operation was in the Engineering Divisions. I don't really know for sure.

Q: So you think they controlled the reservoirs?

A: The functional operations. The instructions would go to the dam tender. I'm sure he worked for the operations division. It was required that the dam tender be provided with a set of operating instructions for normal use and for cases of lost communications. During emergencies, the Weather Bureau and the Corps worked together on forecasting. I suspect that that was in the engineering, stayed in the Engineering Division.

Q: So you worked with operations people, and you also worked with the design people, people who did the designs. You had to review their materials plus also provide them data, didn't you?

A: They what?

Q: You had to provide them with analysis of the data.

A: The Engineering Division, of course, would develop the requirements for the spillway capacity. The structures people would be in the Engineering Division, too, so that was a family affair as far as the design was concerned. Then the hydraulic design people took care of the gates, how the gates worked, the machinery, and the design of the tunnels. That was another thing that Hathaway, I don't know just how it started, but every once in a while a project would come in where a dam design would not have a low-level outlet. Hathaway just wouldn't let anybody build a dam that couldn't be drained.

Q: Why would that be? I mean not letting them do it, but why would they. ..

A: It cost money to build low-level outlets. It cost money to put them in through a dam, and in some cases they were not required for normal operations.

Q: Like the ones they put in at Boulder Dam, through the rock walls?

A: Yes, those went around in the canyon walls or in the sides rather than through the dam. They were part of the diversion schemes, see. During construction, you had to divert the water. So those tunnels served both purposes.

Q: So they became outlets, too?

A: Yes, they also have some tunnels for spillways.

Q: So Hathaway looked at all of these designs himself when they came in? Or was it Corps problems identified. . .

A: No, he just worried about big things. He didn't worry about the details. I think this was after I got there or shortly after Cochran took over as the head of the branch and Hathaway became a special assistant. But, this sort of thing was what he did as a special assistant. I mean, worry about major items like that, and he was real good at cultivating people so he could get his way through the front office. He, generally, had a good reason for it.

Q: Was he mainly brought in on the very difficult problems, controversial projects?

A: Well, I'm sure he was on even things beyond hydrology. I don't remember anything in particular, but I'm sure he worked on things for the Chief or the Army that weren't strictly hydrologic in nature. Particularly on some interagency stuff, there was some interagency group that he was active on. I remember one time when I accompanied him to a State Department meeting. The group was drafting a U.S. position on some item for delivery to the U.S. Ambassador to the U. N. But he knew all of the people in similar capacities in the agencies.

Q: So he had all of these cross-agency connections. What about the development of the laboratories? We had talked about Hydrologic Engineering Center, but that didn't come until the '60s. Did the various Corps laboratories, especially WES, significantly improve their hydrologic capabilities until the '50s? Or were they already so strong they didn't need to do. . .

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A: I don't think WES ever got too interested in hydrology early on. They were kept pretty busy taking care of the straight hydraulics. I think the model probably came as close to hydrology as they got up to that time. I can't think of any particular hydrology experiment that would have been assigned to them to do like they did on the Mississippi Basin Model. Sedimentation is a part of hydrology, and WES did a lot of work in that field.

Q: Are there any other things about your experience with hydrology in the Chief's Office that you want to touch on? I've got some more questions here for you, but I thought since we were talking about that. ..

A: Well, I should have been thinking about that in advance, I guess. Rather difficult to come up with anything. I was very fortunate in that I got to participate in all of these international and outside activities that gave me opportunities of traveling and meeting people, and things which I would not have had if I had not represented the office on so many different activities. So that was very fortunate. I suppose that was sort of a natural evolution in that I was Mr. Hathaway's backup; and, as a result of that, I gradually got into activities like the Hydrology Commission of the WMO, the International Hydrologic Decade, and the St. Lawrence River activities.

Q: But you were encouraged by the Corps' leadership to be involved in those professional-type activities, besides the point that in some cases there was actually a Corps position involved. You were encouraged to participate in the International Union of Geodesy and Geophysics?

A: Yes. Yes, you saw those papers that I wrote.

## ***Directors of Civil Works and Assistant Chiefs***

Q: I want to ask you some questions about some of these engineer officers who you may have worked with in your time there. We talked some about the Chief of Engineers, but you said you didn't see much of them or you weren't at the level that you saw them. So I'm going to ask you about people who were the Directors of Civil Works.

A: Yes, the Assistant Chief of Engineers.

Q: Yes. James Stratton. He was in Civil Works in 1945-46.

A: There was a big engineering firm that he went to after he retired.

Q: **Yes.**

A: I was thinking that one of the leaders of that firm had a brother that was active in our circle. I started to say it was General Stratton, but it was McCarthy.

Q: No. It was Tibbets, Abbott, McCarthy and Stratton.

A: McCarthy. There was a McCarthy in the Washington circle here. His brother was in the firm. I'm sure I had some contact with General Stratton. Would he have been here the same time as Wheeler?

Q: Yes.

A: Yes. I think at that time, I probably had more contact with General Wheeler than I did with General Stratton. I had some contact with them, but I don't really remember much about it.

Q: Okay. He was replaced in '46 by Peter Feringa. Feringa was Civil Works until 1949.

A: I don't think I had much business with him.

Q: Then he went to the Lower Mississippi Valley Division.

A: How do you spell that?

Q: F-e-r-i-n-g-a. Feringa.

A: Yes, I just don't--that's **funny** now that I don't--I remember General Stratton, but I don't remember Feringa.

Q: Well, Feringa apparently had a reputation as a very good engineer, a technical person.

A: You say he went to MRC?

Q: Yes.

A: Did he go to the Panama Canal then?

Q: I don't think so. I'd have to check and see.

A: Well, it doesn't matter.

Q: I do know that he did not get along with Lew Pick.

A: I just don't have any. ..

Q: We mentioned already Bill Potter.

A: Yes, yes, I remember him. Of course, I think in all of those cases, we would have had, in the branches, we would have had more contact with the executive officer than we would have with the assistant chief.

Q: What I'm really looking for is any observation that you have on their style, or the impact they may have had directly on civil works.

A: I'm afraid you're not going to get much.

Q: Well, I'll persist in this anyway, because if you can think of anything that comes across your mind. ..

A: Yes, yes.

Q: He was replaced in 1951 by Claude Chorpening.

A: That one. ..

Q: He would have been there with General Sturgis, when Sturgis served his first year as Chief of Engineers.

A: Yes. No, that leaves me cold.

Q: Okay. One you do know is Emerson Itschner, who was Director of Civil Works from '54-56, before he became Chief.

A: Yes. For some reason, I guess because of the Columbia River activity and the IJC. Let's see, the IJC set up a Columbia River Unit, I don't know if it was a board or . . .

Q: Authority or River Basin Commission?

A: I think Gene Weber was a member, but Itschner came from that area, didn't he, or he went there?

Q: He went there.

A: He went there, yes.

Q: He retired to Portland.

A: He died just recently?

Q: Yes. He'd been North Pacific Engineer, I think, before he came in.

A: Before he came in, yes. Because of the work on the IJC, for some reason or other, I felt that I knew Itschner more than anyone that we've spoken of so far. We decided that he was the one that I flew up to the Seaway dedication on his plane with Mary.

Q: When he was Chief?

A: Yes.

Q: Because he was Chief from '57 to '61.

A: Oh, that's when he was Chief rather than when he was in Civil Works, yes?

Q: Yes, '61, right. I think he was a deputy before he became Chief. I think he was Itschner's Deputy Chief of Engineers. Then he replaced Sturgis, I mean. He replaced Sturgis.

A: Yes. Was he probably either the Assistant Chief of Civil Works or Chief of Engineers when Colonel Whipple was Executive.

Q: Whipple is the guy apparently that pushed the computerization program, and he's the one that was involved with John von Neumann.

A: What?

Q: He was the one involved with John von Neumann. Remember you talked about Von Neumann? Because Whipple knew, he was associated with people at Princeton.

A: I see. That's where he knew Von Neumann.

Q: And he got Von Neumann apparently to come down and do that seminar you were talking about.

A: Yes, yes.

Q: Because after he retired, he went to Princeton to teach civil engineering.

**A:** Yes, I had some contact with him because he was active in the government passed legislation that gave money to the Geological Survey to parcel out to the states that set up Water Resource Centers. I think Whipple was in charge of New Jersey's Water Resource Center at Princeton.

**Q:** He was the head of their Department of Natural Resources or something?

**A:** Yes. An ASCE foundation sponsored research seminars in various fields. Week-long meetings were held in the summer at universities with quarters available and decent weather, mostly in New England and on the West Coast. There were a number of such meetings on water resource research. We worked in the mornings, at leisure in the afternoons, and worked again in the evening. Colonel Whipple, then General Whipple, was active at these seminars, which Mary and I attended a number of times.

**Q:** Anything else you can remember about Itschner, whether it's Civil Works or as Chief of Engineers that you dealt with him beyond the St. Lawrence Seaway.

**A:** No. I am thinking of an officer. He was assistant, or what do they call the number two man?

**Q:** Deputy.

**A:** Deputy Chief, Robbins, do you remember that?

**Q:** Thomas Robbins, World War II.

**A:** Yes. When they were designing the St. Lawrence Project, he was on a design board. I don't know whether it was an IJC board, or a board set up by the power entities, but Robbins was on one of the boards that reviewed the design of the project. He had two sons, of course, and one or both of them were in the Corps. I knew the boys casually, but I knew General Robbins. I just don't know how I got acquainted. Probably partly due to the St. Lawrence.

After his first wife died, he married a secretary from the office whom we all respected. I'm trying to think. We'd been at some function. I guess it was somebody's funeral, and on the way to the cemetery, his car broke down. I

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happened to be going by, so I don't know whether I knew who it was or not, but I stopped and gave them a lift-to where they wanted to go. I never did get to the cemetery. But they never forgot that. They really thought that was something special, that I stopped and helped them out on the way to the cemetery. So from then on we exchanged Christmas cards and everything. Of course, the last few years, I've kind of lost track--I think the boys, I don't know whether they both died or not.

Q: I know the General has been dead for a long time.

A: Yes.

Q: I don't know if the boys--I'll have to check and see.

A: I think at least one of them has died, and maybe both of them even. Oh, that was the one thing that I meant to mention you know, Gail Hathaway had two boys, twins. He was really proud of those boys. They were both successful, one of them with a large corporation, working for some big company. I forget what the other one did. But Hath used to always brag about both of those boys making more money than he was. The sad thing was they both died years before he passed on. They died in their thirties, I guess. But anyhow, I hadn't mentioned that.

Q: Sort of tragic, isn't it?

A: Yes. That hit him pretty hard. But anyhow, General Robbins, I always liked him.

Q: Okay. After Itschner was John Person from 1956-59.

A: From what?

Q: Jack Person.

A: Oh, yes, yes. I don't have any particular remembrance of him. Of course, I left in December of '66.

Q: Okay. The next one was '59-'62, Bill Cassidy. You knew Cassidy.

A: Yes, he must have been in, you're talking about when he was Chief?

Q: Director of Civil Works first.

A: Oh, Civil Works.

Q: Then he was Deputy Chief and then he was Chief.

A: When was he Chief?

Q: He was Chief from '65-'69.

A: Oh, so I was wondering how I ..

Q: He became Chief like about a year-and-a-half before you retired.

A: Well, for some reason or other, and I don't know why, I got to know him when he was in Civil Works. I remember taking him home from the airport one time when Mary picked me up. I don't know why I felt I knew him better than the others. I always liked him. I don't remember any-4 was trying to think if he was involved in that Florida project that they're now redoing. I was sent down there to help the district when they were designing the streamlining of the river project.

Q: Okeechobee?

A: Yes. We were straightening the channel of the Kissimmee and St. Johns Rivers, speeding it up and everything. Now we're just trying to reverse the conditions. I saw something the other day that was crazy. These environmentalists! The way it is now, there's one place that they want to put back into a flooding condition, but the environmentalists won't let them because there's some bird or something in there now. It came in after they built the project, that they don't want to disturb it.

Q: So what did you think of that project when you went and looked at it?

A: Well, I tell you, frankly, I didn't have any overall thoughts about it. The hydrology, the hydraulics people, had a job to do and we just did it. I don't think I had any feeling, or knowledge, or concern about the authorization, or whether the construction went one way or another. There was a given objective, and we met the objective. I mean the objective may have been wrong, but that was set by Congress. So all the district was doing was building, designing, and building the project to do what was desired, and it did do what they wanted it to do, but it did it too well, I guess.

Q: Well, that's the problem of an organization like the Corps when it responds to political mandates.

A: Yes.

Q: Even though it has to establish a procedure to analyze and decide upon projects, the political powers that be still are, can get stuff done, as you well know. The views of the population and of the engineering community have changed over time on what's good engineering, what's beneficial engineering.

A: The public gets into everything more now. I guess anybody that wants to do anything now, if he's smart, he gets everybody, even though he's going to go ahead and bypass them, he has to give everybody a chance to put in their two-cents worth. Apparently, that does make people happy, I guess.

Q: At the public hearings?

A: Yes.

Q: Of course, you left before the big environmental movement hit the Corps with the NEPA and all of the consequences of that.

A: Oh, yes, yes.

Q: You were out of the target area, so to speak.

A: When I read what's going on now in all of this reorganization and everything, I say to myself, "Thank God, I'm not in this."

Q: Well, it's sort of clear to us that they don't know where they're going, from what I can see. What they're going to end up doing, as an old Deputy Chief of Engineers told me, they'll just reinvent what used to be there at one time before. There's no new ideas coming up even though they think they are. You go back in the Corps' organizational history, and you'll find somebody one time or other thought of that.

A: Oh, yes, yes.

Q: But these guys have to think that their. ..

A: Something new.

Q: Something brand new.

A: Reinventing the wheel, huh?

Q: Yes, that's what they say. You're right about that. After Cassidy was Robert MacDonell.

A: That I. ..

Q: Jackson Graham?

A: Of course, General Graham was--I feel like I knew him. I'm trying to think why. I met a lot of generals while they were on the Mississippi River Commission and the Model Board. I know what he did after he retired. But I felt like I knew him before he retired. I don't know whether we were on some trips together or not. Every so often we'd fly out over a flood zone, but I don't think it was that. But anyhow, I always liked General Graham.

Q: And then when you retired, it was Walter Leber.